School of Pharmacy

Medication safety in Indonesia:

Expanding pharmacists' role through Interprofessional Education (IPE)

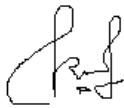**and Interprofessional Practice (IPP)**

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Declaration

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgement has been made. This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

Signature:

Date: 3rd December 2015

ABSTRACT

Background: Although the Indonesian Government supports the role of pharmacists in patient care with relevant government policies, the role of pharmacists to ensure the safe use of medication is limited in Indonesian practice. Communication failure is one of the root causes of medication errors. Lack of communication may result from poor understanding of the role of other healthcare professionals. Meanwhile, studies showed that Interprofessional Education (IPE) may provide an opportunity for healthcare professionals to improve understanding of the role of other healthcare professionals. D'Amour and Oandasan in their framework for Interprofessional Education for Collaborative Patient-Centred Practice (IECPCP) stated that IPE and Interprofessional Practice (IPP) are closely linked and influenced by factors at the Micro (learners, teachers, practitioners and patients), Meso (institutional) and Macro (political, socio-economical, and cultural systems) levels. They further recommended that research to document the links of the Micro, Meso and Macro factors is required for adopting collaborative patient centred practice. This is the first study to investigate the feasibility of implementing IPE to assist in expanding the role of pharmacists in patient care to ensure the safe use of medication in the Indonesian context.

Aims: This study had three aims: (1) to assess the feasibility of expanding the role of pharmacists in patient care in ensuring medication safety; (2) to examine the feasibility of the implementation of IPE in a public university; and (3) to examine the feasibility of the implementation of IPP in an Indonesian teaching hospital.

Research Methods: The present study had five phases. _The First Phase (development, validation, and translation)_ involved the development, translation and validation of questionnaires. All questionnaires were translated into Bahasa Indonesian. Validity and reliability of the questionnaires were obtained through review by an independent lecturer and from piloting the questionnaires to representative sample groups. _The Second Phase (administration of questionnaires)_ involved administration of questionnaires employed at the present study. The Readiness for Interprofessional Learning Scale (RIPLS) questionnaire was

administered to Year 1, 2, 3, and 4 healthcare students (medical, nursing and pharmacy students) in Survey Year 2012 and the Year 1, 2, and 3 Cohorts in Survey Year 2013. The academics at the study university and practitioners in the study hospital responded to the RIPLS questionnaire and the medication errors case vignettes. The medication errors case vignettes were developed to reflect common cases seen in the local practice setting. The participants were selected using a random number generator available online. Pharmacy graduates of the study university responded to the graduates' questionnaire of attributes as care providers to assess their preparedness to deliver patient care. _The Third Phase (clinical pharmacy services)_ was conducted in a geriatric ward in the study hospital to determine whether the pharmacist could detect errors in the medication delivery process, and hence provide evidence for the pharmacist role in medication safety. The primary investigator (a Master of Clinical Pharmacy graduate) provided the clinical services including medication reconciliation, clinical review, and patient discharge counselling for 20 weeks in the study hospital. Data were reported as proportions of medication errors identified in the medication delivery process. _The Fourth Phase (interprofessional learning-IPL workshop)_ involved a two day IPL workshop on medication safety involving final year medical, nursing, and pharmacy students from the study university. To identify whether the IPL workshop influenced healthcare students' attitudes towards IPE, the students' responses to the pre- and post- workshop RIPLS questionnaires were compared. _The Fifth Phase (interviews and focus group discussions-FGDs_) involved pharmacy graduates and healthcare professionals to determine facilitators, barriers, and the level of support for the implementation of IPE and IPP, as well as participants' perceptions as to the role of pharmacists in patient care to ensure medication safety. Transcripts of the interviews and FGDs were thematically analysed.

Results and Discussion:

The First Phase Confirmatory factor analysis (CFA) confirmed the RIPLS questionnaire for healthcare students had two sub-scales (i.e. Shared Learning and Teamwork-SLT and Professional Identity-PI) in the study population. Similarly, CFA of the RIPLS questionnaire for healthcare professionals identified two sub-scales (Shared Learning and Teamwork-SLT; and Patient centredness-PC) in the study population.

The Second Phase A total of 488 students participated out of 550 RIPLS questionnaires administered in Survey Year 2012 and 346 students participated out of the 412 RIPLS questionnaires administered in Survey Year 2013. These gave a response rate of 88.7% and 83.9%, respectively. Overall, medical students had less positive attitudes towards IPE than their counterparts in nursing and pharmacy, and this was associated with a stronger sense of professional identity in both survey years. A strong sense of professional identity was also notable in the Year 2 Cohort medical students (p=0.03). This stronger sense of professional identity compared with other healthcare students was considered as a barrier to the implementation of IPE at the educational setting. The trend analysis indicated that Year 1 healthcare student's attitudes towards shared learning and teamwork (SLT sub-scale) diminished as they progressed through their study. This suggests IPE should be initiated early in the healthcare students' learning in the study university.

A total of 310 healthcare professionals responded to the 550 questionnaires administered which gave a 56.4% response rate. Healthcare professionals regardless of their place of work had positive attitudes towards IPP and had no variation of their attitudes towards any RIPLS sub-scales. However, the Physician Groups had more positive attitudes towards Statement 19 (*The function of nurses and therapists is mainly to provide support for doctors)* compared to the Nurse and Pharmacist Groups (p=0.001). This indicated physicians had a stronger sense of professional identity than nurses and pharmacists which may be a barrier in the clinical practice, as it may diminish team work. Nurses at the study hospital had significantly more positive attitudes towards Statement 19 than nursing academics (p=0.001). This may be influenced by the informal learning at their place of work and may reflect the hierarchical model of healthcare service delivery at the study hospital. Interestingly, the healthcare academics had more positive attitudes than practising healthcare professionals towards Statement 19 (p=0.001). These findings were considered as barriers to the implementation of IPE at the education setting. This indicated the need for faculty development if IPE was to be implemented in the study university. The results from medication errors case vignettes study showed that the pharmacists who participated in the study were more likely to provide the expected answers for medication errors. The case vignettes aimed to examine healthcare professionals' understanding of medication errors and the professionals responsible for the errors.

Only a small proportion of participants responded that communication failure was a contributor to the medication errors provided in the vignettes.

Owing to a poor response rate of 15.4% of registered pharmacists that graduated from the study university, 40 of 45 pharmacy interns were recruited for the study and gave a response rate of 88.9%. A higher proportion of male than female pharmacy interns perceived to have the leadership potential attribute (p=0.004). Both male and female registered pharmacists and pharmacy interns showed no significant difference in the desirability to have the attributes for patient care, however, the pharmacy graduates felt that they had acquired few of the attributes required to provide patient care. The breadth of the pharmacy course content and short clinical placements were suggested as two potential reasons for the low acquisition. These findings indicated that pharmacy graduates from the study university lacked preparedness as care providers.

The Third Phase A 20 week clinical pharmacy service activity was conducted in a geriatric ward at the study hospital. Ninety two of 121 geriatric patients who met the inclusion criteria consented to participate in the study. There were 770 medication orders for the 92 inpatients that participated in the study, i.e. 8.4 ±3.3 medications per patient. The total number of doses charted was 7,662, i.e 83 ± 81 doses per patient. A total of 1,563 medication errors were identified through the clinical pharmacy services provided by the investigator, which represented an error rate of 20.4% (1,563/7,662). Administration errors were the most frequent medication errors identified (59.3%), followed by transcription errors (14.7%), dispensing errors (14.4%), and prescribing errors (6.5%). The pharmacist conducting clinical review activities on the study ward intercepted eight near miss events during the administration stage and 24 near miss events at the dispensing stage. A low acceptance rate of pharmacist interventions during the activity indicated a lack of familiarity with the pharmacy service, a lack of relationship with other healthcare professionals and the level of clinical experience of the investigator.

The Fourth Phase Ten medical, 10 nursing and 15 pharmacy students responded to the RIPLS pre- and post- workshop RIPLS questionnaires. Healthcare students had significantly more positive attitudes towards some statements in the SLT sub-scale

after attending the workshop. The Fisher Exact test value indicated that healthcare students had varied responses to Statement 4 (*Team working skills are essential for all healthcare students to learn*) before and after the workshop (p=0.011). Medical students had less agreement; pharmacy had more agreement, while nursing students had no significant difference of agreement towards this statement after attending the workshop. The results from the open-ended questionnaire suggest that the healthcare students admitted of gaining experience of teamwork and communication skills and obtaining the respect and trust of other healthcare professionals. They also believed in the need to improve their understanding of the role and of the responsibility of other healthcare professionals.

The Fifth Phase Although support for the implementation of IPE at the education and practice settings, and support for expanding the role of pharmacists were obvious from the interviews and FGDs activities, some barriers were also identified. The major barriers identified were pharmacists' internal factors (i.e. lack of knowledge and experience, lack of confidence, lack of pharmacist workforce and pharmacists' mind set) in the expansion of the role of pharmacists in patient care. The pharmacists' external barriers were varying understanding of the role of pharmacist, no fee for service, and poor recruitment procedures. At the study university, barriers to the implementation of IPE were differences in curriculum between the healthcare courses, differences in opinions on when and how to start IPE as well as differences in opinions on the level of support from the university. The major barrier to the implementation of IPP at the study hospital identified by participants was the lack of competencies of IPP which was mainly due to the lack of understanding of the role of healthcare professionals. Other significant barriers to the implementation of IPP identified at the study hospital were the strong sense of superiority, no legislation from the government on teamwork and limited staff.

Conclusion: This study found despite a number of barriers being identified to the implementation of IPE and IPP, the expanding role of pharmacists in patient care through the implementation of IPE and IPP was feasible for the following reasons. Firstly, the support from the Indonesian Government via a joint accreditation is considered as a significant driving force for the implementation of IPE in Indonesian health education. Secondly, participants in the qualitative study supported the role

of pharmacists for the perceived benefits of pharmacists' involvement in patient care. Thirdly, a pharmacist providing clinical pharmacy services was able to identify and intercept medication errors during the medication delivery process. Findings of this study should provide data to support the expansion of the role of pharmacists in medication safety. It also provides evidence to facilitate the implementation of IPE and IPP as both are necessary and feasible with the support from the health system, health education, and pharmacy organisations.

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ABBREVIATIONS

ADEs   : Adverse Drug Effects
ADRs   : Adverse Drug Reactions
AFDOKGI   : Asosiasi Fakultas Kedokteran Gigi Indonesia
AIPGI   : Asosiasi Institusi Pendidikan Gizi Indonesia
PERSAGI   : Persatuan Ahli Gizi Indonesia
AIPKI   : Asosiasi Institusi Pendidikan Kedokteran Indonesia
AIPKI   : Asosiasi Pendidikan Kebidanan Indonesia
AIPNI   : Asosiasi Institusi Pendidikan Ners Indonesia
PPNI   : Persatuan Perawat Nasional Indonesia
AIPTKMI   : Asosiasi Institusi Pendidikan Tinggi Kesehatan Masyarakat
                  Indonesia
ANOVA   : Analysis of Variance
APAC   : Australian Pharmaceutical Advisory Council
APTFI   : Asosiasi Pendidikan Tinggi Farmasi Indonesia
ASHP   : American Society of Health-System Pharmacists
CAIPE   : Centre for Advancement of Interprofessional Education
CFA   : Confirmatory Factor Analysis
CFI   : Comparative Fit Index
CI   : Confident Interval
DRPs   : Drug Related Problems
EFA   : Explanatory Factor Analysis
FGDS   : Focus Group Discussions
FIP   : International Pharmaceutical Federation
FMEA   : Failure Mode Effects Analysis
HPEQ   : Health Professional Education Quality
IAAHEH   : Indonesian Accreditation Agency for Higher Education in Health
IAI   : Ikatan Apoteker Indonesia
IAKMI   : Ikatan Ahli Kesehatan Masyarakat
IBI   : Ikatan Bidan Indonesia
IDI   : Ikatan Dokter Indonesia
IECPCP   : Interprofessional Education for Collaborative Patient-Centred
                  Practice
IPE   : Interprofessional Education
IPE-CP   : Interprofessional Education Collaborative Practice
IPL   : Interprofessional Learning
IPP   : Interprofessional Practice
IPS   : Interprofessional Socialisation
JCI   : Joint Commission International
KMO   : Kaiser-Meyer-Olkin
MMP   : Medication Management Plan
ACCP   : American Colleague of Clinical Pharmacy
MR   : Medication Reconciliation
NCCMERP   : National Coordinating Council for Medication Error Reporting and
                  Prevention
NHS   : National Health System
OEE   : Omission Errors related to Event
OR   : Odd Ratio
PC   : Patient Centredness

PCA	: Principle Component Analysis
PCS	: Practice Change System
PDGI	: Persatuan Dokter Gigi Indonesia
PI	: Professional Identity
RCA	: Root Cause Analysis
RIPLS	: Readiness for Interprofessional Learning Scale
RMSEA	: Root Mean Square Error of Approximation
RR	: Role and Responsibility
SD	: Standard Deviation
SHPA	: Society of Hospital Pharmacists Australia
SLT	: Shared Learning and Teamwork
TLI	: Tucker Lewis Index
TWC	: Teamwork and Collaboration
USAID	: United Stated Agency for International Development
WHO	: World Health Organisation

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PUBLICATIONS RELATED TO THE THESIS

Research papers:

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2. Ernawati, DK., Lee YP, Hughes JD. (2014) Indonesian students' participation in an interprofessional learning workshop. *Journal of Interprofessional Care*. Early Online: 1-3. DOI: 10.3109/13561820.2014.991911.

Conference papers:

1. Ernawati DK, Lee YP, Hughes JD. A comparison of students' attitudes towards IPE; Curtin Health Innovation Research Institute November 2012; Perth (WA),

2. Ernawati DK, Lee YP, Hughes JD. Identification of medication errors amongst healthcare providers and academics in Bali, Indonesia; The Australasian Pharmaceutical Science Association December 2012; Sydney (NSW),

3. Ernawati DK, Lee YP, Hughes JD. Clinical review by pharmacists: an important method to detect and intercept medication errors; The International Social Pharmacy Workshop August 2014; Boston, Massachusetts,

4. Ernawati DK, Lee YP, Hughes JD. Are pharmacy graduates in Indonesia prepared to deliver patient care? The Mark Liveris Health Sciences Research Student Seminar November 2014; Perth (WA).

CHAPTER 1 INTRODUCTION

1.1 BACKGROUND

Medication safety, as part of patient safety, is an issue world-wide. In Australia, a recent review in medication safety identified that 2-3% of hospital admissions were associated with medication,[1] which gave an annual cost of $1.2 billion.[1] In the United States of the estimated 98,000 deaths annually attributed to medical errors, medication errors contributed to approximately 10% to 20% of the fatality.[2, 3] The Indonesian Government has recognised this issue by adopting the Joint Commission International (JCI) accreditation in seven public hospitals in the country.[4] One of the standards of the accreditation is medication management use which aims to ensure the safe use of medication.[5] Medication safety is an important issue for every healthcare service. The involvement of different healthcare professionals in the medication delivery process, who have various skills, knowledge and training, means each has a role in ensuring medication safety.

There are different definitions of medication safety reported in the literature. Yu et al. in a systematic review found that adverse events, near misses, errors and adverse reactions were terms commonly used to study medication safety by organisations.[6] Other studies conceptualised medication safety as drug related problems (DRPs), medication misadventures, adverse drug events, and medication errors.[7-11] Bates et al. who studied adverse drug events and the association with medication errors[10] stated that errors are common and preventable adverse drug events. Based on their findings, the American Society of Health-System Pharmacists (ASHP) recognised medication safety as medication misadventure which involved adverse drug reactions (ADRs) and medication errors.[12] Manasse and Thompson stated that medication misadventure was a costly, preventable and common event which occurred during drug treatment.[11]

The term medication errors had broad classifications in the literature. The error may be classified based on sources, outcomes, and stages during the process of medication delivery.[12-14] Lisby et al. in a systematic review found inconsistency of the

term medication errors used in 45 studies. Medication errors were defined in 26 different wordings from the studies.[15] The authors found that less than 50% of the studies defined medication errors as generic or stage specific terms. Most studies in the literature used medication errors definitions from the National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP). This Council defines medication errors as *"any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer. Such events may be related to professional practice, health care products, procedures, and systems, including prescribing, order communication, product labelling, packaging, and nomenclature, compounding, dispensing, distribution, administration, education, monitoring, and use."* [13]

Aronson stated that although the majority of preventable events may not lead to injuries, some minor errors may result in long-term major outcomes.[16] The ASHP classified medication errors in terms of prescribing, dispensing, administration and patient compliance.[12] The ASHP suggested the medication delivery process of the organisation should be designed to minimise errors. Lisby et al. studied medication errors based on stages of the medication delivery process.[15] Identification of where the errors occurred is important because clear recommendations can be made related to improving the process of medication delivery.[17, 18]

Many factors lead to unsafe care. Reason's Swiss Cheese Model shows no single cause of medication errors.[2] Root cause analysis (RCA) is a method to identify contributing factors which may result in unexpected outcomes including sentinel events.[19] RCA is used retrospectively to identify problems which have occurred [19] and to develop actions for system improvement.[20, 21] Vincent has classified contributing factors to medication errors.[22] One of the root causes of medication errors is poor communication. [23,24] As mentioned previously, various skilled and trained healthcare professionals are involved in the medication delivery process. Communication and information transfer amongst those healthcare professionals is essential. The lack of communication among healthcare professionals may lead to unsafe healthcare service delivery. A safe healthcare service requires a comprehensive approach which involves healthcare professionals, patients, and health systems.[25, 26] This means

healthcare professionals involved in the process of medication delivery need to work interprofessionally to ensure medication safety.

Pharmacists are healthcare professionals who involved in the medication delivery process. Although the Agency for Research and Healthcare Quality (AHRQ) reported that evidence provided in the literature on the role of pharmacists in medication safety has weak methodology design and lack of comparability, the agency supported the role of pharmacists in reducing preventable adverse drug events (i.e. medication errors).[27] A number of professional organisations also support the role of pharmacists in medication safety.[28-31] The International Pharmaceutical Federation (FIP),[28] the ASHP[29] and the Society of Hospital Pharmacists of Australia (SHPA)[31] have stated that pharmacists play an important role in ensuring the safe use of medication by optimising medication therapy and providing interventions in the medication delivery process. In this role, collaboration between pharmacists and other healthcare professionals is essential. The FIP emphasised that the role of pharmacists in medication safety was well-established.[30] They strongly suggested that although pharmacy practices vary widely across different countries, pharmacists are the healthcare professionals who obtain the most extensive medication education.

Clinical review and medication reconciliation are two pharmacists' activities directed at ensuring the safe use of medication. Australia has national guidelines on medication safety which includes clinical review and medication reconciliation.[32] Clinical review is defined as *"the review of patient-specific clinical information including patient parameters to evaluate their response to medication therapies and to detect and manage potential or actual medicines-related problems."*[33] In this activity, the pharmacist reviews the patients' current medication to identify medication related problems and to assess their medication related needs. Pharmacists need to work in collaboration with physicians and nurses in providing clinical review services.[34, 35]

Medication use review as part of clinical review has been reported to improve patient care and professional integration in New Zealand and the United Kingdom.[36, 37] Carpenter highlighted that in a developing country, a shared and structured chart review would be an important approach to improve patient safety.[38] Qualitative

research involving family physicians reported that physicians were believed to gain benefits after working in collaboration with pharmacists in the Integrating Family Medicine and Pharmacy to Advance Primary Care Therapeutics (IMPACT) Project in Canada.[39] In the project, the pharmacists provided patients' medication assessments and drug information to assist them achieve optimum drug therapy. The physicians perceived to gain benefits from obtaining reliable drug information and gaining a sense of teamwork.

The SHPA defines medication reconciliation as *"the standardised process of obtaining a patient's best possible medication history and comparing it to presentation, transfer or discharge medication orders in the context of the patient's medication management plan."* [40] In Australia, the activity is mandatory and includes identifying discrepancies between the patients' medication history and the current medication as well as solving the discrepancies. The activity aims to reduce errors and to obtain the most accurate medication profile in optimising drug therapy. The ASHP [41] states pharmacists have a role in medication reconciliation because pharmacists have the appropriate knowledge, skills and abilities and such services could be implemented based on resources available in the healthcare services.

Evidence shows that pharmacists may contribute to safe medication use in a wide range of settings such as in ambulatory, inpatient and in primary care, and in different patient groups such as psychiatric, elderly and paediatric patients.[2, 34, 42-50] In Indonesia, the government created a policy on the role of pharmacists in patient care with the Indonesian Government Policy Number 51 in 2009. The policy highlights that pharmacists have the capacity to provide direct patient care to optimise patients' health outcomes – a role which had never previously been acknowledged.[51] In terms of the role of pharmacists in patient care in the hospital setting, the Indonesian Directorate General of Pharmacy and Medical Supplies developed a guideline on ward visits.[52] The guideline sets out the role and responsibility of ward pharmacists. One of the roles is working in a team with other healthcare professionals in ensuring patients received safe, quality and cost effective drug therapy. The other support was from the Indonesian Ministry of Health which comes from the release of a guideline in 2008 on the pharmacists' role in ensuring patient safety.[53] The guideline emphasised that pharmacists may play their role in

medication safety by working collaboratively with prescribers and patients; however, activities involved were not clearly defined in the guideline. These policies show that the government recognises and supports the role of pharmacists in patient care to ensure medication safety, whilst acknowledging barriers of lack of communication amongst healthcare professionals. Although the Indonesian Government supports the role of pharmacists, how this will be translated into practice is unclear. To date, there is limited data on the roles of pharmacists in patient care to ensure medication safety in Indonesian practice. In 2009, the United States Agency for International Development (USAID) reported that in Indonesia, the minimal role of pharmacists occurred both in the hospital and the community settings.[54] A random check by the USAID team to assess the level of pharmacy practices in West Java, Indonesia showed that an antibiotic was sold without a prescription and without pharmacists' attendance. This illustrated that the role of pharmacists is very limited in the country.

Studies show that pharmacists' internal and external factors may influence the expansion of the role of pharmacists in patient care.[55-58] The internal factors may result from lack of staff, lack of communication skills and knowledge as well as lack of training. The external factors may be associated with a lack of a clear role for pharmacists, lack of fees for service, and unclear practice standards for pharmacists. Nimmo and Holland recommended that in order to improve the role of pharmacists in medication safety, it requires a clear, comprehensive, systematic and effective system, namely a Practice-Change System (PCS).[59] The system involves a suitable practice environment, motivational strategies, and availability of learning resources which are critical for change. The PCS identifies strategies needed to address those who are involved in the clinical practice and those who are affected by the change such as the society, health system and the practice environment. The PCS also identifies motivational strategies and learning resources in ensuring medication safety. The motivational strategies emphasised internally driven factors of pharmacists to provide quality and safe patient care. Learning strategies involved supporting facilities for the activities for the role of pharmacists in medication safety.[59] Factors that influence the expansion of the role of pharmacists should be addressed.

Interprofessional collaboration between healthcare professionals is the key to safe and quality healthcare.[60] Chrisholm-Burns suggested that to improve the safe use of medication, pharmacists should be involved in and work with other healthcare professionals in the process of medication delivery.[61] In fact, a number of authors have suggested that collaboration between pharmacists and physicians is crucial to ensure medication safety.[1, 8, 50, 62] Studies support the model of pharmacist and physician collaboration to ensure quality use of medicines.[47, 50, 63-65] Strand and Hepler recommended that pharmacists should work interprofessionally with other healthcare professionals regardless of their settings.[8] They suggested that collaboration develops through good interpersonal relationships amongst physicians and pharmacists.

Evidence shows that collaboration or Interprofessional Practice (IPP) may develop awareness of the role of other healthcare professionals,[66] build communication between healthcare professionals,[67] and enhance abilities in resolving conflicts.[68, 69] Freeth et al[70] described IPP as *two or more professions working together as a team with a common purpose, commitment and mutual respect."* In an effective IPP, respect, trust and understanding of each other's role are the basis of effective communication.[66, 71-76] When misconception of the role of other healthcare professionals is minimised, healthcare professionals should have a better understanding of the role of others. A Canadian study suggested that Interprofessional Learning (IPL) enhanced the recognition of other healthcare professionals of the nursing profession.[76] This means working with other healthcare professionals may not only ensure the safe use of medication but also enhance the awareness towards the role of others.

As outlined in the literature, IPP and interprofessional education (IPE) are inter-related in fostering competent healthcare professionals.[77-81] Frenk et al. suggested that to strengthen the health system, health education should be redesigned to prepare the competencies of future healthcare professionals.[81] Barr et al. suggested that there are three foci of IPE.[82] These are individual preparation, collaborative group/teamwork, and improving service. The first focus relates to knowledge, skills, and attitudes of individual learners. The second focus involves support from healthcare professionals, community, professional organisations and patients. The

third focus concerns quality service improvement which depends on support from policy-makers and management in the implementation of IPE. Hammick et al.[80] who employed the 3P model (i.e. Presage, Process, and Product) in analysing IPE stated that teacher and learner characteristics as well as context are the presage components of the implementation of IPE. This suggests that support from the government, health policy and management, as well as those involved in IPE is essential.

D'Amour and Oandasan created a framework for Interprofessional Education for Collaborative Patient-Centred Practice (IECPCP). The framework highlighted that IPE and IPP were interconnected and influenced by factors at the Micro, Meso, and Macro levels.[79] IPE refers to "*occasions when students from two or more professions in health learn together during all or part of their professional training with the object of cultivating collaborative practice for providing patient- or person- centred health care.*"[83] In the educational setting, the Micro level involves interaction between teaching factors (i.e. learning context and faculty development). The Collaboration at the Meso level depends on institutional factors (i.e. leadership and administrative processes), while at the Macro level it is influenced by the education system (i.e. accreditation and institutional structured). Within the practice setting, the Micro level is determined by interactional factors (i.e. sharing goals and the sense of belonging). The Meso level is related to organisation factors (i.e. governance and structuring clinical care). While the Macro level is influenced by the professional system (i.e. regulatory bodies and liability). Further, D'Amour and Oandasan identified that government policies (from local to national policies) and social and cultural values (at the Micro and Macro levels) were systemic factors for the implementation of IPE and IPP.

In parallel, the WHO has highlighted the importance of IPE and IPP to improve healthcare outcomes with the Framework for Action on Interprofessional Education for Collaborative Practice (IPE-CP).[84] The aims of the framework are to provide ideas and approaches for health policy makers, educators and health workers to manage their local health systems in order to improve healthcare outcomes. It is illustrated in the framework that if healthcare students learn together and understand each other's role, they will be ready to practice interprofessionally in the future because

IPE may facilitate the development of competencies required in IPP in ensuring safe patient care.[60, 85] A report[60] of an Expert Panel in the United States identified that there are four core competencies of IPP, namely values/ethics for interprofessional practice, roles/responsibilities, interprofessional communication, and team and teamwork. They further recommended that the healthcare students should learn about being part of the healthcare team to foster those competencies.

Although some studies have shown the benefits of IPE,[72, 86, 87] barriers may be encountered in the implementation of IPE. These barriers may be associated with threats to professional identity, ineffective team dynamics, differences in philosophy of patient care, and a lack of financial support from the health system.[62, 88, 89] However, if healthcare students learn in an effective IPE environment, they will gain experience of collaboration (teamwork) which may facilitate the development of competencies of IPP.[63, 85, 90] In the team training, students learn about the team process and its structure to enhance their learning outcomes[91, 92 93] Accordingly, Thistlewaite and Moran[85] recommended that the six main learning outcomes of IPE (i.e. teamwork, roles/responsibilities, communication, learning/reflection, the patient, and ethics/attitudes) may be obtained through working together in formal education and during practical experiences. The outcomes are similar to the competencies in IPP as mentioned previously.

In order to expand the role of pharmacists in patient care, particularly in ensuring the safe use of medication through IPE and IPP, identifying facilitators for and barriers to the expansion of the role of pharmacists in patient care as well as the implementation of IPE and IPP is important. Thus, in the present study, mixed methods of qualitative and quantitative methodologies were employed. Data were collected from healthcare students, healthcare professionals, as well as key stakeholders in one university and hospital in Bali, Indonesia to investigate the research questions of the present study.

1.2   MEDICATION SAFETY

Medication safety as part of patient safety is an issue world-wide in healthcare service delivery. This issue of patient safety has been widely discussed since the 1995 United States Institute of Medicine's report titled "To Err is Human." [94] In many countries, this issue has raised concerns with the development of agencies to ensure safe healthcare services. In Australia, there are national and state organisations to ensure the safe use of medication.[95] In Indonesia, the Ministry of Health committed to adopt the United States Joint Commission International (JCI) Accreditation in order to ensure patient safety in healthcare practice.[4] One of the accreditation standards is medication management use which ensures medication safety in the hospitals.[96]

The extent of medication safety issues is reported differently in the literature. For instance, the problem has been reported as the percentage of incidence of adverse drug events, rate of medication errors, mortality rate, and even the cost of treatment and hospitalisation. Bates et al. found the rate of adverse drug events in medical and surgical units was 6.5 per 100 admissions in 1995.[10] In the United States, it was estimated that annually, around 98,000 deaths resulted from medical errors and the medication errors contributed to 10-20% of the fatality estimation.[3] In Australia, a review in medication safety reported that 2-3% of hospital admissions were due to the use of medication which contributed to an annual cost of $1.2 billion.[1] Medication errors were reported to result in direct hospital costs of £ 200-400 million per year in 2004 in the UK.[97] The United Kingdom Health Department emphasised that medication errors caused burden to the patients, family, and social community.

Medication safety, is defined as drug related problems, medication misadventures, adverse drug events, and medication errors.[6, 7, 9, 12, 98] Ackroyd-Stolarz et al. stated that several definitions employed by medication safety organisations have implications for clinical, policy and research practices.[7] These implications allow the medication safety organisations to identify priorities and strategies to ensure medication safety. Ackroyd-Stolarz et al. presented a relationship of the types of problems associated with the use of medication based on whether or not the

problems caused injury (Figure 1.1). As seen from Figure 1.1, medication safety may relate to drug used which may cause injury and no injury.
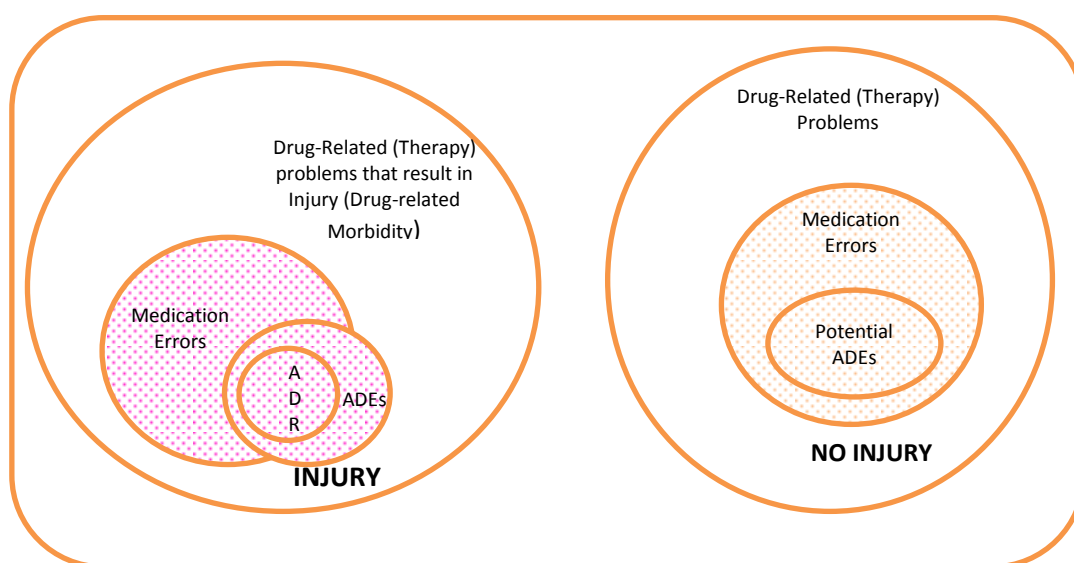
(Reprinted from Research in Social Administrative Pharmacy, Ackroyd-Stolarz S, Hartnell N, MacKinnon NJ, Demystifying medication safety: Making sense of the terminology, Pages 280-9., Copyright (2006), with permission from Elsevier)

Figure 1.1 Relationship between types of problems associated with medication use [7]

Debate remains on the most appropriate terms to use in the study of medication safety. According to the NCCMERP an ADE is defined as an injury which results from a medical intervention related to the use of a drug. ADRs are a type of ADE which relate to any unintended response during the use of a medication within the normal dose range for prophylaxis or therapy. Meanwhile, medication errors are another type of ADE which are preventable events which may cause or lead to inappropriate use of medication while the medication is under the control of healthcare professionals.[13] Nebeker et al.[99] argued that focusing mainly on medication errors in medication safety might overlook ADRs which might be preventable but not related to errors. However, Otero and Schmitt[100] stated that the association of ADRs with medication errors was inappropriate considering ADRs were related to the intrinsic properties of the drugs and cannot be prevented, while, medication errors are preventable events.[26]

With the undecided definition of medication safety, in 2013, Bürkle et al. argued that the Ackroyd-Stolarz et al.'s definition of medication errors' was vague, because

medication errors emerged in both supersets of injury and non-injury.[101] Thus, Bürkle et al. defined medication errors as errors occurring during a medication pathway which includes all activities in the process of medical decision-making and action taken in treating patients. Adverse drug events (ADEs) and ADRs referred to as clinical symptoms and events observed during patients' treatment. These definitions are similar to Hepler and Strand's definition who stated that ADEs and ADRs are outcomes of the use of medication.[8] Bürkle et al. generated a model of the relationship between MEs (Medication Errors - medical decisions and actions), clinical symptoms and events (ADEs and ADRs). The model is used to identify, classify and count drug related events and take into consideration diseases associated with the events (Figure 1.2). The model illustrates all decisions and actions in the process of medication delivery related to medication errors which may lead to drug effects. The drug effect may cause clinical symptoms and events which may cause ADEs. The ADEs may be associated with one drug and/or one ME or more. Bürkle et al. also created a medication pathway to show all decisions and actions made in a drug dose (Figure 1.3). Any errors occurring in the medication pathway (which is shown as Medication errors 1 to 4 in Figure 1.3) are considered as medication errors. However, Bürkle et al.'s classification of omission errors leading to an event (OEE) as clinical symptoms and other events may be inappropriate. These may be better classified as errors in actions. This is because error in omission is no action taken or no drug given during the medication process. The omission may or may not lead to ineffective treatment or harm.
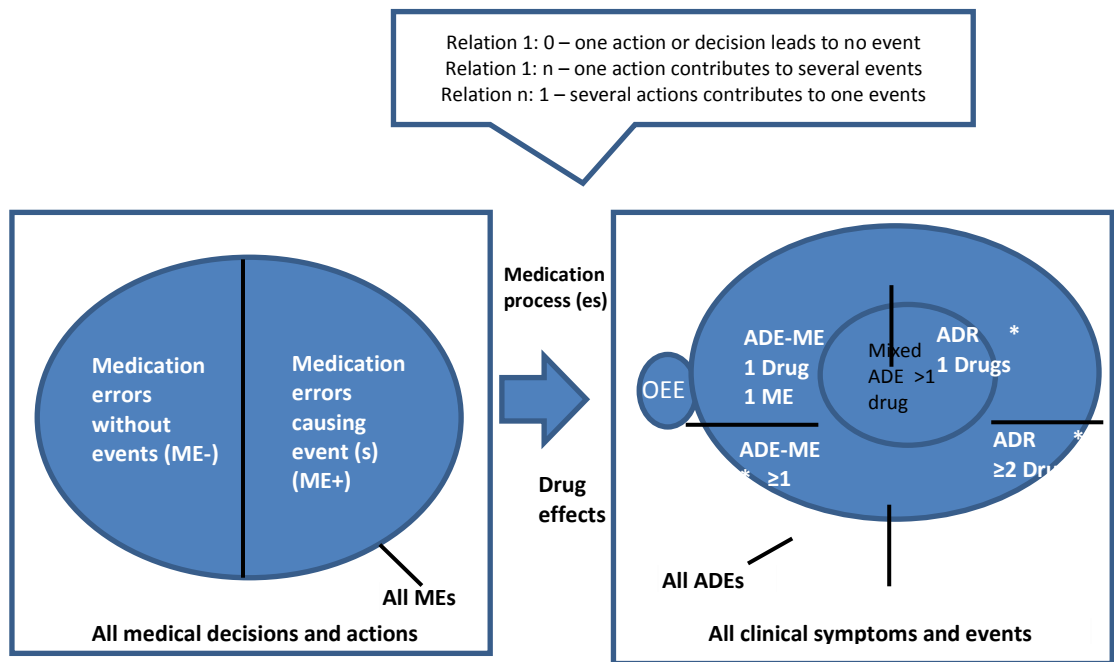
Relation 1: 0 – one action or decision leads to no event
Relation 1: n – one action contributes to several events
Relation n: 1 – several actions contributes to one events

Figure1.2 Proposed set theory diagrams for clinical symptoms and medical decisions in drug therapy process [101]
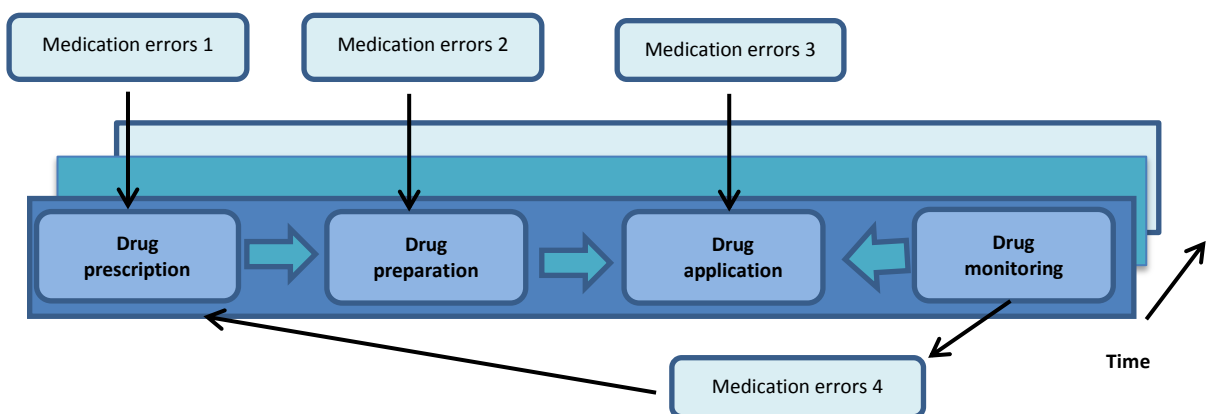
Figure 1.3 Level of medication pathway for one single dose [101]

The importance of medication safety reported in the literature, led to medication errors being chosen as the focus of the present study. Medication errors are

preventable events in the process of medication delivery. Thus, it is important to understand the failures during the process[17, 102] because different approaches are required to overcome the errors.[17,102] If the causes and potential outcomes of the errors are identified, recommendations may be made to ensure a safe healthcare service.

Every healthcare professional involved in the medication delivery process is responsible for the quality and safety of healthcare service. However, the healthcare professionals (i.e. physicians, nurses and pharmacists) involved in the process may have different skills and training. Communication failure is one of the root causes of medication errors.[23, 24, 103, 104] Communication failure in the provision of a healthcare service may result from the complex problem of role ambiguity, interpersonal power, and conflict.[103] Routledge indicated that communication and collaboration amongst healthcare professionals are required to avoid harm to the patients.[105] Thus, study on medication errors and collaboration amongst healthcare professionals is warranted.

1.2.1   MEDICATION ERRORS

1.2.1.1   Definition

Similar to medication safety conceptualisation, medication errors have also been hypothesised in many ways. A medication error has been stated as the only preventable event in medication safety.[106,107] Medication errors are defined as errors occurring in the medication delivery process (i.e. prescribing, transcribing, dispensing and administration) which may or may not result in clinical consequences.[12, 106, 108] Ferner and Aronson defined medication errors as *"a failure in the treatment process that lead to, or has the potential to lead to, or harm the patient"*.[108] Although their definition has been amended by The Australian Council for Safety and Quality in Health Care with the addition of the phrase *"and includes an act of omission or commission,"* Aronso and Ferner stated the phrase has little impact on their definition and claimed their definition is applicable in any error scenario.[108]

Lisby et al. in a systematic review of 45 studies identified that there were 26 different types of wording in the literature to describe medication errors.[15] They found that

less than 50% of the studies featured in the systematic review defined medication errors as generic or stage specific terms. This shows the inconsistency of the definition of medication errors used in the literature. They found that the majority of definitions used in the literature employed the National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP) definition.[13] The NCCMERP recommended researchers and institutions use the following definition in identifying errors:[13]

> *"A medication error is any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer. Such events may be related to professional practice, health care products, procedures, and systems, including prescribing; order communication; product labelling, packaging, and nomenclature; compounding; dispensing; distribution; administration; education; monitoring; and use."*

Based on the NCCMERP definition, medication errors are not only related to human errors but also system errors. This definition also includes errors which are associated with the medication process, from prescribing, dispensing, labelling, administration, monitoring and communication processes.

1.2.1.2 Causes of medication errors

Leape et al. employed systems analysis to identify causes of ADEs which may result from medication errors.[23] In general, they classified the causes of errors into human and system sources. Human-related errors ranged from physiological, psychological to knowledge factors, while the system errors included lack of training, limited access to patient's information, and lack of standard operational procedures. The Californian Healthcare Foundation claimed that insufficient knowledge of the patient and their medication, as well as poor understanding of the current guidelines and policy, may result in medication errors.[109] Leape et al. described the causes of errors as being less complex than that of the Reason's or Vincent's framework of the sources of errors. The Reason's Swiss Cheese Model is the commonest model used to explain the causes of medication errors (Figure 1.4).[2] The model demonstrates that no single error leads to medication errors. According to the Swiss Cheese model, errors maybe caused by latent and unsatisfactory working conditions, as well as active failures, and weak defences in the system.

Latent Conditions: Organisational processes and Management decisions → Errors producing Conditions: Environmental, team, personal, or task factors that affect performance → Active Failures:
o Slips: action in which there are recognition or selection failures
o Lapses: failure of memory or attention
o Mistakes: incorrect choice of objectives, or choice of an incorrect path to achieve it
o Violation – instances in which rules of correct behaviour are consciously ignored
→ Accident

Defences: Designed to protect against hazards and mitigate consequences of failure. Defences can be inadequate as a result of latent conditions

(Reprinted from The Lancet, Vol 359, Dean B, Schachter M, Vincent C, Barber N, Causes of prescribing errors in hospital inpatients: a prospective study, Pages 1373-8., Copyright (2002), with permission from Elsevier)

Figure 1.4 Reason's Framework on causes of errors [110]

In parallel to the Reason's Framework, Vincent classified and explained the sources and contributing factors of medication errors (See Table 1.1).[22] As seen in Table 1.1, medication errors may result from the institution, management, the system, healthcare professionals, and even from the patients. Cohen defined the system of medication errors as being influenced by the interconnection between how information management is handled, how the environment is structured, and how human resources operated.[26] This further implies no single cause of or solution for medication errors.

Table 1.1 Vincent's Framework of sources and contributing factors of medication errors [22]

Framework	Contributory Factors	Example of problems that contribute to errors
Institutional	Regulatory context Medico legal environment	Insufficient priority given by regulators to safety issues; legal pressures against open discussion; preventing the opportunity to learn from adverse events
Organisational and management	Financing resources and constraints Policy standards and goals Safety culture and priorities	Lack of awareness of safety issues on the part of senior management; policies leading to inadequate staffing levels
Work environment	Staffing levels and mix of skills Patterns in workload and shifts Design, availability, and maintenance of equipment Administrative and managerial support	Heavy workload; leading to fatigue; limited access to essential equipment; inadequate administrative support; leading to reduced time with patients
Team	Verbal communication Written communication Supervision and willingness to seek help Team leadership	Poor supervision of junior staff; poor communication among different professions; unwillingness of junior staff to seek assistance
Individual staff member	Knowledge and skills Motivation and attitudes Physical and mental health	Lack of knowledge or experience; long-term fatigue and stress
Task	Availability and use of protocols Availability and accuracy of test results	Unavailability of test result or delay in obtaining them; lack of protocols and guidelines
Patient	Complexity and seriousness of illness Language and communication Personality and social factors	Distress; language barriers between patients and caregivers

[(Reproduced with permission from Vincent), Copyright Massachusetts Medical Society]

Failure Mode Effects Analysis (FMEA) and Root Cause Analysis (RCA) are two methods to study the causes of an event.[19] FMEA is a proactive approach to prevent an event from occurring and to explore what could happen if a particular event occurred in a process. FMEA is a quality improvement process in evaluating a new program or service or product to decide points where failure might occur and consequences of the failure.[111, 112] RCA is a retrospective approach to analysis after an event has occurred or nearly occurred. RCA aims to answer the questions on what happened, why an event occurred, and what can be done to prevent a similar event from occurring?[19, 113] FMEA and RCA are similar in involving team activity and in identifying the possible causes that lead to harm or potential harm.

16

The Office of Safety and Quality in Healthcare Western Australia defines RCA as the following: [114]

> *"Root Cause Analysis (RCA) is a comprehensive and systematic methodology to identify gaps in hospital systems and the processes of healthcare that may not be immediately apparent and which may have contributed to the occurrence of an event."*

RCA focuses on systems and processes of healthcare, and it does not emphasise blame for the individual.[114] It is undertaken in a comprehensive and systematic way to reveal the contributing factors of an event. The analysis involves an interdisciplinary team which consists of 3-5 people who are familiar with the event.[114] Although RCA aims to create recommendations to reduce sentinel events,[113] it may also be applicable to less harmful events.[19] The RCA needs to be thorough and credible.[115] Thorough means it determines the primary causes and secondary causes of the events by asking why questions. The RCA determines the potential improvement in the process to minimise the risk of re-occurring. Credible means the RCA should involve the leader in the organisation, is consistent and supported by evidence. The Joint Commission suggested having 12 minimum scopes of the root cause analysis in medication errors which may result in sentinel events.[19] The scopes are patient identification process, staffing level, orientation and training of staff, competency assessment, supervision of staff, communication among staff members, availability of information, adequate technology support, equipment management/maintenance, physical environment, control of medications: (storage and access), and labelling of medication.

1.2.1.3 Methods to identify medication errors

Direct observation, unannounced control visits, pharmacist and nurse interventions, chart reviews, administrative data, and voluntary error reports are some of the methods to detect medication errors.[18, 23, 116-118] Although direct observation is the least commonly employed method and the most costly, it is accurate in detecting medication errors[119] and can identify the highest number of drug related problems.[120] In spite of the Hawthorn effect on an observational study, Dean and

Barber in 2001 reported that the observation methods used to study administration errors were reliable and valid.[118]

Chart review conducted by healthcare professionals has also been used widely to identify medication errors and ADEs.[10, 98] Chart review has been employed to study medication safety in adults and paediatric populations.[18, 120] Bates et al. found that nurses and pharmacists medication chart reviews could detect medication errors which may result in ADEs.[98] Flynn et al. also suggested that chart review was less expensive than direct observation studies in detecting medication errors.[117] They also stated that this review could identify prescribing errors. Meyer-Masseti et al.[120] found that chart review could identify potential drug related problems more frequently than incident reports.

Other studies recommended employing a triangulation method to identify medication errors.[18, 23, 50, 116, 120] This is because each method has its weaknesses and strengths.[120] This triangulation approach may involve more than one method for instance chart reviews, pharmacist interventions, and voluntary error reports. Lisby et al. identified the frequency, type and potential clinical consequences of medication errors during the process of medication delivery by adopting direct observational, unannounced control visits, and chart review methods.[116] Mangino in 2004 stated *"combining incident reports with practitioner interventions into a single reporting system has the potential for building a powerful database for analysing faulty processes."*[50] The involvement of healthcare professionals to clarify drug orders could be a useful step to detect and prevent errors before reaching the patient. Because none of the reported methods appear better than the others, in the present study, chart review and direct observation were employed to detect medication errors.

1.2.1.4   *Strategies to prevent medication errors*

Several strategies have been outlined in the literature to prevent medication errors. These strategies involve a sustainable system which may include formulary management, targeted medication interventions, clinical pathways, clinical pharmacy programs, operational improvement and the support of technology during the prescribing stage.[18, 50] Miller et al. recommended some strategies to reduce medication errors in the paediatric population based on a review of the literature

(Table 1.2).[18] They identified 26 recommendations from a range of medication safety organisations. The recommendations ranged from technical and administrative aspects in the medication delivery process to training to up skill healthcare professionals. The technical aspects included adopting computerised-physician order entry (CPOE), automatic dispensing devices, unit dose dispensing, and clear and accurate documentation of drug administration. The strategies to improve the skills of healthcare professionals may consist of adequate training and continuing professional development for healthcare professionals in the process of medication delivery.

From the prescriber's point of view, medication errors could be prevented by both education and practice initiatives.[16] The education initiatives may include undertaking continuing education and assessment on safe prescribing. Whilst, practice initiatives may involve implementing a standardised national guideline and computerised system of safe prescribing in hospitals, from the organisational point of view, the American Society of Health-System Pharmacists (ASHP) recommended a well-designed medication delivery process covering prescribing, dispensing, and administration to reduce medication errors.[12] A non-blame culture is considered as a fair and accountable way to improve safety in the health system.[121] The culture should facilitate healthcare professionals' involvement in identifying the errors and failures in the system.

Table 1. 2 Recommendations to reduce medication errors in paediatrics [18]

Recommendation
Computerised provider order entry
Automatic dispensing devices
Paediatric presence with formulary management
Appropriate and competent pharmacy personal and environment
Pharmacist available "on call" when pharmacy is closed
Policies on verbal orders
Clear and accurate labelling of medications
Quality improvement efforts with drug use evaluation and medication error reporting and review
Healthcare workers have access to current information and references
Emergency medication dosage calculation tools
Accurate documentation of medication administration
Medication standardisation and appropriate storage
Standardise equipment (pumps, weight scale)
Patient education on drugs
Direct participation of pharmacists in clinical care
Computerised detection/alert system for adverse drug events
Standardise measurement systems (kilograms)
Standardise order sheets to include areas for weight and allergies
Reducing adverse drug events related to anticoagulants
Unit dose drug distribution systems
Special procedures and written protocols for high alert drugs
Use pharmaceutical software
Pharmacy-based IV admixture systems
Use of bar coding for medication administration
Training of all healthcare professionals in appropriate medication prescribing, labelling, dispensing, monitoring and administration

(Adapted by permission from BMJ Publishing Group Limited. [Medication errors in paediatric care: a systematic review of epidemiology and an evaluation of evidence supporting reduction strategy recommendations. Miller MR, Robinson KA, Lubomski LH, Rinke ML, Pronovost PJ. 16; 116-26., Copyright 2015]).

1.2.1.5   Medication error classifications

Medication errors have been classified based on the sources of errors, the outcomes, and the process of medication delivery.[13-15] The ASHP[12] stated that their classification of medication errors was not exclusive considering multiple factors may lead to medication errors (See Table 1.5). Although Ferner and Aronson[108] classified medication errors based on a psychological approach, they claimed that this classification could explain and prevent errors. However, their classification may lead to the notion that errors only result from human factors. Other errors such as failure of drug distribution in the system may not be retrievable from Ferner and Aronson's classification.

The NCCMERP classified medication errors based on the outcomes. The classification ranged from no error (Category A), no harm (Category B, C, D), error with harm (Category E, F, G) and fatality (Category I). In 2007, Forrey et al.[122] conducted a study to validate the NCCMERP categories. They found that NCCMERP categories were valid when tested using 27 case scenarios amongst three groups of respondents who used the index alone, or, a paper based or computer based algorithm. However, this classification is focused on the outcomes not the process of medication delivery.

Lisby et al. who classified medication errors during the process of medication delivery[116] (See Table 1.3) also defined the potential outcomes of medication errors (See Table 1.4). This error classification is important because healthcare professionals involved in the process may have different knowledge and skills. Communication amongst healthcare professionals is essential. Therefore, it is not surprising that studies have shown that communication failure amongst healthcare professionals is one of the root causes of medication errors.[23, 24, 103] Thus, in the present study, medication errors were studied in the context of the process of medication delivery, because understanding how errors occur in the process should help in identifying ways to improve the safe use of medication in the future.

Table 1.3 Medication errors classification based on stages in the medication process [116]

Stage	Definition	Errors Types
Ordering	Unambiguous prescription	Omission of: drug name, drug formulation, route, dose, dosing regimen, date, signature, treatment time for antibiotics
Transcription	An identical copy of prescription in medical record	Discrepancy in: drug name, drug formulation, route, dose, dosing regimen, omission of drug; unordered drug
Dispensing	Dispensed medication is concordant with prescribed drug in nurse medication chart	Unordered drug (wrong drug), unordered dose, omission of dose, wrong dose, wrong formulation
Administration	The right medication to the right patient in the right way and at the right time	Wrong: administration technique (injection), route, time (±60mins), delivery (dose not delivered directly to the patient); unordered drug, unordered dose, omission of dose, lack of identity control
Discharge summaries	Eligible prescriptions in medical record are identical to prescriptions in discharged summaries	Discrepancy in: drug name, drug formulation, route, dose, regime, omission of drug, unordered drug

(Lisby M, Nielsen LP, Mainz J. Errors in the medication process: frequency, type, and potential clinical consequences. International Journal for Quality and Health Care, 2005; 17: 15-22, by permission of Oxford University Press)

Table 1. 4 Definitions of potential clinical consequences [116]

Category	Definition	Definition of keywords
Potentially fatal	Medication errors judged to imply a potential clinical risk for causing the death of the patient	Fatal refers to medication errors that could lead to the death of the patient
Potentially serious	Medication errors judged to imply a potential clinical risk of injuring the patient	Injury includes medication errors that would require active treatment to restore the health of the patient. A potentially serious error would lead to either permanent or temporary disability
Potentially significant	Medication errors judged to imply a potential clinical risk of being inconvenience for the patient-without causing any harm or injury	Inconvenience refers to unpleasant consequences of wrong dose/drug or omission of dose/drug that could lead to pain, dizziness. It also refers to any monitoring of the patient such as extra blood test, measurement of blood pressure
Potentially non-significant	Medication errors judged to be without any potential clinical risk for the patient	Without clinical risk refers to medication errors that did not lead to any injury or inconvenience for the patient

(Lisby M, Nielsen LP, Mainz J. Errors in the medication process: frequency, type, and potential clinical consequences. International Journal for Quality and Health Care, 2005; 17: 15-22, by permission of Oxford University Press)

Prescribing errors

Prescribing errors can be defined as errors occurring during the process of prescribing which may result from errors in the selection of the medication (i.e. the drug, dose and dosage form) and the action of writing the prescription.[106] In the present healthcare service in Indonesia, physicians have the role to prescribe medication. Wrong selection may include wrong drug, wrong dose, wrong quantity, wrong indication, wrong or contraindicated drug, and prescribing a drug which has clinically significant drug interactions (i.e. drug-disease interactions).[107] Dean et al.[123] stated that prescribing errors may be errors in decision making and errors in the writing of the prescription. They carried out research employing two Delphi techniques which proposed the definition of prescribing errors as failure to communicate the important information of the patient and failure to select the appropriate drug and the dose through not considering the patient's circumstances. They also suggested prescribing errors involved errors during writing the prescription which may include the physician failing to prescribe the patient's regular medications at the time of hospitalisation. Dean et al. also stated that drugs written outside the hospital formulary and guidelines were excluded as prescribing errors. [123]

The rate of errors may be described in a number of ways, such as errors per medication order, errors per 100 admissions, and error per 1000 patient days.[124] Dean reported more than 50% of prescribing errors was errors in decision making and 42% in medication order writing.[125] Some studies reported the rate of prescribing errors was around 50% for hospital admissions[124, 126] and most occurred on the first day of hospitalisation.[127] Although 25% of prescribing errors were reported clinically significant,[110] most of the errors were not serious or life-threatening.[124, 126]

Some causes of prescribing errors reported in the literature may be influenced by personal, environmental, and organisational factors. Personal factors included lack of knowledge, lack of patient information during prescribing, poor handwriting, inaccurate medication history taking, uncertainty of the name of drugs, inappropriate use of decimal points, using abbreviations, in-sufficient communication with team members and using verbal orders.[106, 107 124, 128]

Environmental factors include high workload and a distractive working environment.[124] Organisational factors may involve hierarchy in the medical team, and a lack of physicians' awareness to their contribution to errors.[124] Some studies recommended training on rational prescribing for junior physicians. The training may be on deciding the appropriate medication and its dosage to minimise the frequency of prescription errors.[16, 124] The World Health Organisation (WHO) created a guide to good prescribing which is primarily designed for undergraduate medical students before entering clinical internship.[129] It is anticipated the guide will be used as a resource for rational prescribing by medical students. However, the guide could also be employed by medical postgraduates as a resource to improve their prescribing. CPOE systems have been recommended to be adopted as a means to reduce prescribing errors.[16, 26, 50] However, the effectiveness of such systems on patient outcomes is still under investigation.

Dispensing errors

Dispensing errors can be defined as discrepancies between interpretable written prescriptions and dispensed medications[130, 131] They may occur in the process of dispensing of medication from the pharmacy for the ward prior to the medication being given to the patient.[106] Pharmacists have the role of dispensing medication in the process of medication delivery. The rate of dispensing errors has been reported to range between 1 to 24% predominantly due the supply of the wrong dose and wrong drug due to look alike and sound alike medications. [106] Beso et al. reported that dispensing errors occurred in 2% of all dispensed items, and were made up of content, labelling and documentation errors.[131]

James et al. reviewed 60 studies in hospital and community pharmacy settings to determine the incidence, type, and causes of dispensing errors.[132] They found different definitions of dispensing errors because of different settings and methods reported in the literature. They defined dispensing errors into prevented and un-prevented dispensing errors, and filling errors. A prevented dispensing error was defined as an error which occurred during the process of dispensing which was detected in the pharmacy (near-miss). An un-prevented dispensing error was identified as an error detected after the medication has left the pharmacy. A filling error occurred when the pharmacist identified an error while dispensing the

medication. James et al. reported prevented errors occurred more frequently than un-prevented errors.[132] Thus, as outlined in the literature[106, 132] dispensing errors can be classified as drug omission, near miss, wrong drug, wrong dose, wrong dosage form, wrong quantity of drug and labelling errors.

Factors contributing to dispensing errors found in the literature were workload, interruption or distraction from the environment, skills and knowledge, communication, reliance on others in identifying errors, drug packaging and protocols in labelling and storage in the dispensing area.[131, 132] Dispensing errors may be minimised by ensuring drug distribution and dispensing procedures occur in a systematic, safe environment with minimum distraction. In addition, clearly defined processes to deal with look and sound alike medication and improved awareness of high alert medication (such as potassium chloride and cytotoxic agents) should be employed to prevent dispensing errors.

Transcription errors

There is very little discussion in the literature on transcription errors. Dean et al. classified transcription errors as part of prescribing errors.[123] They stated that errors of transcription may include unintentional omissions of patients' regular medication prior to admission, transcribing wrong medication orders, and transcribing wrong medication on the discharge summary. The Californian Healthcare Foundation stated transcription errors may occur during transcription of prescriptions from physicians to pharmacists or to nurses.[109] In the process of medication delivery, communication may be in writing, verbally, or electronically which may potentially result in errors during transcription. Transcription errors may result from illegible handwriting, inaccurate spelling, inappropriate use of abbreviations, and lack of communication skills. The **S**ituation, **B**ackground, **A**ssessment, and **R**ecommendation (SBAR) method is recommended in minimising communication failure between healthcare professionals.[133] If verbal orders are unavoidable, the order should be read back by the nurse who received the order, written verbatim on the medication chart, and signed by the physician as soon as possible. Other ways to reduce transcription errors include use of standard abbreviations, computerised records and enforcement of a standard legible handwriting.

Administration errors

Nurses have the role to administer medication to patients. In the literature, administration errors were reported as the second most frequent medication error occurring after prescribing errors.[102] An administration error occurs when there is a discrepancy between the intended prescribed medication and the actual medication administered to patients.[106, 109] The classification of ASHP (Table 1.5) has been used widely in studies on administration errors.[102, 134-136] Studies employing this classification revealed that the wrong route of administration, wrong dose and wrong time were the commonest errors identified in the administration process.[134-136] Kelly and Wright[134] found that in some circumstances, medication administration had been recorded although the medication had not been given. The authors suggested that this may lead to loss of control of patients' diseases. Berdot et al.[102] found 66 publications on administration errors in the literature. The publications had different study designs and reported error rates either as doses observed (i.e. total number of doses observed in the process of medication administration)[137] or total opportunity of errors (i.e. the sum of the doses given plus the number of omission errors). The reported average rate of administration errors based on doses observed was 19.7% from 12 studies and the rate was 10.5% according to the total opportunity of errors from 34 studies.

Table 1.5 Types of medication errors by the ASHP [12]

Types of Medication Errors	Definition
Prescribing errors	Incorrect drug selection (based on indications, contraindications, known allergies, existing drug therapy and other factors), dose, dosage form, quantity, route, concentration, rate of administration, or instructions for use of a drug product ordered or authorised by physician (or other legitimate prescriber), eligible prescriptions or medication orders that lead to errors that reach the patient.
Omission errors	The failure to administer an ordered dose to a patient before the next scheduled dose, if any.
Wrong time errors	Administration of medication outside a predefined time interval from its scheduled administration time (this interval should be established by each individual health care facility).
Unauthorised drug error	Administration to the patient of medication not authorised by a legitimate prescriber for the patient.
Improper dose error	Administration to the patient of a dose that is greater than or less than the amount ordered by the prescriber or administration of duplicate doses to the patient, i.e. one or more dosage in addition to those that were ordered.
Wrong dosage-form error	Administration to the patient of a drug product in a different dosage form than ordered by the prescriber.
Wrong drug-preparation error	Drug product incorrectly formulated or manipulated before administration.
Wrong administration-technique error	Inappropriate procedure or improper technique in the administration of a drug.
Deteriorated drug error	Administration of a drug that has expired or for which the physical or chemical dosage form integrity has been compromised.
Monitoring error	Failure to review a prescribed regimen for appropriateness and detection of problems, or failure to use appropriate clinical or laboratory data for adequate assessment of patient response to prescribed therapy.
Compliance error	Inappropriate patient behaviour regarding adherence to a prescribed medication regimen.
Other medication error	Any medication error that does not fall into one of above predefined categories.

(Originally published in American Society of Hospital Pharmacists. ASHP guidelines on preventing medication errors in hospitals. Am J Hosp Pharm. 1993; 50:305-14 © 1993, American Society of Health System Pharmacists, Inc. All right reserved. Reprinted with permission)

Factors contributing to administration errors may include personal factors (feeling tired and lack of support in the work place); environment factors (noisy and busy working environment); [138] insufficient knowledge of patient's condition and their medication; and non-adherence to policy and procedures at the workplace.[106, 109] Convenient working environment, accurate patients' identification, and double checking of medication by other healthcare professionals are required in order to reduce administration errors.[106]

Facing the fact that medication errors may occur in every stage of medication delivery and that different healthcare professionals are responsible in those stages, it is essential that healthcare professionals work interprofessionally in order to minimise the errors from occurring.

1.2.2 THE ROLE OF PHARMACISTS IN MEDICATION SAFETY

Although the role of pharmacists in ensuring the safe use of medicine is significant, [44, 61] disagreement on their role remains.[44, 139, 140] Some researchers claim that the role of pharmacists in patient care has not provided enough positive evidence on their influence on mortality, morbidity and the patients' quality of life.[34, 44, 46, 141] Chisholm-Burns et al.[61] suggested that the lack of evidence to support the impact of pharmacists on patients' quality of life may be because of limited time of interaction between pharmacists and patients. Sanghera[46] claimed that pharmacists' activities reduced medication errors because pharmacists provided services in a range of settings which reduced the risk of medication errors. A meta-analysis from the United States reported that the rate of ADEs detected through medication chart reviews was higher when pharmacists conducted the reviews compared to other healthcare professionals.[142]

The significant role of pharmacists in ensuring the safe use of medication has been recorded in different settings such as in ambulatory, elderly, paediatrics and psychiatric patients.[34, 46, 47, 143, 144] Studies have shown that pharmacists' involvement in a team with other healthcare professionals improved patient safety by reducing medication errors, polypharmacy, suboptimal prescribing in frail elderly as well as minimising medication related diseases in diabetic and hypertensive patients.[61 47, 64, 145, 146] Dean et al. [125] found that pharmacists detected and resolved prescribing errors in 1.5% of medication orders. Leape et al.[47] identified that pharmacist participations in ward rounds with physicians as part of a medical team reduced prescribing errors by 66%. In that study, the pharmacist made more than 300 recommendations and 99% of them were accepted by the physician. An Ethiopian study reported that 68.4% of the pharmacists' interventions were accepted by the physicians. The majority of the interventions in that study related to changes of drug dosage and instructions for use.[147]

Bond et al.[148] evaluated the association between clinical pharmacy services in reductions in medication errors in several hospitals in the United States. They found that pharmacists' activities reduced medication error rates from between 13% to 51%. The pharmacists' activities which were associated with a reduction in medication errors were: participation in ward rounds, participation in ADEs management, provision of drug information services, undertaking drug use evaluations and taking of admission medication histories. The level of pharmacist staffing per occupied bed was also a strong predictor of reduced medication errors, providing strong evidence for the need for adequate pharmacist numbers.[52, 148] Further, Bond and Raehl[149] identified seven clinical pharmacy services that were associated with reduction of mortality rate delivered in hospitals in the United States, and confirmed that the incidence of medication errors was inversely proportional to the number of pharmacists (administrative and clinical). The International Pharmaceutical Federation (FIP) as the international pharmacist association strongly recommends that the role of pharmacists in medication safety is essential because of their expertise in medication.[30] The FIP indicated that pharmacists' involvement in the healthcare team is crucial because pharmacists have a greater knowledge of medication and drug formulations compared to other healthcare professionals.

This study was focused on the role of pharmacists in medication safety within hospital settings. Medication reconciliation and clinical review are two pharmacists' activities related to ensuring the safe use of medication at hospital settings.[27, 33, 40, 41, 150, 151] The Joint Commission[152] stated that medication reconciliation should be done in all transition care regardless of the setting, the type of service provided, and the level of care. The Society of Hospital Pharmacists of Australia (SHPA)[40] defined medication reconciliation (MR) as "*the standardised process of obtaining a patient's best possible medication history and comparing it to presentation, transfer or discharge medication orders in the context of the patient's medication management plan (MMP)."* The aim of MR is to ensure the patient receives the optimum drug therapy by reducing errors in the medication history. The SHPA recommends that MR should be standardised in health institutions (i.e. hospitals) and it should be conducted as soon as the patient is admitted to the hospital. The confirmed list of

the patient's medication should be provided to the doctor before ordering medication begins if possible.

The SHPA[40] states there are four steps of MR, namely: 1) obtaining and documenting the best possible medication history; 2) confirming the accuracy of the medication history; 3) comparing the medication history with the prescribed medicine and follow-up discrepancies; and 4) supplying verified information for ongoing care. Vogelsmeier et al.[153] in a qualitative study found that healthcare professionals had different opinions on the professionals who were responsible for MR, but those who participated in the study agreed that pharmacists have a critical role in MR.

Another pharmacist activity which contributes to medication safety is clinical review. The SHPA defines clinical review as "*the review of patient-specific clinical information including patient parameters to evaluate their response to medication therapies and to detect and manage potential or actual medicines-related problems.*"[33] The clinical review activity involves:

1. Obtaining information of the patient's medication history from MR, assessing the patient's needs for medication based on their clinical signs, symptoms and laboratory results,
2. Documenting medication information which is not included in the formal documentation of medication administration,
3. Making interpretation and evaluation based on the patient's medication history, significant laboratory results, pathophysiology of the disease, and management plans,
4. Identifying actual and potential drug related problems based on the risk and urgency,
5. Having a discussion on the problems with the physician and documenting the resolved issues in the patients' medication record.

As discussed previously (See Section 1.2.1.3), clinical review by healthcare professionals is one of activities which may allow them to detect medication errors.

The above evidence shows that pharmacists have a significant role in patient care to ensure the safe use of medication by conducting MR and clinical review within hospital settings.

1.2.3 INTERPROFESSIONAL PRACTICE (IPP) IN MEDICATION SAFETY

As recommended in the literature, IPP is warranted to improve healthcare service and patient safety.[8, 12, 26, 85, 154-156] Studies have shown that pharmacists' involvement in healthcare teams offer positive benefits to health outcomes.[47, 61, 157] Teamwork in healthcare will only occur when the health system supports the implementation of teamwork in the provision of healthcare service.[155, 158] The support from the health system includes support from the professionals' organisations, regulatory bodies, health education institutions, and accreditation organisations.

Despite the fact that support from the health system is required in IPP, several agencies have also highlighted the significance of team training in medication safety in the provision of healthcare service.[30, 159, 160] A report on the emergence of a global patient safety network from the WHO recommended that research to improve the skills and knowledge of healthcare professionals in developing countries is one of the priorities.[161] In parallel, Baker et al reported for the Agency for Healthcare and Research Quality (AHRQ) highlighting the three main competencies (knowledge, skills and attitudes) are required in effective team training in patient safety.[160] Knowledge competencies include knowledge of the role of other team members, as well as the knowledge of the team mission and objectives. Skills competencies include communication skills, teamwork, leadership, and mutual monitoring to ensure the task has been completed. Attitudes competencies consist of team orientation morale, shared vision, mutual trust, and the importance of teamwork. In 2011, the Interprofessional Education Collaborative Expert Panel released a report on core competencies for interprofessional collaborative practice which fell into four domains.[60] The domains were values/ethics for IPP, roles/responsibility, interprofessional communication and teams/teamwork. The panel indicated that healthcare professionals should acquire the competencies required in IPP to ensure safer and better patient-centred care.

1.3   THE ROLE OF PHARMACISTS IN PATIENT CARE

The expansion of the role of pharmacists in patient care has been well accepted with the concept of pharmaceutical care from Hepler and Strand.[8] They defined pharmaceutical care as "*The responsible provision of drug therapy for the purpose of achieving definite outcomes that improve a patient's quality of life*" in 1990. The definition of pharmaceutical care was updated by Cipole[162] in 2007 as "*a patient-centred practice in which the practitioner assumes responsibility for a patient's drug related needs and is held accountable for this commitment*". However, Blackburn et al.[163] stated that those definitions did not provide clear guidance on how to practice pharmaceutical care. Thus, they recommended the process of care should be focused consistently on the patients with the highest priority.

1.3.1   FACTORS INFLUENCING THE EXPANSION IN THE ROLE OF PHARMACISTS IN PATIENT CARE

The role of pharmacists in patient care in the present study is focused on medication safety in hospital setting. The review of the role of pharmacists in medication safety is discussed in Section 1.2.2. Few studies were found in the literature to identify factors which influenced the expansion of the role of pharmacists in medication safety.[164] Although this study is focused on the role of pharmacists in hospital settings, review of factors influencing the role of pharmacists in patient care from both hospital and community settings can be classified into pharmacists' internal and external factors. Table 1.6 lists the factors summarised from studies and reviews found in the literature.

Table 1.6 Pharmacists' internal and external factors in expanding the role of pharmacist in patient care

Sources	Participants (Country)	Methods	Pharmacist's Internal Factors	Pharmacist's External Factors
Dunlop and Shaw, 2002[165]	Community pharmacists (New Zealand)	Surveys	- Lack of time - Lack of knowledge - Lack of clinical problem solving	- Absent reimbursement system - Finance - Appropriate space - Patient demand - Access to patient medical records
Roberts et al., 2008[166]	Community pharmacists (Australian)	Surveys	- Lack of staff - Lack of communication - Lack of teamwork - Lack of relationship with physician	- Lack of remuneration - Pharmacy layout - Patient expectation - External support/assistance
Uema et al., 2008[167]	Community, hospital/institutional and primary care clinic pharmacists (Argentina)	Surveys	- Lack of time - Lack of training - Lack of communication skills	NA
Scahill et al., 2009[168]	Practicing registered pharmacists (New Zealand)	Surveys	- The humanistic factors of pharmacists (lack of motivation, narrow and inward focus on current role, negativity towards current healthcare environment, silo thinking, personal factors)	- No integrated system of care and teamwork - Funder relationships and remuneration factors - Lack of research support - Lack of a united voice in pharmacy organisations - Lack of promotion - Lack of appreciation of the knowledge of pharmacists
Herman and Susyanty, 2012[55]	Community pharmacists (Indonesia)	Qualitative	- The willingness and commitment of pharmacists - Lack of knowledge (competencies) - Lack of communication with physician - Lack of time	NA
Nasution et al., 2014[56]	Hospital pharmacists (Indonesia)	Surveys	- The preparedness of pharmacists and their knowledge	- Lack of facilities (internet, computers) - Lack of support from institution - Lack of support from other healthcare professionals - Lack of budget
Cooksey et al., 2002[57]	Community pharmacists (The United States)	Review	- The shortage of pharmacists	- Structural and process
Martin-Calero, et al., 2004[58]	(Spain)	Review	- Lack of education - Lack of communication with physician - Lack of time - Lack of skills - Lack of staff - Interprofessional relationship with physicians -	- Absent of acknowledgment and economic compensation from healthcare authorities - No practice standard in implementing pharmaceutical care - Lack of documentation - Lack of reimbursement
Azhar et al., 2009[169]	Pharmacists (Pakistan)	Review	- The shortage of pharmacists - The pharmacists focused on management service	- Lack of recognition of pharmacists from health system which led to lack of interaction to the public

Table 1.6 continued

Sources	Participants (Country)	Methods	Pharmacist's Internal Factors	Pharmacist's External Factors
Semple and Roughead, 2009[164]	Acute care (Australia)	Review	- The workload of pharmacists - Lack of time	NA
O'Connor et al., 2011[170]	Palliative care (Australia)	Review	- Lack of education and training	- No remuneration
Jorgenson et al., 2013[171]	Teamwork (Canada)	Review	- Lack of role clarity - Pharmacists do not understand the role of other healthcare professionals in teamwork - Lack of pharmacists' assertiveness - Inadequate pharmacists' support - Lack of space - Inadequate pharmacists' training	- Other healthcare professionals have unclear expectation of the role of pharmacists in the team - Patient had no understanding of the role of pharmacists
Gholami and Najmeddin, 2013[172]	Pharmacists (Iran)	Review	- Inadequate skills pharmaceutical care - Lack of training	- Lack of supportive technology - Unclear rules and instructions within authorisation of pharmacist's role - Lack of financial or fee for service
Rubio-Valera et al., 2014[173]	Mental Health Care (Australia)	Review	- Lack of interactions with other healthcare professionals - The stigma of pharmacists - Lack of time	- Limited direct access to patients' clinical data - Other healthcare professionals' stigma - Lack of privacy - Inadequate remuneration

Notes: NA = Not available

Pharmacists' internal factors

As seen in Table 1.6, the pharmacists' internal factors ranged from the pharmacists' lack of time, knowledge, skills, and training to a lack of staff and interactions with physicians. There were two studies conducted in Indonesia which described barriers to the role of pharmacists in patient care in the community and hospital settings.[56, 174] Both studies found that lack of knowledge was one of the pharmacists' internal factors. The studies indicated that the lack of knowledge may result from inadequate training during undergraduate education or lack of ongoing profession development. Thus, Nasution et al. highlighted the importance of continuing professional development for registered pharmacists.[56] Lack of time was also mentioned as another pharmacist internal factor. The lack of time may relate to the lack of pharmacists' workforce. This may lead to high workloads which were also identified in other studies.[57, 164] Yuniar and Herman proposed to recruit more pharmacists and to empower pharmacy technicians as a means to overcome the lack of a pharmacist workforce in Indonesia.[174] Another internal factor in the community setting in

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Indonesian practice was a lack of communication with the physician. This lack of communication may result in a lack of rapport between pharmacists and physicians.

Pharmacists' external factors

The pharmacists' external factors as outlined in the literature included no practice standards, no support from the health system, lack of recognition from other healthcare professionals, and inadequate remuneration. As opposed to the lack of support from the Pakistani Government,[169] the Indonesian Government has supported the role of pharmacists in patient care through the introduction of the Indonesian Government Regulation No 51 in 2009.[56] In the hospital setting, the Directorate General of Pharmacy and Supply Medicine established a guideline for ward visits.[52] This suggests that the role of pharmacists in Indonesia should be viable with the support from the government. There was only one study which discussed the pharmacists' external factors as barriers to the expansion of the role of pharmacists in Indonesia. Nasution et al.[56] indicated that the pharmacists' external factors in the Indonesian hospital setting included the lack of facilities (internet and computers), lack of support from the hospital, lack of support from other healthcare professionals and lack of funding in providing patient care. The lack of financial support identified within the Indonesian setting was also similar to the lack of remuneration identified in other countries.[58, 165, 166, 168, 172, 173] The lack of recognition from other healthcare professionals found in Indonesia may result from the fact the pharmacists did not play their role as expected as a profession.[175] The lack of understanding of the role of pharmacists amongst healthcare professionals is also similar to that found in Spain[58] and Pakistan.[169] The lack of acknowledgement of the role of pharmacist may lead to lack of interaction with other healthcare professionals, which has also been previously identified.[58, 166, 173]

1.3.2 MODELS IN THE EXPANSION OF THE ROLE OF PHARMACISTS IN MEDICATION SAFETY

There are a number of possible models discussed in the literature for the implementation of new initiatives in healthcare services. One of the models is the sustainability model for implementing new initiatives proposed by the National Health System (NHS).[176] This model was developed by experts in the UK to determine

the strength and to ensure the sustainability of the new initiative. It aims to identify key barriers to sustainability and to overcome the barriers of implementation of the initiative. The model is made up of 10 sustainability dimensions which are covered under three factors (i.e. process, staff, and organisation). The Process factor includes the dimensions: benefits beyond helping patients, credibility of the benefits, adaptability of improved processes, and effectiveness of the system to monitor processes. The Staff factor consists of the dimensions of staff involvement and training to sustain the process; staff behaviours towards sustaining the change; as well as support and engagement of senior and clinical leaders. Organisation factor involves the new initiative fit with the organisation's strategic aims, culture and infrastructure for sustainability.

Another model is the Holland-Nimmo Practice Change System (PCS). This model is particularly applicable for innovation in the role of pharmacists in medication safety. The model provides guidance for leaders to link the current practice and the desired change of practice. The leaders should clearly address not only those who are involved, but also those who are affected by the change.[59] This model can be adapted by leaders in the organisation to justify whether the innovative role of pharmacists in medication safety is feasible. This model aims to identify barriers and to offer strategies to overcome these if pharmacists are to engage in expanding their role in medication safety.
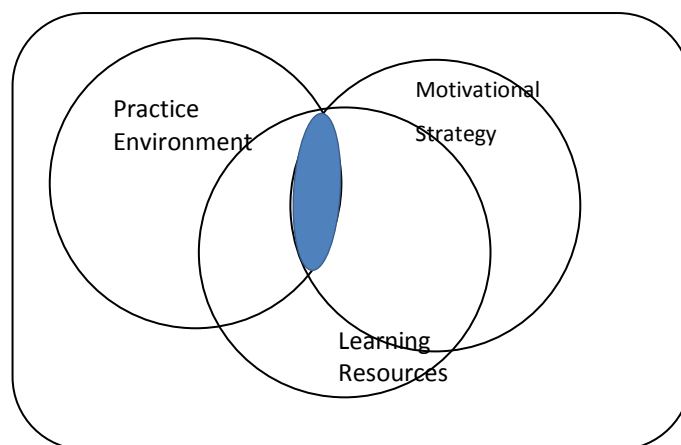
(Reprinted with permission from Holland RW, Nimmo CM. Transitions in pharmacy practice, part 3: effecting change-the three-ring circus. Am J Health Syst Pharm. 1999; 56:2236)

Figure 1.5 The Holland-Nimmo Practice Change System [59, 177]

Figure 1.5 shows that there are three components of the PCS, i.e. practice environment, motivational strategies, and learning resources.

Practice environment

The practice environment covers three levels of changes (i.e. society, health system and practice site) to support the role of pharmacists in medication safety. The society level needs to address factors in the form of regulation from the federal, state, and local authorities. This level also takes into consideration the acceptance of patients and other healthcare professionals in the practice changes at the national level. The health system level involves factors derived from the availability of resources, support from the health administrator, infrastructure (e.g. internet and computers) and access to information. The practice site level is related to how things are done, interpersonal relationships, and communication patterns. The practice site level consists of training for pharmacists, a clear job description for pharmacists, and differences in values and expectations of the present state of practice to the desired state of practice.

Motivational strategies

This component addresses different values of pharmacists, as well as those of other healthcare professionals. The strategies have two components such as the mind-set of the pharmacists and the systematic motivation to drive the changes of practice. Nimmo and Holland[59] emphasise that professional socialisation provides strong motivation for participants to learn and to engage in the new practice. This is important because those who have less motivation will gain less. Nimmo and Holland stated "*creating motivational strategy entails persuading practitioners to acquire any knowledge and skills required for competence in the changed practice and to desire to make that mode of practice their own.*" Thus, the leaders should create strategies to motivate the pharmacists to be practice ready as care providers.

Learning resources

The third component of the PCS model is the learning resources needed for the pharmacists in their role in medication safety. The resources consist of learning program materials (i.e. materials directly linked to the desired outcome), awareness (i.e. the learning program should meet the criteria for the specific training needed),

accessibility (i.e. the learning program should be accessible), affordability (i.e. the learning program should be affordable within the institution budget), and time (i.e. the training should be adjusted to the pharmacist's regular work time). Nimmo and Holland[59] recommended that these learning principles should apply to all practice. They indicated that all components of the PCS model should be addressed in expanding the role of pharmacists in medication safety.

1.4 INTERPROFESSIONAL EDUCATION (IPE) AND INTERPROFESSIONAL PRACTICE

1.4.1 WHAT IS IPE AND IPP?

Meads et al. suggested that in order to be professional, education needs to be interprofessional.[178] Interprofessionalism is required in the provision of healthcare services because no single healthcare profession can manage all the problems of patients. The word "Interprofessional" is commonly associated with collaboration, multidisciplinary or teamwork. However, Barr[82] argues that teamwork, collaboration and multidisciplinary are different from interprofessional. Collaboration has a wider view which involves not only healthcare professionals as team members but also organisations or health systems. Multidisciplinary is also different from interprofessional. In multidisciplinary, members of the team consist of different professions who are responsible for their own role. According to the American College of Clinical Pharmacy (ACCP), the different healthcare professionals involved should share mutual goals, responsibilities, and resources in the interprofessional activities.[179] Thus, in the present study, the term interprofessional was used because it has the notion that healthcare professionals involved in the collaboration should share the same goals and responsibilities in the healthcare service delivery.

Thistlethwaite et al.[85] stated that Interprofessional Education (IPE) is associated with education, while Interprofessional Learning (IPL) is associated with the learning experience of the participants in the collaboration. They suggest that IPL and IPE are used interchangeably. IPP is used to describe interprofessional activity involving healthcare professionals. The most frequently used definition of IPE in the literature is the definition of the Centre for the Advancement of Interprofessional Education

(CAIPE). The centre uses the term of IPE for learning processes from the academic through to the practice level. The CAIPE defines IPE as the following:[180]

> *"Interprofessional Education occurs when two or more professions learn with, from and about each other to improve collaboration and the quality of care".*

Freeth et al. have defined IPL (and its relationship to IPE) as follows: [70]

> *"Interprofessional learning (IPL): Learning arising from interaction between members (or students) of two or more professions. This may be a product of interprofessional education or happen spontaneously in the workplace or in education settings. Interprofessional practice (IPP): Two or more professions working together as a team with a common purpose, commitment and mutual respect. "*

In the present study, IPE is used when the discussion involves healthcare students and IPP when it refers to the healthcare professionals. In support of the argument of Freeth et al., Adam et al. point out the relationship of IPE, IPL, IPP and theoretical interdependent concepts which may influence IPE.[181] They suggested that to put IPE in to practice, it requires informal, integrated, and situated learning.[181] The informal learning helps the learners to gather interprofessional socialisation. The learners acquire the informal learning from their peers, students from other professions, their practice educators and their patients. From this learning, students gain interprofessional values of informal and social working. Integrated learning assists students to learn not only about each profession, but also interconnection between professions. In this type of learning the students learns about other profession roles and communication skills ('proportional knowledge'), problem solving and decision making ('tacit knowledge'), as well as learning and working experience in the community practice ('personal knowledge'). Situated learning reinforces the need of learning to the interdisciplinary practice environment and to learn from other health professionals. The most important process of the situated learning is learners have the chance to experience, share, discuss and learn from one another in the interprofessional collaboration as part of the culture of interprofessional practice in the workplace.

CAIPE reinforces that an effective IPE:[82]

- Works to improve the quality of care

- Focuses on the needs of service users and carers

- Involves service users and carers

- Promotes interprofessional collaboration

- Encourage professions to learn with, from and about one another

- Enhances practice within the professions

- Respects the integrity and contribution of each profession

- Increases professional satisfaction

In support of the CAIPE statement on requirements of IPE, Sargeant et al.[182] identified that understanding and respecting the role of other team members and communication were the two essential requirements. They also emphasised that an effective interprofessional practitioner needs the appropriate skills, knowledge and attitudes. These competencies were also discussed as requirements for healthcare professionals in IPP ensuring medication safety (See Section 1.2.3). Communication skills are considered essential for healthcare professionals in IPP. Knowledge competency is not only knowledge of one's own discipline, but also knowledge of the roles of other health professionals which may be acquired through IPE. Respect of other healthcare professionals can also be gained through effective IPE.

The outcomes of IPE

No studies have provided solid evidence on the benefits of IPE.[155] Research on IPE has mostly been on the attitudinal changes towards IPE after attending IPL.[72, 87, 183] Reeves et al.[184] stated that in the last decade much research has been conducted on IPE and they recommended employing qualitative and quantitative data to support the implementation of IPE.[184] A Cochrane review in 2009 suggested that further evidence is required to justify the effectiveness of IPE in health outcomes.[185] The review authors also believed that the recent studies on IPP only showed promising results because no evidence was provided from well-designed randomised control studies. The WHO found that both developed and developing countries almost equally perceived the benefits of IPE.[186] The benefits were similar as those reported by Hammick et al.[80] They found that benefits were usually discussed in terms of three main outcomes (i.e. for learners, for healthcare service delivery and for patient/client care).

Table 1.7 Classification of outcomes of IPE[82]

Level 1 – Reaction	Learners' view on the learning experience and its interprofessional nature
Level 2a – Modification of attitudes/perceptions	Change in reciprocal attitudes or perceptions between participant groups. Change in perception or attitudes towards the value and/ or use of team approaches to caring for a specific client group
Level 2b – Acquisition of knowledge/skills	Including knowledge and skills linked to interprofessional collaboration
Level 3 – Behavioural change	Identifies individuals' transfer of interprofessional learning to their practice setting and their changed professional practice
Level 4a – Change in organisational practice	Wider changes in the organisation and delivery of care
Level 4b – Benefits to patients/clients	Improvement in health or well-being of patients/clients

(Permission granted from John Willey &Sons Ltd)

Thistlethwaite and Moran[85] argued that although Kirkpatrick's model used by Barr et al. (See Table 1.7) may be useful to assess the level of evidence of an IPE initiative, it was too broad. Thus, Thistlethwaite and Moran[85] conducted a comprehensive literature review and categorised the outcomes of IPE into six themes; teamwork, role/responsibility, communications, learning/reflection, the patient, and ethics/attitudes. They found that teamwork, role and responsibility were the most frequent outcomes discussed in the literature. They suggested that learners will obtain these outcomes if the learners gain experience to be involved actively in a group. They recommended assessing several methods to measure the learning outcomes of IPE. They suggested that these learning outcomes may be obtained from formal education or from the real-world working environment.

IPE theoretical frameworks

Debates on theories to articulate IPE currently remain. Reeves and Hean argue that healthcare professionals believed that the theories belong to academia.[187] However, theories are required for better understanding of IPE in practice for learners, educators, practitioners, and policy makers.[188][187,189] Theories outlined in the literature are built in a wide range of disciplines such as sociology, psychology, education and management.[187,189-191] The theories are developed in accordance to the aims of understanding IPE. Hammick et al.[80] suggested that the 3P Model (Presage, Process and Product) was able to accommodate key messages to the adoption of IPE into practice. The presage encompassed socio-political context and

characteristics of learners, academics and administrators. Process involved methods employed in the learning and teaching, meanwhile Product referred to the outcomes of IPE. Hammick et al. argued that the model should reveal factors which may influence the process and product of IPE.[80]

Hean et al. proposed several dimensions to consider in the adoption of the theoretical framework of IPE. The dimensions covered how, which, when, why and what to study which were described in a guide of the Association for Medical Education in Europe (AMEE).[188] They used the term *tool box* to describe the dimensions. The tool box is selected based on the context of the understanding of IPE. They also argued adopting only one theory may be inappropriate knowing IPE involves complex interactions between participants from different courses of studies. They suggested that the theories of IPE are important as a reflection to the current practice and the tool box is viewed as a second reflection on the more objective understanding of IPE. According to the AMEE, the tool box (i.e. level tool boxes) may be employed in order to gain the understanding of factors of IPE at the Micro, Meso and Macro levels. The Micro level studies the interaction between teaching factors (i.e. learning context of how, what, where and when to teach IPE and faculty development in terms of recognition of ones professional beliefs and attitudes towards collaboration). Meso level explores the understanding of IPE as institutional factors (i.e. education institution and/or academic hospital environment) which may be influenced by leadership, resources and administration processes. The Macro level intends to gain an understanding of IPE at the systemic level of health and politics. Government policies, professional policies, and institution accreditation are crucial factors at the Macro level.

D'Amour and Oandasan recommend a concept of interprofessionality in this level dimension.[79] They suggested that the concept links IPE and collaborative practice to patient-centredness outcomes. Collaborations at Micro, Meso and Macro levels are essential to achieve interprofessionalism in patient-centred care. They named the framework the Interprofessional Education for Collaborative Patient-Centred Practice (IECPCP) which emphasises the association between patients, healthcare professionals, healthcare students, health academics, stakeholders at the institution and the policy makers to achieve patient-centred care. In the present study, the

IECPCP framework was adopted because it met the aims of the present study to understand the feasibility of implementing IPE and IPP which are aimed at enhancing patient care. The interconnection between IPE and collaborative practice in patient care can be seen in Figure 1.6. Further explanation of the levels can be seen in Section 1.4.3.
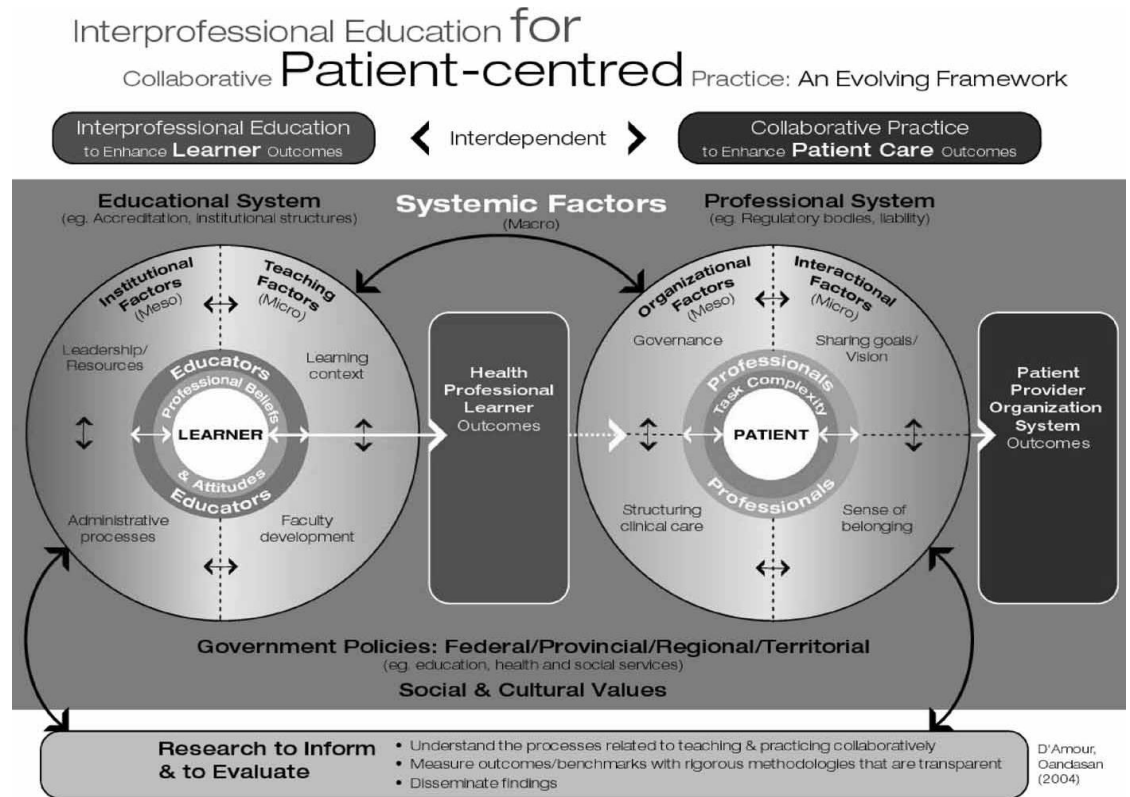
(Reproduced with permission of Informa Healthcare, [Interprofessionality as the field of interprofessional practice and interprofessional education: An emerging concept], [2005; Supplement 1:8-20], Copyright © [2005], Informa Healthcare).

Figure 1.6 The Framework of Interprofessional Education for Collaborative Patient-Centred Practice (IECPCP)[79]

When to initiate IPE?

Barr[192] put forward the introduction of IPE at the professional level. This was because the students already have their sense of professional identity and a better understanding of their role before learning from and about other professions. However, recent evidence recommends IPE should be introduced as early as the first year of undergraduate education and continuously learned until post qualification.[193-195, 196] These suggestions were to reduce the pre-existing stereotyped views[197] and to anticipate the different motivations[198] amongst healthcare students

which may influence the effectiveness of the implementation of IPE. Saxel et al. supported the introduction of IPE at undergraduate level.[195] They found medical, nursing and midwifery students learning during undergraduate improved their understanding towards the role of other healthcare professionals and allowed them to gain teamwork skills. Further, Ruebling et al.[199] confirmed that early introduction of IPE into healthcare students' learning, not only maintained the positive attitudes towards IPE but also improved them. Horsburg et al.[86] found that first year nursing, pharmacy and medical students had positive attitudes towards shared learning. These positive attitudes towards IPE were also shown in third year healthcare students.[200] Pollard et al.[201] conducted a three year longitudinal study of a pre-qualified interprofessional curriculum involving health and social care students. They concluded that the students had positive attitudes towards IPE but lacked confidence in their communication and teamwork skills in the second year of their courses. On balance the evidence indicated that IPE should be started early and delivered continuously during healthcare students' education.

IPE learning methods

Adoptions of learning strategies are dependent upon the learning needs of the students because none of the learning strategies is better than others. Key to the learning process, learners must gain valuable experience in learning from, with and about each other. Some IPE learning strategies are summarised below.

1. **E-learning and blended learning**: E-learning uses technology such as online seminars or workshop. Blended learning involves a mixed method of learning such as online seminars and face to face discussion. Authentic multimedia resources on medication safety in medical, nursing and pharmacy students were studied in the Australian setting. The study showed that such resources provided opportunities for students to engage interactively using a virtual experience of IPE in a clinical practice situation related to medication safety.[202]

2. **Exchange (seminars or workshop discussions)**: Each participant shares their experience, perspective and feelings while working in a group. Participants from different healthcare professionals have interactive discussions. Studies have shown that an IPL workshop activities improved healthcare students' knowledge on the topic, enhanced their communication skills and improved students' awareness towards other healthcare professionals roles.[93, 203]

3. **Observation (work shadowing/site visits)**: In this method participants from different healthcare professionals view the role of others in practice. A study in Canada suggested that chiropractors who had interprofessional shadowing enhanced the experience of IPE.[204] This may bring about benefits for future collaboration in patient care.

4. **Practice learning (student placement)**: This method provides students with a real-world practical experience where healthcare professionals work collaboratively. Khalili et al. reported that a clinical simulation practice as an addition to clinical placements in a Bachelor of Nursing and Practical Nursing course bridged the gap between theory and practice by enhancing competencies, confidence and real collaborative practice.[205]

5. **Problem-focused (problem-solving activities)**: This method is useful both at the pre- and post- qualification level. Hughes and Lucas[206] reported that healthcare students were inspired to learn independently, had improved communication skills, and respected each other's role better in problem based learning within a multiprofessional education curriculum. Barr et al. highlighted that problem-based learning is important because it stimulates critical evaluation of a problem amongst participants.[82]

6. **Received (lectures/presentations)**: Although this method is considered inappropriate in IPE, this method remains important to provide background information and to allow participants to raise questions in IPE activities. However, there is little evidence in the literature to support lectures as one of learning methods in IPE.

7. **Simulation (role play)**: This method uses simulated patients and healthcare students from different professions who are involved in providing care for the patient. The simulation method is recommended by a number of researchers because it offers a meaningful learning experience for the learners.[207, 208] Baker et al. found that the simulation learning method enhanced medical and nursing students' learning experience.[209]

1.4.2 THE WORLD HEALTH ORGANISATION (WHO) FRAMEWORK

IPE has developed globally, yet, there is a discrepancy between developed and developing countries. In the former countries, the preparation of IPP (i.e. practice of IPE) is concentrated on individuals and families, whereas, in developing countries, the practice moves toward community and public work.[178] The WHO supported the development of IPE worldwide with the release of "A Framework for Action on Interprofessional Education and Collaborative Practice (IPE-CP) in 2008. The goal of the framework is to provide an instrument which can be implemented by local governments based on their local needs by adopting or changing their system to achieve or improve health outcomes in their countries.

WHO (2010) Framework for Action on Interprofessional Education and Collaborative Practice
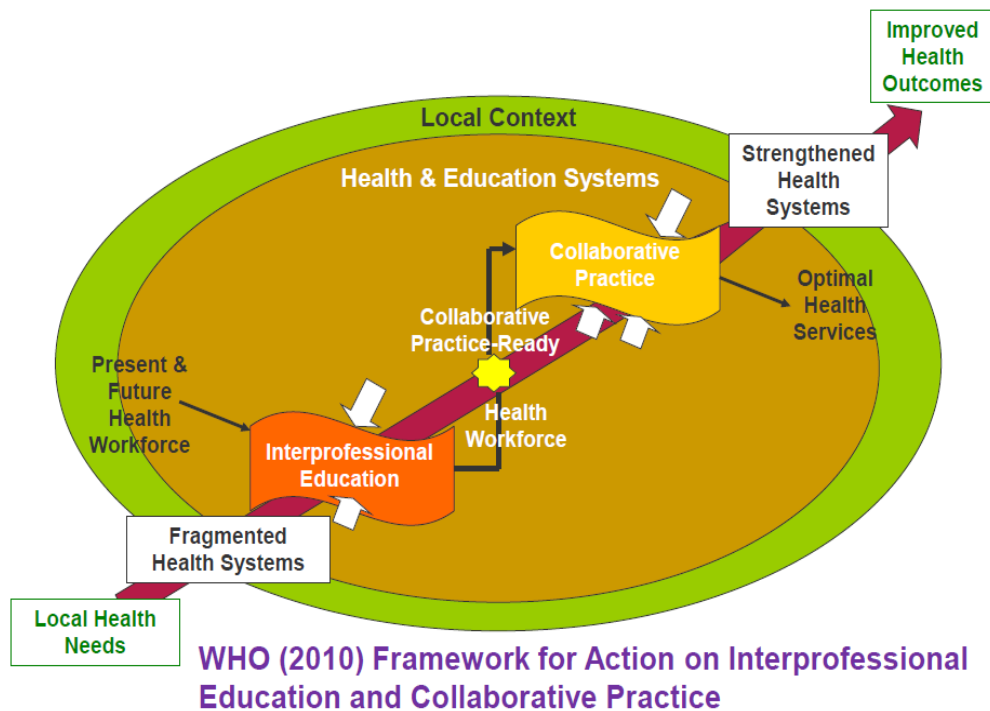
(Source: © World Health Organisation, Framework for Action on Inter-professional Education and Collaborative Practice, 2010).

Figure 1.7 The WHO Framework for Action on IPE (IPE-CP)

Figure 1.7 shows that healthcare professionals need to be provided with the opportunity to learn interprofessionally through both their education and health systems. Barriers such as fragmentation in health and/or education systems might restrict the implementation of IPE. Consequently, health and education systems need to change prior to the adoption of IPE into practice. If the learning experience

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of healthcare students in working with other healthcare professionals is maintained after graduating, the future professionals are ready to practice in a culture of interprofessionalism. This then will strengthen the health system as well as potentially improve health outcomes. Frenk et al. recommended that in the present century, reformation of health education is required to strengthen the future health system.[81] They further emphasised the importance of IPE to change the behaviours of healthcare professionals in the complex healthcare service.[81] In 2010, Barr criticised the WHO framework as only a 'blueprint' for the international and national policy makers to support the WHO global health goals.[210] Barr recommended that the framework should be viewed as a worldwide long term agreement of IPE. He also remarked that IPE remains a task for international organisations to establish multidisciplinary approaches in healthcare.

Research on the global clarification of IPE in 2010 reported that there was no significant difference between developed and developing countries in terms of the perceived benefits of IPE for teaching and learning as well as for practice and policy.[186] Some of the benefits mentioned were improvement of workplace practice and better health outcomes for the patients. However, Mickan et al. identified some barriers and facilitators from case studies in different settings in developed and developing countries (Table 1.8).[63] Although some similarities were found in terms of support from the government and legislation as well as financial incentives in both developed and developing countries, some differences are illustrated in Table 1.8. In developed countries, the governance model may facilitate a shared model of responsibility amongst healthcare professionals, meanwhile, in the developing countries, the traditional hierarchical model of healthcare service delivery is considered as one of the barriers. Mickan et al. stated that the lack of access to medical records for healthcare professionals in developing countries may restrict IPP.[63] This may relate to the culture and infrastructure of the health system. Thus, they suggested reforming the model of healthcare service delivery in those countries.

Table 1.8 Facilitators and barriers of collaborative practice in developed and developing countries [63, 84]

Countries	Facilitators	Barriers
Developed (Canada, Denmark, Japan, the United Kingdom)	Remuneration models, a governance model that shares responsibility between professionals, interprofessional rounds, committed leadership, joint discussion of patients by general practitioners and staff, supportive legislation, structured protocols, team conferences; regular face to face meetings; respect for other professions	Lack of electronic health record, interpersonal conflict, lack of structured protocols, unsuitable office and administrative space for all task, unclear division of responsibility and competency between different staff groups, discord between teams, time constraints, and lack of managerial support
Developing (India, Nepal, Oman, Thailand)	Approachability and adaptability of team member, evidence, government policy, commitment from high-level policy maker, ongoing staff training, clear guidelines, spirit of teamwork, supportive policies from universities, agencies, common goals, regulatory bodies, financial support, trusting relationships	Miscommunication, time constraints, traditional care delivery models, managing difficult personalities, staff turnover, lack of time and resources

1.4.3 FACTORS INFLUENCING THE IMPLEMENTATION OF IPE AND IPP

Several factors may influence the implementation of IPE. These factors may include poor communication among healthcare professionals,[103] ineffective team dynamics,[89] sub-specialisation in professions, lack of awareness of teamwork, professionals' traits,[211] and competition amongst healthcare professionals. Hall highlighted professional cultures as a major barrier in working with other healthcare professionals.[211] Professional cultures such as the power and hierarchy of physicians in team processes, lack of understanding of the role of other healthcare professionals, and professionals' stereotypes are seem to inhibit IPP. However, Ateah et al. stated that not all of those stereotypes are negative.[76] They described that nurses are known for their traits for being caring and trustworthy which brings a positive notion to the nurse as professional. Table 1.9 summarises factors affecting the implementation of IPE and IPP at the Micro, Meso and Macro levels from studies found in the literature. The factors at those levels were summarised based on the

IECPCP framework (Figure 1.6). Factors identified at these levels were analysed in assessing the feasibility of the implementation IPE and IPP in Indonesia as part of the present study.

Table 1.9 Factors at Micro, Meso and Macro levels affecting to the implementation of IPE/IPP

Sources	Setting	Micro level	Meso level	Macro level
IECPCP framework from D'Amour and Oandasan[79]	Education	Teaching factors: learning context (how, what, where, and when) and faculty development (how to facilitate IPE and recognise own beliefs and attitudes); Social and cultural values	Institutional factors: Leadership/resources; administrative processes (logistics and funding)	Educational system (accreditation, institutional structures); Government Policies (Federal, provincial/regional/territorial); Social and cultural values
	Practice	Needs of the patient/client and task complexity; Interactional factors: sharing goals/vision and sense of belonging; Social and cultural values	Organisational factors: governance and structuring clinical care (the structure of healthcare service)	Professionals system (regulatory bodies, liability); Government Policies (Federal, provincial/regional/territorial); Social and cultural values; structural and financial segregation of healthcare professionals training
Hammick et al., 2007[80](Review)	Education	Barriers: learners' characteristics; approaching to teaching and learning	Management support; funding; incompatible timetable and practical issues	Drivers: government policy, professional and public needs Barriers: regulatory framework; relationship with other stakeholders
Nisbet et al., 2011[212] (Review)	Education	Different expectation of each profession; the fear of loss of status; students have different ability and interest; lack of resources for program coordination and facilitation; lack of availability of staff in interprofessional programs	Structural barriers (i.e. curriculum and timetable difference); lack of organisational commitment and support	Historical interprofessional and intraprofessional rivalries
Abu-Rish et al., 2012[213] (Review)	Education	Learner-level compatibility; faculty not prepared for role; staffs support	Scheduling; funding; preparation time; leadership buy in; dedicated office space; technology support	Hierarchies
Indonesian Directorate General of Education, 2012[214] (unpublished report)	Education	Ego of students; unclear job description; communication skills; no staff who prepared to facilitate for IPE	Ego of school; funding; structural barriers (i.e. no rule of IPE; no facilities; curriculum differences	No legal law for collaboration; issues within the professions; the public perception of the role of healthcare professionals; different level of educations between health courses; no support from health education

Table 1.9 continued

Sources	Setting	Micro level	Meso level	Macro level
O'Daniel and Rosenstein, 2008[215] (Review)	Practice	Personal value and expectation; culture and ethnicity; disruptive behaviour; personal differences; gender; complexity of care; responsibility; rapid decision making	NA	Varying levels of qualifications and status; payment and rewards; differences in accountability, hierarchy; concerns regarding clinical responsibility; fears of dilutes professional identity; differences in language and jargon; difference in schedule and professional routines; historical interprofessional and intraprofessional rivalries; differences in requirements, regulations and norms
WHO, 2008 (Worldwide Review)[84]	Practice	Lack of time; difficult personality; miscommunication; professional prejudice and role; common goals; trusting relationship; respect	standard protocol; support from institutions	Government policies; training of staff; support from regulatory bodies; traditional model of healthcare delivery; financial support
Légaré et al., 2008[216] (Review)	Practice	Barriers: Time constraint; lack of applicability due to patients' characteristics; clinical situation. Facilitators: healthcare motivation; positive impact on the clinical process; and patient outcomes	NA	NA
Mickan et al., 2010[63] (Review)	Practice	Interpersonal conflict; communication skills; time constraint; personality; common goals; shared responsibility; unclear division of responsibility and competency between staff groups	Structured protocols of IPP; lack of electronic health record; leadership; support from institution	Government policy; training of staff; remuneration; financial; payment scheme for all healthcare professionals; support from regulatory bodies; professional prejudice and attitudes

Notes: NA = Not available

1.4.4 MODEL OF COLLABORATION

The FIP[30] established a pyramid to illustrate the degree of collaboration pharmacists have with other healthcare professionals namely Collaborative Pharmacy Practice (CPP). The CPP has five levels of collaboration based on the level of interaction of pharmacists with other healthcare professionals and their responsibility in managing patients' medications (Figure 1.8).
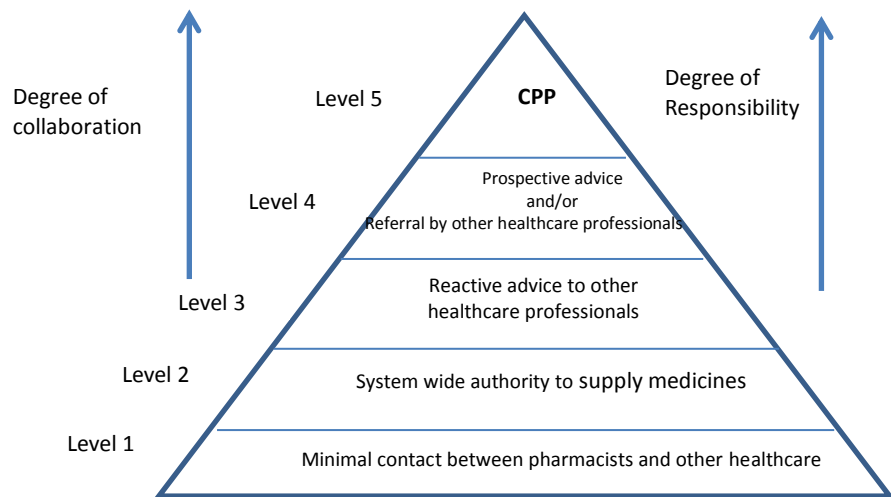
Figure 1.8 Level of Collaborative of Pharmacy Practice (CPP)

At *Level 1*, pharmacists have minimum contact with other healthcare professionals as well as with patients. The pharmacist works by themselves and has limited interaction with the physician. Interactions may occur while clarifying prescriptions. At *Level 2,* pharmacists give pharmacy only medication to patients. The National and Local Authorities regulate "the pharmacists only" and "the pharmacy only" medication. At this level, pharmacists have the authority to provide the medication to the patients in person based on their knowledge and skills. The interaction between the pharmacists and other healthcare professionals is built on personal relationships at *Level 3*. At this level, the pharmacists examine the prescribed medication and provide recommendations. The number of recommendations accepted is influenced by the level of rapport between physician and pharmacist. The level of interaction may occur in the hospital setting where ward pharmacists are present. At this level in the wards the activities of the pharmacists is limited to offering reactive advice.

At *Level 4*, the pharmacist is considered as part of a healthcare team. The pharmacist provides proactive advice which may influence the decision related to patients' medications. At this level, other healthcare professionals refer pharmacists to examine the rationale of the medication regimens of patients with multiple

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medications. The physicians may accept or reject the recommendations of pharmacists based on the level of trust in the competencies of the pharmacists.

At *Level 5* pharmacists have the authority to decide the medication of the patients. At this level, the pharmacists act as part of the healthcare team who share the responsibility of the decision of the medication. Pharmacists have the authority to change or initiate medication therapy based on agreements with the team. Pharmacists may visit patients in person or with other healthcare professionals, but they work as part of the team. The FIP[30] also highlights that the level of collaboration of pharmacists with other healthcare professionals is highly influenced by support from the national and local health system.

Another model of collaboration was from D'Amour et al. who created a model to promote patient care which takes into consideration the relationship and the interaction of 10 indicators at the level of the individual and organisational settings (Figure 1.9).[217] The individual level consisted of **Shared Goals and Visions** and **Internalisation** dimensions which contained four indicators (See Figure 1.9 in italics). The organisation level comprised **Governance** and **Formalisation** dimensions which had six indicators (See Figure 1.9 in italics). Table 1.10 displays definitions of the indicators in the model of collaboration. D'Amour et al. further described the typology of collaboration based on the level of achievement of indicators (Table 1.11). In the present study, this model was employed because it takes into consideration factors at the individual and organisational levels.

Governance
- Centrality
- Leadership
- Support for innovation
- Connectivity

Shared Goals and Vision
- Goals
- Client-centred orientation vs other allegiances

Formalisation
- Formalisation tools
- Information exchange

Internalisation
- Mutual acquaintanceship
- Trust
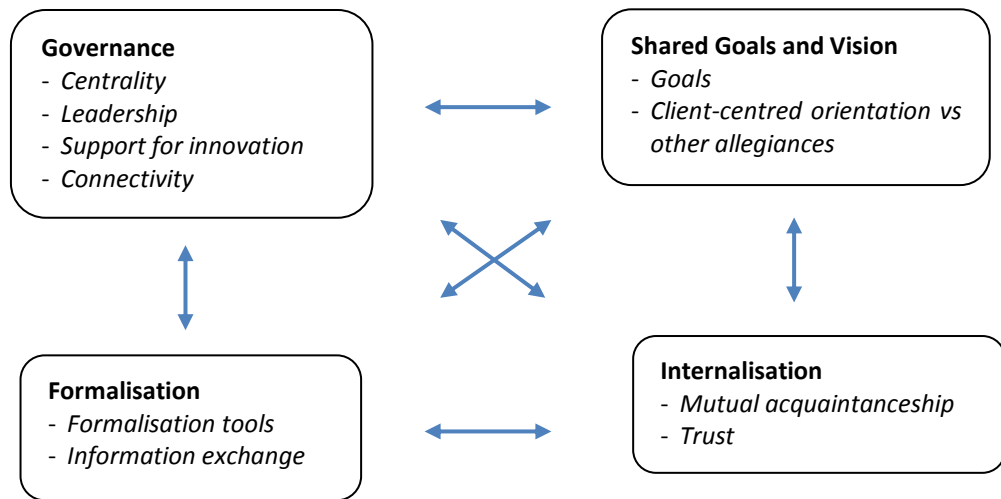
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Figure 1.9 The four-dimensional and indicators of D'Amour et al.'s model of collaboration [217]

Table 1.10 Description of indicators of collaboration by dimension [217]

Dimension	Indicators	Description
SHARED GOALS AND VISION	Goals	The indicator is related to professional values in the form of common goals, with particular reference to the consensual and comprehensive nature of the goals. Identifying and sharing common goals is an essential point of departure for a collaborative undertaking. The data suggest that the goal most likely to rally stakeholders is that of promoting patient-centred care. Providing a response to clients' needs thus becomes a central objective on which everyone can agree. The problem is that this goal entails a radical transformation of values and practices; its achievement would truly be an innovation
	Client-centred orientation vs other allegiances	There generally exists a complex structure of interests involving a variety of different types of allegiance: to the clientele, to the profession, to the organisation, to private interest, etc. The result is thus an asymmetry of interests among partners or a partial convergence of interests. Mutual adjustments are required, making the need to negotiate all the more important. In some cases, negotiation is possible. In others, interests are left largely unexpressed, and there is no negotiating process. When shared goals are not negotiated, the risk is that private interests will emerge, resulting in opportunistic behaviour and a concomitant loss of focus on client-centred collaboration.
INTERNALISATION	Mutual acquaintanceship	The data show that professional must know each other personally and professionally if they are to develop a sense of belonging to a group and succeed in setting common objectives. Knowing each other personally means knowing each other's values and level of competence. Knowing each other professionally means knowing each other's disciplinary frame of reference, approach to care and scope of practice. The familiarisation process occurs at social occasions, training activities and formal and informal information-exchange events. It is necessary to create the social conditions that will foster collaboration, particularly through social interaction.
	Trust	According to the professionals, collaboration is possible only when they have trust in each other's competencies and ability to assume responsibilities (that is, when goodwill exists). Trust reduces uncertainty. Professionals acknowledge that they do not know each other well, and so must constantly gauge risks and allow them to be placed in a vulnerable position. When there is too much uncertainty, the data show, health professionals hold on to responsibility for their

Dimension	Indicators	Description
		clients as long as possible to avoid collaborating. Such actions run counter to the goal of constructing networks. Professionals use the results of collaboration to evaluate each other and build trust.
GOVERNANCE	Centrality	Centrality refers to the existence of clear and explicit direction that is meant to guide action, in this care, towards collaboration. The data reveal the importance of the involvement of some central authorities in providing clear direction and playing a strategic and political role to further the implementation of collaborative processes and structures. Senior managers can exert significant influence on interorganisational collaboration; particularly through agreements they reach with the managers of other facilities to make the collaboration official.
	Leadership	Local leadership is necessary for the development of interprofessional and inter-organisational collaboration. Leadership may take a variety of forms and can be collaboration; leadership can be categorised as either emergent or as related to a position. With respect to collaboration, leadership can be exercised either by managers who have been mandated to do so or by professionals who take the initiative themselves. In the latter case, leadership is shared by the different partners and is subject to wide agreement. When leadership is related to a position, power should not be concentrated in the hands of single partner, all partners must be able to have their opinions heard and to participate in decision making.
	Support for innovation	Because collaboration leads to new activities or because it involves dividing responsibilities differently between professionals and between institutions, it necessarily entails changes in clinical practices and in the sharing of responsibilities between partners. These changes represent real innovations that must be developed and implemented. Collaboration cannot take hold without a complementary learning process and without the organisation involved drawing on internal or external expertise to support this learning process.
	Connectivity	Connectivity refers to the fact that individuals and organisations are interconnected, that there are places for discussion and for constricting bonds between them. Connectivity is the opposite of being cut off, isolated, separate. It solves coordination problems and makes it possible to make adjustments to practices. Connectivity allows for rapid and continuous adjustments in response to problems of coordination. It takes the form of information and feedback systems, committees, etc.

Table 1.10 continued

Dimension	Indicators	Description
FORMALISATION	Formalisation tools	Formalisation is an important means of clarifying the various partner's responsibilities and negotiating how responsibilities are shared. There are many types of formalised tools; inter-organisational agreements, protocols, information systems, etc. For professionals, it is important to know what is expected of them and what they can expect of others. Earlier findings suggest that collaboration is influenced less by the degree of formalisation than by the consensus that emerges around formalisation mechanism and the specific rules that are implemented
	Information exchange	The exchange of information refers to the existence and appropriate use of an information infrastructure to allow for rapid and complete exchanges of information between professionals. The findings suggest that professionals use information systems to reduce uncertainty in their relationships with partners they do not know well. Feedback provides professionals with the information they need to follow up with patients as well as to evaluate their partners on the basis of the quality of the written exchanges and feedback. This is an important aspect of establishing relationships of trust.

Table 1.11 Indicators of collaboration according to the typology [217]

Indicators	Active Collaboration LEVEL 3	Developing Collaboration LEVEL 2	Potential or Latent Collaboration LEVEL 1
Goals	Consensual, comprehensive goals	Some shared ad hoc goals	Conflicting goals or absence of shared goals
Client-centred orientation vs other allegiances	Client-centred orientation	Professional or organisational interests drive orientation	Tendency to let private interests drive orientation
Mutual acquaintanceship	Frequent opportunities to meet, regular joint activities	Few opportunities to meet, few joint activities	No opportunities to meet, no joint activities
Trust	Grounded trust	Trust is conditional, is taking shape	Lack of trust
Centrality	Strong and active central body that fosters consensus	Central body with an ill-defined role, ambiguous political and strategic role	Absence of a central body, quasi-absence of a political role
Leadership	Shared, consensual leadership	Unfocused, fragmented leadership that has little impact	Non-consensual, monopolistic leadership
Support for innovation	Expertise that fosters introduction of collaboration and innovation	Sporadic, fragmented expertise	Little or no expertise available to support collaboration and innovation
Connectivity	Many venues for discussion and participation	Ad hoc discussion venues related to specific issues	Quasi-absence of discussion venues
Formalisation tools	Consensual agreements, jointly rules	Non-consensual agreements, do not reflect practices or are in the process of being negotiated or constructed	No agreement or agreement not respected, a source of conflict
Information exchange	Common infrastructure for collecting and exchanging information	Incomplete information-exchange infrastructure, does not meet needs or is used inappropriately	Relative absence of any common infrastructure or mechanism for collecting or exchanging information

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1.5   THE CURRENT STATUS IN INDONESIA

1.5.1   HEALTH WORKFORCE

Data on the size of the health workforce was reported by the Ministry of Health in Indonesia[218] in 2014, with healthcare professionals totalling 891,897 out of a population of 253,609,643.[219] The distribution of healthcare professionals and the ratio per 1000 of the population can be seen in Table 1.12. The table shows that the ratio of nurses per 1000 population was the highest compared to other healthcare professionals. They were followed by the pharmacists, general practitioners and medical specialists. Data from the World Bank in 2008 from other South East Asia countries suggested that the ratio of physicians (0.4 per 1000 population) were higher than that in Indonesia in 2014.[220] An update from the World Bank in 2014 on the education and distribution of healthcare professionals in Indonesia showed that more qualified healthcare professionals are required and that the healthcare professionals need to be distributed equally in the country.[221] This suggests that reformation in health education and health policy are required.

Table 1.12 Number and ratio of healthcare professionals[218]

Healthcare professionals	The number of healthcare professionals in 2014	The ratio per 1000 population
Medical specialists	38,866	0.15
General practitioners	42,265	0.17
Nurses	295,508	1.17
Pharmacists	46,336	0.18
Others	422,975	1.67

1.5.2   NATIONAL HEALTH SYSTEM

The Indonesian health system employs decentralisation on financial support between the Central and the Local Governments. [222] The Central Government provides rules and guidance to conduct the service. The WHO recommended that a strong National Health Information System is required in the decentralisation system. [222] The information exchange between Local and Central Government needs to be accountable and up to date. Otherwise the system will fail to maintain a sustainable quality healthcare service to the community.

The decentralisation system influences the level of responsibility of the Local and Central Government in the healthcare service. The Local Government is responsible to manage their own issues within the provinces, districts, and sub-districts. Each sub-district in Indonesia has at least one physician who is responsible for a community healthcare service. The sub-district is also supported by sub-centres which are led by nurses. Decentralisation may also bring about an impact on human resources recruitment (in this instance, healthcare professionals) where the Local Government may employ their own district civil servants. The organisational structure of the health system in Indonesia from the Local to Central level (from bottom to top) can be seen in Figure 1.10. The figure also shows the referral system (in brackets) from the Primary Health Centre at the Village level to National Referral Hospital at the Central level.
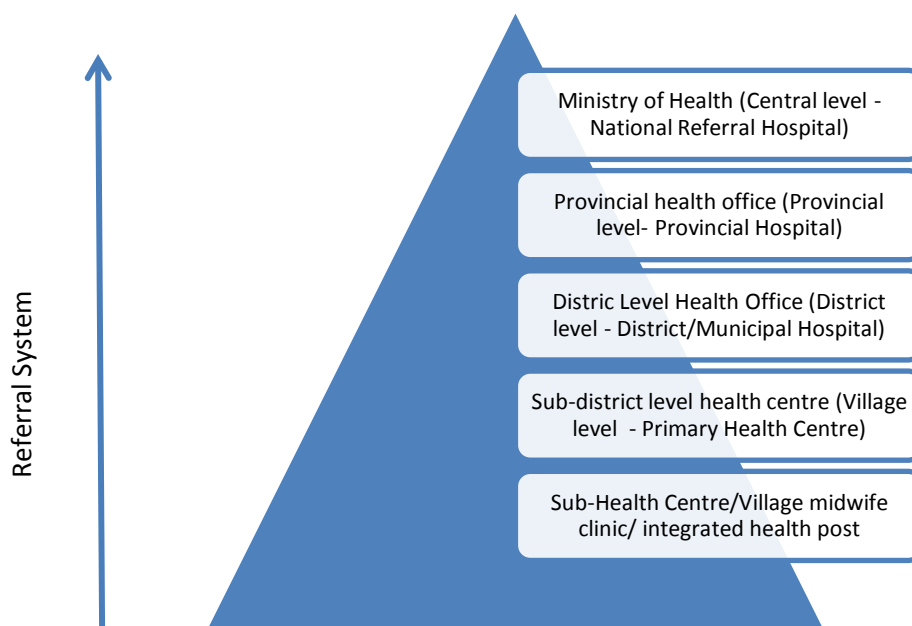
Figure 1.10 The structure of referral, government, and health systems[223]

A report from the U.S Agency for International Development (USAID) found that the private sector play a significant role in the Indonesian healthcare service[54] This was because the number of private hospitals was higher than public hospitals[224] in Indonesia and almost half of the Indonesian community visited pharmacies and drug stores for self-medication. However, the pharmacies were rarely acknowledged as healthcare facilities.[54] Data from the USAID showed that the Indonesian community has easy access to competitively priced medicine including prescribed medicines, but issues of counterfeit medications remain. Anyone can buy medication in pharmacies

or drug stores without the attendance of pharmacists. Although the Indonesian Pharmacy Association (IAI) has had an initiative "no pharmacist no service for medication" since 2009, its implementation may take many years. This may result from the fact that the IAI has no power in the Indonesian health system. As such, there are no penalties if the pharmacies disobeyed this regulation. The USAID data indicated that the irrational use of medication in Indonesian practice was largely driven by low fees for services to healthcare professionals.[54] These facts showed that the safe use of medication is an issue in the Indonesian health system.

1.5.3 HEALTH FINANCING SYSTEM

Data from the World Bank demonstrated that although the Indonesian population has little expenditure on medication, it still has a higher proportion of the population with out of pocket health expenditure.[225, 226] In comparison to other Asian countries, Indonesia has the highest proportion of out of pocket expenses for health expenditure after the Philippines. This high proportion may due to the fact that the World Bank collected the data in 2010 when health insurance was not well implemented in Indonesia. Recent changes in this area may however mean that the out of pocket health expenditure by the Indonesian population may change in the future. Jaminan Kesehatan Masyarakat (Jaskesmas), Jaminan Kesehatan Daerah (Jamkesda), Asuransi Kesehatan (Askes), Tabungan dan Asuransi Pensiun (Taspen), Jaminan Sosial Tenaga Kerja (Jamsostek) and private health insurers are existing health insurances available in Indonesia.[227] The Indonesian Government has initiated the adaptation of the National Social Security System (SJSN- Sistem Jaminan Kesehatan Nasional). The system is mandatory to all Indonesian citizens and it is managed by the Social Security Administration Agency (Badan Penyelenggara Jaminan Sosial Kesehatan-BPJS Kesehatan) since 1 January 2014. All Indonesian citizens are expected to be covered by the insurance through a continuing program and partnership with the existing health insurers by 2019.

1.5.4 THE JOINT ACCREDITATION IN INDONESIAN HEALTH EDUCATION

The Indonesian Accreditation Agency for Higher Education in Health (IAAHEH) was established in 2014 as a commitment of the Indonesian Government to improve the

quality of health education in the country.[228] The IAAHEH is an independent accreditation agency which aims to ensure the quality of education and that healthcare graduates meet the national standard for higher education (Standar Nasional Pendidikan Tinggi). The vision and mission of the agency are to ensure a trustworthy and sustainable standard of quality of health education.

This joint accreditation consists of seven health education institutions and their professional organisations including those of physicians (AIPKI- Asosiasi Institusi Pendidikan Kedokteran Indonesia and IDI-Ikatan Dokter Indonesia), nurses (AIPNI- Asosiasi Institusi Pendidikan Ners Indonesia and PPNI- Persatuan Perawat Nasional Indonesia), midwifes (AIPKI- Asosiasi Pendidikan Kebidanan Indonesia and IBI- Ikatan Bidan Indonesia), pharmacists (APTFI- Asosiasi Pendidikan Farmasi Indonesia and IAI- Ikatan Apoteker Indonesia), dentists (AFDOKGI- Asosiasi Fakultas Kedokteran Gigi Indonesia and PDGI- Persatuan Dokter Gigi Indonesia), public health (AIPTKMI- Asosiasi Institusi Pendidikan Tinggi Kesehatan Masyarakat Indonesia and IAKMI- Ikatan Ahli Kesehatan Masyarakat), and nutritionists (AIPGI- Asosiasi Institusi Pendidikan Gizi Indonesia and PERSAGI- Persatuan Ahli Gizi Indonesia). The role of IAAHEH is to facilitate the standard criteria and the standard assessment of interprofessionalism within healthcare professions and to facilitate integration of interprofessionalism in accreditation. At the time of writing of this thesis, the accreditation was under development and being piloted in a number of universities in Indonesia.

1.5.5 THE ROLE OF PHARMACISTS IN PATIENT CARE IN INDONESIA

Generally speaking, the role of pharmacists in patient care in Indonesia is very similar to that in other developing countries, which can be best described as unclear. The lack of a defined role for pharmacists in patient care in developing countries is reflected in the fact that the majority of pharmacists are business oriented. This often results in pharmacists being seen as people who sell products, rather than healthcare professionals who provide patient care. It is this recognition that pharmacists contribute to patient care which is essential to allow pharmacists to take on the role of care providers.

As opposed to Pakistan,[169] the Indonesian Government has supported the role of pharmacists in patient care in hospital and community settings through regulations[229, 230] and policy.[51] The Ministry of Health Decree No 889 in 2011 regulates administrative requirements of the role of pharmacists as care providers.[231] Consequently, all Indonesian pharmacists who work in the community, hospital and industry must have a license as a pharmacist to ensure the best quality of pharmacy services is provided. In the hospital setting, the Directorate General of Pharmacy and Supply Medicine created guidelines for pharmacists' ward visits.[52] The guidelines provide the standard of practice of joint and independent pharmacist's visits to the ward. In particular to the role of pharmacist in medication safety, the Indonesian Health Department[232] released guidelines for pharmacists on the responsibility and activities involved in ensuring the safe use of medication in the hospital setting. The Ministry of Health Decree No 58 in 2014 on the standard of pharmaceutical care in the hospital setting regulates the ratio of pharmacists and patients should be 1 to 30 for inpatients and 1 to 50 for outpatients.[230] This ratio should allow pharmacists to provide pharmaceutical care within the hospital setting. Those regulations indicate that Indonesian Government supports the expansion of the role of pharmacists as healthcare providers particularly in ensuring the safe use of medication.

Despite the fact the Indonesian Government supports the role of pharmacists, there are limited data on the role of pharmacists in patient care in Indonesian practice.[55, 175] Tan and Aslam reported that the role of pharmacists in 2000 was similar to that in England in the 1960s.[233] They also found that the resistance to the role of the pharmacist in patient care came not only from other healthcare professionals but also from pharmacists. Tan and Aslam suggested that the Indonesian Pharmacists Association (IAI-Ikatan Apoteker Indonesia) does not have significant authority with the Indonesian Government as does the Royal Pharmaceutical Society of the Great Britain. The powers of the IAI are limited and depend upon the policy in each province. As discussed in Section 1.3.1, the pharmacists' internal and external factors were reported to influence the role of pharmacist in patient care in Indonesian practice.[55, 56]

1.6   REVIEW OF STUDY METHODS

1.6.1   MIXED METHODS

The present study adopted mixed methods which have been used widely in the last decades[234] to answer similar types of questions as set out in the aims. Other researchers prefer to use integrated design instead of mixed methods design. The integration is not only at the final outcomes but also during the process of research and the sources used. [235] One of objections to the use of combined research methods is the different epistemology of qualitative and quantitative approaches, and the validity of the mixed method approach.[236] However, if both approaches have similar aims in understanding of the object under investigation then mixed methods approach is applicable.[236] Although validity of mixed methods approach remains controversial, Creswell and Clark contended that validity of mixed method study could be acquired by improving the strategies during data collection, data analysis and interpretation of the data.[234] They suggested that the investigator must take into consideration factors which might impede the validity of research activities. Errors during data collection might result from inappropriate sized samples and wrong sample selection, and techniques during data collection. Biased methods of analysis and different interpretation of themes in the qualitative approach may cause flaws in the data analysis process. Interpretation errors may occur when the investigator fails to relate the results to the research questions and inability to relate one result to others.

Mixed methods approach is employed for a number of reasons.[234, 235] Firstly, one data source is insufficient to answer the research questions. This is because each quantitative and qualitative data set has its own limitations. Quantitative data retrieves information from big numbers of participants, while qualitative data explores information intensively from individuals. Contradictive results may come up with both qualitative and quantitative approaches. This contradiction might not be captured if only one method of design is employed. Secondly, the mixed method approach is adopted for exploratory purposes. Qualitative studies may need to be implemented before a quantitative study. For instance, the investigator needs to find out the topics revealed from qualitative research before using a quantitative study for further exploration to understand the issues. Thirdly, the investigator might adopt a mixed method approach to comprehend complex problems using different

study designs. The design can be conducted sequentially or concurrently to answer the research questions. The investigator needs to use different strategies to improve validity of methods being used and to discuss any limitations of the study designs.[234, 236] If the investigator continuously adopts this in their research, combining these two methods remains acceptable. Mixed methods approach was employed in the present study because various study designs were required to answer the research questions posed.

1.6.2 REVIEW OF QUALITATIVE METHODS

The trend of data gathering and analysis in health sciences has shifted to qualitative study. In a positivisms' point of views, qualitative studies have a lack of reliability and validity because the nature of the study is to understand human experience.[237] The experiences tend to be subjective in themselves. However, Guba and Shenton proposed trustworthiness of qualitative studies may be acquired from credibility, transferability, dependability, and conformability.[238,237] Patton[239] stated that the credibility of qualitative study can be improved by understanding the philosophy of qualitative study which is naturalistic inquiry, inductive analysis, purposeful sampling and holistic thinking. Shenton suggested credibility is equal to internal validity in quantitative research.[198] Some techniques to ensure credibility of qualitative studies consist of having the results of the interview checked by the interviewee (member check), describing the phenomena under study thoroughly, regular debriefing sessions, and adopting triangulation in the research study. Transferability in qualitative study can be achieved by providing thick description of the study.[237, 238] Information such as the number of organisations who participated in the study; participants involved in the fieldwork, data collection design, the length and the time of the study undertaken should be reported. This allows readers who have similar settings to relate the results of the study to their current settings. Dependability is equal to reliability in the quantitative study. The investigator should report the process of the study in detail. The process details include research design and its implementation, step by step detail of the study and evaluation of the process of data collection, so that others who aim to conduct similar studies could obtain comparable results. Conformability is considered as objectivity in a qualitative study.

Despite the fact a qualitative approach is costly, time consuming, and requires a complex analysis in the process of data analysis, interviews have several advantages compared to questionnaires.[240] By nature, a one on one interview allows the interviewer to ask many open-ended questions, improve response rate, and the interviewer has more time to comprehend the interviewee's opinion on the topic discussed. In contrast, questionnaires have limited space to obtain the participant's opinion. In comparison to interviews, focus group discussions (FGDs) allow the investigator to explore the opinion from a small number of participants.[241] Further, the investigator may capture responses from a group of participants at once and report the group interaction in the discussion.[241, 242] In the present study, both interviews and FGDs were employed to capture data from different sources.

1.6.2.1   Questions in interviews

Patton pointed out that there are four types of interviews.[239] The interviews can be i) informal, ii) guided (semi-structured), iii) standardised open-ended and iv) standardised close-ended. In the present study, the interviews were designed using a semi-structured approach because in this type of interview, topics can be outlined in advance and the interviewer can decide the sequence during interviews. Although the flexibility of the sequence and wording may result in different responses from different participants, it allows systematic, conversational and situational approaches with the different interviewees. Open-ended questions were used to provide more vigorous responses. The question asked during the interview may include experience/behaviour, opinion/values, feelings, knowledge, senses, and background/demographic characteristics. These questions are very effective in obtaining comprehensiveness on the topic of the interviews. Singular and clear questions are essential to eliminate confusion amongst interviewees.

1.6.2.2   Analysis of qualitative study

Phenomenology and hermeneutic are two methodologies commonly employed in qualitative studies. Phenomenology was introduced by Husserl to purely understand the world through intentionality and essence of phenomena.[243] Laverty argued that phenomenology does not take into consideration participants' pre-understanding to the process of understanding the phenomena.[243] Hermeneutics methodology refers

to interpretation of human being experience which is influenced by historical and cultural backgrounds.[244] There is no absolute truth of interpretation because the aim of interpreting lived experience is to search for possible meaning of phenomena.[245] In this study, hermeneutics methodology was employed to interpret the meaning of participants' opinion and experiences during interviews and discussions.

Hermeneutics methodology uses 'thick description', 'paradigm cases', 'exemplar' and 'thematic analysis' to understand the meaning of human experiences.[246] Braun and Clarke[247] recommended thematic analysis in qualitative study because it is flexible and accessible in the analysis of qualitative study. There are two approaches in thematic analysis, inductive (bottom up) and deductive (top down) approaches. The inductive approach is organised based on open coding and categories in the analysis, meanwhile, a deductive approach employs a categorisation matrix in the analysis based on categories extracted from theories or literature.[248] Grounded theory is an example of a bottom up approach in which the analysis is data driven. While in top down approach, it is derived from researchers' theoretical or analytical interest. In support of Braun and Clarke's recommendations, Bazeley[249] stated that in qualitative data analysis, thorough thematic analysis, continuous activities of describing, comparing and relating one theme to others is recommended to support deeper analysis of the data.

Braun and Clarke described the six steps in thematic analysis[247] as the following; the investigator gets used to the data; creating preliminary codes where one sentence may be classified into several codes to obtain the widest possible perspectives of the issue being studied; themes exploration which involves constructing several codes in to themes by finding similarities, differences or relationships in the themes; assessment of themes which involves reviewing themes and refining themes; state and label the themes; and reporting the results. Qualitative study is not free from pitfalls.[247] Errors in data analysis, utilising the research questions as themes, unconvincing analysis, and no correlation between data or theory and the analysis may lead to potential bias in a qualitative study.

1.6.3 REVIEW OF QUANTITATIVE METHODS

1.6.3.1 *Validity and reliability of case vignettes*

There are four types of validity (i.e. content, face, construct, and criterion validity).[250, 251] Content validity should be done to ensure the content meet the objectives of the study. Face validity reviews the appearance of the survey to determine whether the survey is reader friendly and asks the appropriate questions. Content and face validity can be obtained from expert panels. Criterion validity is used to predict the likelihood of future occurrence in a population. Construct validity is used to demonstrate the difference between participants (respondents) using convergent and discriminant validity.[251]

Considine stated that the concept of reliability is related to consistency, stability, internal consistency and equivalency of the measurement.[250] There are several factors which may violate reliability of case studies. These include item sampling, construction of the items, test administration, scoring objectivity, item difficulties and participant factors.[252] Item sampling error can be minimised by using more items (questions). Errors in item construction might result from ambiguity of wording or tricky questions. Problems relating to the difficulty of tests may result from the questions being too easy or too hard for the participants.

Case vignettes used in the present study were designed as multiple choice questions (MCQs) on medication errors to assess the understanding of healthcare professionals of the root cause of medication errors. Collin suggested that if items in the MCQs are answered correctly by 50-75% participants, it means that MCQs are of moderate difficulty.[253] According to Wichman,[113] to determine system-based causes of errors, root cause analysis may be employed to identify 'what happened, why it happened, and what can be done to reduce the likelihood of a recurrence. Consequently, the MCQs of the medication errors case vignettes of the present study were created based on those questions. Oppenheim pointed out that the questionnaire should follow some basic rules: the length of questions should not be more than 20 words, avoid double barrelled questions, avoid proverbs, beware of leading questions, avoid double negatives, use simple words, and avoid jargon and ambiguity.[240]

1.6.3.2   Questionnaires translation and validity

Translating a survey from English to a non-English language may raise concerns of validity of the translated version. In assessing the validity and reliability of translated questionnaires one needs to consider the epidemiological and cultural differences of the languages.[254, 255] This is because in a translation survey, factors such as content, conceptual, semantic, and technical differences may influence the equivalence of the translated version compared to the English version. Hunt and Bhopal pointed out that conducting translation and back translation of the translated surveys may be necessary but it is not always sufficient[256] and required extensive time and monetary funds.[257] In order to ensure validity of the translated version, it is suggested the translated version is validated for its face, content, construct and criterion validity in the second language.[254, 256, 257] Dale stated that piloting the translated survey to a group of potential participants to find out their understanding on the translated version is considered sufficient.[254] Hunt and Bhopal also highlighted that emphasising the similarity of the concepts instead of items equivalence was one of approaches to ensure validity of the translation version.[256]

1.6.3.3   Factor analysis

DiStefano et al. stated that factor scores could be analysed using non-refined and refined analysis.[258] The non-refined method involves all scores of each positive item being added while the negative responses were deducted from the total positive scores. Negative responses may also be reverse-coded to have the same agreement as that in positive responses and adding them to the total positive scores.[259] The refined method was conducted by comparing the attitudes of participants towards sub-scales retrieved from the factor analysis. The scores of each sub-scale amongst groups were then compared based on its mean regression factor scores.

Explanatory Factor Analysis (EFA) and Principle Component Analysis (PCA) may be employed in the factor analysis. PCA is a unique mathematical solution analysis to explore components of a survey, whereas EFA is not.[242] Each item is scored based on their loading on its components and can be treated as a new variable (refined analysis) in PCA. This variable is standardised automatically in SPSS software based on their mean and standard deviation.

In the present study, to determine the best factor structure of the modified RIPLS survey in the study population, Principle Component Analysis (PCA) and Confirmatory Factor Analysis (CFA) were employed. These analyses were run in SPSS Windows and AMOS Version 22.0.[260] PCA was conducted to determine the latent variables in the data set.[258] CFA was conducted to determine if the current data fitted in the model of the RIPLS from an established questionnaire.[66, 261] CFA is a sophisticated analysis because factors are selected based on theory or pre-existing knowledge. Correlations of factors were assessed based on the p-value of covariance in the estimates column. If the p-value was <0.05, there is a correlation between the factors. CFA relies upon several statistical tests to assess the adequacy of model fit to the data. The model fit in CFA was assessed using several indices which include the Chi-square (χ^2) statistic, the Tucker Lewis index (TLI), the comparative fit index (CFI) and the root mean square error of approximation (RMSEA).[262] Chi-square test shows the differences between expected and observed covariance matrices. If the value is close to zero, it shows little different when the probability is higher than 0.05. CFI indicates the discrepancy function adjusted for sample size. TLI gives resolution to negative bias of discrepancy between Chi-square values of the hypothesised model and the value of null model. CFI and TLI values higher than 0.9 shows acceptable model fit. RMSEA is related to residuals in the model. In this case a value less than 0.06 shows better model fit.[263]

1.7   SUMMARY OF REVIEW FINDINGS

The present review provides discussion on the importance of IPP amongst healthcare professionals in the provision of healthcare services. Evidence shows that IPP as a means of improving medication safety which requires interprofessionalism and IPP can be developed through IPE. Medication errors may occur in every stage of the medication delivery process and all healthcare professionals may contribute to these errors. Pharmacists have a significant role to play in ensuring the safe use of medication during the medication delivery process. However, in Indonesia the role of pharmacists in patient care is yet to be established. As outlined in the literature, there are a number of factors which may influence the implementation of IPE and the expansion of the role of pharmacists in patient care. Thus, a study to assess the feasibility of the role of pharmacists to improve medication safety as well as the

feasibility of the implementation of IPE and IPP involving pharmacists in Indonesia is important. These issues were addressed in this study.

CHAPTER 2 RESEARCH QUESTIONS, AIMS, AND SIGNIFICANCE OF THE STUDY

2.1 RESEARCH QUESTIONS AND AIMS

This study sought to investigate the feasibility of expanding the role of pharmacists in patient care in an Indonesian setting to ensure the safe use of medication through the implementation of Interprofessional Education (IPE) and Interprofessional Practice (IPP). To do this the following three research questions and aims were addressed:

1.   Is it feasible to expand the role of pharmacists in patient care to ensure medication safety?

In order to fully address this research question, the following topics were investigated:

  1.1 The preparedness of pharmacy graduates to deliver patient care,

  1.2 The appropriateness of clinical review conducted by a hospital pharmacist as a means of identifying medication errors in Indonesian hospitals,

  1.3 Stakeholders', healthcare professionals' and pharmacy graduates' attitudes towards the role of pharmacists in patient care.

2.   Is the introduction of IPE feasible in an Indonesian university?

In order to fully address this research question, the following topics were investigated:

  2.1 The attitudes of medical, nursing and pharmacy students towards IPE,

  2.2 The influence of interprofessional learning (IPL) activities on medical, nursing and pharmacy students' attitudes toward IPE,

  2.3 Stakeholders' support towards the implementation of IPE.

3. Is the introduction of IPP focused on medication safety feasible within an Indonesian teaching hospital?

In order to fully address this research question, the following topics were investigated:

3.1 Healthcare professionals' attitudes towards IPP,

3.2 Healthcare professionals' understanding of medication errors and the attitudes towards professionals responsible for and factors contributing to the errors,

3.3 Stakeholders' and healthcare professionals' support towards the implementation of IPP.

2.2 HYPOTHESES

The following were hypotheses of the current study:

1. Male and female pharmacy graduates have no significant difference in terms of perceived attainment of all the attributes required to deliver patient care

2. Pharmacists conducting clinical review have no means of identifying medication errors in Indonesian hospitals

3. Stakeholders', healthcare professionals' and pharmacy graduates would not be supportive towards the role of pharmacists in patient care

4. Medical, nursing and pharmacy students have no significant difference in attitudes towards IPE and there will be no significant differences in attitudes towards IPE as they progressed through their degrees

5. Interprofessional Learning (IPL) activities would not have an influence on medical, nursing and pharmacy students' attitudes towards IPE

6. Stakeholders would not be supportive towards IPE

7. Healthcare professionals regardless of place of work and profession would have no significant difference in attitudes towards IPP

8. Physicians, nurses and pharmacists would have no significant difference regarding their evaluation of the medication error case vignettes and no significant difference in respect to which healthcare professionals are responsible for and the factors that contributed to the medication errors

9. Stakeholders' and healthcare professionals' would not support IPP implementation at the study hospital.

2.3   SIGNIFICANCE OF THE STUDY

To ensure medication safety, healthcare professionals need to work in a collaborative environment. This includes understanding the role and contribution that each professional can provide to ensure their practice reduces errors. Medication errors may lead to significant morbidity and mortality, and they are costly to the health system. This study provides information that is crucial to determining whether IPE needs to be incorporated into the undergraduate curriculum to promote effective IPP in the future. Further, through a pharmacist conducting clinical pharmacy services evidence of the role of the pharmacist in patient care through detecting and intercepting medication errors in an Indonesian hospital practice setting. This study provides recommendations on how pharmacists should be involved in improving the safe use of medication in Indonesian hospital practice and how this may be facilitated through IPE. These recommendations support an expanded role for hospital pharmacists in medication safety in Indonesia.

CHAPTER 3 RESEARCH METHODS

The current study was conducted at a university and a public hospital in Denpasar, Bali Indonesia. The research gained approval from the Curtin University HREC Approval Number HR175/2011 (**Appendix 1**) and from the study hospital and university Ethics Committee Approval Number 64/UN.14.2/Litbang/II/2012 (**Appendix 2)** and Research and Development Department Approval Number LB.02.01/II.C5.D11/4008a/2012 (**Appendix 3**).

There were five phases of data collection, which employed both qualitative and quantitative approaches. The phases are explained in Sections 3.1 to 3.5.

3.1 PHASE 1 DEVELOPMENT, VALIDATION AND TRANSLATION OF QUESTIONNAIRES

The first phase of the present study had four stages which are outlined in the following sections. This phase consisted of the development of case vignettes, and validation and translation of questionnaires used in the study. The case vignettes were developed based on common clinical problems seen in the Indonesian practice setting. Established questionnaires to determine readiness of healthcare students and healthcare professionals towards interprofessional education and interprofessional practice and pharmacy graduates' preparedness as care providers were employed. The questionnaires were translated and validated prior to data collection.

3.1.1 DEVELOPMENT OF CASE VIGNETTES

Case vignettes were created on medication errors as the focus of medication safety in the present study. These case vignettes aimed to gain an understanding of healthcare professionals' knowledge of medication errors and their perception towards professions who are responsible for the errors. The vignettes were created based on common cases in practice in Indonesia. The questions for each of the cases were generated based on root cause analysis as recommended by the Canadian Patient Safety Institute.[20] The questions developed included: Why the error occurred?; How to prevent it from occurring again?; and The level of severity of the

error?. The other questions sought the opinion of healthcare professionals on the profession (s) who was responsible for the error and on the type of medication error presented in each case.

The development of the case vignettes involved two iterations. The first series of six case vignettes were reviewed by five physicians, five nurses and five pharmacists. The results from the piloting of the case vignettes revealed that physicians felt that the cases were too specific. It was suggested that the cases might not be applicable to general practitioners, even though the cases were to be administered to physicians at the study hospital. They suggested cases should be on common diseases. Pharmacists who participated in pilot study also stated that they needed to read the cases twice or three times before they could answer the questions. Nurses who participated in the pilot found that the cases were too hard to understand and they needed to read them twice or three times to answer the questions. The participants of the pilot also identified that they did not understand medication errors. For this reason, the primary investigator created a one page information sheet on medication errors for the participants (**Appendix 4d**).

Based on the above feedback the case vignettes were redesigned to include more common diseases which may be seen in practice (as a second series of case vignettes). The cases were modified to include common disorders such as gastritis, pain, and adverse reactions, so to be relevant to a wider population. The second series were then piloted. The content validity was achieved by designing questions which assessed the respondents' knowledge of medication errors. Content and face validity of the case vignettes employed in the current study were validated by two clinical pharmacy academics at Curtin University. Construct validity of the case vignettes was assessed from item difficulty of the case vignettes. Collins suggested that 50-75% participants should provide the anticipated correct answers.[253]

3.1.2 QUESTIONNAIRES TRANSLATION AND VALIDITY

Established questionnaires used in the literature were employed in the present study. The questionnaires were the Readiness for Interprofessional Learning Scale (RIPLS) for healthcare students modified from Curtin University, Perth, Western Australia,[264] the RIPLS for healthcare professionals,[261] and the validated Pharmacy Graduate Questionnaire from the Faculty of Pharmacy, Nova Southeastern

University, Florida, USA to evaluate graduates' self-perceived ability to provide patient care.[265] The study was conducted in Indonesia, thus those questionnaires were translated into Bahasa Indonesian which is the delivery language in the country. The accuracy of translation of the translated version of questionnaires employed in the present study was obtained from an independent academic who speaks both English and Bahasa Indonesia (**Appendix 6**). Piloting the questionnaires to potential participants as suggested by Dale was also conducted to obtain contextual meaning of the translated questionnaire.[254] The questionnaires were then adjusted based on feedback obtained from participants of the pilots. Translated questionnaires were not translated back to English due to time limitations.

3.1.2.1   *Piloting of the graduates questionnaire*

Piloting the translated graduates' questionnaire as care providers (**Appendix 11b**) was conducted in 10 pharmacy graduates from the study university. Graduates were contacted by the primary investigator via their mobile phone or email. The graduates who participated in the pilot found that the questionnaire could be completed in 10 minutes. The graduates also pointed out the attribute related to "motivation" required explanation. Thus, the primary investigator amended the attribute of motivation as "motivation in providing patient care" in the questionnaire.

3.1.2.2   *Piloting of the RIPLS questionnaire to healthcare students*

The RIPLS questionnaire was adopted in the present study because it has been widely used in evaluating attitudes towards IPE in different courses of studies across a range of healthcare students including medical, nursing and pharmacy students.[266] In addition, there had not been any IPE learning activity in the study university prior to this study being undertaken. Employing the RIPLS questionnaire was therefore appropriate. The RIPLS questionnaire employed in the present study had 17 statements which were adopted from a validated RIPLS questionnaire used at Curtin University, Perth, Western Australia.[264] These statements were selected because they were considered to be more relevant for medical, nursing and pharmacy students. Each statement was scored using a Likert scale from 1 (strongly agree) to 4 (strongly disagree).

3.1.2.3 Piloting of the RIPLS questionnaire and case vignettes to healthcare professionals

The primary investigator piloted the RIPLS questionnaire with five pharmacy lecturers, five physicians, five nurses, and five hospital pharmacists. All of them were able to understand the statements in the survey and answer the survey in around 10 minutes. During piloting of the questionnaire, two participants suggested to add the year of graduation in the participants' demographic characteristics because some participants might not work as practitioners as soon as they graduated (See **Appendix 9b**). They also suggested for the RIPLS survey to provide options for background education apart from their current profession such as Masters/PhD, specialisation or sub-specialisation in a certain area of medicine.

The second series of six medication error case vignettes were piloted to three physicians, four nurses and three pharmacists at the hospital and three pharmacy academics. The medication error case vignettes (**Appendix 4b**) were provided with a one page information sheet on medication errors (**Appendix 4d**). The participants' responses to the case vignettes in the pilot test can be seen in Table 3.1. The table shows that Pharmacy respondents were the most accurate in answering the case vignettes questions. Reliability was unable to be gathered because of the nature of case vignettes of the present study where the cases were multifactorial and different.

Table 3. 1 The percentage of anticipated correct answers for piloting of the second set of questions.

Participants (N = 13)	Number of correct answers (N=30)	% of anticipated correct answers
Pharmacy academic	23	76.7
Pharmacist at the hospital	22	73.3
Pharmacy academic	20	66.7
Pharmacy academic	20	66.7
Physician	19	63.4
Physician	17	56.7
Pharmacist at the hospital	17	56.7
Pharmacist at the hospital	16	53.3
Nurse at the hospital	16	53.3
Nurse at the hospital	16	53.3
Nurse at the hospital	13	43.3
Physician	12	40.0
Nurse at the hospital	12	40.0

3.1.3 FACTOR ANALYSIS OF RIPLS QUESTIONNAIRES

The RIPLS questionnaires for healthcare students and healthcare professionals employed in the present study were analysed to determine whether the questionnaires had the same sub-scales as that of the established questionnaires.[66, 261] Principle Component Analysis (PCA) and Confirmatory Factor Analysis (CFA) were adopted to determine the sub-scales of the questionnaires. A review of PCA and CFA can be seen in Section 1.6.3.3

3.2   PHASE 2 ADMINISTRATION OF QUESTIONNAIRES

This phase consisted of administration of questionnaires to pharmacy graduates, healthcare students, and healthcare professionals. The pharmacy graduates from the study university were selected to determine their preparedness as care providers after completing their pharmacy education at the study university. Year 1 to Year 4 medical, pharmacy and nurse students of the study university were surveyed to assess healthcare students' readiness to participate in interprofessional education. Physicians, nurses and pharmacists of the study hospital and academics of medical, nursing, and pharmacy schools of the study university were recruited to determine their readiness to participate in interprofessional practice.

3.2.1 THE ADMINISTRATION OF GRADUATES QUESTIONNAIRE AS CARE PROVIDERS

3.2.1.1   The administration of graduates questionnaire

The primary investigator retrieved contact details of registered pharmacists (former pharmacy graduates) from the Pharmacy Department in the study university. The primary investigator sent the questionnaire package via email to the registered pharmacists. The package included graduates questionnaire (**Appendix 11b),** an invitation letter (**Appendix 12b**), and participant information sheet (**Appendix 12d**). This was sent to the 104 registered pharmacists. The primary investigator recommended that those who had participated in the pilot study should not return the questionnaire. After one week, the primary investigator sent a reminder to all the registered pharmacists. A second reminder was sent one week later. The registered pharmacists' responses were classified as "registered pharmacist group" in the present study.

Due to a poor response rate from the registered pharmacist group, the pharmacy interns were invited to participate in the study. The primary investigator attended a meeting with the interns two weeks prior to their final examination when the students had finished all their internship courses to become a pharmacist. The primary investigator invited the pharmacy interns in the meeting and administered the graduate questionnaire to the interns. These participants were classified as "pharmacy interns group" in the present study.

3.2.1.2   Analysis of pharmacy graduate questionnaire

The responses of the pharmacy graduates on attributes in delivering patient care and their desirability to have those attributes were analysed descriptively. The responses were compared based on gender. Data were analysed using SPSS Window version 22.0. Open-ended questions of the questionnaire were analysed using an inductive approach to identify common themes from the questions.[247]

3.2.2 THE ADMINISTRATION OF THE RIPLS QUESTIONNAIRE FOR HEALTHCARE STUDENTS

The primary investigator piloted the RIPLS questionnaire English version (**Appendix 7a**) to 10 International Medical students and the translated the RIPLS questionnaire (**Appendix 7b**) to 10 Pharmacy students, 10 Nursing students and 10 Regular Medical students. Around 20% of medical students at the study university were International students. The students who participated in the pilot found that they understood the questionnaire and were able to answer the questionnaire within less than 10 minutes. Some students stated they were not sure of the question whether they had previous interprofessional education. The primary investigator explained whether the students have had any kind of training or workshops which were conducted with other healthcare students. They suggested adding explanatory information on workshops or training for the question. The questionnaire was adjusted accordingly.

3.2.2.1 The administration of RIPLS questionnaire in Survey Year 2012

The primary investigator contacted each schools' administrator to obtain the names of the students from each year and to find out their timetable prior to administration of the questionnaire. Three hundred and thirty two nursing students, 270 pharmacy students and 870 medical students were enrolled in 2012. This gave a total of 1472 healthcare students. In order to obtain an estimate of overall support for IPE with a precision within 5%, a sample size of at least 385 was needed. In order to mitigate an anticipated non-response of 30% a total sample size of 550 was used. A stratified sampling strategy was used to ensure representation in the sample across all years in all schools. Based on the number of students in each school, the sample sizes were 306, 95 and 149 for Medicine, Pharmacy and Nursing respectively in order to obtain representative sample from each school. Further stratifying of students into four equal sized year groups within each school meant there were 77, 24, and 37 in each year of each school respectively. The primary investigator selected a random sample of the students using a random number generator available online.

The primary investigator invited the selected healthcare students to participate in the survey by attending classes, and explaining the aims and nature of the research. The primary investigator also explained the information package to the selected

students. The package consisted of the RIPLS questionnaire (**Appendix 7a/b),** an invitation letter (**Appendix 8a/b**), and participant information sheet (**Appendix 8c/d**). Because the study was voluntary, students who were willing to participate were asked to complete and return the questionnaire within one week. These activities were conducted in every Year of Study for each health course. In some Years of Study, the primary investigator enlisted the Year of Study coordinators to collect the questionnaires; this was particularly the case for the nursing and medical students. The primary investigator administered and collected the questionnaire directly for Year 4 medical students because they were about to start their internship.

3.2.2.2   The administration of RIPLS questionnaire in Survey Year 2013

For this survey year, the primary investigator administered the RIPLS questionnaires to medical, pharmacy and nursing students using similar methods as in the Survey Year 2012. However, only Year 1, 2 and 3 Cohorts from 2012 were recruited because the 2012 Year 4 Cohort had graduated. The healthcare students in these cohorts were also randomly selected which meant the healthcare students who participated in Survey Year 2012 may or may not necessarily have participated in Survey Year 2013. A total of 412 students were invited to participate in the survey, consisting of 231 medical, 111 nursing and 72 pharmacy students.

3.2.2.3   Analysis of the RIPLS questionnaire to healthcare students

In the present study, non-refined and refined factor analyses as suggested by DiStefano et al were adopted.[258] The attitudes of healthcare students towards IPE were determined based on their responses towards each RIPLS statement, the total score of RIPLS (non-refined method) as well as from the sub-scales of factor analysis (refined method). Descriptions of these analyses can be found in Section 5.1.3.

3.2.3 THE ADMINISTRATION OF THE RIPLS QUESTIONNAIRE FOR HEALTHCARE PROFESSIONALS AND CASE VIGNETTES

3.2.3.1 The administration of the RIPLS questionnaire and case vignettes for healthcare professionals

The sample was derived from 320 lecturers (273 medical lecturers, 30 pharmacy lecturers, 17 nursing lecturers) and 1107 healthcare professionals from the study hospital (206 physicians, 19 pharmacists, and 882 nurses). For the same reasons as those in the RIPLS healthcare student group (See Section 3.2.2), the RIPLS questionnaire and case vignettes were administered randomly to a total of 550 participants. The primary investigator conducted stratified random sampling using a random number generator available online in order to get proportional representation of academics and healthcare professionals at the studied hospital. The primary investigator selected 77 medical lecturers, 67 physicians, and 340 nurses who worked at the hospital. Because the number of pharmacy academics, nursing academics and pharmacists at the hospital was very low, the primary investigator invited all 30 pharmacy lecturers, 17 nursing lecturers, and 19 hospital pharmacists.

The primary investigator provided packages which consisted of an invitation letter (**Appendix 8b**); participation information sheet (**Appendix 10b**); the RIPLS questionnaire (**Appendix 9b**); medication error case vignettes (**Appendix 4b**); a medication error information sheet (**Appendix 4d**); and an envelope, and asked the selected participants to return the questionnaire and case vignettes via the internal courier. After one week, the primary investigator sent a reminder to the participants. After two months, the primary investigator followed up the participants who had not returned the questionnaire by sending them a second questionnaire (consisted of the RIPLS questionnaire and case vignettes) and personally collected the questionnaire from the participants.

3.2.3.2 Analysis of health professionals" RIPLS questionnaire and case vignettes

Similar analysis was conducted to that of the RIPLS questionnaire to healthcare students. Principle Component Analysis (PCA) was used to determine the number of factors represented in the questionnaire. SPSS Windows 22.0 was used to undertake

this analysis. Confirmatory Factor Analysis (CFA) was used to confirm the factors which constructed the questionnaire fitted the model derived from PCA or from the established questionnaire found in the literature. Analysis Moment Structures (AMOS) and SPSS Windows version 22.0 was employed in the CFA.[267] The factors from Reid et al. and factors that emerged from PCA were modelled using AMOS to justify the fitness of the factors to the study population.

The cases consisted of prescribing (Cases 1 and 2), dispensing (Cases 3 and 4) and administration errors (Cases 5 and 6). Each case had five standard multiple choice questions and one question seeking participants' opinions on the profession(s) responsible for the error. Each question of the case vignettes had three options because three options were as effective as four alternatives to answer the questions. Collins suggested that more options results in a longer time to read the questionnaire.[253]

Each of the six medication error case vignettes was viewed by each participant in the study, and they gave responses to a set of six questions relating to each one. These questions all required a True/False (binary) response. A Logistic regression model could be used to analyse each question for each case vignette separately, but the results of this large number of analyses may be difficult to interpret. The simpler approach was to analyse all the data in a single model, but the model needs to take into account the fact that many responses were provided by the same respondent. Because of the correlations between these responses, a General Estimating Equation (GEE) was used to analyse the data (in preference to a logistic regression model). In this model, some adjustment is made for the internal correlations in the dataset. In this context, the GEE may be thought of as a 'repeated measures' Logistic regression.[268]

3.3   PHASE 3 CLINICAL PHARMACY SERVICES

The clinical pharmacy services were conducted on a ward in a public teaching hospital in Bali Indonesia to provide evidence of the role of hospital pharmacists in ensuring medication safety by identifying and preventing medication errors in Indonesian.

3.3.1 STUDY DESIGN AND PATIENT POPULATION

This was a prospective study conducted in a 13-bed geriatric ward of a public teaching hospital, in Bali, Indonesia. The patients recruited into the study were those aged > 60 years, who did not have a primary diagnosis of malignancy, were not undergoing surgery, or receiving chemotherapy, and who were willing to participate in the study. The patients signed a consent form of participation (**Appendix 15d**) and received a participation information sheet (**Appendix 16b**). The consent was signed by the family member if the patient was unable to sign. In the ward where the study was undertaken, the protocol for the medication delivery process was as follows: the physician was responsible for writing the medications administered in the patients' progress notes, medication charts, and in drug order forms. However, in most instances, nurses would transcribe the medications ordered in the patient's progress notes onto medication charts and drug order forms. The drug order form is the primary form used to order medication from the Central Pharmacy in the hospital. Additional medications required after the physician visits the ward were ordered by phone or on a temporary drug order form. The Central Pharmacy dispenses medication orders based on the drug order form. The pharmacist on the ward dispenses medications in unit dose packaging based on the medication chart. Nurses document the administration of oral dosages on the medication chart, and record injectable medications in a nurse's log book.

The present study was conducted over a period of 20 weeks from February through July 2013, during which time the primary investigator provided clinical pharmacy services to the study ward. It should be noted that such services are not routinely provided within the study hospital.

3.3.2 DATA COLLECTION AND MEDICATION ERRORS CLASSIFICATION

The primary investigator undertook training in hospitals in Perth, Western Australia and in Jakarta, Indonesia prior to data collection to obtain a clear insight into the medication delivery process and the delivery of clinical pharmacy services. Medication errors were identified through the delivery of clinical pharmacy services (see next paragraph). The error classification system used in the study was modified

from a number found in the literature.[12, 106, 109, 123, 130-132] The classification was adjusted in order to identify as many errors as possible during the medication delivery process. In order to justify the validity of the current study's classification system for medication errors, two independent pharmacists checked the accuracy of each error identified.

The primary investigator provided clinical pharmacy services including medication reconciliation, clinical review, and patient discharge counselling. The primary investigator identified prescribing and transcription errors by reviewing patients' progress notes, their medication charts, and nurses' log books. The primary investigator identified dispensing and administration errors by reviewing medications dispensed from the Central Pharmacy in the hospital, reviewing medication charts, and checking stock levels in patients' medication drawers. The primary investigator also interviewed patients or their carers to identify prescribing errors (such as failure to complete patients' medication histories during admission), and to identify administration errors (e.g. whether or not medications had been administered as prescribed). In the ward where the study was undertaken, the patients were attended by their family members or carer 24 hours a day. Thus, if a patient was unable to communicate, the primary investigator obtained informed consent and patients' information on medication use from family members or carers.

Prescribing errors were classified as failures to prescribe regular medications in the patient's progress notes, incomplete patient medication history, and drug not prescribed although it was indicated (omission), unclear indication, wrong drug, wrong dose, wrong time, illegible hand-writing, medication duplication, unclear duration for antibiotic use, and contraindicated medication prescribed. In the study ward, the physician had to prescribe on three different documents as described previously in Section 3.3.1. This resulted in transcription errors which may or may not have resulted in further errors in later steps of the medication delivery process. Transcription errors were defined as discrepancies in the medication (drug name, dose, frequencies, and dosage form [tablets/capsules/syrups/injections]) written in a patient's progress notes, medication chart or drug order form, or in the nurse's log book. The nurse's log book was used as the nurse's record of administering injectable medications (including the route, the dose, and the time).

Dispensing errors were defined as wrong dose, wrong patient, wrong drug, duplication, labelling errors, wrong dosage form (whether capsules or tablets [oral], or injections [e.g. intravenous]), wrong quantity, drug omission, and drug dispensed although it was not charted on the drug order form. In all cases, dispensing errors were identified after the medication had arrived in the ward. Administration errors were classified as administering the wrong dose, wrong drug, wrong dosage form (tablet, syrup [oral] or injections [intravenous, intramuscular]), duplicated medications, following the wrong instructions for drug administration, drug omission, drug given not indicated, and documentation errors. Documentation errors were further subcategorized into two classifications. These classifications were created during the review process because it was found that some doses of medication had not been documented although they had been given, while others had not been given but were documented as given.

Monitoring errors were identified when monitoring patients' outcomes had not been conducted, or the results of investigations were not available prior to patients being discharged. System errors included 1) errors in drug distribution (e.g. three different pharmacies used to dispense medications based on patients' health insurance coverage, or stock outages); 2) errors in the health insurance system (e.g. when a medication was needed by the patient but it was not covered by their insurance, or the number of medications needed exceeded the limit of the patient's health insurance coverage); and 3) technical problems (phone and facilities malfunctions).

The Anatomy and Therapeutic Chemical classification was used to classify the medications associated with medication errors.[269] In addition, the World Health Organisation's *International Classification of Diseases Tenth Revision* (ICD 10) diagnosis classification was employed to report patients' diagnoses in this study. Potential outcomes of documentation errors were classified based on the study of Lisby et al (See Table 1.5).[116]

3.3.3. STUDY OUTCOMES AND ANALYSIS

The primary outcomes of this study were the nature and frequency of medication errors detected during the medication delivery process. Simple statistical analyses were employed in obtaining frequencies, means, and standard deviations. The

primary investigator coded and evaluated each error identified during the activity based on stages of the medication delivery process.

3.4 PHASE 4 WORKSHOP OF INTERPROFESSIONAL LEARNING (IPL) ACTIVITY

The IPL Workshop activity involving final year medical, nursing, and pharmacy students of the study university aimed to identify changes of the healthcare students' attitudes towards IPE before and after attending the workshop.

In July 2012, the primary investigator selected a total of 72 final year medical, pharmacy and nursing students from the study university to attend a workshop in September 2012 using a random number generator available online. The primary investigator attended the classes of final year nursing and pharmacy students at the study university and delivered an invitation letter (**Appendix 14b**) and participation information sheet (**Appendix 14d**) to selected students to take part in the workshop. The primary investigator invited the medical students through the Medical Students Guild as per the requirement of the Medical Department of the study university. Confirmation of students' participation was obtained within 2 weeks. The primary investigator also recruited a coordinator from each school. Two weeks before the workshop, the investigator sent a reminder to the students. Further follow up was conducted one week before the workshop through the assigned school coordinators. The primary investigator invited five facilitators from lecturers at the three schools who showed an interest to take part in the project. The facilitators underwent a facilitator training in IPL activity using Curtin University's IPE online module. The training of facilitators was conducted to ensure common perceptions of IPE and to obtain understanding of how to facilitate a discussion in an IPL activity. The IPL activity was selected because the activity allowed the participants to interact actively and share their experience while working in a small group.

There were three speakers in the workshop who gave lectures on quality and safety in healthcare, root cause analysis, developing interventions, medication safety and errors versus violations. The workshop materials were adopted from that of Curtin University Interprofessional Learning Workshop module on Medication Safety (**Appendix 14e**). The medication errors case vignettes used in the small group discussion were the same as that of the medication error case vignettes

administered to healthcare professionals in the present study (Section 3.2.3). On the first day, before attending those lectures, the students filled in the pre- workshop questionnaire (**Appendix 13b**). On the second day, the students experienced an IPL activity involving small group work which involved students from the three schools. In their group, the students discussed a case involving a medication error and determined the root cause of the error and devised an intervention to prevent its recurrence. The facilitators ensured all students took part in the discussion and shared their opinion on dealing with the cases. At the end of the session, the students presented the cases to their peers for critiquing and feedback. Finally, the students completed the post- workshop questionnaire (**Appendix 13d**).

3.4.1   ANALYSIS OF WORKSHOP ACTIVITIES

The responses of the students in the pre- and post- RIPLS questionnaire were compared. A Wilcoxon test was used to analyse the overall attitudes of the healthcare students in the pre- and post- questionnaire. Fisher's Exact Test was employed to identify changes of attitudes in the three courses. A statistically significant difference was determined to be a p-value of less than 0.05. Open-ended question responses from the post-workshop questionnaire were analysed using an inductive approach to determine the themes that emerged.

3.5   PHASE 5 INTERVIEWS AND FOCUS GROUP DISCUSSIONS (FGDS) ACTIVITIES

Qualitative analysis in this study used triangulation where data were collected from interviews and FGDs. Participants in the interviews were recruited by purposeful sampling. Interviewed participants were the Heads of Medical, Nursing and Pharmacy Departments in a public university in Bali, Indonesia and the Director of the Hospital and Head of Pharmacy Department at a public hospital in Bali, Indonesia. Meanwhile, participants in FGDs were physicians, nurses and pharmacists from a public hospital in Bali, Indonesia. In addition, pharmacy interns at a public university in Bali, Indonesia were also selected for FGDs. The pharmacy interns were invited to participate in the study to obtain their opinion on IPP in the current healthcare service and their preparedness to deliver patient care to ensure the safe use of medications. Questions asked during interviews and FGDs were developed in order to answer the aims of the current study i.e. the feasibility of expanding the role

of pharmacists in patient care in the study hospital; the feasibility of the implementation of IPE at the study university and the feasibility of the implementation of IPP at the study hospital. The semi structured questions delivered in these activities can be seen in **Appendix 5**.

Interview activities can be seen in Section 3.5.1 and FGDs activities in Section 3.5.2. Interviews with Heads of Departments at the university and in the hospital were conducted by the primary investigator. FGDs were facilitated by an independent facilitator to minimise bias during discussions. Three research questions were used in the interviews and FGDs:

1) Do pharmacists have roles in patient care to ensure the safe use of medication?
2) Is IPE feasible in the study university?
3) Is IPP feasible in the study hospital?

Semi-structured questions were developed (Section 3.1.2) as a guide for the interviews and FGDs (**Appendix 5**). This was to ensure consistency in the manner in which the primary investigator and facilitator conducted the interviews and FGDs, while helping ensure that the interviews and FGDs stayed on topic.

3.5.1 INTERVIEWING THE HEADS OF DEPARTMENT AT THE HOSPITAL AND UNIVERSITY

The primary investigator sent a participation information sheet (**Appendix 15b**) to all participants of interviews. The interviews were conducted during May and June 2012 and were between 30 to 60 minutes in duration. All participants signed a consent form (**Appendix 15d**).

3.5.2 CONDUCTING FGDS ACTIVITIES

Participants in the FGDs were recruited from healthcare professionals at the study hospital and pharmacy interns at the study university. There were between six to eight participants in each of the FGD. The discussions were conducted during May and June 2012, and each lasted between 45 to 80 minutes. All participants also signed a consent form (**Appendix 15d**).

3.5.3 ANALYSIS OF QUALITATIVE STUDY

Data triangulation to reduce the bias of a single source of data collection was adopted giving information from a range of participants. All interviews were recorded to ensure accuracy during the translation and transcribing processes. The interviews were translated and transcribed directly from Bahasa into English by the primary investigator to have more understanding in data interpretation. The primary investigator found some difficulties at the beginning of the translation and the transcription processes because of language differences between Bahasa Indonesian and English. This was also experienced by Thoha who also conducted a study in Indonesia.[270] She suggested using English as a hybrid language and utilising Bahasa Indonesia as the nuances of the translation. Therefore, this study adapted the same translation and transcription processes.

The translation and transcription were conducted within 48 hours after the interviews and FGDs were completed to ensure that important notes taken during interviews were not lost. After the primary investigator finished the first draft of transcription, the recordings were reviewed again and the transcripts edited to ensure that the interviews/discussions were transcribed verbatim. The final step involved editing the transcription for grammatical or typographical errors. The transcriptions of the semi-structure interviews were provided to the interviewees for checking while transcriptions of the FGDs were evaluated by the facilitator to ensure reliability of the transcriptions. However, in the process of reporting the results it became obvious that some of the participants' quotes were not easily understood when translated from Bahasa Indonesia to English due to differences in language structure, i.e. vocabulary and grammar. Thus, the primary investigator has provided interpretations to some of the quotes for clarification purposes. These interpretations, together with the original quotes are provided in the thesis where appropriate. The interpretations appear within a box directly below the original quote.

Hermeneutics methodology was adopted in the interviews interpretation.[245] The six steps of Braun and Clarke's thematic analysis were implemented in determining the themes (Section 1.6.2.2).[247] The primary investigator was familiar with the transcripts of interviews and FGDs because she translated and transcribed the interviews

herself. Coding of all sentences and phrases was conducted for each interview. Coding is a procedure where similar sentences and phrases are grouped together under similar headings or themes. NVIVO™ software was used in data management of themes.[271] Assessing, exploring and determining the themes were then conducted to justify the themes that were identified from the interview and FGD transcripts. Initially, themes were analysed based on the questions asked during each interview.[266] Then, the themes were sorted and compared across all interview transcripts as a whole. This was part of decontextualizing the meaning of the text.[245] Major themes that were identified from the interviews and discussions were sorted, compared and integrated with respect to the research questions.[266]

Frequencies of themes arising from interviews and FGDs were also presented to obtain an understanding of the theme distributions and the level of their importance with respect to the research questions. The higher the frequency of a theme emerging from the interview and FGD data the more importance attributed to that theme.

CHAPTER 4 RESULTS AND DISCUSSIONS: THE ROLE OF PHARMACISTS IN PATIENT CARE TO IMPROVE MEDICATION SAFETY

This chapter consists of two sections. Section 4.1 illustrates the results on pharmacy graduates preparedness as care providers (the results of Phase 2 Section 3.2.1). Section 4.2 demonstrates the role of pharmacists in medication safety by conducting clinical pharmacy services (the results of Phase 3).

4.1 PHARMACY GRADUATES PERCEPTIONS OF THEIR ATTRIBUTES AS CARE PROVIDERS

4.1.1 DEMOGRAPHIC CHARACTERISTICS OF PHARMACY GRADUATES (REGISTERED PHARMACISTS AND PHARMACY INTERNS)

One hundred and four registered pharmacist graduates from the study university were invited to participate in the study. However, there only 16 registered pharmacists responded. Thus, 45 pharmacy interns were also recruited of whom 40 completed the survey. Nine of 16 (56.25%) registered pharmacists were female and the mean age of the respondents was 24.0 ± 1.0 years. The majority of the pharmacy interns (30/40; 75%) were also female; with the mean age of the pharmacy interns being 22.4 ± 3.7 years.

4.1.2 QUANTITATIVE RESULTS

Pharmacy graduates attributes and their desirability in delivering patient care was assessed by administering the validated Nova Southeastern University Pharmacy Graduate questionnaire.[265] This questionnaire has also been used and validated in medical graduates.[272]

In general, gender did not appear to influence pharmacy interns' perceptions of their acquisition of certain attributes as care providers (Table 4.1). More than 60% of

female and male pharmacy interns believed that they had acquired the following three attributes required by care providers; namely the ability to listen, had a caring and compassionate nature, and had the motivation to provide patient care. In addition, a further four patient care attributes were reported to be partially acquired by more than 60% of both female and male pharmacy interns. Those attributes were the adaptability in a changing environment, capacity for independent learning for life, perseverance, and being satisfactory at interpersonal relationships in their professional life.

In regards leadership potential, 50% of male pharmacy interns stated that they had fully acquired the required leadership potential for patient care compared to only 6.7% of female pharmacy interns (p=0.004). The majority of female pharmacy interns (76.7%) believed they had only partially acquired leadership potential. Different proportions of female and male pharmacy interns reported having fully acquired the attributes of spirit of curiosity and ability to recognise their own limitation and strengths, with the majority of male pharmacy interns believing that they fully acquired those attributes. There were similar proportions of female and male pharmacy interns who reported that they had fully or partially acquired the open-mindedness attribute.

Table 4.1 also shows that there were no significant differences between male and female participants in terms of their assessment of the desirability of the attributes listed in order to deliver patient care. More than 90% of both males and females thought that 15 of 16 attributes were desirable to have. A higher proportion of male graduates (80%) thought tolerance of ambiguity was desirable compared to female graduates (50%, p = 0.001). Yet, the Fisher's exact test indicated that there was a statistically significant difference in male and female pharmacy interns' beliefs around the desirability of tolerance of ambiguity and uncertainty (p<0.001). This is interesting given the majority of pharmacy intern males and females perceived they had either fully or partially acquired this attribute.

Despite the fact that the number of registered pharmacists who graduated from the study university was very small (n=16), data analysis was also conducted. There were

more than 60% of registered pharmacists (males and females) who perceived having the following 10 attributes required to provide patient care (Table 4.2): ability to recognise their own limitations and strengths; ability to listen; ability to work in a team; ability in having a caring and compassionate nature; excitement with the subject of pharmacy; motivation; open-mindedness; perseverance; satisfaction in interprofessional relationships in professional life, and a spirit of curiosity. Similar to pharmacy interns, male and female registered pharmacists had no significant differences in their perceptions regards the desirability of proposed attributes required to deliver patient care (Table 4.2).

Further comparisons using Fisher's exact test were also conducted on pharmacy interns and registered pharmacist's responses. Table 4.3 shows p-values of perceived attainment and desirability of having the attributes amongst pharmacy interns and registered pharmacists. There were statistically significant differences found on having the attributes amongst both groups. As can be seen in Table 4.3 there were a number of attributes where registered pharmacists and pharmacy interns differed in their perceptions of having attained the attribute, namely the ability to inspire confidence in others, adaptability in changing environment, caring and compassionate nature, excitement with the subject of pharmacy, motivation to deliver patient care, open-mindedness, perseverance, and satisfactory in interprofessional relationships in professional life. These differences generally related to registered pharmacists being more confident that they had a particular attribute than their pharmacy interns counterparts. For instance, the majority of registered pharmacists were satisfied with their interprofessional relationship skills (Table 4.2). Meanwhile, most pharmacy interns only partially believed they had acquired this attribute (Table 4.1). However, there were not significant differences between pharmacy interns and registered pharmacists in regards the desirability of having the attributes to provide patient care.

Table 4.1 Comparison amongst male (n=10) and female (n=30) pharmacy interns of personal attributes as care providers and desirability to have the attributes using Fisher's Exact Test

PERSONAL ATTRIBUTES	SEX	YES (%)	PARTIALLY (%)	NO (%)	p-value	DESIRABILITY (%)
Ability to recognise own limitations and strength	F	56.7	43.3	-	0.269	100
	M	80.0	20.0	-		100
Ability to inspire confidence in others, i.e. patients	F	20.0	76.7	3.3	0.187	73.7
	M	40.0	50.0	10.0		100
Ability to listen	F	76.7	23.3	-	0.653	100
	M	90.0	10.0	-		100
Ability to work in a team	F	73.3	26.7	-	0.136	100
	M	50.0	40.0	10.0		100
Adaptability in a changing environment	F	26.7	70.0	3.3	0.667	100
	M	20.0	70.0	10.0		100
Capacity for independent learning for life	F	16.7	73.3	10.0	1.000	89.3
	M	20.0	70.0	10.0		90.0
Capacity for self-audit	F	23.3	66.7	10.0	0.334	88.9
	M	50.0	50.0	-		100
Caring and compassionate nature	F	73.3	26.7	-	0.315	100
	M	70.0	20.0	10.0		100
Excitement with the subject of pharmacy	F	70.0	30.0	-	0.278	100
	M	50.0	50.0	-		100
Leadership potential	F	6.7	76.7	16.7	**0.004***	100
	M	50.0	30.0	10.0		100
Motivation	F	70.0	26.7	3.3	1.000	100
	M	80.0	20.0	-		100
Open-mindedness	F	46.7	50.0	3.3	0.794	100
	M	40.0	60.0	-		100
Perseverance	F	30.0	60.0	10.0	0.757	100
	M	20.0	60.0	20.0		100
Satisfactory at interpersonal relationships in your professional life	F	23.3	70.0	6.7	0.859	93.3
	M	30.0	60.0	10.0		100
Spirit of curiosity	F	40.0	60.0	-	0.148	100
	M	70.0	30.0	-		100
Tolerance of ambiguity and uncertainty, i.e. decision making with inadequate data	F	13.3	46.7	40.0	0.888	50.0
	M	20.0	50.0	30.0		80.0

Notes: * showed significant difference

Table 4.2 Comparison amongst male (n=7) and female registered pharmacists (n=9) of personal attributes as care providers and desirability to have the attributes

PERSONAL ATTRIBUTES	SEX	YES (%)	PARTIALLY (%)	NO (%)	p-value	DESIRABILITY (%)
Ability to recognise own limitations and strength	F	77.8	22.2	-	1.000	100
	M	85.7	14.3			85.7
Ability to inspire confidence in others, i.e. patients	F	55.6	44.4		0.413	100
	M	71.4	14.3	14.3		100
Ability to listen	F	100	-	-	0.143	100
	M	71.4	28.6	-		88.9
Ability to work in a team	F	100	-	-	0.400	100
	M	71.4	28.6	-		88.9
Adaptability in a changing environment	F	77.8	22.2	-	0.329	100
	M	42.9	57.1	-		100
Capacity for independent learning for life	F	55.6	44.4	-	0.608	100
	M	28.6	57.1	14.3		100
Capacity for self-audit	F	44.4	44.4	11.2	0.776	100
	M	28.6	71.4	-		100
Caring and compassionate nature	F	100	-	-	-	100
	M	100	-	-		100
Excitement with the subject of pharmacy	F	100	-	-	-	100
	M	100	-	-		100
Leadership potential	F	50	50	-	-	100
	M	42.9	42.9	14.3		100
Motivation	F	100	-	-	-	100
	M	100	-	-		100
Open-mindedness	F	77.8	22.2	-	0.486	100
	M	85.7	14.3	-		100
Perseverance	F	88.9	11.1	-	1.000	100
	M	71.4	28.6	-		100
Satisfactory at interpersonal relationships in your professional life	F	66.7	33.3	-	0.604	100
	M	71.4	28.6	-		100
Spirit of curiosity	F	77.8	22.2	-	1.000	100
	M	71.4	28.6	-		83.3
Tolerance of ambiguity and uncertainty, i.e. decision making with inadequate data	F	11.1	77.8	11.1	0.211	88.9
	M	42.9	28.6	28.6		80.0

Notes: * showed significant difference

Table 4.3 P-values of perception of having personal attributes and desirability amongst pharmacy interns (n=40) and registered pharmacists (n=16)

PERSONAL ATTRIBUTES	PHARMACY GRADUATES	p-value	
		PERCEPTION	DESIRABILITY
Ability to recognise own limitations and strength	Recent		
	Registered	0.218	0.286
Ability to inspire confidence in others, i.e. patients	Recent		
	Registered†	**0.018***	0.525
Ability to listen	Recent		
	Registered	0.707	0.283
Ability to work in a team	Recent		
	Registered	0.423	-
Adaptability in a changing environment	Recent		
	Registered†	**0.021***	-
Capacity for independent learning for life	Recent		
	Registered	0.123	0.568
Capacity for self-audit	Recent		
	Registered	0.892	0.548
Caring and compassionate nature	Recent		
	Registered†	**0.032***	-
Excitement with the subject of pharmacy	Recent		
	Registered†	**0.005***	-
Leadership potential	Recent		
	Registered	0.099	-
Motivation	Recent		
	Registered†	**0.032***	-
Open-mindedness	Recent		
	Registered†	**0.033***	-
Perseverance	Recent		
	Registered†	**0.001***	-
Satisfactory at interpersonal relationships in your professional life	Recent		-
	Registered†	**0.008***	
Spirit of curiosity	Recent		
	Registered	0.079	0.273
Tolerance of ambiguity and uncertainty, i.e. decision making with inadequate data	Recent		0.100
	Registered	0.358	

Notes: † indicated the group had higher proportion of perceived believe of having the attribute; * showed significant difference

The open-ended question included in the survey identified other attributes which were reported to be developed amongst pharmacy graduates. These attributes included communication skills; ability in helping patients with self-medication; being independent, patience, honest and hard-working; and gained ability in managerial and entrepreneurship skills (see quotes below).

"Patience and solving own problems" (Graduate-07)

"Ability in helping the patients to provide self-medication service" (Graduate-09)

"Ability to manage a community pharmacy in terms of drug management as well as human resources to improve sales without disobeying quality for services" (Graduate-08)

"Honesty" (Graduate-11)

"Being independent, ability to understand own strength and limitation and ability to work with in a team" (Graduate -18)

"Ability to communicate with the patients and other healthcare professionals" (Graduate-51)

"Working under pressure" (Graduate -54)

4.1.3 QUALITATIVE RESULTS

Qualitative results were obtained from a focus group discussion involving pharmacy interns. The discussion was conducted after the questionnaire was delivered. Patience in dealing with patients, drug knowledge, communication skills, long life learning, and leadership or managerial skills were attributes identified in delivering patient care in the focus group discussion. Eight participants of the focus group discussion were also participants in the pharmacy graduates survey. Thus, during discussion with these students, further clarification was obtained from the participants regards the findings on the survey. It was revealed that although they agreed the attributes listed in the questionnaire were important in providing patient care to the patients, they mentioned that they were not confident enough to acknowledge that they had those attributes, although they were to graduate within two weeks after the discussion was undertaken. They claimed that the broad content of pharmacy subjects and short pharmacy placement exposure were potential

reasons for their lack of experience and knowledge during their pharmacy undergraduate degree. Comments reflecting this are provided below:

Theme 1: Lack of knowledge

> *I also agreed with the others, but most importantly I think it is knowledge about pharmacy, without this knowledge, would you think communication with patients and others will be effective?* (P4-PS)

> *"Pharmacists should also have the knowledge particularly when they communicate with physician with medical specialists"* (P6-PS)

> *"In my opinion, I think my knowledge on medication is very insufficient… Because during our learning in pharmacy at this university, the area of learning is very broad. It's not specific. I think it would be better, if the knowledge on medication will be specific. In certain kind of medication…I will be more confident. Because the knowledge that we got at university is very very broad and so I think I am not confident with my knowledge…"* (P1-PS)

> *"…I think that was because we have lack of knowledge on pharmacology and drug names although we graduated from pharmacy undergraduate but we only know about medication and its brand names in internship level [which was only 6 months]…."* (P4-PS)

Theme 2: Limited experience

> *"…we [as pharmacists] will directly involve in the community pharmacy in providing counselling where I think one of important attributes is our ability to communicate with community and also provide information regarding patients' medication"* (P2-PS)

> *"Although we've learned the theory on medication, but I don't know what will it be in practice. I think we need to have more experiences on how medications used in practice…"* (P4-PS)

4.1.4   DISCUSSION OF PHARMACY GRADUATES ATTRIBUTES AS CARE PROVIDERS

Pharmacy graduates (both registered pharmacists and pharmacy interns) from the study university either completely or partially perceived that they had the attributes to be care providers. In addition, the pharmacy graduates desired to have those attributes as pharmacists in delivering patient care. These results suggest that the pharmacy curriculum in the study university had fostered some of attributes required of pharmacists in delivering patient care. As opposed to pharmacy interns,

it was found that registered pharmacists who graduated from the university after one or two years perceived having more attributes to provide patient care. This may be related to registered pharmacists having been exposed to professional experience in their place of work. Thus, they thought that they had acquired more of the attributes than pharmacy interns. Further, the registered pharmacists may have the sense of responsibility being registered as pharmacists. This may explain the higher proportion of registered pharmacists who perceived having some of the attributes such as ability to inspire confidence in others and satisfactory at interpersonal relationships in their professional life compared to pharmacy interns. However, it should be noted that the proportion of registered pharmacists who participated in the current study was very small compared to pharmacy interns, thus these findings should be viewed with some caution. As opposed to the results of pharmacy graduates from Nova Southeastern University, Florida,[265] the majority of graduates perceived they had acquired all attributes required as patient carer. Whereas, pharmacy graduates (pharmacy interns and registered pharmacist) from the study university perceived to have less acquisition of the attributes. The differences may be influenced by the different curricula and learning methods adopted in the two universities. Nova Southeastern University has a 6 year PharmD program with a large amount of experiential learning and a strong focus on pharmaceutical care.[273] Meanwhile, pharmacy students from the study university had minimal content to shape their knowledge and experience in delivering patient care with their curriculum having a strong focus on pharmaceutical sciences.

Hasan et al found that clinical placements or practice experience was important in gaining patient care competencies amongst students.[274] Thus, they recommended adoption of clinical placements in undergraduate pharmacy curricula. Meanwhile, pharmacy students at the study university had minimal exposure to pharmacy practice experience during their course of study. These students had approximately 6 months (around 750 hours) of pharmacy practice experience which was obtained in community and hospital settings as well as in Government's institutions [(i.e. Primary Healthcare Service – Puskesmas and the National Agency of Drug and Food Control – Badan Pengawas Obat dan Makanan).

Through further discussion with pharmacy graduates about their perceptions of attainment of attributes to provide patient care; it was revealed that their lack of confidence in attaining the attributes was due to a self-reported lack of knowledge of medications because of the broad pharmacy curriculum. This finding was also described as one of characteristics of pharmacy education in Indonesia. Anderson stated that *"Indonesian pharmacists tend to have a wide knowledge of all areas of pharmacy practice but insufficient experience of one branch practice."*[275] This suggested that pharmacy graduates of the study university had little practical experience hence limited opportunities to interact with other healthcare professionals. This may impact on graduates' ability to form interprofessional relationships.

The finding that a higher proportion of male pharmacy interns perceived they had developed leadership potential compared to their female counterparts mirrored that of pharmacy graduates from Nova Southeastern University, Florida[265] and medical graduates from King College's London.[272] This may suggest that the male pharmacy interns had more active roles as leaders than female pharmacy interns in the study university. A group which shares similar social characteristics (gender in this regards) may influence group socialisation amongst its members. This is one assumption of group socialisation theory.[276] The higher proportion of male pharmacy interns who perceived of having the attributes may also have been influenced by Indonesian gender ideology which emphasises men as leaders.[277] In addition, the leadership gender ideology is considered similar to that of Asian countries. Cheng et al. described this model of leadership in the countries as paternalistic leadership.[278] Additionally, the higher proportion of males perceived to have higher leadership roles may also be influenced by one of male's characteristics as a risk taker. Ertac and Gurdal found that male leaders took more risks on behalf of the group than their female counterparts.[279]

The results of this study identified that although the majority of pharmacy graduates desired to be long life learners, most pharmacy interns reported only partial attainment of this attribute. Pharmacy graduates should be long life learners because it is essential to ensure their ongoing competency to practice as

pharmacists.[280] In addition, although pharmacy interns believed that they have the ability to work in a team, they were not totally satisfied with their interprofessional relationships in their professional life. This might result from the fact that there is limited experiential learning during their undergraduate course. Although the number of registered pharmacists in the current study was low (n=16), registered pharmacists were more confident in their interprofessional relationships in their professional life than pharmacy interns. This is likely to reflect the influence of professional practice in development of professional identity and the confidence to interact with other healthcare professionals.[281] This suggests that the pharmacy curriculum needs to be amended to allow more pharmacy practice experience during the undergraduate course. This may improve pharmacy graduates confidence in having the attributes to provide patient care.

Findings from this study indicated that the pharmacy curriculum at the study university needs to be redesigned to meet the requirements of pharmacy graduates to fulfil their role as a seven-star pharmacist. The concept of the seven-star pharmacist was introduced by the WHO in 2000.[282] It is "*contemporary and future pharmacists must possess specific knowledge, attitudes, skills, and behaviours in support of their roles.*"[280] The roles include care-giver, decision-maker, communicator, manager, long-life learner, teacher and leader. A report from the WHO experts group on preparing the roles of future pharmacists in the healthcare system highlighted that curriculum change and partnership amongst leaders in the university and pharmacy profession are essential to adopt the roles of pharmacist as in the seven stars.[280] It was suggested that the curriculum should be designed to foster the seven-star requirements amongst pharmacy graduates.

The concept of pharmacists providing patient care ("*pharmaceutical care is the responsible provision of drug therapy for the purpose of achieving definite outcomes that improve a patient's quality of life*") was introduced by Hepler and Strand in 1989.[8] In the same year, the American College of Clinical Pharmacy (ACCP) in the United States agreed to the Doctor of Pharmacy (PharmD) as entry level degree to prepare pharmacy graduates to meet the demand of patient care in the future.[283] Since then, pharmacy education in the United States has changed. However, Khan

suggested that the implementation of the concept of pharmaceutical care in pharmacy education should be critically adjusted to the needs of individual countries.[284] This was because direct adoption of that in other countries may potentially lead to prolonged pharmaceutical care implementation as a result of lack of facilities, a lack of skilled and qualified clinical pharmacists to develop the curriculum, and lack of support from local institutions and health systems. Further, curriculum development should focus on producing skilled and knowledgeable pharmacists based on local needs.

The curriculum in pharmacy in Indonesian universities was designed by an independent organisation (Indonesian Higher Degree in Pharmacy Education Association-APTFI) which provides a standard curriculum which should be met by all pharmacy education institutions in the country since 2000. Facing the fact that pharmacy graduates in the study university indicated a lack of preparedness in delivering patient care, it is recommended that the current pharmacy curriculum needs to be amended. Amendments should involve both the course content as well as practical experience. The curriculum redesign should focus on ensuring pharmacy graduates feel more prepared to deliver patient care.

The curriculum could be adjusted by introducing more experiential learning; which commences early and continues throughout the course. Experiential learning facilitates pharmacy students to reflect on real practice experience, to conceptualise the theory, and finally to actively participate in practice.[285, 286] For instance, pharmacy students may be exposed to experiential learning by conducting pharmacy practice simulations and shadowing pharmacists in practice. These activities should allow pharmacy students to learn how to engage with patients.

Currently in Indonesia, pharmacists' engagement in pharmaceutical care is very limited. Thus, support from pharmacy organisations (e.g. Indonesian Pharmacy Association -IAI) is essential. The organisations should provide a supportive environment to foster professional socialisation amongst pharmacy students. Organisations could facilitate students' learning by encouraging their members to provide facilities and share experiences with the students to allow them to gain an

understanding of pharmacists' roles in community and hospital pharmacy. Members of pharmacy organisations (i.e. pharmacists practitioners) could act as role models or mentors during students' learning.[287] In the current practice, pharmacy organisations are involved in graduates' pharmacy registration. In addition, a supportive health system and environment is also required for pharmacy students' engagement in hospital or community practice. This means that various supports from health systems, health education institutions as well as pharmacy organisations is essential in order to improve pharmacy graduates opportunities to engage in practice and hence become prepared to deliver patient care.

A recent development of Indonesian health curriculum has occurred in early 2014. In order to ensure the quality of healthcare providers in Indonesia, a joint accreditation authority for seven health professions (physician, nurse, midwife, pharmacist, dentist, public health, and nutritionist) was established. This accreditation organisation was named Indonesian Accreditation Agency for Higher Education in Health (IAAHEH).[228] One of the aims of this accreditation body is to facilitate the incorporation of interprofessionalism in Indonesian health education. This suggests that the Indonesian Government is seeking to improve interprofessional care through the advancement of interprofessionalism in Indonesian health education. Thus, according to WHO framework for action on IPE and collaborative practice (See Figure 1.7),[84] if health education providers are required to have interprofessionalism in their curriculum, this will facilitate healthcare graduates (pharmacist, in this instance) to have more collaboration with other healthcare professionals in providing patient care. Thus, it should allow more pharmacists' engagement in working interprofessionally in delivering patient care.

4.2 THE ROLE OF PHARMACISTS IN PATIENT CARE TO ENSURE MEDICATION SAFETY

4.2.1 DEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS

Ninety-two of 121 patients (76%) who met the inclusion criteria consented to participate during the 20 weeks of study. The participants consisted of 37 (40%) female and 55 (60%) male patients, with the majority in their 70s (mean age: 71.4±7.5 years).

Fourteen patients (15%) were admitted because of diseases of the nervous system such as non-haemorrhagic stroke, vertigo, and epilepsy. Eleven patients (12%) were admitted with cardiovascular diseases, and a further 11 patients (12%) with digestive tract diseases. Eight patients (8.7%) were admitted with both cardiovascular and renal disease. In addition, seven patients (7.6%) were admitted with respiratory diseases such as community acquired pneumonia.

4.2.2 MEDICATION ERRORS DURING MEDICATION DELIVERY PROCESS

The 92 patients in the study were ordered a total of 770 medications, ie, 8.4±3.3 medications per patient. The total number of doses charted was 7,662 ie, 83±81 doses per patient. A total of 1,563 medication errors were identified through the in-hospital clinical pharmacy services provided by the investigator, representing an error rate of 20.4% (1,563 errors/7,662 doses). As can be seen in Figure 4.1, administration errors were the most frequent medication errors identified (59.3%), followed by transcription errors (14.7%), dispensing errors (14.4%), prescribing errors (6.5%), system errors (5.0%), and monitoring errors (0.1%). System errors identified were related to drug distribution and health insurance issues. Errors in drug distribution included unclear procedures to obtain the medication when there was no stock in the Central Pharmacy. In addition, health insurance-related errors involved a different quantity of medication dispensed than ordered, in accordance with the insurance policy. Lists of frequency of medication errors identified in the present study can be seen in **Appendix 17**.
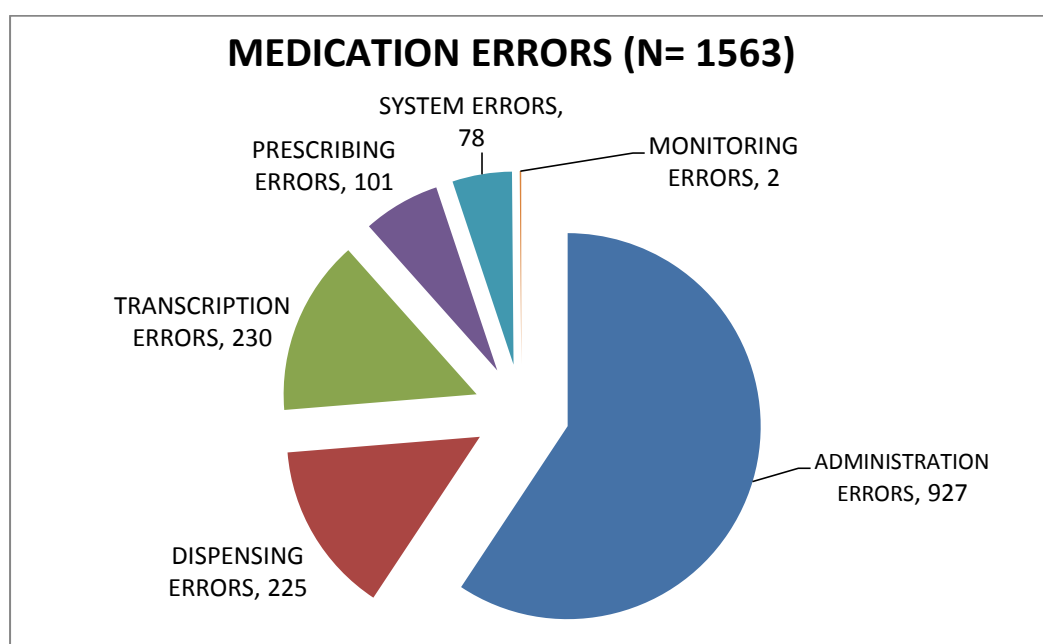
Figure 4.1 Types and number of medication errors identified

4.2.2.1 Administration errors

The majority (64.0%) of the 927 total administration errors were associated with documentation, as shown in Figure 4.2. Drug omission was the second most common administration error identified (22.9%). Pharmacist interventions during the study period prevented eight near miss events during the administration stage. These near miss events included patients potentially receiving the wrong drug or wrong dose of the right medication. For example, Humulin® insulin (Eli Lilly and Company, Indianapolis, IN, USA) was prepared to be given at a dose of 100 units more than the prescribed dose; 1 g of ceftriaxone was to be given instead of 2 g, because the nurse assumed one vial contained 2 g instead of 1 g; also, a dose of pantoprazole was not prepared to be administered as it had been omitted from the patient's drug regimen.

Administration Errors (N: 927)

Category	Value
Wrong dosage form	2
Duplication	3
Near miss	8
Wrong drug	8
Drug given not indicated	10
Wrong drug instruction	19
Wrong time	35
Wrong dose	37
Drug omission	212
Documentation	593
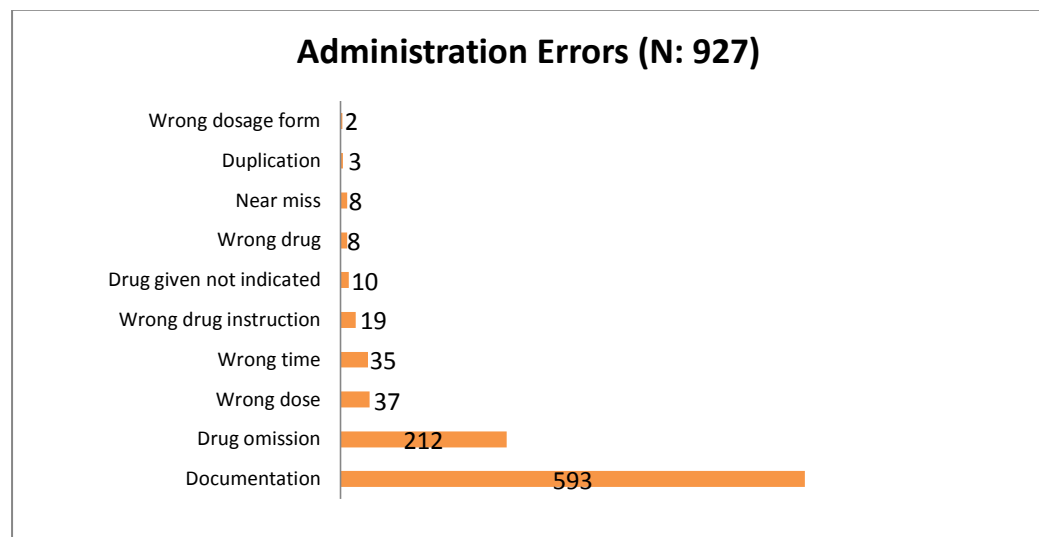
Figure 4. 2 Types and number of administration errors identified

4.2.2.2 Transcription errors

The majority of the 230 total transcription errors (35.2%) involved drugs needed by patients not being transcribed either onto the medication chart or drug order form, or into the nurse's log book (Figure 4.3). These transcription errors resulted in seven drug omissions in the administration stage and two medications being given late. Valsartan, simvastatin, lansoprazole, calcium carbonate, and paracetamol were some of the medications identified in transcription errors which led to drug omission. Other transcription errors involved cessation of medications in patients' progress notes but this cessation not being reflected on their medication charts. Almost half (45%) of medications involved in this type of transcription error were administered to the patient. Medications identified in this type of error included cefixime, paracetamol, pramipexole, captopril, lactulose, and Laxadine® (Galenium Pharmasia Laboratories, Semarang, Indonesia). These results demonstrate the need for accuracy during the transcription process in order to avoid administration errors in the medication delivery process.

Transcription errors (N=230)

Type	Number
Wrong patient	1
Wrong dosage form	2
Wrong time	5
Wrong frequency	7
Wrong drug	8
Drug not needed transcribed on drug order form	10
Wrong dose	52
Drug ceased on progress notes had not ceased on medication chart	64
Drug needed not transcribed	81
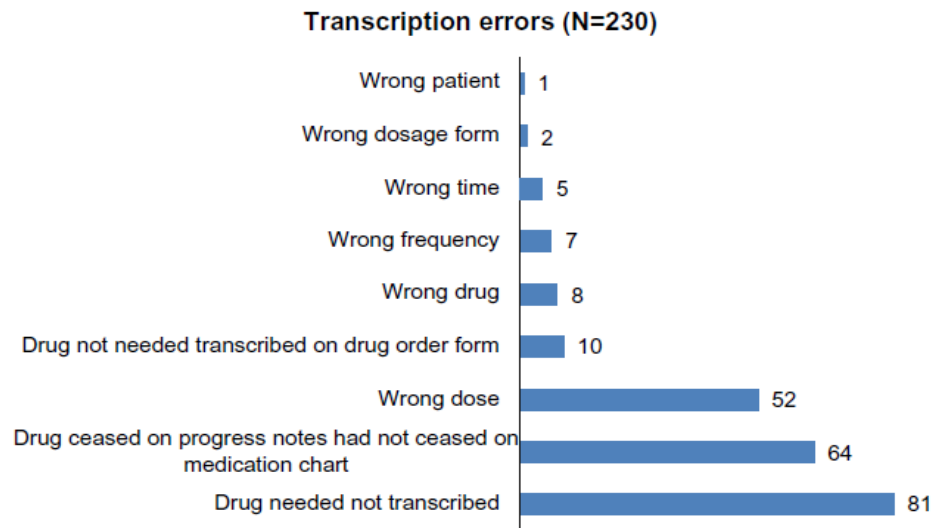
Figure 4.3 Types and number of transcription errors identified

4.2.2.3   Dispensing errors

Eighty-nine (39.6%) of 225 total dispensing errors identified during the study period were associated with omissions during the dispensing stage (Figure 4.4). Of these, 57 (64%) resulted in omissions at the drug administration stage and six (6.7%) resulted in drug administration delays. The second most common dispensing errors were labelling errors in which medications for patients were labelled incorrectly. Twenty-four near misses from dispensing errors were intercepted. The wrong dose of medication dispensed from the pharmacy was one type of near miss event detected. An example was a patient who was dispensed 2.5 mg ramipril instead of the 5 mg ramipril prescribed. The dispensed medication was labelled "1 tab of 2.5 mg ramipril once daily".

Dispensing errors (N=225)

Type	Count
Wrong patient	1
Wrong dosage form	4
Drug dispensed although it was not ordered	5
Wrong drug	10
Duplication	13
Wrong dose	17
Wrong quantity of drug	21
Near miss	24
Labeling	41
Dispensing omission	89
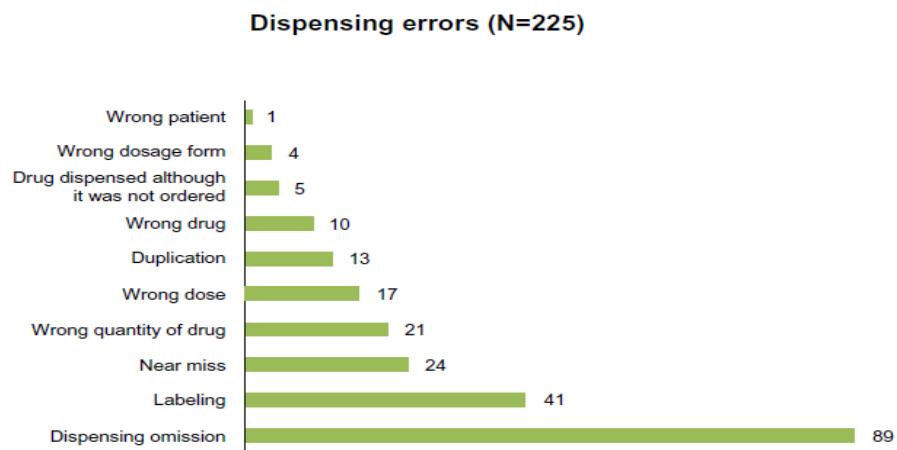
Figure 4.4 Types and number of dispensing errors identified

4.2.2.4 Prescribing errors

The most frequent prescribing errors (40.6%) were related to regular medications not documented in patients' progress notes (Figure 4.5). This type of error was followed closely in frequency by wrong dose prescribed errors. For example, a patient was prescribed both 80 mg and 100 mg aspirin. A review of the above patient's progress notes revealed that whilst the neurologist had prescribed 80 mg aspirin, also written in the patient's progress notes was "aspirin 100 mg daily". In another case, ranitidine 50 mg injection twice daily was prescribed instead of 50 mg three times daily as in the patient's progress notes. The third most common prescribing error was incomplete drug histories. For instance, digoxin, spironolactone, and telmisartan were identified by the pharmacist (the primary investigator) as regular medications for a patient during medication reconciliation, but these did not appear in the patient's progress notes.

Prescribing errors (N=101)

Type	Number
Others	1
Drug prescribed although it was not indicated	1
Wrong time	1
Contraindication	2
Wrong dosage form	2
Wrong drug	3
Illegible hand writing	4
Duplication	4
Unclear indication	4
Drug not given although it was indicated/omission	7
Unclear duration of antibiotics	8
Incomplete drug history	8
Wrong dose	15
Failure of doctor to write drug in patient's progress notes	41

Figure 4.5 Types and number of prescribing errors identified

4.2.2.5   Documentation errors and potential outcomes

The medications involved in documentation errors identified were classified based on the Anatomy and Therapeutic Chemical classification system[269] (Table 4.4). Medications for the alimentary tract and metabolism, cardiovascular systems, and nervous system were the most common groups of medications that had been given but had not been documented as such on the patient's medication chart. Similarly, the same classes of medications were also the most common groups of medications which had not been administered but were documented as given.

Table 4.4 Number of documentation errors identified based on ATC classification of medications

ATC Main Group Classification	Medication Administered Not Documented as Given (n = 513)	Medication Not Administered But Documented as Given (n = 80)
Alimentary tract and metabolism	190	20
Cardiovascular system	81	25
Nervous systems	54	13
Anti-infectives for systemic use	48	11
Respiratory system	40	2
Blood and blood forming organs	29	4
Dermatologicals	23	-
General nutrient	19	1
Sensory organs	13	-
Antineoplastic and immunomodulating agents	9	2
Musculo-skeletal system	4	-
Various	3	2

Potential outcomes associated with documentation errors were further analysed based on Lisby et al.'s classification (Table 4.5).[116] Errors involving the failure to document administered doses (n=513) were all classified as potentially non-significant because the patient had in fact received the medication. Documentation errors associated with omission of doses were deemed to have a range of potential outcomes, also shown in Table 4.5.

All drug omissions may potentially have adverse consequences; the magnitude of such consequences depends on both the clinical status of the patient and the drug involved. Omissions of regular antihypertensive drugs, antinauseants and antiemetics, and opioid analgesics were classified as potentially significant. This classification was applied because omission of these drugs may result in uncontrollable symptoms or disease deterioration.[288] Drug omissions which involved antibacterial drugs were classified as potentially serious, because omission of antibiotic treatment may result in ineffective therapy and recurrent infection.[288] Omission of antiepileptic drugs (e.g., phenytoin) was also classified as potentially serious as such drugs should be administered on time to maintain effective blood levels[269] to reduce the risk of further seizures. Similarly, omission of anticoagulants and antiplatelet agents may result in serious outcomes. Therefore, omissions of those medications were classified as having potentially serious outcomes.

Although the evaluation of pharmacist interventions was not the primary focus of this study, interventions were initiated. Recommendations made in the light of in-hospital clinical services provided included adjustments to the length of antibiotic use, cessation or initiation of medications, and medication dosage adjustment. Acceptance of these recommendations was lower than that reported from other studies[240, 289] as indicated by an acceptance rate of 35%; this low acceptance rate may reflect the unfamiliarity of the medical staff with in-hospital clinical pharmacy services in general, a lack of an established relationship between the clinicians and the pharmacist in particular, and the hierarchical nature of healthcare provision in Indonesia.

Table 4.5 Potential clinical outcomes of documentation errors and medication classes involved

Category	Errors N (%)	Group of Medication Identified
Potentially fatal	0	Nil identified
Potentially serious	14 (2.4%)	Anti-infective for systemic use (quinolones, beta-lactams, aminoglycosides); nervous system (antiepileptic drugs); blood and blood forming organs (antiplatelet and anticoagulants)
Potentially significant	61 (10.3%)	Cardiovascular system (antihypertensive drugs, lipid modifying agents); alimentary tract and metabolism (drugs for peptic ulcers, antinauseants and antiemetics, drug for constipation); nervous systems (opioid analgesic, drugs indicated for analgesics and antipyretics)
Potentially non-significant	518 (87.4%)	Vitamins and mineral supplements

4.2.3   DISCUSSION ON PHARMACISTS' ROLE IN PATIENT CARE TO IMPROVE MEDICATION SAFETY

To the best of our knowledge, this is the first study to document the frequency and nature of medication errors during the medication delivery process in an Indonesian hospital. This study found that administration errors were the most frequent medication errors. This might be due to the fact that nurses have high workloads. Nurses often take on the responsibility for transcribing medications from the patient's progress notes onto medication charts and drug order forms. They are the primary healthcare professional responsible for medication administration and its documentation on the ward. Furthermore, they are also required to complete patients' paperwork on admission and on discharge. These high workloads may have contributed to the high frequency of administration and transcription errors detected.

Documentation errors were the commonest type of administration error identified in this study. This is despite the fact that regulations require two nurses to check medications. According to Ferner and Aronson[14] documentation errors related to drugs given but not documented are associated with memory lapses (memory-based errors). In addition, documentation errors where medications have not been given but are documented as given are rules-based errors. Medication administration

should only be documented after the medication has been given, not before or when it is planned to be given. Thus, these documentation errors relate to a failure to follow the correct procedures during the medication delivery process. Clear, accurate, complete, and timely documentation is important for several reasons. Accurate documentation ensures the quality of healthcare service delivered. Accurate and complete documentation can be used to defend healthcare professionals against malpractice.[290] Clear and timely documentation is also important for the sake of researchers and health organisations, because it serves as reliable evidence to evaluate the quality of healthcare services provided.[290]

Medications not being transcribed onto the medication charts or drug order forms were the most frequent transcription errors identified. These transcription errors were highly influenced by the hospital documentation system. In the current system, the physician has to write patients' medications in three different documents (the patient's progress notes, medication chart, and the drug order form). The investigator identified transcription errors when reconciling patients' regular medications. In these cases, regular medications were charted but they were not prescribed on patients' progress notes. In this type of error scenario, physicians mistakenly did not note patients' regular medications in their progress notes. This lapse quite often resulted in other health professionals (nurses or pharmacists) having different assumptions regarding patients' regular medications. This could be seen when the investigator found discrepancies between patients' progress notes and medication charts, and subsequently queried the nurse in charge as to which document was correct. According to Dean et al.[123] this type of error is associated with prescription writing processes. Similar to documentation errors discussed previously in this section, this error type is also related to rules-based mistakes according to Ferner and Aronson's classification of medication errors.[14] These findings demonstrate poor quality assurance in the studied institution's healthcare service delivery.

In the study hospital, three different pharmacies provided medication to the ward depending upon a patient's health insurance coverage. This created major issues in medication administration, particularly when there was no stock in the Central

Pharmacy or when a medication prescribed was not covered by the patients' health insurance. Systems issues related to drug distribution and health insurance systems contributed to 78 medication errors. Sometimes, these errors caused additional errors in the administration process. This demonstrates that poor procedures in the drug distribution system and/or a lack of communication between the Central Pharmacy and the ward contributed to medication errors. To minimise drug omission errors arising through the dispensing process, it is suggested that drug distribution should be streamlined, with the Central Pharmacy distributing medication to satellite pharmacies in wards, with the satellite pharmacies to take responsibility for all drugs supplied.

This study demonstrated that medication errors may occur in every stage of the medication delivery process. Different healthcare professionals have different roles during this process and hence, they may commit different types of medication errors. In addition, failures such as those associated with drug distribution and health insurance, may also lead to errors. The main limitation of this study was that only one ward in one hospital was included; thus, the generalisability of the results may be limited. Further, the presence of the primary investigator on the ward may have affected the behaviour of the other healthcare professionals, particularly when questions were asked about discrepancies, and recommendations were made to address actual errors and near misses. Finally, the validity of some documentation errors reported in this study was highly dependent on the information retrieved from nurses and patients, because the investigator was unable to observe all functions of medication administration.

Medication errors are preventable events; thus, understanding the nature of errors during the medication delivery process may potentially improve healthcare services through the implementation of strategies to prevent the same errors from occurring again. However, there is no simple solution to preventing medication errors during the medication delivery process. Based on the findings of the present study, simplification of the medications ordering process, with removal of the need for both medication charts and drug order forms, would appear to be a means of reducing the number of omissions and transcription errors. The implementation of a

comprehensive computerised medication orders system would provide a more comprehensive solution. In the late 1900s, research demonstrated that Computerised Physician Ordered Entry (CPOE) reduced medication errors.[291] However, recent evidence shows that CPOE potentially contributes to other technical errors.[292] Furthermore, CPOE requires information and technology maintenance which is costly, and requires healthcare providers to have sufficient computer literacy skills to effectively utilise the system. Thus, implementing CPOE in the study hospital is likely not a viable solution.

Errors in documentation and transcription could be minimised by involving pharmacists during the medication delivery process. Pharmacists potentially play an important role in reducing medication misadventures through the delivery of in-hospital clinical pharmacy services including medication reconciliation,[41] medication chart review, clinical review, staff education, and patient discharge counselling. Medication reconciliation is an activity that ensures the continuity of medications used during transfers between wards, or before and after hospitalisation. The Joint Commission[152] defines medication reconciliation as "the process of comparing the medications a patient is taking with newly ordered medication". Although methodological issues exist in assessing the impact of pharmacists' interventions on medication safety, the Agency for Healthcare and Research Quality[27] suggested that pharmacists' involvement reduces adverse drug events, particularly preventable events (e.g. medication errors).

Pharmacists' involvement in ensuring medication safety requires support from the healthcare system, health administrators, and a good practice environment. Currently, the role of pharmacists in medication safety in hospitals in Indonesia is very limited, as pharmacists are generally involved in drug distribution and not in the provision of patient-related services. This study suggests that pharmacists, through the provision of in hospital clinical pharmacy services, could potentially play a significant role in detecting and preventing medication errors.

4.3 SUMMARY OF THE ROLE OF PHARMACISTS IN PATIENT CARE TO ENSURE MEDICATION SAFETY

This chapter illustrates that pharmacy graduates (registered pharmacists and pharmacy interns) perceived they had have some but not all the attributes required of care providers. This indicates that the pharmacy graduates at the study university have a lack of confidence in providing patient care. The graduates self-reported that the lack of perceived attainment of the attributes may relate to broad content of pharmacy curriculum and limited practical experiences in providing patient care. This study also found that pharmacists have a role in patient care to ensure medication safety by providing clinical review service and conducting medication reconciliation. However, the investigator attended training prior to conducting the research activities to gain insight on conducting the clinical review and medication reconciliation services. This training also aimed to provide practical experience in identifying potential errors during medication delivery process. This study found that medication errors were identified in every stage of the medication delivery process, meanwhile, healthcare professionals with different skills and knowledge were involved in the process. This suggests that healthcare professionals involved in the medication delivery process shared the responsibility in ensuring the safe use of medication. Pharmacists are one of healthcare professionals involved in the medication delivery process. This study found that a pharmacist could identify and intercept medication errors in the medication delivery process demonstrating that pharmacists have a role in patient care to ensure medication safety. This study also identified that system errors contributed to the errors. Thus, system improvement in the medication management is necessary in the study hospital.

CHAPTER 5 RESULTS AND DISCUSSIONS: HEALTHCARE STUDENTS' ATTITUDES TOWARDS INTERPROFESSIONAL EDUCATION (IPE)

This chapter consists of two sections. Section 5.1 describes healthcare students' attitudes towards IPE employing the RIPLS questionnaire for healthcare students in Survey Years 2012 and 2013. Section 5.2 portrays the influence of an interprofessional learning workshop on medication safety on healthcare students' attitudes towards IPE.

5.1   SURVEY ON HEALTHCARE STUDENTS' ATTITUDES TOWARDS IPE

5.1.1   DEMOGRAPHIC CHARACTERISTICS OF HEALTHCARE STUDENTS PARTICIPATION

The RIPLS questionnaire was administered to Year 1, 2, 3, and 4 students in 2012 and Year 2, 3, and 4 students in 2013. Four hundred and eighty-eight out of 550 students surveyed returned the RIPLS questionnaire in 2012, while 346 out of 412 students completed the questionnaire in Survey Year 2013 (Table 5.1). This gave response rates of 88.7% and 83.9% in Survey Years 2012 and 2013, respectively.

Table 5.1 Students' participation based on course of study in Survey Year 2012 and 2013

	Medical	Nursing	Pharmacy	Total (response rate)
Number of Students in Survey Year 2012 (response rate)	259/306 (84.6%)	140/149 (93.9%)	89/95 (93.7%)	488/550 (88.7%)
Number of Students in Survey Year 2013 (response rate)	187/231 (80.9%)	100/111 (90%)	59/72 (81.9%)	346/412 (83.9%)

Tables 5.2 and 5.3 show the demographic characteristics of students in Survey Years 2012 and 2013, respectively. In both surveys, the majority of participants were female with median age of 20 years. Overall, the proportions of participants who had

health related experience (e.g. voluntary or paid working experiences while studying within the students' course) in the Survey Year 2012 (39.1%) was higher compared to participants in Survey Year 2013 (26%). Less than 15% of participants in both surveys had previous health education background (e.g. pharmacy assistance at high school or nursing diploma prior to undertaking undergraduate course). Although 25% of the participants in Survey Year 2012 and 10% in Survey Year 2013 stated they had Interprofessional Learning (IPL) exposure, additional information provided in their responses to this question was not related to "learning with other healthcare students". For this reason, previous IPL was excluded in data analysis.

After data had been cleaned, Expectation Maximization (EM) analysis was employed for the missing data in the survey. The Kolmogorov-Smirnov test indicated that data in 2012 and 2013 were not normally distributed, p=0.001. However, in this study parametric analyses were employed because that approach was considered robust enough even when a normal distribution was violated.[293]

Table 5.2 Demographic characteristics of participants in Survey Year 2012

GENDER

	Medical		Nursing		Pharmacy		Total	
	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)
Female	132	50.9	114	81.4	62	69.7	308	63.1
Male	122	47.1	22	15.7	22	24.7	166	34
Missing	5	1.9	4	2.9	5	5.6	14	2.9

AGE

	Medical	Nursing	Pharmacy	Total
Age range	17-26	17-22	18-22	17-26
Median	20	20	20	20

YEAR OF STUDY

	Medical		Nursing		Pharmacy		Total	
	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)
1	58	22.4	35	25	20	22.5	113	23.2
2	68	26.3	37	26.3	25	28.1	130	26.6
3	68	26.3	35	25	21	23.6	124	25.4
4	65	25.1	33	23.6	23	25.8	121	24.8

PREVIOUS HEALTH WORK RELATED EXPERIENCE

	Medical	Nursing	Pharmacy	Total

Table. 5.2 continued

	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)
Yes	103	39.8	67	47.9	21	23.6	191	39.1
No	156	60.2	73	52.1	68	76.4	297	60.9

PREVIOUS HEALTH EDUCATION BACKGROUND

	Medical		Nursing		Pharmacy		Total	
	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)
Yes	56	21.6	11	7.9	9	10.1	76	15.6
No	203	78.4	129	92.1	80	89.9	412	84.4

PREVIOUS INTERPROFESSIONAL LEARNING†

	Medical		Nursing		Pharmacy		Total	
	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)
Yes	79	30.5	25	17.9	12	13.5	116	23.8
No	180	69.5	115	82.1	77	86.5	372	76.2

Notes: †= excluded in data analysis

Table5.3 Demographic characteristics of participants in Survey Year 2013

GENDER

	Medical		Nursing		Pharmacy		Total	
	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)
Female	97	51.9	71	71	44	74.6	212	61.3
Male	90	48.1	21	21	15	25.4	126	36.4
Missing	0	0	8	8	0	0	8	2.3

AGE

	Medical	Nursing	Pharmacy	Total
Age range	17-24	18-22	18-22	17-24
Median	20	20	20	20

YEAR OF STUDY

	Medical		Nursing		Pharmacy		Total	
	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)
2	56	30.1	30	30.6	19	32.2	105	30.6
3	67	36	37	37.8	21	35.6	125	36.4
4	63	33.9	31	31.6	19	32.2	113	32.9

PREVIOUS HEALTH WORK RELATED ACTIVITY

	Medical		Nursing		Pharmacy		Total	
	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)

Table. 5.3 continued

Yes	43	23	43	43	4	6.8	90	26
No	144	77	57	57	55	93.2	256	74

PREVIOUS HEALTH EDUCATION BACKGROUND

	Medical		Nursing		Pharmacy		Total	
	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)
Yes	10	5.3	21	21	3	5	34	9.8
No	177	94.7	79	79	56	95	312	90.2

PREVIOUS INTERPROFESSIONAL LEARNING †

	Medical		Nursing		Pharmacy		Total	
	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)
Yes	8	4.3	22	22	6	10.2	36	10.4
No	179	93.7	78	78	53	89.8	310	89.6

Notes: †= excluded in data analysis

5.1.2 FACTOR ANALYSIS

The RIPLS questionnaire has been used extensively in the literature and adopted into different languages.[294, 295] The questionnaire used in some countries revealed different items which constructed the RIPLS sub-scales. Thus, in order to ensure validity of the best structure of the RIPLS in the current population, Confirmatory Factor Analysis (CFA) and Principle Component Analysis (PCA) were undertaken on the responses from students who participated in Survey Year 2012. The analyses indicated that the current data did not fit the model of Parsel and Bligh.[66] This could be seen from indicators on goodness of fit which did not meet the desired values (Table 5.4). Figure 5.1 demonstrates a diagram path analysis using Analysis of Moment Structure (AMOS) Version 22.
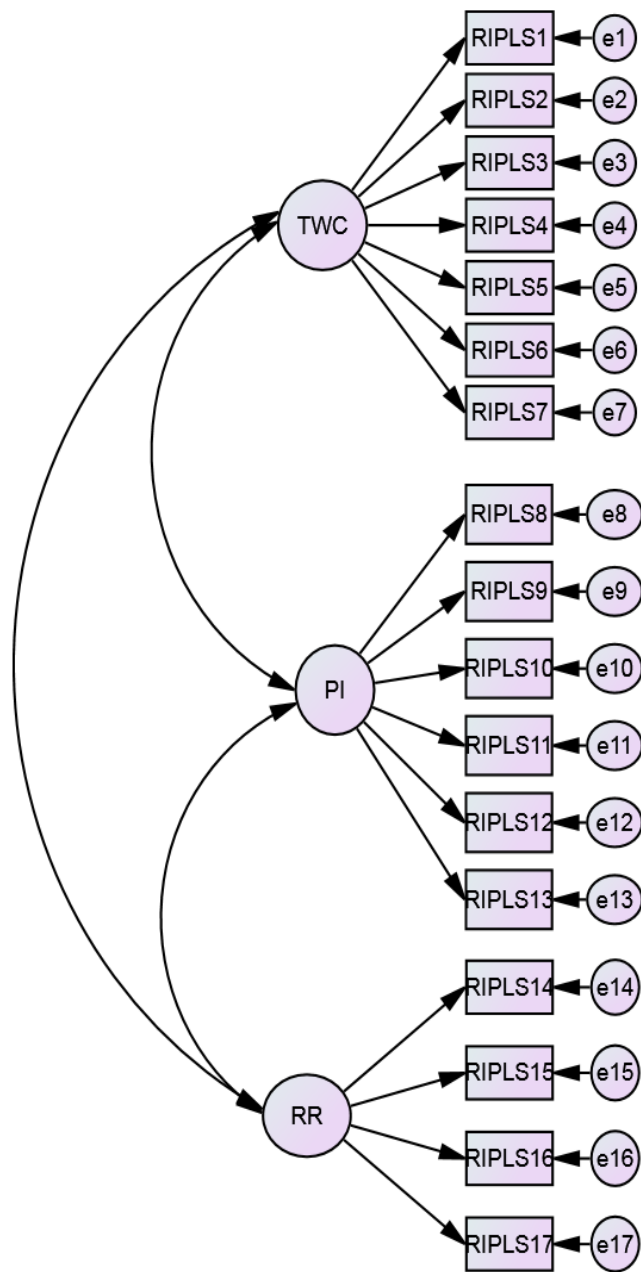
Figure 5.1 Confirmatory factor analysis based on Parsel and Bligh model.

Notes:
TWC   = Teamwork and Collaboration sub-scale
PI   = PI sub-scale
RR   = Roles and Responsibility sub-scale

Table 5.4 Goodness-of fit indicators of the current data to the Parsel and Bligh Model

	Index Fits			
	χ^2/df	TLI	CFI	RMSEA
Desired value[296]	<2	>0.9	>0.9	<0.06
Parsel and Bligh Model	2.99	0.87	0.91	0.065

Notes:

χ^2	= Chi-square
df	= degree of freedom
TLI	= Tucker-Lewis Index
CFI	= Comparative Fit Index
RMSEA	= Root Mean Square Error of Approximation

Schmitt suggested Explanatory Factor Analysis (EFA) could be employed when CFA did not fit the current data.[263] PCA is one form of EFA which was adopted for the current data analysis because of its uniqueness to explore components of questionnaires.[297] PCA is a unique mathematical solution analysis[242] and it is used when the researcher needs to explore components of a questionnaire. In PCA, participants' responses to each item are scored based on its components (sub-scales). This score is standardised based on factor loading for each item, and the mean and standard deviation of each sub-scale.[258] In SPSS, this factor score could be requested and saved as a variable using regression Bartlett, and Anderson-Rubin methods. A factor loading of 0.4 was selected as the cut-off point because it provides fair results.[298, 299] The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.864 and the Bartlett's test of sphericity was statistically significant (<0.001) which showed the current data were appropriate for factor analysis (Table 5.5).

The Pattern Matrix retrieved from Direct Oblimin Rotation showed items and their factor loadings in three sub-scales for the RIPLS questionnaire from the current data (Table 5.6). Table 5.7 shows RIPLS sub-scales, statements that construct the sub-scales and reliability based on their Cronbach alpha scores.

Table 5.5 KMO and Bartlett's Test of RIPLS students

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.864
Bartlett's Test of Sphericity	Approx. Chi-Square	2512.603
	Df	136
	Sig.	.000

Table 5.6 Pattern matrix of RIPLS sub-scales

	Sub-scales		
	1	2	3
RIPLS10	.737		
RIPLS11	.731		
RIPLS1	.723		
RIPLS12	.717		
RIPLS3	.709		
RIPLS9	.692		
RIPLS6	.685		
RIPLS13	.633		
RIPLS7	.600		
RIPLS5	.588		
RIPLS4	.471		
RIPLS2			
RIPLS16		.933	
RIPLS17		.913	
RIPLS15			.779
RIPLS8			.566
RIPLS14			.430

Table 5.7 Items that construct RIPLS sub-scales and its reliability

Sub-scales	RIPLS Statements	Reliability (Cronbach's alpha)
1. Shared Learning and Teamwork (SLT)	1, 3, 4, 5, 6, 7, 9, 10, 11, 12, and 13	**0.873**
2. Roles and Responsibility (RR)	16, and 17	**0.869**
3. Professional Identity (PI)	8, 14 and 15	**0.341**

Similar to that in Parsel and Bligh's model, there were three sub-scales that emerged from the current data. However, the current data had different items which constructed each sub-scale. Sub-scale 1 consisted of Statements 1, 3, 4, 5, 6, 7, 9, 10,

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11, 12 and 13. The theme that emerged was based on those statements embracing "Shared Learning and Teamwork-SLT." Sub-scale 2 of the current survey consisted of RIPLS Statements 16 and 17 with a theme of "Roles and Responsibility-RR". Sub-scale 3 consisted of RIPLS Statements 8, 14, and 15 with a theme of "Professional Identity-PI". In this analysis, Statement 2 was excluded from any sub-scales because it had a very low factor loading in more than one factor. Table 5.7 shows that the SLT and RR sub-scales had good reliability scores (α >0.8) however, PI sub-scale had low score.

Further CFA analysis was conducted based on items retrieved from factors on EFA to confirm the model derived from EFA has an appropriate goodness of fit. It was found that the model from EFA had low goodness of fit based on the indicators. Thus, modification of model based on estimation on modification indices was conducted.[263] It was found that indicators on goodness of fit were improved afterward. Indicators on goodness of fit of the model can be seen in Table 5.8. Figure 5.2 demonstrated the EFA modified model. Compared to the model of Parsel and Bligh,[66] factor loadings and constituent statements of Sub-scales 1, 2 and 3 were slightly different. This might be because three statements were excluded from the present questionnaire. In addition, differences in learning systems and curricula might influence the different items that constructed sub-scales in the present study. However, the correlation amongst variances showed that RR sub-scale had no association with the SLT sub-scale (p=0.147) or with the PI sub-scale (p=0.080). Thus, RR sub-scale was excluded in the study analysis.

Table 5.8 Goodness of fit based on items constructed on EFA modified model

	Index Fits			
	χ^2/df	TLI	CFI	RMSEA
Desired value[296]	<2	>0.9	>0.9	<0.06
EFA modified model	2.09	0.948	0.958	0.047

Notes:
X^2 = Chi-square
df = degree of freedom
TLI = Tucker-Lewis Index
CFI = Comparative Fit Index
RMSEA = Root Mean Square Error of Approximation
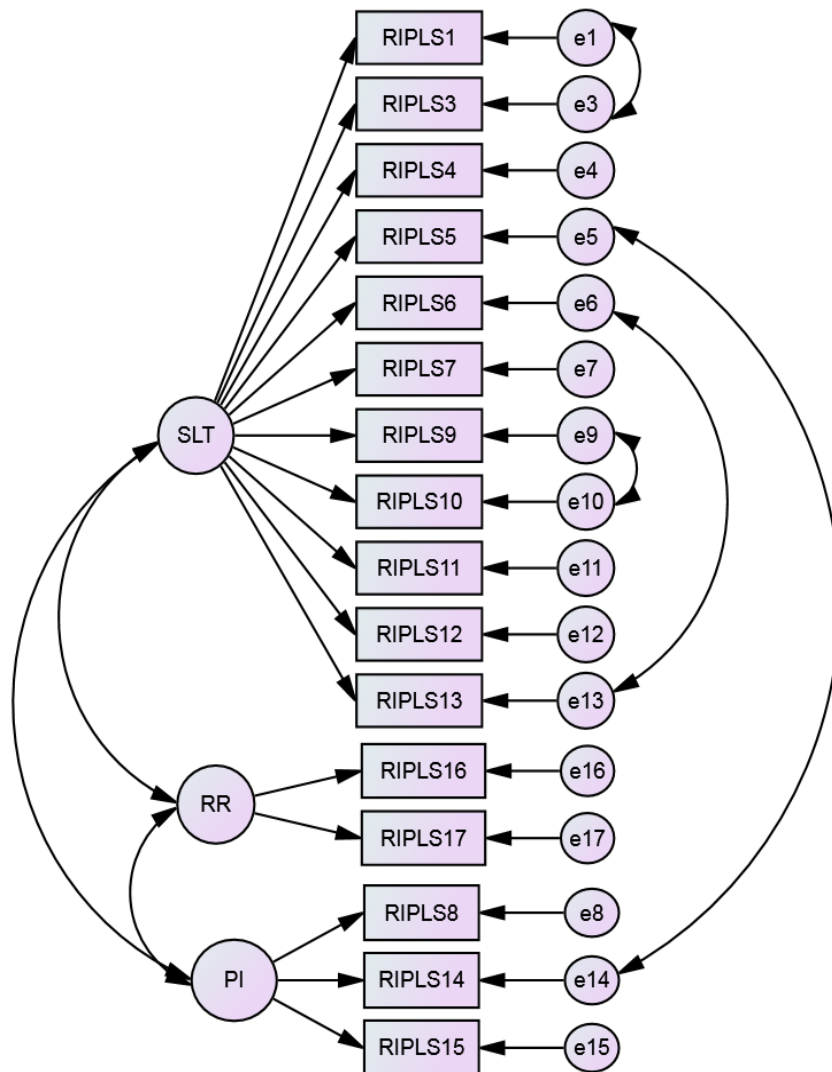
Figure 5.2 Confirmatory factor analysis based on EFA modified model

Notes:

SLT = Shared Learning and Teamwork sub-scale
RR = Roles and Responsibility sub-scale
PI = PI sub-scale

5.1.3 HEALTHCARE STUDENTS' ATTITUDES TOWARDS IPE

DiStefano et al. suggested that factor analysis could be undertaken using non-refined and refined methods.[258] The non-refined analysis is simple and straight forward, while refined analysis is more sophisticated. Both methods have advantages and disadvantages, for this reason in the current study both analyses were adopted. The non-refined method involved adding items in each factor. Meanwhile, participants' responses were analysed by saving the scores as variables using a regression method in SPSS in the refined method. In this study, data from Survey Year 2012 were used as a reference to calculate factor loadings, mean values and standard deviations of each sub-scale were used to adjust for students who may have participated in both surveys (i.e. 2012 and 2013). Then, participants' responses to the RIPLS sub-scales were analysed by comparing students' mean scores for the RIPLS sub-scales.

Students' attitudes towards IPE were assessed in four ways. Figure 5.3 shows a diagram outlining the analysis of students' attitudes towards IPE. The first analysis adopted non-refined analysis, meanwhile the second, third and fourth analyses adopted refined analyses. Post-hoc Scheffe comparison was employed because it provides strong protection against Type I error.[300]

1. Healthcare students' attitudes towards IPE were determined based on data from the cross sectional study in Survey Year 2012 and were assessed in three ways. Firstly, medical, nursing and pharmacy students' mean scores differences towards each RIPLS statement were analysed. Secondly, healthcare students' responses were also assessed based on total RIPLS mean scores and its sub-scales. Total mean scores of the RIPLS sub-scales were analysed using ANOVA to determine whether healthcare students had different attitudes towards IPE between courses of study as well as across different years of study. For the purpose of this analysis only, negative statements (RIPLS Statements 8, 14, 15, 16 and 17) were reverse coded to calculate the total scores. Meanwhile, each statement which constructed the PI sub-scale was analysed separately because of the low Cronbach's alpha. Healthcare students' attitudes towards the RIPLS sub-scales were also compared from the total scores of statements that constructed each sub-scale. The third analysis

involved comparing healthcare students' attitudes towards IPE according to year of study within their course of study.

2. Repeated cross sectional analysis. Medical, nursing and pharmacy students in Survey Year 2012 were analysed based on their mean regression factor score in refined analysis towards the RIPLS sub-scales. Although Cronbach's alpha showed low reliability on the PI sub-scale, this sub-scale was also considered in the refined analysis because factor loadings of Statement 8, 14, and 15 were reasonably fair (more than 0.4).[299] The low reliability may be due to different directions of agreement as shown in Analysis 1. Similar analyses were also performed on data from Survey Year 2013. These analyses aimed to assess whether healthcare students' attitudes from different courses of study were consistent in both years. ANOVA analysis was employed.

3. Years 2, 3, and 4 healthcare students' mean scores on RIPLS factors in Survey Year 2012 and 2013 within their chosen course were compared (e.g. Year 2 medical students in Survey Year 2012 versus Year 2 medical students in Survey Year 2013). This analysis was conducted to assess whether medical, nursing, and pharmacy students within in the same year of the course had similar attitudes towards interprofessional learning independent of the survey year. T-test analysis was employed.

4. A trend analysis of students' attitudes towards IPE aimed to provide answers as to whether students' attitudes changed towards IPE over time during their chosen course of study. In this analysis, longitudinal level was at the population unit not at the subject unit.[301] Thus, participants were selected randomly in Survey Year 2012 and 2013. This analysis was conducted by analysing students' mean regression factor scores as they progressed through their chosen course (e.g. Year 1 medical students in Survey Year 2012 versus Year 2 medical students in Survey Year 2013). T-test analysis was employed. In all analysis, p-value <0.05 was deemed to be statistically significant.

Figure 5.3 Diagram on analyses of students' attitudes towards IPE
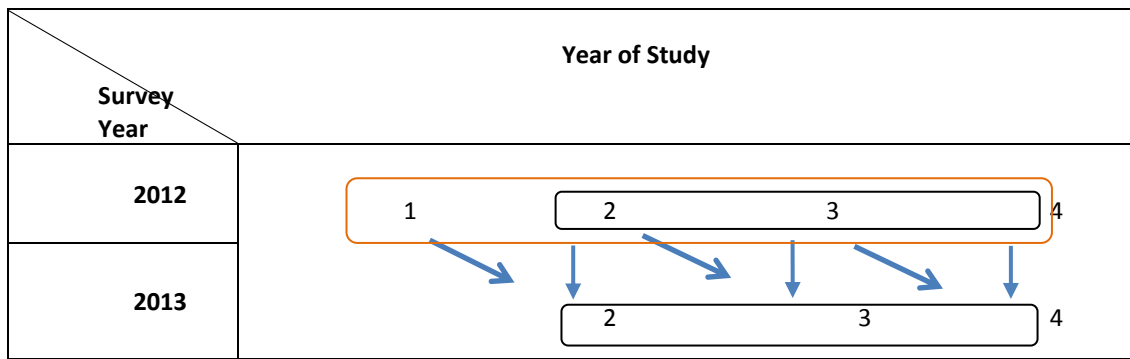
Analysis 1: Year 1 to 4 students' attitudes towards IPE– Cross sectional study in Survey Year 2012

Analysis 2: Repeated cross sectional study of Year 2 to 4 in Survey Year 2012 and 2013

Analysis 3: Year of Study analysis

Analysis 4: Trend Study analysis

5.1.3.1   Healthcare students' attitudes towards IPE

The first analysis was a cross sectional study in which healthcare students' attitudes towards IPE were assessed from each item of the RIPLS statement from healthcare students who participated in Year 1 through 4 in Survey Year 2012. Table 5.9 shows medical, nursing and pharmacy students in Survey Year 2012 had positive attitudes towards IPE. This was shown from the low total mean score on RIPLS positive statements and high total mean scores of RIPLS negative statements which indicated positive attitudes towards IPE. However, there were statistically significant differences for RIPLS Statements 4, 14, 16 and 17. As can be seen in Table 5.9, the mean scores of RIPLS Statement 4 for medical students was significantly lower than nursing and pharmacy students. This means medical students had more positive attitudes towards the importance of learning team work skills compared to other healthcare students.

Interestingly, for the RIPLS Statement 14 "*The function of allied health professionals is mainly to provide support for doctors,*" medical students had significantly more positive attitudes compared to nursing and pharmacy students. The mean scores of medical students were also significantly lower than for nursing and pharmacy students for statements on acquiring more knowledge and skills (RIPLS Statement 16 and 17). This indicated more agreement on these negative statements which

indicated that medical students had more positive attitudes towards acquiring more knowledge and skills than other healthcare students. These findings suggested that although medical students agreed that learning team work skills was essential for healthcare students to learn, they believed they had to acquire more knowledge and skills than other healthcare professionals, who they perceived as having a main role to support the doctor.

Table 5.9 Means, standard errors, and p-value of ANOVA on each RIPLS statement amongst course of study (†: negative statement)

RIPLS statements	Mean ± SE (n)			Mean ± SE (n)	p-value
	Medical	Nursing	Pharmacy	Total	
1. Learning with other students will help me become a more effective member of a healthcare team	1.57 ± 0.03 (258)	1.57 ± 0.04 (139)	1.48 ± 0.06 (87)	1.56 ± 0.02 (484)	0.369
2. Patient would ultimately benefit if healthcare students worked together	1.59 ±0.04 (258)	1.54 ± 0.05 (139)	1.47 ± 0.06 (87)	1.55 ± 0.03 (484)	0.276
3.Shared learning with other healthcare students will increase my ability to understand clinical problems	1.64 ± 0.036 (258)	1.62 ± 0.05 (138)	1.48 ± 0.06 (87)	1.60 ± 0.03 (483)	0.083
4. Team working skills are essential for all healthcare students to learn	1.33 ± 0.03 (253)	1.46 ± 0.05 (136)	1.49 ± 0.06 (81)	1.40 ± 0.02 (470)	0.014*
5. Shared learning will help me understand my own professional limitations	1.85 ± 0.04 (254)	1.99 ± 0.05 (135)	1.89 ± 0.06 (81)	1.90 ± 0.03 (470)	0.084
6. Learning between healthcare students before qualification would improve working relationships after qualification	1.68 ± 0.04 (254)	1.58 ± 0.05 (136)	1.56 ± 0.07 (81)	1.63 ± 0.03 (471)	0.109
7. Shared learning will help me think positively about other healthcare professionals	1.79 ± 0.03 (253)	1.73 ± 0.05 (136)	1.70 ± 0.06 (81)	1.76 ± 0.03 (470)	0.350
8. It is not necessary for undergraduate healthcare students to learn together†	3.41 ± 0.04 (254)	3.45 ± 0.05 (136)	3.44 ± 0.09 (80)	3.43 ± 0.03 (470)	0.834
9. Shared learning with other healthcare students will help me communicate better with patients	1.75 ± 0.04 (253)	1.83 ± 0.05 (136)	1.84 ± 0.07 (81)	1.79 ± 0.03 (470)	0.394
10. Shared learning with other healthcare students will help me communicate better with other professionals	1.60 ± 0.03 (254)	1.68 ± 0.04 (136)	1.68 ± 0.06 (81)	1.64 ± 0.03 (471)	0.313

11. I would welcome the opportunity to work together with other healthcare students	1.65 ± 0.03 (254)	1.71 ± 0.04 (136)	1.63 ± 0.06 (80)	1.66 ± 0.02 (470)	0.460
12. Shared learning will help me clarify the nature of patient problems	1.76 ± 0.04 (254)	1.66 ± 0.04 (136)	1.81 ± 0.06 (81)	1.74 ± 0.03 (471)	0.118
13. Shared learning before qualification will help me become a better team worker	1.69 ± 0.03 (254)	1.60 ± 0.04 (135)	1.69 ± 0.07 (80)	1.67 ± 0.02 (469)	0.217
14. The function of allied health professionals is mainly to provide support for doctors†	2.15 ± 0.05 (253)	3.99 ± 0.06 (136)	3.03 ± 0.08 (79)	2.66 ± 0.04 (468)	<0.001*
15. I am not sure what my professional role will be†	3.45 ± 0.04 (254)	3.60 ± 0.05 (136)	3.43 ± 0.09 (81)	3.49 ± 0.03 (471)	0.063
16. I have to acquire much more knowledge than other healthcare students†	1.98 ± 0.05 (254)	2.19 ± 0.07 (135)	2.33 ± 0.08 (81)	2.10 ± 0.04 (470)	<0.001*
17. I have to acquire many more skills than other healthcare students†	1.94 ± 0.05 (254)	2.13 ± 0.07 (136)	2.33 ± 0.09 (81)	2.06 ± 0.04 (471)	<0.001*

Notes: * showed significant difference

The second analysis involved healthcare students' attitudes towards IPE which were assessed based on the total mean scores of the RIPLS and its sub-scales. Table 5.10 shows total mean scores of the RIPLS and its sub-scales across course of study in students who participated in Survey Year 2012.

Table 5.10 Total scores of RIPLS and its factors amongst course of study in Survey Year 2012

Sub-scales, Statement and RIPLS	Medical (Mean±SE)	Nursing (Mean±SE)	Pharmacy (Mean±SE)	p-value
n	257	138	79	
Shared Learning and Teamwork (SLT) (RIPLS statement 1, 3, 4, 5, 6, 7, 9, 10, 11, 12, and 13)	18.31 ± 0.25	18.37 ± 0.35	18.17 ± 0.48	0.942
Professional Identity (PI) (reversed of RIPLS statement 8, 14, and 15)	5.97 ± 0.08	4.59 ± 0.11	5.09 ± 0.17	**0.001***
RIPLS	31.97 ± 0.29	30.08 ± 0.46	30.13 ± 0.61	**0.001***

Notes: * showed significant difference

The possible total scores for the RIPLS survey ranged from 17 (strongly agree) to 68 (strongly disagree). Overall, healthcare students' attitudes towards IPE were positive with the mean values ranging from 30-31 (agree). As can be seen in Table 5.10, there were significant differences in overall healthcare students' attitudes towards IPE based on course of study ($p<0.001$). Multivariate analysis indicated that students' course of study (i.e. medicine vs nursing vs pharmacy) was the only variable significantly influencing students' mean scores differences in the total RIPLS scores ($F[2,449]= 7.532$, $p< 0.001$). A post-hoc test demonstrated that the overall score for medical students was significantly different to those of nursing students ($p< 0.001$) and pharmacy students ($p<0.01$), but there was no significant difference amongst nursing and pharmacy students ($p=0.997$). These results indicated that medical students had statistically significantly less positive attitudes towards IPE compared to nursing and pharmacy students.

In addition, Table 5.10 demonstrates that healthcare students in the current study had different mean scores towards the PI sub-scale. Because of the low Cronbach alpha score on PI sub-scale (as shown in Table 5.7), in this analysis, statements which constructed this sub-scale (Statement 8, 14, and 15) were analysed separately. As can be seen in Table 5.9, there were no significant mean scores differences on

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Statement 8 "*It is not necessary for undergraduate healthcare students to learn together*." Medical, nursing and pharmacy students had high mean scores towards this statement. These indicated that healthcare students had positive attitudes towards learning together with others. Similarly, there was no significant difference for RIPLS Statement 15 ("*I am not sure what my professional role will be*") between healthcare students from the different courses of study. All healthcare students had high mean scores which indicated that medical, nursing and pharmacy students had positive attitudes towards their professional roles. Meanwhile, medical, nursing and pharmacy students had significant difference attitudes towards RIPLS Statement 14 (Table 5.9). Post-hoc test analysis indicated that medical students had significantly lower mean scores than nursing and pharmacy students for Statement 14 ("*The function of allied health professionals is mainly to provide support for doctors*").

Table 5.11 P-values on RIPLS Statement 14 amongst students' course of study in Survey Year 2012

Course of study	Nursing	Pharmacy
Medical	0.001*	0.001*
Nursing		0.001*

Notes: * showed significant difference

Table 5.11 shows p-values for RIPLS Statement 14 amongst healthcare students' course of study in Survey Year 2012. This indicated that medical students had stronger agreement towards negative statements of PI sub-scale which indicated that they believed their own profession had more importance than other healthcare professionals. Interestingly, pharmacy students had significantly lower mean scores than nursing students for this statement. This indicated that pharmacy students had a greater level of agreement than nursing students towards the roles of other healthcare professionals are mainly to support physicians. This may imply that pharmacy students had less positive attitudes towards their own professional roles.

The third analysis involved students' attitudes towards IPE which were analysed within their chosen course of study across Year of Study. Table 5.12 and Table 5.13 show that there were no significant differences on RIPLS sub-scales and statements on Professional Identity (Statement 8, 14 and 15) across the Years of Study amongst medical and nursing students. However, Year 1 nursing students had significantly

higher reversed mean scores on RIPLS Statement 14 than Year 4 in the course. This means Year 1 nursing students had more positive attitudes than other years of study of nursing students towards the role of other healthcare providers as mainly to support doctors.

Meanwhile, Table 5.14 shows that there were significant differences in the mean total RIPLS scores amongst Year of Study in the pharmacy students groups. As can be seen from the table, the total mean scores for Year 3 students were higher compared to students in the other years of study in the pharmacy course. Multivariate analysis showed none of the variables (i.e. age, gender, previous health education background, and health related activities) for pharmacy students influenced the difference. Non-parametric tests were also conducted because the number of pharmacy students was relatively low. Kruskal-Wallis analysis indicated similar results U (3,79)= 10.853, p= 0.013. This suggested that pharmacy students had significant differences for total RIPLS mean scores across Year of Study. These indicated that Year 3 pharmacy students had less positive attitudes towards IPE compared to the other Years of Study in pharmacy course.

Table 5.12 Mean scores of medical students for the RIPLS and its sub-scales across Year of Study

Sub-scales, Statement and RIPLS	Year of Study				
	Year 1 (Mean±SE)	Year 2 (Mean±SE)	Year 3 (Mean±SE)	Year 4 (Mean±SE)	p-value
n	56	68	68	65	
Shared Learning and Teamwork (SLT) (RIPLS 1, 3, 4, 5, 6, 7, 9, 10, 11, 12, and 13)	18.05 ± 0.51	18.43 ± 0.44	19.00 ± 0.52	17.72 ± 0.50	0.278
Professional Identity (PI) (reversed RIPLS 8, 14, and 15)	5.86 ± 0.15	6.0 ± 0.16	5.89 ± 0.15	6.04 ± 0.17	0.780
Reversed statement 8	1.48 ± 0.08	1.68 ± 0.08	1.57 ± 0.07	1.61 ± 0.08	0.352
Reversed statement 14	2.85 ± 0.08	2.87 ± 0.09	2.77 ± 0.09	2.87 ± 0.09	0.827
Reversed statement 15	1.46 ± 0.78	1.54 ± 0.08	1.59 ± 0.07	1.58 ± 0.08	0.655
RIPLS	31.44 ± 0.58	32.33 ± 0.49	32.59 ± 0.58	31.50 ± 0.57	0.405

Table 5.13 Mean scores of nursing students for the RIPLS and its sub-scales across Year of Study

Sub-scales, Statements and RIPLS	Year of Study				p-value
	Year 1 (Mean±SE)	Year 2 (Mean±SE)	Year 3 (Mean±SE)	Year 4 (Mean±SE)	
n	33	37	35	33	
Shared Learning and Teamwork (SLT) (RIPLS 1, 3, 4, 5, 6, 7, 9, 10, 11, 12, and 13)	19.03 ± 0.61	19.22 ± 0.65	17.63 ± 0.75	17.55 ± 0.729	0.174
Professional Identity (PI) (reversed RIPLS 8, 14, and 15)	4.45±0.24	4.78 ± 0.24	4.29 ± 0.20	4.45 ± 0.18	0.232
Reversed statement 8	1.45 ±0.09	1.56 ± 0.08	1.50 ± 0.09	1.69 ± 0.11	0.315
Reversed statement 14	1.97 ±0.14	1.72 ± 0.11	1.42 ±0.09	1.32 ±0.08	**0.001***
Reversed statement 15	1.39 ±0.11	1.44 ± 0.11	1.35 ± 0.09	1.42 ± 0.09	0.436
RIPLS	31.03 ±0.83	31.14 ±0.86	28.97 ±0.86	29.12 ±0.88	0.235

Notes: * showed significant difference

Table 5.14 Mean scores of pharmacy students for RIPLS and its sub-scales across Year of Study

Sub-scales, Statements and RIPLS	Year of Study				p-value
	Year 1 (Mean±SE)	Year 2 (Mean±SE)	Year 3 (Mean±SE)	Year 4 (Mean±SE)	
n	18	22	17	19	
Shared Learning and Teamwork (SLT) (RIPLS 1, 3, 4, 5, 6, 7, 9, 10, 11, 12, and 13)	17.66 ± 0.91	17.34 ± 0.70	20.38 ± 1.33	17.60 ± 0.86	0.105
Professional Identity (PI) (reversed RIPLS 8, 14, and 15)	5.55 ± 0.39	4.82 ± 0.25	5.58 ± 0.35	4.59 ± 0.35	0.086
Reversed statement 8	1.67 ± 0.198	1.43 ± 0.152	1.94 ± 0.16	1.32 ± 0.15	0.055
Reversed statement 14	2.27 ± 0.16	2.00 ± 0.17	1.94 ± 0.14	1.72 ±0.18	0.143
Reversed statement 15	1.61 ± 0.22	1.43 ± 0.15	1.72 ± 0.21	1.54 ± 0.13	0.696
RIPLS	29.89 ± 1.15	29.09 ± 0.79	33.37 ± 1.64	28.90 ± 0.89	**0.024***

Notes: * showed significant difference

5.1.3.2   Students' attitudes towards IPE based on Survey Year 2012 and 2013 (Repeated cross sectional analysis)

Repeated cross sectional analysis was conducted on Year 2, 3, and 4 students in both survey years. This was because there were no data for Year 1 students in Survey Year 2013.

Demographic characteristics of students' participation

Table 5.15 shows demographic characteristics of students who participated in Survey Years 2012 and 2013. There were some significant differences in the participants' demographic characteristics between the two survey years. Participants in Survey Year 2012 had more health related experience (i.e. paid or voluntary working experience related to students' chosen course of study) than those in Survey Year 2013.

Table 5.15 Demographic characteristics of participants in Survey Years 2012 and 2013

	Survey Year 2012 (n=375)	Survey Year 2013 (n=348)	p-value
Age in years (Mean ± SD)	20.21 ± 0.147	20.12 ± 0.059	0.585
Gender (%Male/Female)	36%/64%	37.3%/62.7%	0.723
% of students had previous health background	13.1%	10.1%	0.271
% of students had work health related experience	38.9%	26.3%	**0.001***

Notes: * showed significant difference

Table 5.16 shows demographic characteristics of participants in Survey Year 2012 and 2013 based on Year of Study. There were a greater proportion of Year 2 students in Survey Year 2013 who had a previous health background compared to those in Survey Year 2012. In contrast, a greater proportion of Year 3 and Year 4 students in Survey Year 2012 had a previous health education background and health related experience compared to that in Survey Year 2013.

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Table 5.16 Demographic characteristics of participants based on Year of Study in Survey Years 2012 and 2013

Year of Study	Survey Year 2012	Survey Year 2013	p-value
Year 2			
Age (Mean ± SD)	19.4±1.89	18.8±1.90	0.071
Gender (%Male/Female)	(29%/69%)	(39%56%)	0.267
% of students had a previous health education background	8.5%	23.4%	**0.001***
% of students had work health related experience	33.1%	40.2%	0.257
Year 3			
Age (Mean ± SD)	20.2±2.70	20.12±0.79	0.698
Gender (%Male/Female)	(37%/56.5%)	(32.5%/61.6%)	0.271
% of students who had a previous health education background	10.5%	3.2%	**0.023***
% of students had work health related experience	50.8%	19.2%	**0.000***
Year 4			
Age (Mean ± SD)	20.2±2.7	21.1±0.74	0.825
Gender (%Male/Female)	(38.8%/60.3%)	(34.5%/65.5%)	0.477
% of students who had a previous health education background	20.7%	5.3%	**0.001***
% of students had work health related experience	33.1 %	21.2%	**0.043***

Notes: * showed significant difference

Table 5.17 shows healthcare students' mean regression factor scores of the RIPLS sub-scales based on refined analysis on data from Survey Years 2012 and 2013.

Table 5.17 Medical, nursing, and pharmacy students' mean regression factor scores on RIPLS sub-scales in Survey Year 2012 and 2013

RIPLS Sub-scales	Course of Study	Survey Year 2012		Survey Year 2013	
		N	Mean ± SE	N	Mean ± SE
Shared Learning and Teamwork (SLT)	Medical	201	0.016 ± 0.070	176	0.194 ± 0.084
	Nursing	105	-0.036 ± 0.100	100	0.068 ± 0.115
	Pharmacy	63	0.007 ± 0.147	58	-0.175 ± 0.145
Professional Identity (PI)	Medical	201	-0.191 ± 0.068	174	-0.405 ± 0.075
	Nursing	105	0.628 ± 0.088	100	0.664 ± 0.106
	Pharmacy	63	0.258 ± 0.156	58	0.450 ± 0.125

Students' attitudes towards IPE in Survey Year 2012

Table 5.18 shows p-values calculated from ANOVA analysis of healthcare students (Year 2, 3 and 4) in Survey Year 2012. Multivariate analysis indicated the course of study variable influenced significantly the differences of mean regression factor scores on Professional Identity (F $[2,347]$ =19.539, p<0.001) between students from different courses of study. Other variables (i.e. age, gender, previous health education background, and health related experience) showed no significant mean scores differences towards these factors. P-values of post-hoc Scheffe test on mean regression factor scores of the PI sub-scales (Table 5.19) showed statistically significant differences between medical students on this sub-scale compared to nursing and pharmacy students.

Table 5.18 P- values of RIPLS sub-scales between medical, nursing and pharmacy students in Survey Year 2012

RIPLS sub-scales	p-value
Shared Learning and Teamwork (SLT)	0.913
Professional Identity (PI)	0.001*

Notes: * showed significant difference

Table 5.19 P-values on the PI sub-scale amongst medical, nursing and pharmacy students in Survey Year 2012

Course of study	Nursing	Pharmacy
Medical	0.001*	0.005*
Nursing		0.086

Notes: * showed significant difference

Analysis on RIPLS Statements 8, 14, and 15 were also conducted because of the low Cronbach's alpha values for the PI sub-scale. Table 5.20 shows healthcare students' mean scores across course of study on those statements in both years of the survey. ANOVA testing indicated that the only significant differences for mean scores amongst courses of study was related to Statement 14 (p<0.001). Medical students had significantly lower mean scores compared to those of nursing and pharmacy students. Yet, their attitudes were not significantly different for Statements 8 and 15. This showed medical students had more positive attitudes towards statement on the

function of other healthcare professionals which was mainly to provide support to doctors. This also suggested that medical students had a stronger sense of their professional identity and importance than other healthcare students.

Table 5.20 RIPLS Statements 8, 14, and 15 mean scores across course of study and p-values in Survey Year 2012

RIPLS Statements	Course of Study	Survey Year 2012		
		N	Mean ± SE	p-values
RIPLS 8	Medical	201	3.39 ± 0.04	0.996
	Nursing	105	3.41 ±0.05	
	Pharmacy	63	3.41 ±0.11	
RIPLS 14	Medical	201	2.18 ± 0.05	**0.001***
	Nursing	105	3.50 ± 0.05	
	Pharmacy	63	3.02 ± 0.12	
RIPLS 15	Medical	201	3.43 ± 0.04	0.155
	Nursing	105	3.58±0.06	
	Pharmacy	63	3.44±0.09	

Notes: * showed significant difference

Students' attitudes towards IPE in Survey Year 2013

Table 5.21 shows p-values from ANOVA analysis of medical, nursing and pharmacy students' attitudes on RIPLS sub-scales in Survey Year 2013.

Table 5.21 P-values of RIPLS sub-scales amongst medical, nursing, and pharmacy students in Survey Year 2013

RIPLS sub-scales	p-value
Shared Learning and Teamwork (SLT)	0.104
Professional Identity (PI)	**0.001***

Notes: * showed significant difference

Multivariate analysis also indicated that there were significant differences in the mean regression factor scores on PI sub-scale ($F_{[2,314]}= 33.198$, $p<0.001$) between the different courses of study in Survey Year 2013. Multiple comparisons using a Scheffe test indicated that medical students had statistically significant differences

for mean regression factor scores (i.e. more positive attitudes) for PI sub-scale compared to their counterparts in nursing and pharmacy (Table 5.22).

Table 5.22 P-values of PI sub-scale amongst medical, nursing and pharmacy students in Survey Year 2013

Course of study	Nursing	Pharmacy
Medical	0.001*	0.001*
Nursing		0.559

Notes: * showed significant difference

Table 5.23 RIPLS Statements 8, 14, and 15 mean scores across course of study in Survey Year 2013

RIPLS Statements	Course of Study	Survey Year 2013		
		N	Mean ± SE	p-values
RIPLS 8	Medical	176	3.30± 0.05	0.002*
	Nursing	100	3.52 ± 0.06	
	Pharmacy	58	3.57± 0.07	
RIPLS 14	Medical	174	2.11 ± 0.06	0.001*
	Nursing	100	3.47 ± 0.06	
	Pharmacy	58	2.91 ± 0.11	
RIPLS 15	Medical	174	3.31 ± 0.05	0.003*
	Nursing	100	3.55 ± 0.06	
	Pharmacy	58	3.59 ± 0.07	

Notes: * showed significant difference

Similar to Survey Year 2012, ANOVA analysis was also conducted in Survey Year 2013 on healthcare students mean scores on RIPLS Statements 8, 14, and 15 which constructed the PI sub-scale. Table 5.23 shows that medical students had significant mean score differences (i.e. lower) towards those statements compared to nursing and pharmacy students. This indicated that medical students had stronger agreements towards statements constructed PI sub-scale.

These findings suggested that medical students in both Survey Years 2012 and 2013 had more agreement on statements of PI sub-scales compared to their counterparts

in nursing and pharmacy. In contrast, there were no significant differences in the attitudes of nursing and pharmacy students on this sub-scale. The higher agreement on statements which constructed PI sub-scales indicated that medical students had a stronger professional identity than their counterparts in nursing and pharmacy. Statements 8 and 15 which constructed the PI sub-scale consisted of negative statements towards IPE. All healthcare students had disagreements on these negative statements which indicated they had positive attitudes towards IPE. However, medical students were significantly more positive towards the statement on the function of other healthcare professionals which was mainly to support doctors (Statement 14-which also constructed PI sub-scale). This result also indicated that medical students had more positive attitudes towards their professional identity.

5.1.3.3 Students' attitudes towards IPE based on Year of Study within health schools

Demographic characteristics of participants based on Year of Study can be seen in Table 5.16. Table 5.24 shows the mean regression factor scores for the RIPLS sub-scales and the p-values calculated from t-test analysis. As can be seen from the table, there were some significant differences found amongst the groups of participants. Multivariate analysis indicated that there were no variables (i.e. age, gender, previous health education background and health related activities) influencing Year 3 pharmacy, Year 3 nursing and Year 4 medical students across the two survey years.

However, age (F[6,129]= 2.866, p<0.012) and health related experience (F[1,129]= 3.948, p<0.049) influenced Year 3 medical students' attitudes on the PI sub-scale across the two survey years. Multivariate analysis indicated that there were no interactions amongst age and health related experience that influenced Year 3 medical students' attitudes on the PI sub-scale. Parameter estimates indicated that older Year 3 medical students had lower mean scores (i.e. more positive attitudes) towards the PI sub-scale than their younger colleagues. In addition, students who had no health related working experience had lower mean scores (i.e. more positive attitudes) towards PI sub-scale than those who had health related activities. Similar to previous analyses, more positive attitudes towards the PI sub-scale indicated that medical students had more positive attitudes towards their own professional identity.

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The mean scores differences for the RIPLS Statements 8, 14 and 15 were also calculated for these data. T-tests indicated that statistically significant mean score differences were only shown in Year 3 medical students on RIPLS Statements 8 and 14 (Table 5.25). Year 3 medical students in 2012 had more positive attitudes towards learning with other healthcare students compared to those in Survey Year 2013. In addition, Year 3 medical students in 2012 had less support towards the role of other healthcare professionals as mainly to support doctors. These results indicated that Year 3 medical students in Survey Year 2012 had more positive attitudes towards IPE than those in Survey Year 2013.

Table 5.24 Medical, nursing and pharmacy students' mean regression factor scores on RIPLS sub-scales based on Year of Study in Survey Years 2012 and 2013

Course of Study	RIPLS Sub-scales	Year of Survey	Year of Study								
			n	Year 2 Students	p-value	n	Year 3 Students	p-value	n	Year 4 Students	p-value
				Mean ± SE			Mean ± SE			Mean ± SE	
Medical	Shared Learning and Teamwork (SLT)	2012	68	0.017 ± 0.111	0.911	68	0.166 ± 0.127	0.788	65	-0.142 ± 0.123	**0.015***
		2013	52	0.036 ± 0.124		60	0.103 ± 0.135		61	0.410 ± 0.168	
	Professional Identity (PI)	2012	68	-0.218 ± 0.122	0.671	68	-0.141 ± 0.106	**0.001***	65	-0.217 ± 0.123	0.680
		2013	52	-0.150 ± 0.101		61	-0.750 ± 0.137		61	-0.287 ± 0.129	
Nursing	Shared Learning and Teamwork (SLT)	2012	37	0.219 ± 0.159	0.983	35	-0.175 ± 0.182	0.912	33	-0.176 ± 0.177	0.172
		2013	30	0.215 ± 0.124		37	-0.203 ± 0.172		31	0.277 ± 0.275	
	Professional Identity (PI)	2012	37	0.466 ± 0.175	0.687	35	0.493 ± 0.146	0.871	33	0.634 ± 0.126	0.718
		2013	30	0.362 ± 0.187		37	0.824 ± 0.138		31	0.731 ± 0.233	
Pharmacy	Shared Learning and Teamwork (SLT)	2012	23	-0.263 ± 0.173	0.370	18	0.553 ± 0.361	0.052	22	-0.156 ± 0.214	0.779
		2013	19	-0.164 ± 0.287		20	-0.315 ± 0.228		19	0.052 ± 0.241	
	Professional Identity (PI)	2012	23	0.405 ± 0.209	0.794	18	-0.334 ± 0.353	**0.036***	22	0.589 ± 0.232	0.664
		2013	19	0.327 ± 0.211		20	0.571 ± 0.210		19	0.445 ± 0.234	

Notes: * showed significant difference

Table 5.25 RIPLS Statements 8, and 14 mean scores in Year 3 medical students in Survey Year 2012 and 2013

Group	Year of Survey	RIPLS 8 (Mean ± SE)	p-value	RIPLS 14 (Mean ± SE)	p-value
Year 3 Medical students	2012	3.44±0.07	**0.002***	2.25 ± 0.09	**0.03***
	2013	3.08±0.09		1.95 ± 0.10	

Notes: * showed significant difference

5.1.3.4 *Students' attitudes towards IPE as they progress through their chosen course of study at health schools (Trend Analysis)*

Demographic characteristics of students' participation

Table 5.26 shows demographic characteristics of the students involved in the trend analysis in Survey Years 2012 and 2013. This study involved surveying a random sample of the Year 1, Year 2 and Year 3 students in 2012, and then repeating the same in 2013 using a random sample of the Year 2, Year 3 and Year 4 students. The intent of this study was to assess whether time spent within the students' course of study influenced their attitudes towards IPE.

There were no significant differences in the demographic characteristics of the Year 1 Cohort when comparing students who participated in Survey Year 2012 and Survey Year 2013 (Table 5.26). However, in the Year 2 Cohort, students who participated in Survey Year 2012 were younger and had more health related experience than those from Survey Year 2013. Similarly, in the Year 3 Cohort, students who participated in Survey Year 2012 were younger; had a lower proportion of males; and had more health related experience than those who participated in Survey Year 2013.

Table 5.26 Demographic characteristics of participants in cohort Year 1, 2, and 3 in Survey Year 2012 and 2013

	Survey Year 2012	Survey Year 2013	p-value
Year 1 Cohort			
Year of Study	**Year 1**	**Year 2**	
Age (Mean±SD)	18.5±0.68	18.8±1.90	0.054
Gender (%Male/Female)	31%/66%	39%56%	0.267
Medical/Nursing/Pharmacy (N)	57/33/18	52/30/19	0.927
% of students had previous health background	23.9%	23.4%	0.926
% of students had health related experience	39.8%	40.2%	0.956
Year 2 Cohort			
Year of Study	**Year 2**	**Year 3**	
Age (Mean±SD)	19.4±1.89	20.12±0.79	**0.000***
Gender (%Male/Female)	29%/69%	32.5%/61.6%	0.426
Medical/Nursing/Pharmacy (N)	68/37/23	61/37/20	0.879
% of students had previous health background	8.5%	3.2%	0.074
% of students had health related experience	33.1%	19.2%	**0.012***
Year 3 Cohort			
Year of Study	**Year 3**	**Year 4**	
Age (Mean±SD)	20.2±2.7	21.1±0.74	**0.010***
Gender (%Male/Female)	32.5%/65.5%	34.5%/65.5%	**0.017***
Medical/Nursing/Pharmacy (N)	68/35/18	62/31/19	0.989
% of students had previous health background	10.5%	5.3%	0.143
% of students had health related experience	50.8%	21.2%	**0.000***

Notes: * showed significant difference

Students' attitudes towards IPE as they progressed through their chosen course

Participants in the current study were selected randomly for both survey years, thus, the participants were treated as an independent variable. Students' attitudes towards RIPLS sub-scales were reported based on changes of students' mean regression factor scores as they progressed through their courses. T-test was employed to analyse healthcare students' attitudinal changes during their course of study for each cohort.

Table 5.27 shows the RIPLS mean regression factor scores amongst students as they progressed through their course of study (e.g. Year 1 Cohort refers to Year 1

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pharmacy students in Survey Year 2012 vs Year 2 pharmacy students in Survey Year 2013). The table also displays p-values of t-test analyses to determine any significant changes in the students' mean regression factor scores over time. As can be seen from Table 5.27, only Year 2 Cohort medical students showed significant differences in mean regression factor scores for the PI sub-scale (p=0.004) as they progressed through their course. The students' mean regression factor scores on this sub-scale were significantly lower (i.e. more positive attitudes) as they progressed in their studies. Once again, similar to findings from other analyses, more positive attitudes towards the PI sub-scale suggested that this cohort of medical students had more positive attitudes towards their own professional identity. This indicated that the Year 2 Cohort medical students showed improvement in their attitudes towards the PI sub-scale from 2012 to 2013. More positive attitudes towards this sub-scale also suggested that Year 2 Cohort medical students had less positive attitudes towards IPE as they progressed through their study. Multivariate analysis indicated that age was the only significant contributor influencing Year 2 Cohort medical students' attitudes changes towards the PI sub-scale (F[5,128]= 3.479, p= 0.006) sub-scale. Parameter estimates indicated that older Year 2 Cohort medical students had lower mean regression factor scores (i.e. more positive attitudes) for this sub-scale compared to younger students in the same cohort.

Table 5.27 Students' mean regression factor scores on RIPLS sub-scales as they progressed through in the course of study

Course of Study	RIPLS Sub-scales	Year of Survey	Cohort								
			Year 1			Year 2			Year 3		
			n	Mean ± SE	p-value	n	Mean ± SE	p-value	n	Mean ± SE	p-value
Medical	Shared Learning and Teamwork (SLT)	2012	57	-0.086 ± 0.125	0.493	68	0.017 ± 0.111	0.571	68	0.166 ± 0.128	0.320
		2013	52	0.036 ± 0.124		61	0.116 ± 0.135		62	0.375 ± 0.168	
	Professional Identity (PI)	2012	57	-0.089 ± 0.115	0.693	68	-0.218 ± 0.122	**0.004***	68	-0.141 ± 0.106	0.369
		2013	52	-0.150 ± 0.101		61	-0.750 ± 0.138		62	-0.292 ± 0.129	
Nursing	Shared Learning and Teamwork (SLT)	2012	33	0.149 ± 0.153	0.745	37	0.219 ± 0.159	0.076	35	-0.176 ± 0.182	0.166
		2013	30	0.215 ± 0.124		3737	-0.203 ± 0.176		31	0.277 ± 0.275	
	Professional Identity (PI)	2012	33	0.511 ± 0.170	0.558	37	0.466 ± 0.176	0.114	35	0.792 ± 0.147	0.822
		2013	30	0.363 ± 0.188		3737	0.825 ± 0.139		31	0.731 ± 0.233	
Pharmacy	Shared Learning and Teamwork (SLT)	2012	18	-0.147 ± 0.228	0.611	23	-0.263 ± 0.173	0.854	18	0.533 ± 0.362	0.071
		2013	19	0.043 ± 0.287		20	-0.315 ± 0.228		19	-0.247 ± 0.241	
	Professional Identity (PI)	2012	18	0.001± 0.302	0.378	23	0.405 ± 0.209	0.579	18	-0.334 ± 0.353	0.072
		2013	19	0.327 ± 0.211		20	0.572 ± 0.210		19	0.445 ± 0.235	

Notes: * showed significant difference

Further, analysis of RIPLS Statements 8, 14 and 15 were also conducted for this data set. T-tests indicated that only RIPLS Statement 8 was significantly different amongst Year 2 Cohort medical students as they progressed through their course (Table 5.28). The table shows that Year 2 Cohort medical students as they progressed through their course had more positive attitudes towards Statement 8 "*It is not necessary for undergraduate healthcare students to learn together*". This indicated that Year 2 Cohort medical students had less positive attitudes towards learning with other healthcare students.

Table 5.28 RIPLS Statements 8 mean scores and p-values in Cohort Year 2 medical students in Survey Year 2012 and 2013

Group	Year of Survey	RIPLS 8 (Mean ± SE)	p-value
Year 2 medical students	2012	3.34±0.07	**0.03***
	2013	3.08±0.09	

Notes: * showed significant difference

The changes of mean regression factor scores for Year 1, 2, and 3 Cohorts of medical, nursing and pharmacy students in Survey Year 2012 and 2013 are shown in Figures 5.4; 5.5 and 5.6. Figure 5.4 shows all Year 1 Cohort healthcare students' from the three courses moved towards less positive attitudes on SLT sub-scale as they moved along in their chosen course of study.

Figure 5.5 displays Year 2 Cohort had different attitudes on the PI sub-scale in the different courses of study. Year 2 Cohort medical students had more positive attitudes towards the PI sub-scale as they progressed through their study. Meanwhile, the Year 2 Cohorts of nursing and pharmacy students moved towards less positive attitudes towards the sub-scale. Figure 5.6 shows Year 3 Cohort medical and nursing students moved towards more positive attitudes towards PI sub-scale, on the contrary, pharmacy students of the same cohort showed less positive attitudes on this sub-scale.

Furthermore, all cohorts (as seen on Figures 5.4 to 5.6) of medical students consistently showed more positive attitudes on PI sub-scale as they moved along the course at medical school. Yet, they had less positive attitudes towards SLT sub-scale

in all cohorts. In contrast, all cohorts of pharmacy students had consistently less positive attitudes on PI sub-scale as they moved along their course in pharmacy. Meanwhile, Year 1 Cohort nursing students had more positive attitudes towards the PI sub-scale, while the Year 2 and 3 Cohorts had less positive attitudes towards this sub-scale.

The findings of trend analysis showed that medical students had less positive attitudes towards learning with other healthcare students. These were shown from less positive attitudes towards the SLT sub-scale and more positive attitudes towards the PI sub-scale. The most significant difference of medical students' attitudes towards PI sub-scale was seen in the Year 2 Cohort.
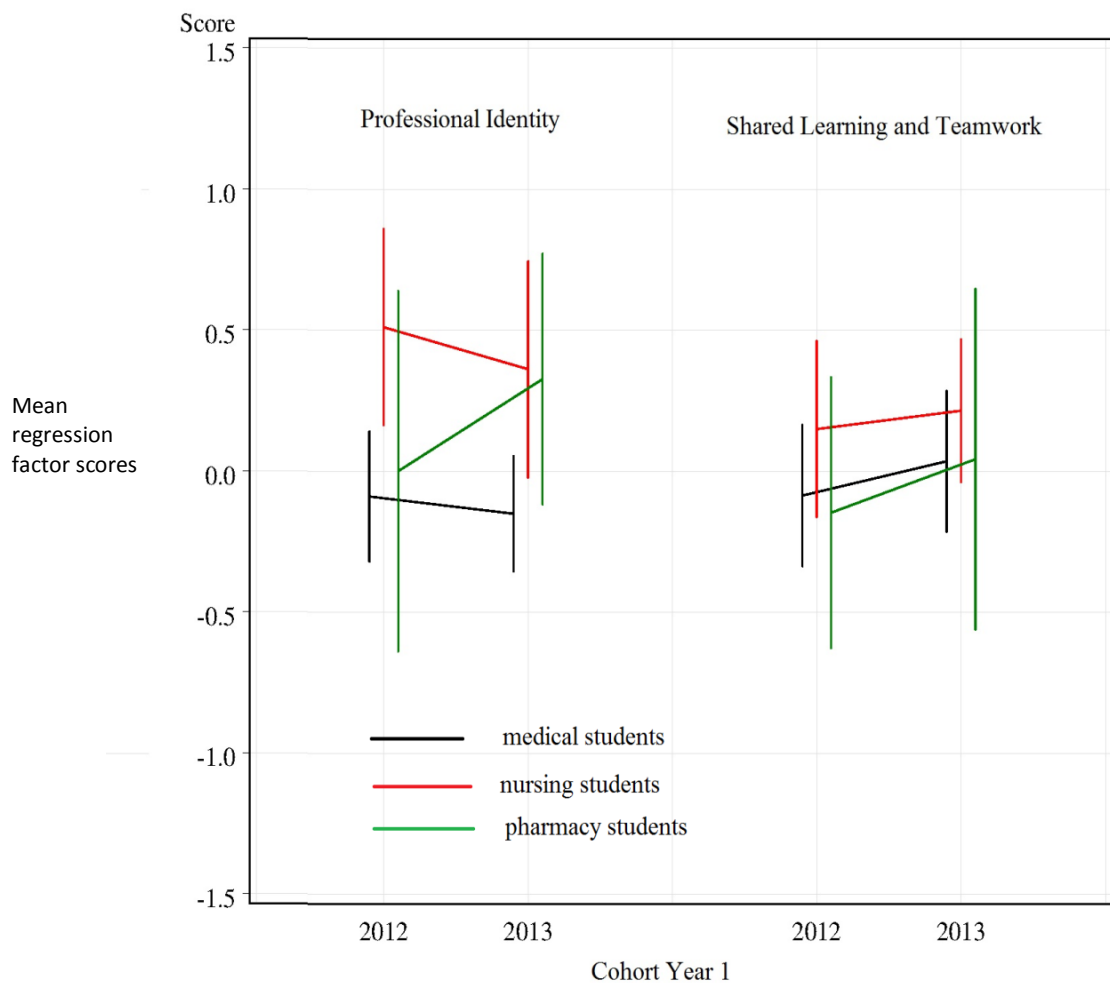
Figure 5.4 Medical, nursing and pharmacy students' Year 1 Cohort changes in mean regression factor scores of RIPLS sub-scales in Survey Year 2012 and 2013
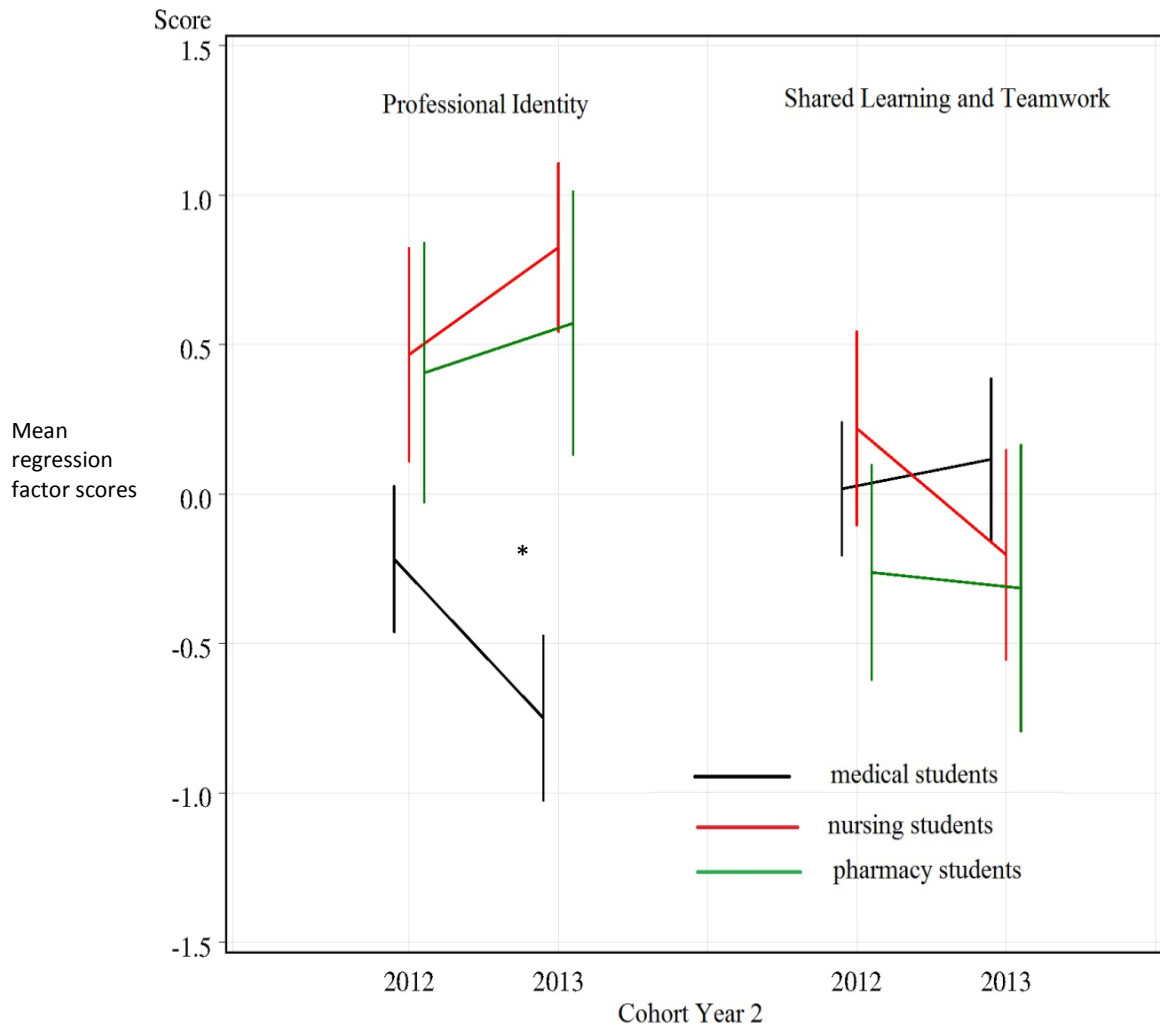
Notes: * showed significant difference

Figure 5.5 Medical, nursing and pharmacy students' Year 2 Cohort changes in mean regression factor scores of RIPLS sub-scales in Survey Year 2012 and 2013
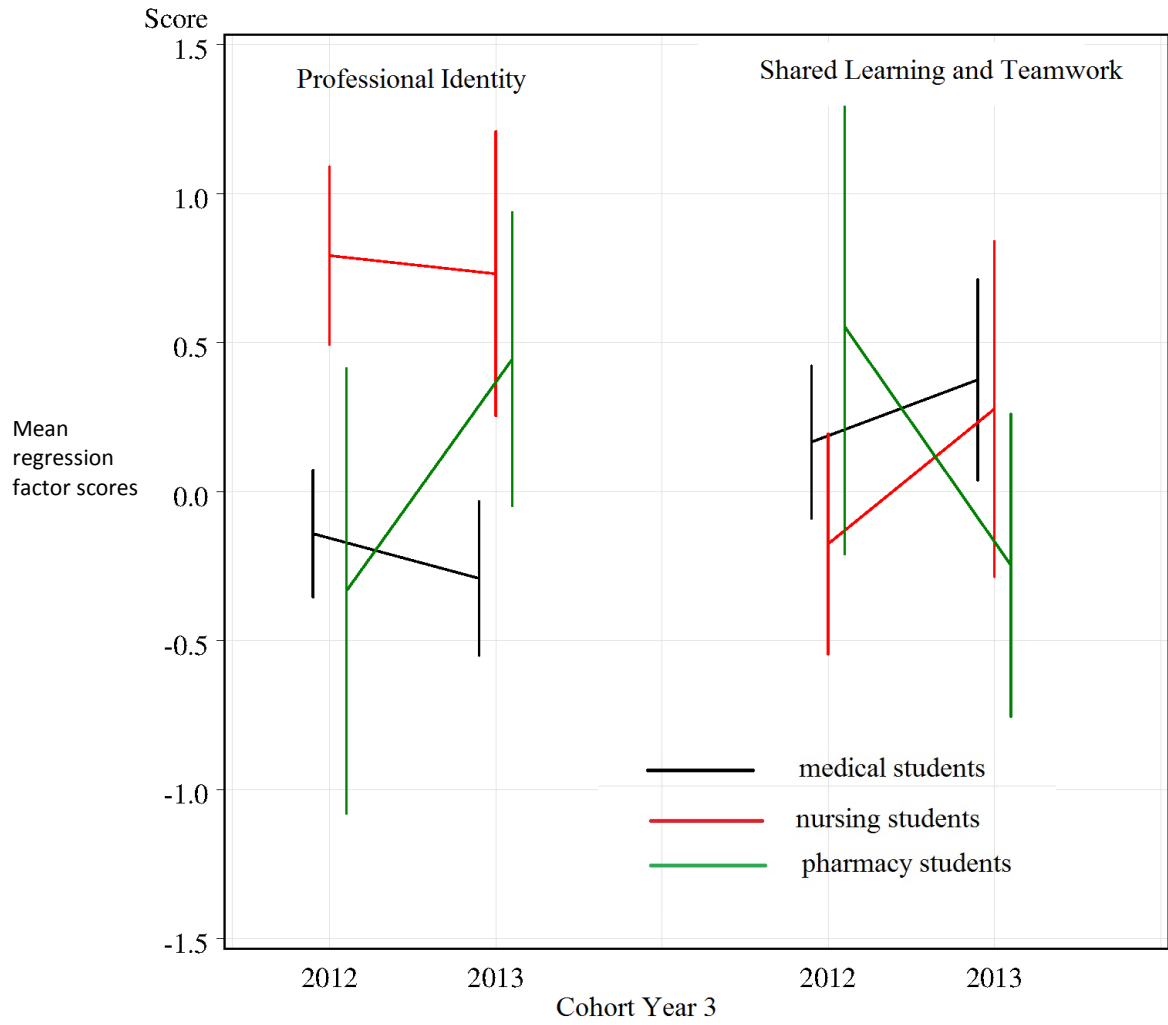
Figure 5.6 Medical, nursing and pharmacy students' Year 3 Cohort changes in mean regression factor scores of RIPLS sub-scales in Survey Year 2012 and 2013

5.1.4 DISCUSSION ON HEALTHCARE STUDENTS' ATTITUDES TOWARDS IPE

This study employed the RIPLS questionnaire to identify healthcare students' willingness to engage in IPE. This questionnaire previously validated and has been used extensively in the literature. [66, 294, 296] Macfadyen et al. suggested that the original questionnaire had unstable sub-scales, thus they recommended researchers should use the questionnaire with caution.[296] A recent Indonesian study employing RIPLS questionnaire found three sub-scales constructed the questionnaire, namely Teamwork and Collaboration, Positive and Negative Professional Identity sub-scales using 16 items of RIPLS questionnaire.[294] However, in the present study, although it was also conducted in Indonesia, it retrieved different sub-scales (Shared Learning and Teamwork and Professional Identity). EFA (Explanatory Factor Analysis) retrieved three sub-scales, CFA (Confirmatory Factor Analysis) test indicated that the Roles and Responsibility sub-scale had no correlation with the other two sub-scales, thus, the modified RIPLS questionnaire in the present study constructed two sub-scales. The different sub-scales constructed may result from items employed in both studies being slightly different. The present study used a RIPLS survey which had been modified at Curtin University,[264] meanwhile the study which was conducted in another province in Indonesia used 16 of 19 items from the original RIPLS.

Cross sectional results of this study found that medical, nursing and pharmacy students' attitudes towards IPE were generally positive. These positive attitudes towards IPE existed despite the fact that no IPE activities had been conducted at the university where the study was undertaken. Thus, as a new initiative participants' attitudes may be positive. Furthermore, the overall positive attitudes towards IPE may also be influenced by the high level of disagreement on negative statements (Statements 8 and 15) from some participants. Participants in a survey tend to disagree more with negative statements than to agree with positive statements,[302] which may influence the direction of participants' responses in the survey.

This study also found that medical students had less positive attitudes towards IPE than those of nursing and pharmacy students. This finding was similar to that found in the literature. Curran et al. identified that medical students had less positive attitudes compared to nursing, pharmacy and social work students towards IPE.[259]

Subsequently to the administration of the RIPLS questionnaire in the study university, an unpublished report of a national multi-centre study in Indonesia in 2012 identified similar results where the medical students had the least positive attitudes towards IPE compared to other healthcare students.[303] Further analysis of the RIPLS sub-scales in this study revealed medical students' attitudes towards the PI sub-scale were significantly more positive than nursing and pharmacy. Statements constructing this sub-scale were negative statements (unfavourable) towards IPE. This also suggested that medical students had less positive attitudes towards IPE.

Although the overall mean scores towards IPE for medical students were less positive than nursing and pharmacy students, medical students had more positive attitudes towards the importance of learning with other healthcare students (Statement 4). This positive attitude may result from a tendency of participants to present themselves in a favourable light which was influenced by culturally acceptable and appropriate behaviour.[304] This is one of the common biases in a survey which is known as social desirability bias. This bias may hide the true relationship between variables in the study.

There were different directions of healthcare students' levels of agreement towards negative Statements 8, 14, and 15 (which constructed a PI sub-scale). Medical students' attitudes towards RIPLS Statement 8 and 15 were not significantly different compared to nursing and pharmacy students. However, the medical students had significantly more positive attitudes towards RIPLS statement 14 (*The function of allied health professionals is mainly to provide support for doctors*) than nursing and pharmacy students. This suggested that medical students in this study had strong positive attitudes towards their professional identity. These different directions may explain the low Cronbach's alpha score on the PI sub-scale. Although reversed coded the scores for Statements 14 were shown to have the same direction as those for Statements 8 and 15, with the Cronbach's alpha remaining low for this sub-scale. As a consequence, healthcare students' attitudes towards the statements which constructed the sub-scale (Statement 8, 14, and 15) were also employed in data analysis to examine the significant differences on statements which may influence statistically significant differences identified on the PI sub-scale mean regression factor scores.

Analysing healthcare students' mean score differences based on their responses to statements which constructed the sub-scales may be invalid in repeated and trend analysis. This was because some students may have received the questionnaire in both Survey Years 2012 and 2013. Thus, to reduce method bias, students' responses towards RIPLS sub-scales were analysed based on mean regression factor scores which had been standardised based on factor loading of the sub-scales, students' means and standard deviations of sub-scales retrieved from factor analysis in Survey Year 2012. However, because results of a cross-sectional study (Section 5.1.3.2) indicated healthcare students' attitudes towards the statements which constructed PI sub-scale had different directions of agreement, consequently, analysis of healthcare students' attitudes towards Statement 8, 14 and 15 were also employed.

Repeated cross sectional analysis in the current study also found that medical students had more positive attitudes towards the PI sub-scale but no significant differences in attitudes towards the SLT sub-scale compared to nursing and pharmacy student in both Survey Years 2012 and 2013. This suggested that the attitudes of students from the three health courses towards RIPLS sub-scales were consistent in both survey years. The medical students will be physicians in the future. The positive attitudes found in medical students towards PI sub-scale as a perceived belief in superiority towards their own profession compared to other professions may result from the fact that medicine is a mature profession which has long been known for its autonomy in decision making in healthcare.[72] This autonomy in decision making may influence the culture of healthcare service delivery where physicians consider themselves as the leader in healthcare service. In addition, they may perceive the roles of other healthcare professionals mainly to support the physician. This was also reflected in the results of cross sectional study (Section 5.1.3.1 and 5.1.3.2) where medical students had more positive attitudes towards Statement 14 than their counterparts in nursing and pharmacy.

Furthermore, trend analysis showed that all cohorts of medical students had more positive attitudes towards PI sub-scale but less positive attitudes on SLT sub-scale as they progressed through the course. Year 2 Cohort medical students' attitudes on the PI sub-scale were also significantly more positive as they progressed through their courses from 2012 to 2013. Multivariate analysis indicated that these students' attitudes were influenced by their age where older students had more positive

attitudes on this sub-scale than younger students. The PI sub-scale was constructed of negative statements towards IPE which indicated that Year 2 Cohort medical students had less positive attitudes (unfavourable) towards IPE as they progressed through their study. This result was also confirmed from further analysis of RIPLS Statement 8. It showed that Year 2 Cohort medical students had less positive attitudes towards learning with other healthcare students as they progressed through their course of study.

The above findings indicated that medical students may have gained professional socialisation during their learning in the university. Year 2 medical students were taught important units (i.e. infection and infectious diseases; and immune systems and disorders). In addition, most of the lectures at the medical school were delivered by medical specialist practitioners from the local teaching hospitals. The learning tasks were designed to develop medical students' knowledge, skills and attitudes as medical doctors. Being exposed to medical practitioners in their field of practice during their course may have improved their professional socialisation. Trede et al. in a review on higher education suggested that students need to learn from the lecturers who engaged in practice to obtain a clearer understanding on their professional identity.[305]

Nursing students in the current university may also have been taught important units (i.e. cardiovascular and respiratory blocks) in Year 1. However, in comparison to stronger agreement towards PI sub-scale amongst medical students as they progressed through in their chosen course, the nursing students had no significant different attitudes towards this sub-scale. The difference in attitudes towards this sub-scale between medical and nursing students may result from the different extent of professional socialisation amongst the different courses of study.[306] Wynd stated that different beliefs in public service, as well as less autonomy for nurses, contributed to the difference in nurse's professional identity development.

Meanwhile, pharmacy students' curriculum in the present university course was focused on pharmaceutical sciences with little exposure to patient care. Less than 10% of pharmacy students' curriculum was on pharmacotherapy and patient care related topics. Further, the topic of clinical pharmacy and pharmacotherapy were optional units for pharmacy undergraduates. These two units are considered

essential in students' engagement with patient care delivery. The lack of exposure to these units amongst pharmacy students may explain the trend of less positive attitudes towards the PI sub-scale in pharmacy students in the three cohorts. In addition, the result of the mean scores on RIPLS Statement 14 in the cross sectional study as well as in the repeated cross sectional study showed that pharmacy and nursing students had significantly different attitudes towards this statement compared to those of medical students. Yet, pharmacy students' had more agreement than nursing students on Statement 14 (T*he function of allied healthcare professionals is mainly to provide support for doctors)*. This may suggest that pharmacy students had less sense of their professional identity than nursing students. This may reflect a lack of pharmacy students' confidence in their professional identity and may also imply the lack of understanding of their role or professional responsibility.

The less positive attitudes towards the PI sub-scale in nursing and pharmacy students may suggest that they may not have a clear understanding on their professions' roles within the healthcare system due to lack of educational role model. This may be because of the roles of the nurse and pharmacist professions are less well defined in the current health system than that of the physician. Studies showed that role models are essential in professionalism formation.[307-309] This could be seen in medical students where they had stronger sense towards professional identity because the physician's role in the health system is clear. Physicians have the most hierarchical authority and autonomy in delivering their care.[306] In contrast, nurses often have lower autonomy and tend to follow orders from physicians.

In the literature, debate on professional identity of nurses and pharmacists remains.[310-312] Lai and Lim argued that nurses' professional socialisation is influenced by two sociological conditions (structural and cultural). Structural conditions involved hospital and job descriptions while cultural conditions included systems prevalent in the society as expressed in wards, symbols, and ceremonies.[309] These may include nurses' uniforms and medical tools attached to physicians. Further, they suggested professional socialisation in nursing is essential to foster nurses' professional identity. It was suggested that professional identity development in nursing required moral maturity to reflect their professional and personal growth in caring.[311] Partnerships amongst nurse academics and practitioners were also deemed to be essential in

nurses' professional identity development,[311, 313] so that nursing students could foresee their future career from nurses practitioners.

Pharmacists' professional identity is also less well defined in the literature. Noble concluded the ambiguity of pharmacist's role may be influenced by the fact that pharmacy curricula had less engagement with patients.[314] This fact was also current in the pharmacy curriculum of the study university. Furthermore, an Indonesian study found that pharmacists in the country had limited participation in professional activity.[175] This may result in a further uncertainty of the role of pharmacists in healthcare delivery in the country. The lack of role models for nurses and pharmacists in the study university may explain the lesser sense of professional identity amongst nursing and pharmacy students in this study.

Although the cross sectional study in Survey Year 2012 showed medical students had more positive attitudes towards the importance of learning with other healthcare students (Statement 4), trend analysis identified all cohorts of medical students had less positive attitudes towards SLT sub-scale. Khalili et al. suggested that strong uni-professional identity may lead to strong cohesiveness to their own profession but less acceptance of working with other professions.[315] Further, they stated that if those who have strong uni-professional identity learned together with those who have lack of uni-professional identity; there may be ineffective interprofessional learning. In support, Wackerhausen[316] argued that strong professional identity may inhibit interprofessional learning.

Professional identity is an outcome of professional socialisation.[309] Professional identity portrays professional attributes, professional self-image and behaviour. Wackerhausen[316] stated that professional identity could be presented at the micro and macro levels. Micro level included culture dimensions which may involve habitual ways of talking, explaining, perceiving, valuing, doing and assuming based on one's profession. He considered these dimensions may be exhibited by a person in a profession. Meanwhile, the macro level of professional identity included public perception, privileges, duties, regulation and self-image promoted by profession's leaders. Meanwhile, professional socialisation is a complex process and requires interaction within the profession and a reflective nature during the learning process.[317, 318] This socialisation is influenced by beliefs and values promoted during

the learning process. In the learning process of becoming a professional, healthcare students observe, experience and evaluate being a professional.[319] Studying longer at university, healthcare students not only learn knowledge, skills, and attitudes but also values, norms and subcultures of their own professions.[317, 320]

To promote effective interprofessional learning amongst healthcare students, Khalili et al. proposed fostering interprofessional socialisation.[315] As opposed to professional socialisation, in interprofessional socialisation, intergroup contact theory and social identity theory were adopted to foster dual identity (Uni-professional Identity and Inter-professional Identity). The adoption of this dual identity is suggested to maintain interprofessional learning which can lead to continuing interprofessional collaboration in the future. Thus, continuing interprofessional collaboration will be very beneficial for future healthcare providers to improve teamwork in healthcare delivery.

In support to overcome strong professional identity, Wackerhausen[316] suggested a second order reflection. This reflection involved being a stranger in one's own profession. Although a second order reflection which may not be easy to implement, it is an essential transformation of professional education for collaboration to work. He argued that being a stranger to their own profession may endanger a stable profession because they could be seen as an attacker of their own profession. Wackerhausen also argued that the purpose of professional existence remains, he named this term *raison d'eˆtre*. Second order reflection could mean interprofessional reflection thus it could address barriers of interprofessionalism resulting from strong professional identity. This suggests that because medical students at the study university had strong professional identity, they need to have a second order reflection during their learning if IPE is implemented in their curricula. In addition, involving teachers other than doctors was considered to provide a profound benefit to medical students learning which may emphasise the importance of other healthcare professionals.[200] Further, it was suggested that other healthcare professionals may also enhance medical students understanding of the impact of disease on the patient, which may be neglected when medical students are taught by physicians only.

The results from trend analysis demonstrated that Year 1 Cohort in medical, nursing and pharmacy students showed less agreement towards SLT sub-scale as they progressed through their chosen course. This suggested that IPE needs to be initiated early in healthcare students' education so that interprofessional socialisation can be fostered early in students' courses of study. This is to prevent negative stereotypes which may prevent effective IPE in practice.[196] This study also found that a strong sense of professional identity in medical students may be one of the barriers to interprofessional learning at the current university. Therefore, besides fostering IPE early in healthcare students' curriculum, continuous reflection of the learning process is essential to gain the utmost benefits of implementing IPE in the current university. Furthermore, in order to improve the sense of professional identity amongst nursing and pharmacy students, nurses and pharmacists who worked as practitioners should also be involved during their learning so that these students have proper professional socialisation from practitioners in their professions.

There were some limitations to this study. Firstly, despite the fact that the power of analysis was anticipated at 0.8 with the sample size being stratified across the health courses and year of studies and the response rate being high (more than 80% from each courses and Survey Year); there were very little significant differences in the present study. This result may associate with the unequal sample size across the courses or may be related to the lack of relationship between the groups in the present study.[321] Secondly, other studies suggested that Statements 17, 18 and 19 in Parsel and Bligh questionnaire were considered unstable to construct a RIPLS survey because of low reliability.[294, 296] These statements were Statement 14, 15, 16 and 17 of the current questionnaire. McFadyen et al. argued that studies had shown employing those statements in RIPLS questionnaire had low internal consistency, thus they suggested researchers should take careful consideration when using the RIPLS questionnaire.[296] This fact may explain some anomalies found in students' attitudes towards the PI sub-scale (which was also constructed from Statement 14 and 15). Year 3 medical students without having health related experience (e.g. paid or voluntary activities related to their roles) had more positive attitudes towards this sub-scale than those who had such experience. In addition, Year 1 nursing students also had stronger agreement towards Statement 14 than their seniors. In addition, analysis on RIPLS Statements 8, 14, and 15 in Survey Year 2013 may be more accurate if it was corrected based on means and standard deviations from Survey

Year 2012 to adjust for students who may participate in both survey years. However, the aim of the analysis of these statements was to obtain confirmation on where the significant differences were found in the mean regression factor scores on the PI sub-scale in repeated and trend analysis. Thus, analysing these statements towards their raw mean scores was deemed to be more practical than adjusting the mean scores based on that in Survey Year 2012. The other limitation was the longitudinal study should have been conducted at an individual level so that bias from individual factors could be eliminated. However, in this study, the changes of healthcare students' attitudes were assessed based on the population to identify the trend of changes in the population.

5.2   IPL WORKSHOP ON MEDICATION SAFETY

5.2.1   DEMOGRAPHIC CHARACTERISTICS

Twenty-one medical, 16 nursing and 22 pharmacy students attended the first day of the IPL workshop. While on the second day, 10 medical, 10 nursing and 15 pharmacy students completed the post-workshop questionnaire. These respondents were made up of 22 (63%) female and 13 (37%) male students.

5.2.2   QUANTITATIVE ANALYSIS OF PRE- AND POST-WORKSHOP QUESTIONNAIRES

Wilcoxon's test indicated that RIPLS statements 1, 3, 6, 10, 11, 12 and 13 were significantly different pre-post workshop, $p < 0.05$ (Table 5.29). These statements were components of the Shared Learning and Teamwork (SLT) sub-scale of the modified RIPLS questionnaire in the current study. This showed that the interprofessional learning workshop had changed students' attitudes towards agreement on the importance of shared learning and working in a team with other healthcare students. In addition, responses to the RIPLS Statement 8 (*It is not necessary for undergraduate healthcare students to learn together*) showed no significant differences between the RIPLS pre- and post- workshop questionnaire (p = 0.617) which indicated that the healthcare students agreed to similar extents with this statement.

Despite the fact that the students' attitudes toward the SLT sub-scale moved toward agreement, students from the three schools showed significant differences toward

the importance of learning teamwork skills. This was shown from students' responses to RIPLS statement 4 (*Team working skills are essential for all healthcare students to learn*). Fisher's exact test value (p=0.011) for this statement was significantly different across the three cohorts of students before and after attending the workshop (Table 5.29). Medical students' responses moved towards disagreement on this statement in the post-workshop questionnaire, whilst those of pharmacy students became more positive, and those of nursing students' remained unchanged (Figure 5.7). This may suggest that medical students had less agreement on the necessity to learn teamwork skills after attending the workshop.

Table 5.29 Students' mean scores on RIPLS statements before and after attending IPL workshop

RIPLS Statement	Pre-Test (Mean ± SD)	Post-Test (Mean ± SD)	Wilcoxon p-value (n = 35)	Fisher's Exact between groups
1. Learning with other students will help me become a more effective member of a healthcare team	1.63 ± 0.490	1.26 ± 0.423	**< 0. 01***	0.640
2. Patient would ultimately benefit if healthcare students worked together	1.46 ±0.505	1.31 ± 0.471	0.197	0.162
3. Shared learning with other healthcare students will increase my ability to understand clinical problems	1.63 ± 0.490	1.34 ± 0.482	**< 0.05***	0.643
4. Team working skills are essential for all healthcare students to learn	1.40 ± 0.497	1.31 ± 0.471	0.439	**0.011***
5. Shared learning will help me understand my own professional limitations	1.77 ± 0.598	1.71 ± 0.519	0.480	0.899
6. Learning between healthcare students before qualification would improve working relationships after qualification	1.60 ± 0.497	1.29 ± 0.458	**< 0.01***	0.101
7. Shared learning will help me think positively about other healthcare professionals	1.63 ± 0.490	1.49 ± 0.507	0.225	0.052
8. It is not necessary for undergraduate healthcare students to learn together	3.46 ± 0.482	3.46 ± 0.701	0.617	0.103
9. Shared learning with other healthcare students will help me communicate better with patients	1.83 ± 0.453	1.66 ± 0.684	0.186	0.165
10. Shared learning with other healthcare students will help me communicate better with other professionals	1.74 ± 0.443	1.49 ± 0.562	**< 0.05***	0.901
11. I would welcome the opportunity to work together with other healthcare students	1.71 ± 0.458	1.46 ± 0.505	**< 0.01***	0.700
12. Shared learning will help me clarify the nature of patient problems	1.71 ± 0.458	1.40 ± 0.497	**< 0.01***	1.000
13. Shared learning before qualification will help me become a better team worker	1.71 ± 0.458	1.31 ± 0.471	**< 0.01***	0.319
14. The function of allied health professionals is mainly to provide support for doctors	3.00 ± 0.686	3.11 ± 0.676	0.248	0.265
15. I am not sure what my professional role will be	3.29 ± 0.710	3.40 ± 0.604	0.439	0.356
16. I have to acquire much more knowledge than other healthcare students	2.03 ± 0.568	2.17 ± 0.707	0.096	0.174
17. I have to acquire many more skills than other healthcare students	2.03 ± 0.568	2.23 ± 0.731	0.052	0.768

Notes: RIPLS score (1 strongly agree to 4 strongly disagree); * showed significant difference
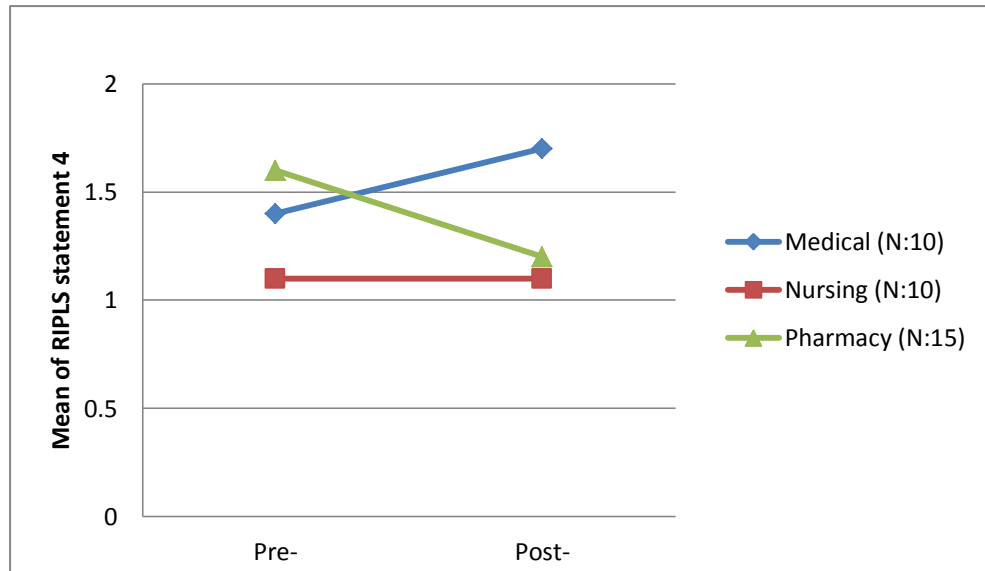
Figure 5.7 Changes of mean scores in medical, nursing and pharmacy students' towards RIPLS Statement 4 after attending IPL workshop on medication safety.

5.2.2.1   *Qualitative results*

An inductive approach was employed to analyse healthcare students' responses to open-ended questions. Healthcare students' responses on those questions were categorised into several themes in each question. Qualitative analysis showed that the workshop had changed healthcare students' view on the importance of teamwork and on understanding the roles, responsibility and limitation of healthcare professionals. The students also believed that they perceived a gain in teamwork experience and communication skills after the workshop. Table 5.30 shows themes identified from the open-ended post- workshop questionnaire questions.

Table 5.30 Themes identified in the open-ended post-workshop questionnaire

Post Workshop Questions	Themes
How the workshop has changed your view of the roles of other healthcare providers?	• Understanding roles and responsibility of other healthcare professionals • The importance of teamwork • The importance of communication among healthcare provider in patient care
How the workshop has enhanced your ability to interact with other students?	• Gain teamwork experience and its importance • Improve communication skills • Open-minded to the roles, responsibility and limitation of healthcare professionals • Improve confident, respect, and trust
What is the best aspect of the workshop?	• Discussion session with other healthcare students • Experience to share ideas and knowledge with other healthcare students in a team as a practice of real world • More understanding on other healthcare professional roles • Have more friends from different health background

Understanding roles and responsibility of healthcare professionals and *the importance of teamwork in healthcare* were identified as major themes on how the workshop had changed healthcare students' view of the roles of other healthcare providers (Table 5.30). They also gained understanding on the importance of communication in healthcare services in patient care.

"*The workshop has improved my understanding on the importance of other healthcare professionals and I gained experiences on how to communicate and to work in a team* (P5- Medical student)."

"*I had more understanding on the roles of healthcare professional and on the importance of working with others to improve healthcare service after attending this workshop* (P1- Pharmacy student)"

"*…I realised the importance of working in a team with other healthcare providers after attending this workshop…*" (P21- Pharmacy student)

The students believed that the workshop enhanced their *teamwork* and *communication skills in working with other healthcare professionals*. In addition, the students stated that the workshop improved *understanding on the roles, responsibility and limitation of other* healthcare professionals. Lastly, the healthcare students stated that the workshop had improved their *confidence, respect, and trust*

after interacting with other healthcare students. The following are some students' responses.

> *"….The workshop has helped me to learn on how to communicate effectively with other healthcare professional. This is very important for my future practice"* (P3- Nursing student)

> *"…In the workshop I could share my knowledge. I found a connection while working with other healthcare students"* (P10- Nursing student)

> *" improve trust to other healthcare professionals"* (P4- Medical student)

> *"the workshop improve my confidence and respect for each other…"* (P21- Pharmacy student)

The healthcare students stated that *the discussion session with other healthcare students* was the best aspect of the workshop. Other themes that were identified from this question were *opportunities to share ideas and knowledge during case discussion, gained knowledge and teamwork experience, became open- minded, had more friends from different health background and improved understanding on the roles of other healthcare professionals*. The following extracts demonstrate some of students' responses.

> *"…discussion session with other healthcare students was the best experience I gained because it was a rare opportunity"* (P13- Nursing student)

> *"…small group discussion to discuss case with other healthcare students who have different perspective based on their professions. I thought this was very useful for the future."* (P22- Medical student)

All healthcare students showed agreement that the workshop has improved their knowledge on medication safety, with 71.4% students strongly agreeing and 28.6% students agreeing with the statement that "understanding medication safety will be beneficial for their future roles as healthcare providers". All healthcare students also strongly agreed on the importance of learning about medication safety at the undergraduate level. With regards to professionals who were responsible to ensure medication safety, the healthcare students agreed that all healthcare providers have the responsibility of ensuring the safe use of medication.

5.2.2.2   Discussion on IPL workshop

This study indicated that an IPL workshop on medication safety involving medical, nursing and pharmacy students improved students' attitudes towards RIPLS SLT sub-scale. The change in attitudes after attending the workshop was at Level 2a outcomes of IPE (See Table 1.7). Participants also stated that they obtained an understanding of the roles, responsibility and limitations of other health professions, as well as gaining teamwork and communication experiences with other healthcare students during the activity. This study suggested an increased positivity towards shared learning, teamwork and communication after attending an IPL workshop. This meant that participants of the present study also acquired knowledge and skills of IPE which was at a Level 2b outcome of IPE (See Table 1.7). The finding that medical students' perceptions towards the need to learn to work in a team was less important following the workshop may be related to the strong professional identity of medical students in general. This needs further investigation prior to implementing IPE in the study university.

The present study adopted the IPL workshop on medication safety as an initiative for IPL undertaken at Curtin University in 2008.[264] This study found that the IPL workshop improved students' attitudes towards SLT sub-scale with other healthcare students. This can be seen from the significant differences in students' response on Statements 1, 3, 6, 10, 11, 12, and 13 which constructed the SLT sub-scale, before and after attending the workshop. These findings were similar to those achieved at Curtin University. However, participants of the IPL workshop at Curtin thought more positively towards RIPLS Statement 7 (*Shared learning will help me think positively about other healthcare professionals*) after attending the workshop, whereas, no significant difference on this statement was seen in the present study.

The open ended questions in the post-workshop questionnaire revealed that healthcare students perceived to acquire teamwork experience after attending the workshop. The above facts showed that in spite of the difference amongst healthcare students from the three cohorts towards attitudes on the importance to learn teamwork skills during their undergraduate years, they agreed that the IPL experience had changed their attitudes on SLT sub-scale.

The students also recognised that the workshop provided an opportunity to understand the roles of other healthcare providers and to interact with other healthcare students. In addition, some students claimed that respect and trust was built during the workshop. This result was consistent with findings in the literature on the outcomes of IPE activities such as respect, trust, teamwork, communication skills and understanding on the roles of other professions.[85, 182, 322] Similarly, Pollard and Miers[323] found that health and social care students in the United Kingdom who attended IPL during pre-qualification showed confidence in communication skills and had more positive attitudes towards their interprofessional interaction than those who learned within their own field of study.

Findings from the present study showed that interactive learning could potentially be an effective approach to initiate IPE on medication safety. This could be seen from the positive healthcare students' attitudes on the RIPLS pre- and post- workshop questionnaire, as well as from the results of the open-ended questions. In addition, students have the opportunity to interact and to share their knowledge with healthcare students from different background in this type of learning. This learning plays a significant role in fostering communication skills amongst healthcare professional students. Leape et al using a system approach analysis on adverse events have found that communication failure was one of main sources of adverse events.[23] In support of Leape et al findings, Allard et al stated that poor communication was the most common source of errors in the medication delivery process.[324] Communication skills are very important for healthcare professionals in ensuring the safe use of medication, thus, interactive learning with other healthcare professional should be fostered in education.

However, there were some limitations to the study. Although the primary investigator recruited the students randomly, students' participation was entirely voluntary. Due to the nature of voluntary participation, it is likely that those who participated in the study were supportive of IPE. The other limitation was lower than expected student participation rate. Although class coordinators had supported students' participation in the workshop, less than 50% of randomly selected students actually attended the two-day workshop. Further, there was a significant drop in the number of students' participating on the second day. The investigators were unable to explain the drop in student participation. In summary, an IPL workshop conducted

on medication safety involving Indonesian pharmacy, medical and nursing students improved students' attitudes toward shared learning, teamwork and communication with other health professional students. This supports the use of this type of workshop as an instrument to increase students' readiness for IPE which is seen as key facilitator for effective interprofessional practice in the future.

5.3 SUMMARY OF RESULTS ON HEALTHCARE STUDENTS' ATTITUDES TOWARDS IPE ON MEDICATION SAFETY

The results of this study found that the healthcare students in the study university had positive attitudes towards IPE. However, medical students had less positive attitudes towards IPE compared to nursing and pharmacy students which was shown from the more positive attitudes towards the PI sub-scale. This was also supported from the results that Year 2 medical students moved towards more positive attitudes on the RIPLS PI sub-scale as they progressed through their studies. The trend analysis also indicated that Year 1 medical, nursing and pharmacy students had less positive attitudes towards the SLT sub-scale as they progressed through their course of study. Given the fact that the IPL workshop on medication safety changed the medical, nursing and pharmacy students' attitudes towards the SLT sub-scale, it suggests that such workshops may be one of the IPE learning methods which could be introduced early and used continuously in the healthcare students' curricula in the study university.

CHAPTER 6 RESULTS AND DISCUSSIONS: HEALTHCARE PROFESSIONALS' ATTITUDES TOWARDS INTERPROFESSIONAL PRACTICE (IPP) AND MEDICATION SAFETY

This chapter consists of two sections. Section 6.1 reports the results of healthcare professionals' attitudes towards IPP from their responses to Readiness for Interprofessional Learning Scale (RIPLS) questionnaire for healthcare professionals. Section 6.2 presents the healthcare professionals responses to a series of medication error case vignettes.

6.1 HEALTHCARE PROFESSIONAL ATTITUDES TOWARDS IPP

6.1.1 DEMOGRAPHIC CHARACTERISTICS OF HEALTHCARE PROFESSIONALS

The translated RIPLS questionnaire (**Appendix 9b**) of Reid et al.[261] was administered to healthcare professionals in the study hospital and university. Three hundred and ten (56.4%) questionnaires were returned from the 550 RIPLS questionnaires administered. The investigator could not reach 66 potential participants due to staff being on maternity leave, staff relocation, and being on academic leave during data collection. Forty five participants returned the questionnaires uncompleted. Table 6.1 shows demographic characteristics of participants in the current survey. Twenty three of 67 (34.3%) physicians, 202 of 340 (59.1%) nurses, 12 of 19 (63.2%) of pharmacists at the hospital returned the survey. The response rates amongst university academics were as follows: 46 of 77 (62.3%) medical academics, 10 of 17 (58.8%) nursing academics, and 17 of 30 (56.7%) pharmacy academics. The total number of participants included in the study was 310 (69 physicians, 29 pharmacists, and 212 nurses). Females made up 66.7% of participants and male 33.3%. The majority of the participants (60%) were in their 20s and 30s, whilst over 15% participants were in their 50s and above. More than 75% of participants worked at the hospital and the majority of the participants were nurses. A small proportion of participants (3.6%) had previous experience working with other healthcare

professionals (IPP). More than 75% of participants stated that they did not have any postgraduate training. Of those who did, 11.1% of participants had a Masters degree and 0.7% participants had a PhD. The majority of the physicians (60.6%) who participated in this study held a medical specialty or subspecialty, while 3% of nurses had a Masters degree. Nearly half of the pharmacists had a Masters degree. In terms of work experience, almost 30% participants had working experience of less than 5 years, and over 13% participants had more than 25 years of working experience.

Table 6.1 Demographic characteristics of healthcare professionals participated in the study

GENDER

	Physicians		Nurses		Pharmacists		Total	
	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)
Female	23	31.8	161	77.0	20	69	204	66.7
Male	45	68.2	48	23.0	9	31	102	33.3

AGE

	Physicians		Nurses		Pharmacists		Total	
	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)
20-29	5	7.8	72	35	11	37.9	88	29.4
30-39	16	25	66	32.5	11	37.9	93	31.4
40-49	14	21.9	52	25.6	2	6.9	68	23
50-59	19	29.7	14	6.9	2	6.9	35	11.8
>60	10	15.6	0	0	3	10.3	13	4.4

WORKING PLACE

	Physicians		Nurses		Pharmacists		Total	
	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)
Academics	46	66.7	10	4.7	17	58.6	73	23.5
Practitioners	23	33.3	202	95.3	12	41.4	237	76.5

PREVIOUS INTERPROFESSIONAL PRACTICE

	Physicians		Nurses		Pharmacists		Total	

	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)
Yes	6	9	5	2.4	0	0	11	3.6
No	61	91	207	97.6	29	100	295	96.4

OTHER EDUCATION BACKGROUND

	Physicians		Nurses		Pharmacists		Total	
	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)
None	13	19.4	205	96.7	14	48.3	230	75.2
Master	12	17.9	7	3.3	15	51.7	34	11.1
PhD	2	3	0	0	0	0	2	0.7
Specialist and Subspecialist	40	59.7	0	0	0	0	40	13

YEARS OF WORKING EXPERIENCE

	Physicians		Nurses		Pharmacists		Total	
	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)
<5	14	21.9	62	31.6	8	34.8	83	29.4
6-10	6	9.4	31	15.9	6	26.1	43	15.2
11-15	10	15.6	40	20.5	3	13	53	18.8
16-20	8	12.5	27	13.8	2	8.7	37	13.1
21-25	8	12.5	21	10.8	0	0	29	10.3
>26	18	28.1	15	7.7	4	17.4	37	13.1

6.1.2   FACTOR ANALYSIS

There was less than 5% of missing data for each RIPLS statement. Thus, missing data were excluded in the total scores of the RIPLS survey. However, in the CFA and EFA, an Expectation Maximization (EM) approach was employed for missing data. This approach is the most robust and has good statistical validity.[325] Similar to the analysis of students' attitudes towards IPE, Confirmatory Factor Analysis (CFA) was also conducted on the RIPLS survey data involving healthcare professionals. The three sub-scales (Teamwork and Collaboration, Patient Centredness and Professional Identity) from Reid et al.[261] were modelled using Analysis Moment Structure (AMOS) in the study population (Figure 6.1). However, it was found that the current population did not fit with the sub-scales of Reid et al. Key indicators for fits indices did not meet the desired values (Table 6.2). Schmitt suggested that EFA (Exploratory Factor Analysis) could be employed when CFA did not fit the current data.[263] Thus, Principle Component Analysis (PCA) which is one of EFA approaches was conducted to determine factors that constructed the RIPLS survey for healthcare professionals in the current population.

Table 6.2 Goodness-of fit indicators for the current data to Reid et al.[261]

		Index Fits		
	χ^2/df	**TLI**	**CFI**	**RMSEA**
Desired value[296]	<2	>0.9	>0.9	<0.06
23 RIPLS Statements	(673.57/227) 2.97	0.87	0.83	0.08

Notes:
X²   = Chi-square
df   = degree of freedom
TLI   = Tucker-Lewis Index
CFI   = Comparative Fit Index
RMSEA   = Root Mean Square Error of Approximation
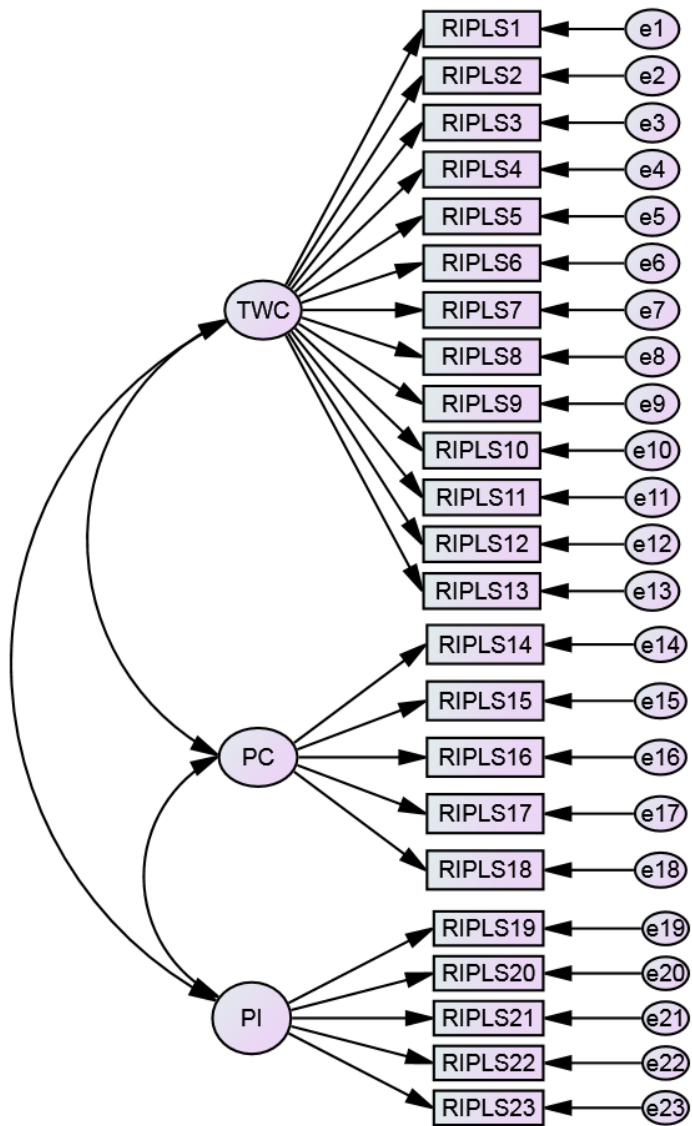
Figure 6.1 Path diagram based on Reid et al. on RIPLS Healthcare Professional

Notes:

TWC = Teamwork and Collaboration

PC = Patient Centredness

PI = Professional Identity

Table 6.3 KMO and Bartlett's Test for the factor analysis of the health professional RIPLS questionnaire

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.921
Bartlett's Test of Sphericity	Approx. Chi-Square	3208.399
	Df	253
	Sig.	.000

Table 6.4 Pattern matrix of RIPLS questionnaire and Cronbach's alpha of components in healthcare professionals

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.921 and Bartlett's test of sphericity was statistically significant (p<0.001) which showed the current data was appropriate for factor analysis (Table 6.3).

	Component (Cronbach's Alpha)			
	1	2	3	4
	(0.924)	(0.674)	(0.848)	(0.265)
RIPLS1	.620			
RIPLS2	.749			
RIPLS3	.749			
RIPLS4	.882			
RIPLS5	.826			
RIPLS6	.868			
RIPLS7	.765			
RIPLS8	.800			
RIPLS9				
RIPLS10			.553	
RIPLS11			.549	
RIPLS12			.817	
RIPLS13			.825	
RIPLS14			.793	
RIPLS15			.638	
RIPLS16			.672	
RIPLS17				
RIPLS18				
RIPLS19		.730		
RIPLS20		.809		
RIPLS21		.736		
RIPLS22		.546		
RIPLS23				.869

Direct Oblimin Rotation retrieved four sub-scales of the RIPLS questionnaires for healthcare professionals (Table 6.4). Initially, a cut-off point of 0.4 factor loading was employed, however, the number of sub-scales and items constructed the sub-scales were not significantly different compared to when the cut-off point was 0.55. Thus, this cut-off point was selected because according to Pett et al., items constructed factor loading more than 0.55 shares 30% of variance and shows good contribution.[298] The first sub-scale "Shared Learning and Teamwork-SLT" consisted of RIPLS Statements 1 – 8 (Cronbach's alpha= 0.924); the second sub-scale "Professional Identity-PI" consisted of RIPLS Statements 19-22 (Cronbach's alpha = 0.674); and the third sub-scale "Patient Centredness- PC" consisted of RIPLS Statements 10 – 16 (Cronbach's alpha = 0.848). Meanwhile the fourth sub-scale had very low Cronbach's alpha and it only consisted of one RIPLS statement (Statement 23). Measurement of sampling adequacy (MSA) should be >0.6,[298] while the MSA of this statement was 0.475. These results suggested that deletion of the statement was appropriate. As a result, sub-scale 4 was excluded from the current study as one of sub-scales of the RIPLS of healthcare professionals. Statements 9, 17, and 18 did not significantly contribute to any factors because they had loadings less than the cut off value for factor loading (0.55) in more than two factors; thus, they were also excluded as items that constructed the RIPLS factors.

Further CFA analysis was conducted based on items retrieved from factors from EFA to confirm the model derived from EFA had a goodness of fit. It was found that the model from EFA had low goodness of fit based on the indicators. Thus, modifications based on estimation of modification indices were conducted. It was found that indicators on goodness of fit were improved afterward. Indicators on goodness of fit of the model can be seen in Table 6.5. Figure 6.2 shows the path diagram of the modified EFA model. The correlation amongst variances showed that the PI sub-scale had no association with the SLT sub-scale (p=0.222) or the PC sub-scale (p=0.090). Thus, the PI sub-scale was excluded in the study analysis.
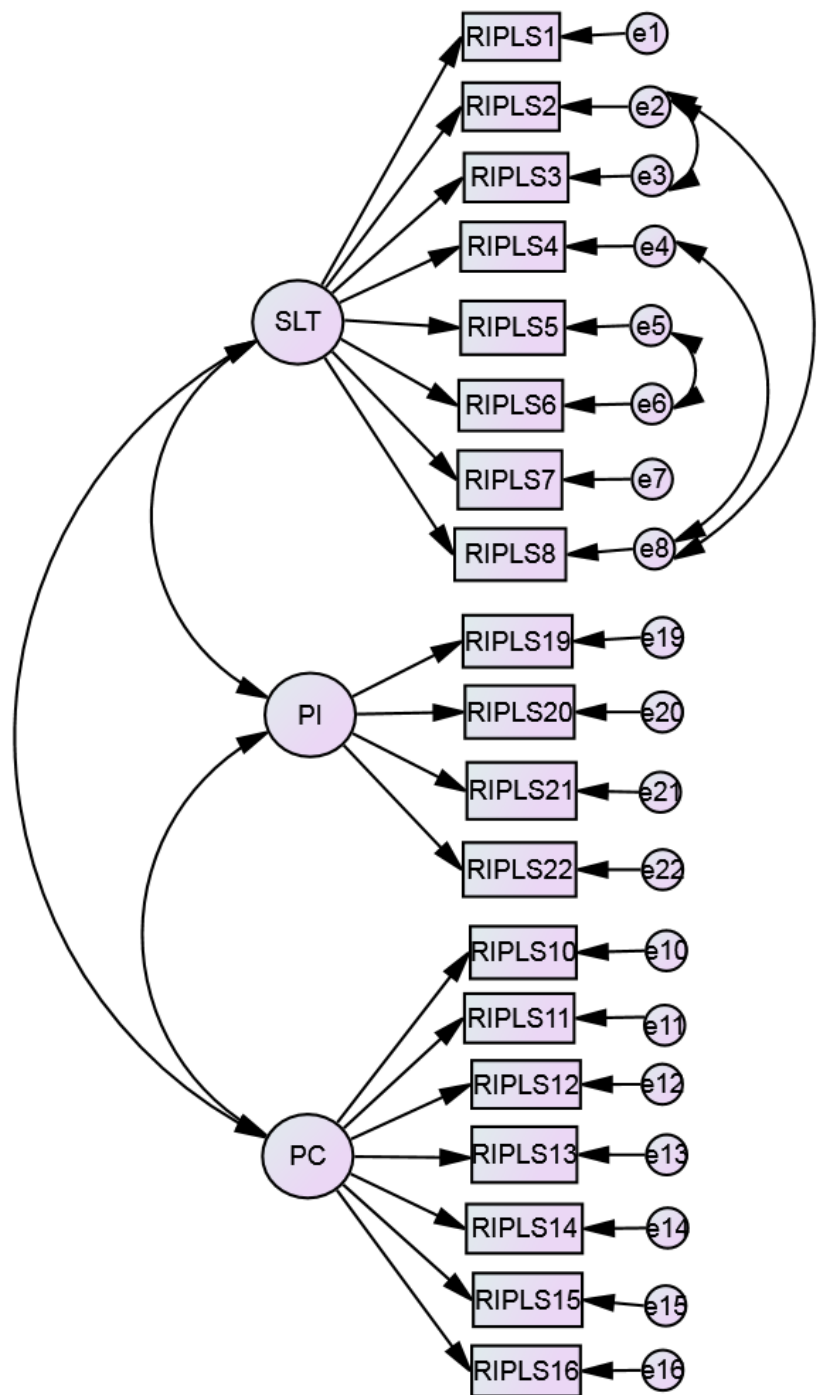
Figure 6.2 Path diagram of the modified EFA model of RIPLS healthcare professionals

Notes:

SLT   = Shared Learning and Teamwork

    PC   = Patient Centredness
    PI   = Professional Identity

Table 6.5 Goodness of fit based on items constructed on EFA modified model

	Index Fits			
	χ^2/df	TLI	CFI	RMSEA
Desired value[296]	<2	>0.9	>0.9	<0.06
EFA modified model	2.18	0.935	0.945	0.062

Notes:

|	
X^2	= Chi-square
Df	= degree of freedom
TLI	= Tucker-Lewis Index
CFI	= Comparative Fit Index
RMSEA	= Root Mean Square Error of Approximation

Similar to the RIPLS students' analysis, although the Kolmogorov-Smirnoff test indicated a degree of non-normality, data were analysed using parametric methods. Even in the case of non-normality distributed data, parametric methods are considered in many cases to give results more stable than non-parametric methods.[293]

6.1.3 ANALYSIS OF HEALTHCARE PROFESSIONAL ATTITUDES TOWARDS IPP

Three analyses were conducted to determine healthcare professionals' attitudes towards IPP.

1. **Healthcare professionals' attitudes towards IPP**. Firstly, healthcare professionals' mean scores towards each of RIPLS statement were analysed. Then, healthcare professionals' attitudes towards IPP were assessed by calculating and comparing total RIPLS scores across professions. The total scores were obtained by summing all participants' responses towards each RIPLS statement. For the sake of this analysis only, negative statements (Statement 19, 20, 21 and 22) were reverse coded. Secondly, Healthcare professionals' total mean scores towards each sub-scale (retrieved from factor analysis i.e. SLT and PC sub-scales) were also analysed using ANOVA by adding items which constructed the sub-scale retrieved from factor analysis. In addition, healthcare professionals' mean regression factor scores towards IPP were also analysed. Further, the mean regression factor scores for each of the RIPLS sub-scales were compared between healthcare professionals using ANOVA.

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2. **Academics and practitioners (healthcare professionals who worked at the study hospital) attitudes towards IPP**. Participants' mean regression factor scores for the RIPLS sub-scales were compared based on their practice settings (practitioners at hospital versus academic at university). Participants' mean regression factor scores were compared between practice settings within the same professions (e.g. physicians at the hospital versus academics in the medical school). T-test analysis was adopted in these analyses.

3. **Healthcare professionals' and healthcare students' attitudes** (from Chapter 4) within the same profession were also analysed with regards the statement on the role of healthcare professionals. This statement was Statement 14 in the RIPLS for students and Statement 19 in the RIPLS for health professionals' questionnaires.

Multivariate analysis was employed to determine mean regression factor score differences of the RIPLS sub-scales amongst healthcare professionals by considering independent variables such as age, gender, previous interprofessional practice, and duration of working which may potentially influence participants' attitudes towards IPP.

6.1.3.1 *Healthcare professionals attitudes towards IPP*

Healthcare professionals' attitudes towards IPP were initially assessed by comparing their responses to each RIPLS statement. Table 6.6 shows all healthcare professionals had positive attitudes towards IPP. However, there were significant mean differences for RIPLS Statements 17, 18, 19 and 21 amongst healthcare professionals.

Post-hoc Scheffe test analysis indicated that physicians had significantly more positive attitudes towards RIPLS Statements 17 and 19 compared to nurses and pharmacists (Table 6.7). In addition, physicians had more positive attitudes towards Statements 18 and 21 compared to nurses but these were not significantly different compared to pharmacists. Yet, nurses and pharmacists had no statistically significant differences in their attitudes towards any of the statements. Examination of the responses to Statements 17 and 18 indicated that physicians had more positive attitudes around patient care than nurses and pharmacists.

Table 6.6 Means, standard errors, and p-values of ANOVA on each statement amongst physician, nurse, and pharmacist

RIPLS Statements	Health Professionals' Mean Scores ± SE (n)			p-value
	Physician	Nurse	Pharmacist	
1. Shared learning will help me to think positively about other healthcare professionals	1.42±0.06 (67)	1.51±0.04 (211)	1.52±0.09 (29)	0.434
2. Shared learning helps to clarify the nature of patients problems	1.43±0.06 (67)	1.46±0.04 (211)	1.45±0.09 (29)	0.933
3. Shared learning with other healthcare professional will help me to communicate better with patients and other professionals	1.48±0.06 (67)	1.47±0.03 (211)	1.52±0.09 (29)	0.909
4. Shared learning before qualification would help healthcare professionals become better team workers	1.63±0.07 (67)	1.69±0.04 (211)	1.57±0.10 (29)	0.535
5. Shared learning with other healthcare professionals will increase my ability to understand clinical problems	1.48±0.06 (67)	1.46±0.04 (211)	1.39±0.09 (28)	0.761
6. Shared learning will help me understand my own limitation	1.51±0.06 (67)	1.49±0.04 (209)	1.41±0.09 (29)	0.686
7. Learning with other healthcare professionals will help me to be a more effective member of healthcare team	1.48±0.07 (64)	1.52±0.04 (205)	1.58±0.99 (26)	0.739
8. Learning with healthcare students from other disciplines before qualification would improve relationships after qualification	1.61±0.08 (64)	1.65±0.04 (204)	1.57±0.11 (28)	0.755
9. Communication skills should be learned with other healthcare professionals	1.52±0.07 (64)	1.64±0.04 (204)	1.82±0.12 (28)	0.065
10. I would welcome the opportunity to work on small-group projects with other healthcare professionals	1.58±0.07 (64)	1.63±0.04 (205)	1.61±0.09 (28)	0.801
11. Team-working skills are essential for all healthcare professionals to learn	1.44±0.07 (64)	1.48±0.04 (205)	1.54±0.09 (28)	0.712
12. For small group learning to work, healthcare professionals need to trust and respect each other	1.38±0.06 (64)	1.37±0.03 (205)	1.43±0.11 (28)	0.844
13. Patients ultimately benefit if healthcare professionals work together to solve patient problems	1.36±0.06 (64)	1.39±0.03 (204)	1.39±0.09 (28)	0.895
14. Establishing trust with my patients is important to me	1.25±0.06 (64)	1.36±0.04 (205)	1.43±0.11 (28)	0.209
15. In my profession one needs skills in interacting and co-operating with patients	1.28±0.06 (64)	1.43±0.04 (204)	1.46±0.09 (28)	0.089
16. Thinking about the patient as a person is important in getting treatment right	1.45±0.06 (64)	1.57±0.05 (204)	1.71±0.14 (28)	0.164
17. I like to understand the patient's side of the problem	1.83±0.08 (64)	2.14±0.06 (204)	2.43±0.15 (28)	0.002*
18. I try to communicate compassion to my patients	1.47±0.06 (64)	1.70±0.04 (203)	1.70±0.09 (27)	0.012*

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Table 6.6 continued

19. The function of nurses and therapists is mainly to provide support for doctors†	1.90±0.10 (63)	2.91±0.06 (204)	2.71±0.14 (28)	0.001*
20. Clinical problem-solving skills should only be learned with professionals from my own discipline†	2.63±0.11 (63)	2.83±0.06 (204)	2.82±0.06 (28)	0.252
21. I have to acquire much more knowledge and skills than other healthcare professionals†	2.30±0.11 (64)	2.65±0.06 (203)	2.71±0.15 (28)	0.008*
22. I would feel uncomfortable if another healthcare professionals knew about a topic that I did†	3.17±0.09 (64)	3.17±0.05 (204)	3.29±0.11 (28)	0.662
23. There is little overlap between my role and that of other healthcare professionals	2.41±0.08 (63)	2.58±0.05 (200)	2.32±0.15 (28)	0.09

Notes: RIPLS score (1 strongly agree to 4 strongly disagree); †: negative statement

Table 6.7 Post-hoc analyses on RIPLS Statements 17, 18, 19 and 21

RIPLS Statements	Professions	Nurse	Pharmacist
RIPLS 17	Physician	0.017*	0.03*
	Nurse	-	0.199
RIPLS 18	Physician	0.01*	0.172
	Nurse	-	1.00
RIPLS 19	Physician	0.001*	0.001*
	Nurse	-	0.600
RIPLS 21	Physician	0.008*	0.073
	Nurse	-	0.600

Notes: *showed significant difference; means and standard errors can be seen in Table 6.6

In addition, in order to determine healthcare professionals' attitudes towards IPP, the total mean scores of RIPLS statements were calculated. Possible scores ranged from 23 (strongly agree) to 94 (strongly disagree). Homogeneity of variance (Levene's statistic) was not significantly different across the professions (2, 304) = 1.127, p=0.325.

Table 6..8 shows that physicians', nurses' and pharmacists' attitudes towards IPP were positive and were not different significantly (p=0.960) between groups. This was seen from the fact that the total mean scores of the three groups of participants

were between 38 and 39. Further, it was found that healthcare professionals had no significant differences in their attitudes amongst the RIPLS sub-scales.

Table 6..8 Total mean scores of RIPLS sub-scales and total RIPLS scores amongst physicians, nurses and pharmacists

Sub-scales	Healthcare Professionals' Mean Score ± SE (n)			p-values
	Physician (67)	Nurse (211)	Pharmacist (29)	
Shared Learning and Teamwork (SLT) (Statement 1-8)	12 00± 0.44	12.27 ± 0.23	12.21 ± 0.58	0.852
Patient Centredness (PC) (Statement 10-16)	6.73 ± 0.23	7.11 ± 0.14	7.42 ± 0.37	0.224
Total RIPLS scores	39.00 ± 1.00	38.76 ± 0.48	38.87 ± 1.31	0.960

6.1.3.2   *Academics and practitioners' attitudes towards IPP*

Table 6.9 shows mean regression factor scores of RIPLS sub-scales amongst healthcare professionals and their place of work. The table also displays mean score of Statement 19 of those participants. Levene's equality of variances was also conducted to detect homogeneity of variance in healthcare professionals' mean regression factor scores for those who worked in university versus hospital settings. If variables met homogeneity of variance (p>0.05), t-test results on RIPLS sub-scales were reported based on equal variances assumed. Otherwise, it was reported based on equal variances not assumed. T-test analysis of healthcare professionals working at hospital and at university showed no significant differences in attitudes towards any of the RIPLS sub-scales (Table 6.10). However, there were significant differences in regards to Statement 19 (*The function of nurses and therapists is mainly to provide support for doctors*) amongst academics and practitioners. Table 6.9 demonstrates that the mean score of academics was lower (more positive attitudes) for this statement. This indicated that healthcare academics had more positive attitudes regarding the role of nurses and allied healthcare professionals are mainly to support the physician. Interestingly, nurse academics had significantly less positive attitudes (p=0.001) on this statement in comparison to their counterparts in hospital.

Table 6.9 Mean regression factor scores (refined method) of RIPLS sub-scales and mean of Statement 19 stratified by professions, and participants' place of work

| | N | Shared Learning and Teamwork (SLT) | | Patient Centredness (PC) | | RIPLS Statement 19 | |
		Mean regression factor scores	SE	Mean regression factor scores	SE	Mean	SE
Professions							
Physician	67	-0.047	0.124	-0.158	0.113	1.90	0.10
Nurse	211	0.012	0.065	0.020	0.065	2.91	0.06
Pharmacist	29	-0.032	0.149	0.143	0.159	2.71	0.14
Place of Work							
Hospital	237	0.003	0.060	0.032	0.062	2.77	0.89
University	73	-0.016	0.114	-0.119	0.104	2.36	1.00
Professions and place of work							
Physician at hospital	21	-0.208	0.199	-0.161	0.202	2.09	0.19
Nurses at hospital	210	0.012	0.067	0.031	0.068	2.86	0.63
Pharmacists at hospital	12	0.124	0.191	0.300	0.207	2.55	0.21
Medical academics	46	0.025	0.156	-0.158	0.138	1.84	0.16
Nursing academics	10	0.009	0.228	-0.192	0.164	3.80	0.13
Pharmacy academics	17	-0.142	0.216	0.032	0.229	2.82	0.18

Table 6.10 T-test results on RIPLS sub-scales and Statement 19 based on working place and professions

Notes: *****showed significant difference

Independent t-test analysis	RIPLS sub-scales and Statement 19	Significance of Levene's equality of variance	t	df	Sig (2-tailed)
Practitioners (n=237) vs academics (n=73)	Shared Learning and Teamwork (SLT)	0.530	0.148	308	0.882
	Patient centredness (PC)	0.339	1.206	308	0.229
	Statement 19	0.062	3.250	308	**0.001***
Physicians at the hospital (n=23) vs medical academics (n=46)	Shared Learning and Teamwork (SLT)	0.211	-0.873	65	0.386
	Patient centredness (PC)	0.962	-0.011	65	0.992
	Statement 19	0.187	1.190	65	0.239
Nurses at hospital (n=202) vs nursing academics (n=10)	Shared Learning and Teamwork (SLT)	0.037	0.015	209	0.989
	Patient centredness (PC)	0.011	1.259	209	0.231
	Statement 19	0.046	-3.309	209	**0.001***
Pharmacist at hospital (n=12) vs pharmacy academics (n=17)	Shared Learning and Teamwork (SLT)	0.058	0.882	27	0.385
	Patient centredness (PC)	0.312	0.826	27	0.416
	Statement 19	0.985	-1.009	27	0.322

6.1.3.3 Comparison of healthcare students' and professionals' attitudes towards the statement on the role of other healthcare professionals

Healthcare students' and healthcare professionals' attitudes towards the statement *"The function of allied health professionals is mainly to provide support for doctors"* were compared within professions (i.e. medical students vs physicians; nursing students vs nurses; and pharmacy students vs pharmacists). This statement was Statement 14 in the RIPLS for students and Statement 19 in the RIPLS for healthcare professional questionnaires. This analysis aimed to determine whether healthcare professionals had different attitudes compared to healthcare students within their professions towards statement on the role of other healthcare professionals.

Table 6.11 Healthcare students' versus professionals' attitudes towards the statement on the role of other healthcare professionals

Group	Mean ± SE	Significance of Levene's equality of variance	t	df	Sig (2-tailed)
Medical students (n=253)	2.15± 0.05	0.175	2.418	314	**0.016***
Physicians (n=63)	1.90±0.10				
Nursing students (n=136)	3.39±0.06	0.192	5.411	338	**0.001***
Nurses (n=204)	2.91±0.06				
Pharmacy students (n=79)	3.03±0.08	0.718	1.908	106	0.059
Pharmacist (n=28)	2.71±0.14				

Notes: ***** showed significant difference

Table 6.11 contains the t-test results for the comparison of the attitudes of health professionals and students within their professions. This testing showed that physicians and nurses means scores were statistically significantly lower than those of medical and nursing students, respectively. Physicians strongly agreed with the notion that other healthcare professionals' role is mainly to support doctors. Nurses generally disagreed with (the mean was close to 3-disagree), however their scores were relatively lower than nursing students which was almost 4 (strongly disagree). Meanwhile, the response of pharmacy students was not significantly different compared to pharmacists.

6.1.4 DISCUSSION ON HEALTHCARE PROFESSIONALS' ATTITUDES TOWARDS IPP

This study employed the RIPLS from Reid et al. because this survey has been validated in post-graduates (i.e. healthcare professionals).[261] Confirmatory Factor Analysis (CFA) indicated the study population's responses did not fit the sub-scales proposed by Reid et al. Thus, Explanatory Factor Analysis (EFA) was conducted which then revealed three sub-scales (Shared Learning and Teamwork-SLT; Professional Identity-PI; and Patient Centredness-PC) of the RIPLS survey in the study population. However, further CFA of sub-scales retrieved from EFA confirmed only two sub-scales (SLT and PC). Thus, the PI sub-scale was excluded in the analysis. Overall, regardless of place of work, healthcare professionals (physicians, nurses and pharmacists) who participated in the current study showed positive attitudes towards IPP. In addition, their attitudes were not significantly different towards IPP. This study also found that the healthcare professionals had similar attitudes towards the RIPLS sub-scales. This indicated that healthcare professionals had positive attitudes toward working with other healthcare professionals (reflected from SLT sub-scale) and had the same vision on Patient centredness (identified from PC sub-scale). In this study, Statements 17 and 18 did not construct any RIPLS-sub-scales because their factor loadings were less than 0.5, unlike those of Reid et al., where these two statements were items of the PC sub-scale. This difference may result from the differences in the practice of healthcare service delivery in the current study and that of in the UK. For the present study, physicians are deemed to be the primary healthcare professionals.

This study found that healthcare professionals had significant differences on Statements 17, 18, 19 and 21. This study identified that the Physician Group had significantly stronger agreements towards Statement 17 (*I like to understand the patient's side of the problem*) and Statement 19 (*The function of nurses and therapists is mainly to provide support for doctors)* compared to the Nurse and Pharmacist Groups. Yet, the Nurse and Pharmacist Groups had no significant differences on these statements. These results may indicate that despite the fact that physicians had stronger willingness to understand patients' perspective of their problems; they believed that other healthcare professionals were mainly to support them. Compared to nurses, physicians had stronger agreement towards Statement 18 (*I try to communicate compassion to my patients*) and Statement 21 (*I have to*

acquire much more knowledge and skills than other healthcare professionals). These suggested that physicians had higher sense of superiority compared to nurses and pharmacists in healthcare service delivery.

Physicians stronger sense of superiority may result from the fact that medicine is a well-established profession.[306] The physicians' role has been well-accepted in the healthcare service. Furthermore, physicians have a strong professional socialisation during their learning. Physicians have intensive working experience to engage with patients while undergoing medical specialists' qualification. Professional socialisation is a life-long learning process which develops through interaction and reflection between the individual and environment.[309, 318] Hafferty and Frank stated that medical education had three forms of curricula (formal, informal, and hidden curricula).[326] They suggested informal socialisation in clinical settings as a hidden curriculum is a stronger component of professional socialisation compared to formal medical education.

Additionally, physicians have a high level of autonomy within healthcare services which allows them to make judgements about the services they provided.[306, 327] In contrast, nurses have less autonomy to provide services compared to physicians. Further, in comparison to the physician's stable role, nurses and pharmacists' role as health professionals are currently under developed. This could be seen from various initiatives to develop nurses' and pharmacists' professional identity as reported in the literature.[310-312] Öhlén and Segesten suggested nurse identity development is needed to improve nurses' self-esteem.[311] This development was considered vital for the nurses' professional and personal growth. Öhlén and Segesten identified that nurses' professional identity emerged as a self-conceptualisation based on personal and interpersonal interaction, growth and maturity.[311] Wynd recommended that in order to foster strong professionalism in nursing, nurses' involvement in nursing organisations is crucial to build a symbiotic relationship amongst members and the organisation.[306] Thus, nurses professionalism will increase as they are more involved in professional organisations and with the support from its members, these professional organisations will continue to grow.

Similarly, pharmacists' professional identity is currently under development. Noble et al. suggested that the pharmacist's role ambiguity and weak professional identity

may result from curricula exposure which focuses more on pharmaceutical science rather than engagement with patients.[314] They recommended pharmacy students need a role model to observe, experience what it is like to be a pharmacist and to evaluate their role. The importance of role models is essential in pharmacists' identity development to clarify role expectations and to decrease identity conflict amongst new graduates.[309] Pharmacy professional organisation must facilitate the development of role models in pharmacy practice. This means that pharmacy professional organisations should play their role in the development of professional identity amongst pharmacy graduates.

Interestingly, although overall healthcare professionals' attitudes towards IPP were not different regardless of their place of work, academics had significantly lower scores (more positive attitudes) on Statement 19 (*The function of nurses and therapists is mainly to provide support for doctors)* than their counterparts in the hospital. This may indicate that academics (the majority of academics were medical academics) believed that other healthcare professionals were to support physicians. This fact could be a barrier in IPP implementation in the study university because the academic is the key factor in the development of IPE.[80]

However, further comparisons in the Nurse and Pharmacist Groups based on their place of work revealed different results. Although, the mean score of nurses who worked at the hospital was in the proximity of disagreement on Statement 19 (mean score was near 3-disagreed), they had significantly lower score (more positive attitudes) on this statement compared to that of nurse academics. Nurses who worked in the hospital had more positive attitudes on Statement 19 than their counterparts in the university. These findings indicated nurses who worked at the hospital had more positive attitudes than that of academics on their role were mainly to support physicians. This demonstrated healthcare professionals who worked at the hospital have been exposed to learning at the workplace (the hospital) where physicians are at the top of the hierarchy in healthcare service delivery.

Learning in the workplace includes experiential learning, informal learning, incidental learning, and situated learning from everyday work activity.[328] Informal learning obtained in the place of work has been acknowledged as significantly improving skills and knowledge beyond formal education.[329] Tacit knowledge which is one of the

outcomes of informal learning is defined as subjective knowledge which was acquired from non-conscious and unintentional socialisation in the workplace by repetitive observation.[329, 330] Eraut stated the other outcomes of informal learning in the place of work include improved task performance, role performance, awareness and understanding, personal development, decision making and problem solving, academic knowledge and skills, teamwork, and judgment.[331] Further, learning in the workplace is influenced by the work, relationships and personal traits as well as a supportive working environment.

Healthcare professionals' and students' attitudes towards the Statement "*The function of allied health professionals is mainly to provide support for doctors"* were different. Physicians and nurses had more positive attitudes on this statement compared to medical and nursing students, respectively. Physicians who participated in the current study had positive attitudes on this statement which may result from strong professional socialisation. Professional socialisation amongst physicians may have strengthened their belief that physicians have a superior role in healthcare service delivery. Physicians as professionals have long been known to have autonomy in providing healthcare service.[306] In contrast, nurses in the current study showed more agreement on this statement compared to nursing students although the absolute scores are in the proximity of disagreement. Nurses as they progressed further in their working environment may find themselves in an inferior position compared to physicians due to the hierarchy that exists within their practice setting. Nurses mostly received orders from physicians when providing their services. This suggested that professional socialisation after working as physicians and nurses may have influenced the different attitudes amongst medical and nursing students' vs physicians and nurses. Further, only a small proportion of nurses who participated in the current study had postgraduate degrees. Meanwhile, the majority of physicians in the current study were medical specialists. These levels were considered as post-graduate degrees. This may influence their attitudes towards the role of other healthcare professionals in healthcare services which were mainly to support physicians.

Pharmacy students and pharmacists' attitudes towards the statement "*The function of allied health professionals is mainly to provide support for doctors,"* showed they had no significantly different attitudes on this statement. Although pharmacists had

lower scores (i.e. indicated more positive attitudes towards this statement) than pharmacy students, both pharmacy students and pharmacists had disagreement towards this statement. This result may indicate that pharmacy students and pharmacists want to be part of the healthcare team and to be seen as an equal with doctors. This may also suggest that pharmacists may already have a strong understanding of their role. However, in the current practice setting, pharmacists have less contact with patients as well as with other healthcare professionals, particularly with physicians in providing their services. In comparison to many interactions between nurses and physicians in providing their services, pharmacists mostly work in isolation in the pharmacy department. This may also indicate that pharmacists have less exposure in their place of work to engage with other healthcare professionals compared to nurses. Thus, pharmacists' attitudes towards this statement may not have been significantly different compared to that of pharmacy students for this reason.

Indonesian nursing education has developed rapidly. In 1998, the nursing qualification was revised from high school graduates to diploma holders to improve the standard of formal training of nurses. A study conducted in Indonesia in 1999 identified that 39% of nurses graduated from the diploma course and 60% graduated from high school.[332] As a result of developments within the nursing profession, clinical practice has been incorporated into the training of nurses in Indonesia. Meanwhile, the role of the pharmacist in patient care through pharmaceutical care was introduced in 2000. However, the development of pharmaceutical care has been slow. This was confirmed in a study in Surabaya, Indonesia which found that pharmacists in the community spent limited time in delivering their professional activities in delivering patient care.[175] The authors suggested that if pharmacists did not conduct their services appropriately this may result in de-professionalism of pharmacy.

There are some limitations of the current study. Firstly, the low response rate of healthcare professionals. In the first month after the survey administration less than 30% of healthcare professional had responded, although methods which have been proven to improve response rate had been employed (a cover letter and second reminder).[333-335] Hochstim and Athanasopoulos suggested that personal follow up could be employed when repeated contact was unsuccessful.[336] Thus, the

investigator followed up the survey herself to improve participation. The investigator met the participants in person particularly those in the Physician Group during follow up. The low response rate of physicians may have resulted from the limited time to respond to the mail survey.[335] Another limitation was the participants in the present study may have worked together to answer the questionnaire, however, this was one of common forms of response bias in survey based research. The investigator was unable to control this during the survey.

6.2   MEDICATION ERRORS CASE VIGNETTES

There were 308 (56%) case vignettes returned from 550 sets of cases administered. Twenty three of 67 (34.3%) physicians, 202 of 340 (59.4%) nurses, 14 of 19 (73.7%) pharmacists at the hospital returned the survey. Forty six of 77 (61.0%) medical academics, 10 of 17 (58.8%) nursing academics, and 15 of 30 (50%) of pharmacy academics returned the survey. Based on participants' profession, there were 69 physicians (22.3%), 29 pharmacists (9.4%) and 212 (68.4%) nurses. The same demographic characteristics were reported as that in the RIPLS healthcare professionals (Table 6.1).

6.2.1 ACCURACY IN ANSWERING MEDICATION ERRORS CASE VIGNETTES

The General Estimating Equation (GEE) was used to estimate participants' responses in answering anticipated correct options for the case vignettes. Six cases were administered to the participants. The cases consisted of prescribing (Case 1 and 2), dispensing (Case 3 and 4), and administration errors (Case 5 and 6). Each case had five standard multiple choice questions and one question which sought an agreement as to which of the profession(s) was responsible for each error. The GEE approach was conducted on the five multiple choice questions to identify accuracy of anticipated answers across all cases. Table 6.12 shows pharmacists at the hospital (p =0.0027) and pharmacist academics (p=0.0036) responses were significantly different compared to medical and nursing academics or their practitioners groups. Pharmacists at the hospital were more likely to provide the anticipated correct answer for the case vignettes (OR= 1.61; 95% CI 1.16 - 2.06), as were pharmacist

academics; OR = 1.68; 95% CI 1.19 - 2.38). In contrast, participants who were aged over 50 years were less likely to give the anticipated correct answer (OR=0.79; 95% CI= 0.66 - 0.95).

Based on the GEE analysis the Pharmacist Groups showed higher levels of deemed correct answers. Further analysis was conducted to identify in which case vignettes and/or questions the difference between healthcare professionals groups arose. The Pharmacy Groups were used as the reference in this analysis. The data presented in Table 6.13 demonstrates that differences arose in Case 2 (prescribing error), Cases 3 and 4 (dispensing errors) and Case 6 (administration error).

Table 6.12 GEE Analysis on case vignettes for correct responses

Group of Participants (n)	Odds Ratio (OR)	95% Confident interval	P value
Pharmacists at Hospital (14)	1.61	1.16 to 2.06	**0.0027***
Pharmacists at University (15)	1.68	1.19 to 2.38	**0.0036***
Age over 50 (50)	0.79	0.66 to 0.95	**0.0129***

Notes: * showed significant difference

In Case 1, which involved a prescribing error, there was no significant difference in any question across all three professions. In Case 2, another prescribing error, the Nurse Groups were less accurate than the Pharmacy Groups in answering why the error had occurred with an OR = 0.177 (95% CI 0.059 – 0.533). However, in determining the level of severity in Case 2, the Physician Groups were more accurate (OR=3.388; 95% CI 1.179 - 9.627) than the Pharmacist Groups. For the cases on dispensing errors (Case 3 and 4), both Physician and Nurse Groups were less accurate than the Pharmacy Groups. They answered the questions for these cases less accurately than the Pharmacy Groups in terms of determining the types of errors, why the errors had occurred, what can be done to prevent the errors from occurring again, and the level of severity of the errors. In the case of administration errors, the Pharmacy Groups were more accurate in determining the type of error in Case 6 compared to the Nurse Groups (OR=0.340; 95% CI 0.121 - 0.958), and what can be done to prevent the administration error from occurring again in Case 5 compared to the Physician Groups (OR=0.201; 95% CI 0.057 - 0.709). Interestingly, the Physician Groups answered the question more accurately than Pharmacy Groups on what can

be done to prevent the administration error in Case 6 (OR=3.449; 95% CI 1.256 – 9.470). Table 6.13 also shows that the professional groups showed some significant differences in answering questions on the types of errors (Question 2), why the error occurred (Question 3), what can be done to prevent it from re-occurring (Question 5) and the level of severity of the errors (Question 6). However, no significant differences in determining patients' problems (Question 1) across all cases were observed between professions.

Table 6.13 Odds Ratio and its 95% Confident Interval of Physician and Nurse Groups compared to Pharmacy Group across all cases and questions

	Case 1 [OR (95% CI)]	Case 2 (OR)	Case 3 (OR)	Case 4 (OR)	Case 5 (OR)	Case 6 (OR)
Question 1	Phy [0.889 (0.084-9.422)]	Phy [1.161 (0.274-4.916)]	Phy [0.404 (0.082-2.003)]	Phy [1.388 (0.467-4.125)]	Phy [0.994 (0.375-2.637)]	Phy [1.366 (0.244-7.645)]
	Nur [0.421 (0.052-3.373)]	Nur [0.790 (0.217-2.868)]	Nur [0.679 (0.149-3.086)]	Nur [1.840 (0.713-4.747)]	Nur [0.717 (0.305-1.687)	Nur [0.645 (0.138-3.021)]
Question 2	Phy [1.045 (0.347-3.145)]	Phy [1.022 (0.284-3.682)]	Phy [0.324 (0.107-0.976)]*	Phy [0.150 (0.054-0.416)]*	Phy [0.943 (0.367-2.420)	Phy [0.738 (0.233-2.337)]
	Nur [0.677 (0.259-1.771)}	Nur [0.411 (0.135-1.253)]	Nur [0.372 (0.135-1.027)]	Nur [0.199 (0.085-0.468)]*	Nur [1.189 (0.526-2.691)]	Nur [0.340 (0.121-0.958)]*
Question 3	Phy [1.458 (0.504-4.216)]	Phy [0.573 (0.169-1.942)	Phy [0.229 (0.070-0.750)]*	Phy [0.193 (0.070-0.530)]*	Phy [0.970 (0.291-3.235)]	Phy [1.821 (0.694-4.778)
	Nur [1.540 (0.585-4.015)]	Nur [0.177 (0.059-0.533)]*	Nur [0.208 (0.069-0.628)]*	Nur [0.120 (0.049-0.289)]*	Nur [0.935 (0.329-2.658)]	Nur [1.545 (0.672-3.552)]
Question 5	Phy [2.318 (0.600-8.955)]	Phy [1.399 (0.496-3.951)]	Phy [0.268 (0.082-0.879.])*	Phy [0.257 (0.089-0.738)]*	Phy [0.201 (0.057-0.709)]*	Phy [3.449 (1.256-9.470)]*
	Nur [1.989 (0.566-6.981)]	Nur [0.501 (0.209-1.201)]	Nur [0.229 (0.075-0.701)]*	Nur [0.268 (0.103-0.696)]*	Nur [0.505 (0.203-1.255)]	Nur [1.377 (0.579-3.277)]
Question 6	Phy [0.998 (0.386-2.576)]	Phy [3.388 (1.179-9.627)]*	Phy [1.666 (0.424-6.545)]	Phy [0.556 (0.218-1.465)]	Phy [0.501 (0.197-1.273)]	Phy [0.510 (0.182-1.434)]
	Nur [1.317 (0.569-3.043)]	Nur [2.594 (0.995-6.762)]	Nur [2.255 (0.644-7.894)]	Nur [0.441 (0.191-1.020)]*	Nur [0.782 (0.345-1.775)]	Nur [0.657 (0.259-1.668)]

Phy: Physicians; Nur: Nurses; * showed significant difference

Question 4 of each case assessed the level of agreement amongst the health professionals regarding who they thought was responsible for the error. In general, participants agreed which healthcare professional was responsible for each error based on the professions who possess the role during the medication delivery process. Interestingly, participants who had the role in medication delivery did not totally agree that they were the only healthcare professionals who were responsible for the errors as illustrated in Figures 6.3-6.8.
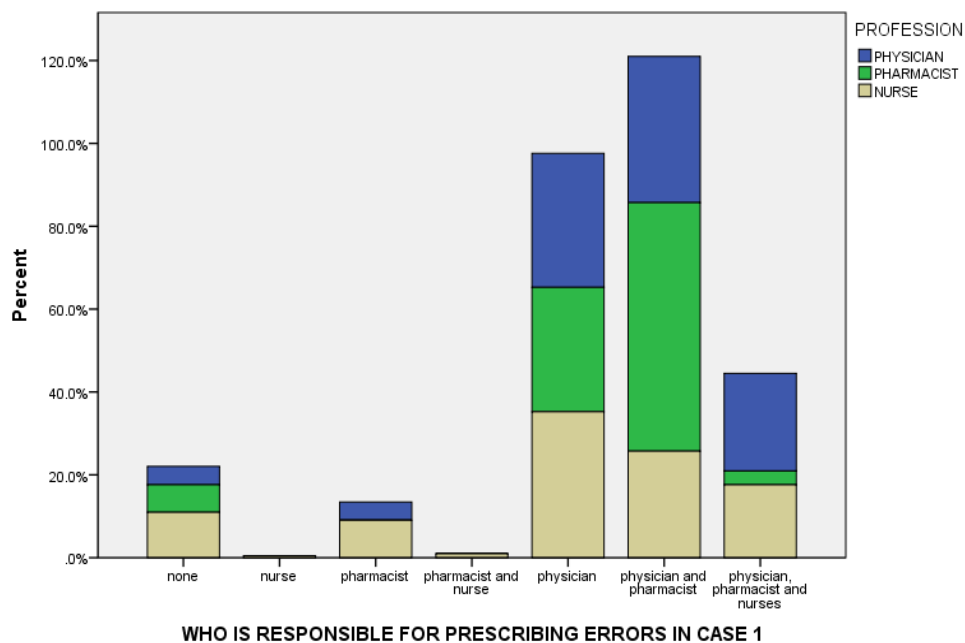
Figure 6.3 Participants' opinion on which professional was responsible for prescribing errors in Case 1

Figure 6.3 demonstrates that the majority of participants agreed that the physician and pharmacist were responsible for the prescribing error in Case 1. This case involved a prescribing error where a physician did not inquire about the patient's medication history. Meanwhile, there were similar proportions of physicians who thought that physician only and physician as well as pharmacist was responsible for the error.

Figure 6.4 Participants' opinion on which professional was responsible for prescribing errors in Case 2

In Case 2, which was another case involving a prescribing error, most participants agreed that the physician was responsible for an error in a patient who experienced an allergic drug reaction. The majority of participants believed that the physician was responsible because they failed to elicit a complete drug allergy history (Figure 6.4).
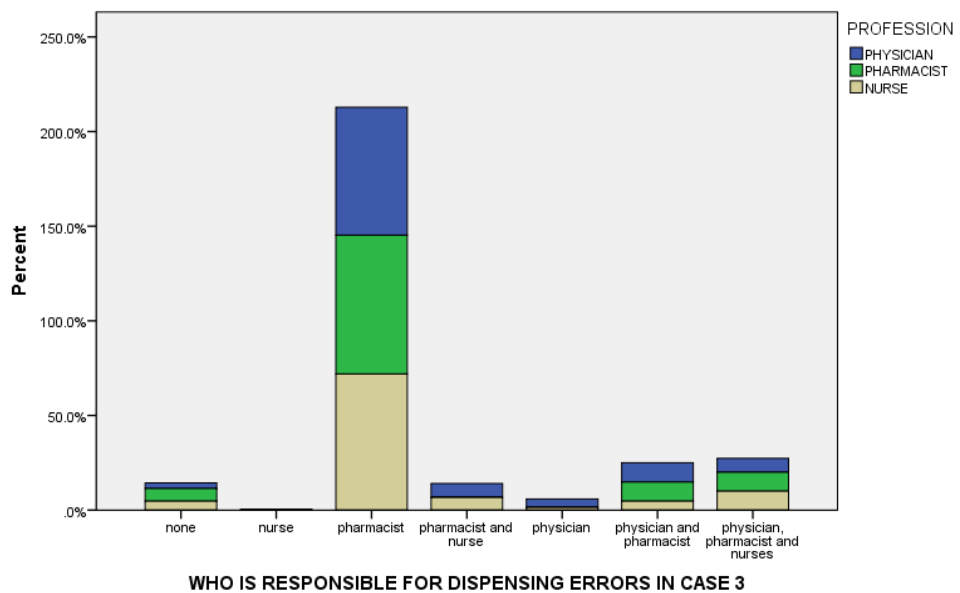
Figure 6.5 Participants' opinion on which professional was responsible for dispensing errors in Case 3

Case 3 included a dispensing error where the pharmacist mistakenly dispensed the wrong medication. Figure 6.5 shows that most health professionals agreed that pharmacist was responsible for mistakenly dispensing Lasix™ (furosemide) for Losec™ (omeprazole).
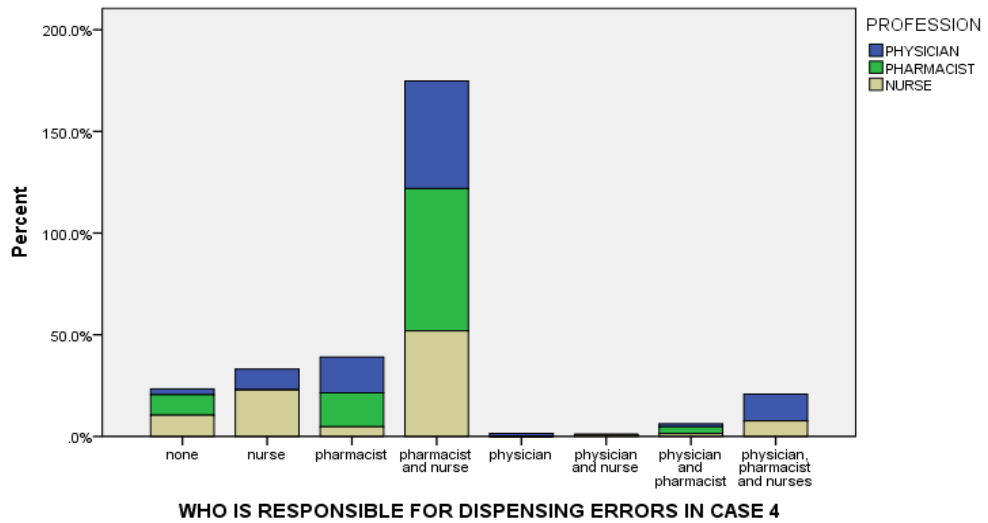
Figure 6.6 Participants' opinion on which professional was responsible for dispensing errors in Case 4

In Case 4, a patient experienced dizziness and hypotension after he was dispensed 10 mg of amlodipine. The pharmacy staff dispensed 10 mg instead of 5mg of amlodipine. On the ward, the nurse administered 10 mg amlodipine to the patient which resulted in the patient experiencing an adverse event. The majority of health professionals agreed that the pharmacist and nurse were responsible in this case (Figure 6.6). There were only a small proportion of pharmacists and nurses who thought the pharmacist was solely responsible for the error. More than 70% of pharmacists believed that they were not the only profession who was responsible for this error although the source of the problem was a dispensing error.
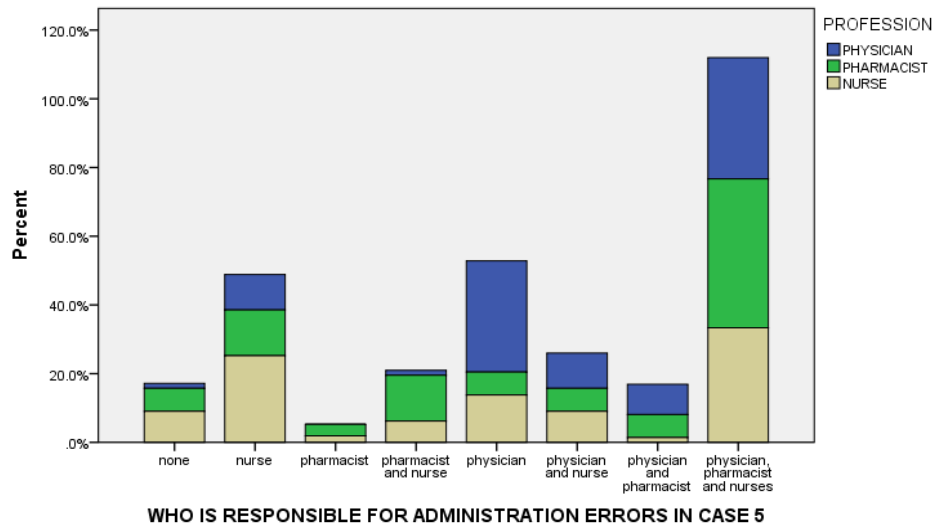
Figure 6.7 Participants' opinion on which professional was responsible for administration errors in Case 5

Case 5 was an administration error where the patient received ciprofloxacin and sucralfate at the same time. These medications should not be administered at the same time because sucralfate reduces the absorption of ciprofloxacin. This has led to ineffective antibiotic therapy. The majority of healthcare professionals agreed that all healthcare professionals were responsible for the error occurring. There were around 33% of nurses who believed that all healthcare professionals were responsible for the error (Figure 6.7). Notably there was just over 20% of nurses who thought they were the only healthcare professionals responsible for this error.

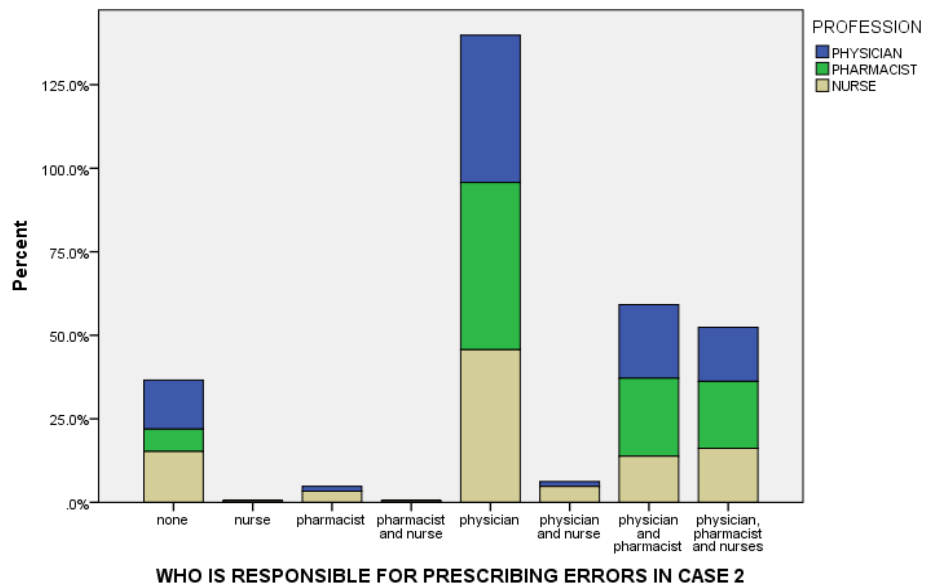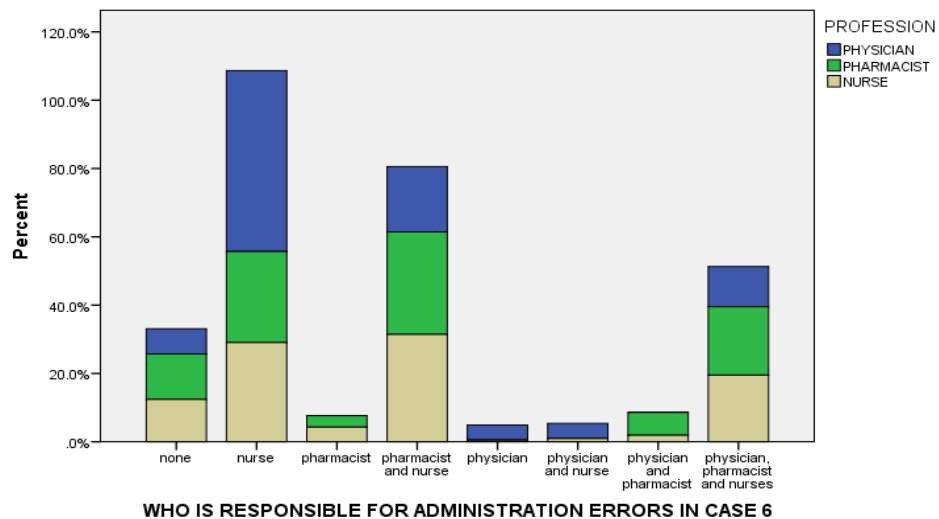**Figure 6.8 Participants' opinion on which professional was responsible for administration errors in Case 6**

Case 6 was another case involving an administration error where the nurse gave the wrong dose of antacid. The majority of participants agreed that the nurse was responsible for the error. In addition, there was almost the same proportion of nurses who believed that nurse only as well as nurse and pharmacist were responsible for the error (Figure 6.8). This also meant that approximately 50% of the nurses agreed that they were not the only professional who was responsible for the administration error in this case.

The possible root cause for Case 1 was lack of communication between the physician, patient and pharmacist. The physician should have inquired about the patient's medication history. Similarly, the pharmacist should have also asked about what other medications the patient was on prior to dispensing the medication. If the pharmacist had identified the patient's other medications prior to dispensing, they could have identified the problem and contacted the prescriber. Interestingly, there was only small proportion of participants who believed this error resulted from lack of communication. This may reflect that only a small number of participants believed that communication amongst healthcare professional is important. This error may also have resulted from healthcare professionals believing that the patient's medication history had been retrieved by another healthcare professional. This may relate to perceived roles of healthcare professionals.

In Case 2, the root case was likely a lack of access to the patients' information. This lack of access could be due to a lack of patient's information documented prior to prescribing, or the patient being exposed to the medication for the first time thus there was no record on the patient's medical history. Case 1 and 2 were purely on prescribing errors which resulted from incomplete medical histories being retrieved by the physician. Although physicians agreed that they were responsible for the errors, they also agreed that other healthcare professionals were also responsible for the errors. In Case 1, 32% of physicians agreed that physician were responsible whilst 35% of physicians agreed that physician and pharmacist were responsible in that case. Meanwhile, in Case 2, 44% of physicians agreed that they were responsible, whilst 22% of physicians agreed that both the pharmacist and physician were responsible.

In Case 3 which involved a dispensing error associated with similar brand name words (sound-alike) medications, the majority of pharmacists (76%) agreed that they were responsible for the error. Meanwhile, in Case 4 which resulted from the pharmacist dispensing the wrong strength of amlodipine and the nurse failing to double check the dose of medication to be administered, 72% of pharmacists agreed that both pharmacist and nurse were responsible for the error. Cases 3 and 4 were dispensing errors which arose from drug storage techniques utilised in pharmacy department. In Case 3, the nurse identified the error prior to it reaching the patient, thus, this became a near miss event. Meanwhile, in Case 4, although the root cause was a deficiency in the technique of storing the medication; the nurse may have also contributed to the error because the patient received the wrong dose of medication. The nurse should have double checked the dose of medication before it was administered. This meant that both pharmacist and nurse shared the responsibility for the medication error.

In Case 5 which involved a nurse administering two interacting medications, 33% of nurses agreed that the nurse, physician, and pharmacist were all responsible for the error. There was only 25% of nurses who agreed that only the nurse was responsible for the error. Similarly, in Case 6, another administration error scenario involving a nurse giving the wrong dose of antacid, there were 31% of nurses who agreed that the nurse and pharmacist were responsible for the error and 29% of nurses agreed

that the nurse was the main health professional responsible for the error. Case 5 may have been caused by lack of communication amongst healthcare professionals. The pharmacist should have identified the drug interaction and notify the prescriber and nurse of its existence. However, only a small proportion of participants suggested the root cause of this error was a lack of communication. Again, this may indicate that only a small proportion of participants considered that communication barriers may result in medication errors. In Case 6, the root cause may have been the nurse's lack of knowledge on the dose of medication. Although another contributing factor was the failure of the pharmacist to double check the dose to be administered to the patient.

6.2.2 DISCUSSION ON MEDICATION ERRORS CASE VIGNETTES

Some of the case vignettes in the current study were designed to evaluate participants understanding of "lack of communication" as a root cause of medication errors. However, there were only a small proportion of participants who believed that communication barriers may result in the errors portrayed in the case vignettes. This may indicate that some healthcare professionals had a lack of understanding of the importance of communication in medication safety. The result of the present study indicates that there is a need to improve healthcare professionals' understanding of the importance of communication amongst healthcare professionals to ensure the safe use of medication. This is because communication failure may be one of root causes of medication errors[23] which may be associated with hierarchical and personality differences, conflicting roles, and role ambiguity.[103]

These case vignettes also indicated that health professionals had various views on responsibility with respect to making and identifying errors. Different views on professional responsibly for medication errors may result from the perceived role of healthcare professionals. For instance, nurses did not double check the dose of medication prior administration; they may have perceived that the physician and pharmacist had ensured the dose of medication was accurate. Thus, they could have administered the medication without verifying the dose. This suggests that each healthcare professional should understand the role and expectations of other healthcare professionals.

Generally, healthcare professionals in the present study afforded responsibility for medication errors to healthcare professionals who were responsible for a particular stage of the medication delivery process. However, they also believed that other healthcare professionals shared the responsibility for medication errors. Cohen stated the importance of shared responsibility in preventing medication errors.[26] Most root causes of medication errors resulted from system errors. He suggested that every healthcare provider involved in healthcare delivery must be aware of their shared contribution to medication errors. Healthcare professionals (i.e. physicians, nurses, and pharmacists) share the responsibility to prevent medication errors from occurring. However, a qualitative study involving 17 nurses in the United Kingdom found that nurses believed they were responsible for most medication errors. Yet, the nurses also blamed physicians and pharmacists if other healthcare professionals were also involved.[337] This indicated that there was a perception of shared responsibility in the provision of healthcare. Shared responsibility may improve healthcare professionals' awareness to their contribution to medication errors. Further, a non-punitive culture should be employed to increase error reporting and system improvement thus enhancing medication safety.[338]

Although Pharmacist Groups were more likely to provide the anticipated correct answers, this may be influenced by the fact that the investigator and her supervisors were also pharmacists. It might have been better to use a panel comprised of doctors, nurses and pharmacists to develop and evaluate the case vignettes. However, the investigator was unable to identify such a panel. This fact led to one of the limitations of the case vignette scenarios. Due to the nature of the study setting, comprehensive justification of validity was unable to be performed. As a result, the vignettes were only validated based on face and content validity. Another limitation was minimum information given to allow further understanding on the cases. This was because one of the criteria of the questionnaire is to be brief and to the point[31], thus, long and detailed scenarios were avoided in this study. Participants may have worked together in answering the questions particularly if participants worked in the same clinical setting. But, this was beyond the control of the investigator.

6.3 SUMMARY OF HEALTHCARE PROFESSIONALS ATTITUDES TOWARDS IPP AND MEDICATION SAFETY

The present study showed that healthcare professionals regardless of their place of work and professions had positive attitudes towards IPP and similar attitudes towards PC sub-scale. However, Physician Groups in the present study portrayed stronger senses of professional identity than Nurse and Pharmacist Groups. Academics in the study university also had a stronger sense that the role of other healthcare professionals is mainly to support physicians. In addition, this stronger sense was also identified in the Physician and Nurse Groups compared to medical and nursing students. Interestingly, no significant difference in attitude amongst Pharmacist Group and pharmacy students towards the role of other healthcare professionals is mainly to support physician. The results on the medication errors case vignettes indicated that Pharmacist Groups had higher accuracy in providing the anticipated correct answers in the vignettes. There was only a small proportion of healthcare professionals who believed that communication failure was one of root causes of medication errors presented in the vignettes. Further, the healthcare professionals also had various views on professionals who were responsible for errors in the vignettes. The various views of professionals responsible for the errors and a strong sense on the statement of the function of other healthcare professionals as supporting the physicians may be influenced by the unclear role of healthcare professionals and the hierarchical model identified in the present healthcare service delivery.

CHAPTER 7 RESULTS AND DISCUSSIONS: QUALITATIVE FINDINGS

This qualitative study used interviews and focus group discussions (FGDs) to answer the three research questions as described in Section 3.5. The results of this study, being the emergent themes as well as their distributions, are reported in this section. In order to ensure the anonymity of participants in this study, the following abbreviations are used:

- Heads of Departments in the University = HU1- HU3
- Heads of Department in the Hospital = HH1- HH2
- Participants in the Physician Group – [(P1- P7) – MG]
- Participants in the Nurse Group – [(P1- P6) – NG]
- Participants in the Pharmacist Group – [P1- P8] – PG]
- Participants in the Pharmacy Interns Group – [(P1-P8) – SG]

7.1 RESEARCH QUESTION 1: DO PHARMACISTS HAVE A ROLE IN PATIENT CARE TO ENSURE MEDICATION SAFETY?

This question was asked of the Heads of Departments in the university and hospital. In addition, the question was also put to groups of healthcare professionals (including physicians, nurses and pharmacists) who worked at the study hospital and pharmacy graduates of the study university. Overall, although the majority of participants suggested that the role of pharmacists varied, they believed that the role of pharmacists in patient care was to ensure the safe use of medication. Interviewed stakeholders believed that pharmacists' engagement in patient care may take time but their support of pharmacists undertaking this role can be seen in the following extracts.

> *"There must be pharmacists. I also want to have a team to control infectious diseases in general because pharmacists' and microbiologists' role, pharmacists were supporting healthcare professionals in the hospital but they are an integrated part in healthcare services. Without pharmacist, it is impossible. For this reason, I acknowledge that the role of pharmacists are important…"* (HH1)

> *"I think if it is something to do with medication, I think pharmacist as well as … pharmacologist which I think they should understand the medication better than general practitioners, it is unquestionable."* (HU1)

"I think it takes time, but if it is based on urgency, it should be 9 [9 over 10 of level of agreement), for nurse's sake. So, pharmacists should be there." (HU2)

There were four themes identified from this question, these were:

- Benefits of the role of pharmacists,
- Government support,
- Pharmacists' internal factors,
- Pharmacists' external factors.

Table 7.1 shows the themes identified of the interviews and FGDs as facilitators for and barriers to the role of pharmacists in patient care to ensure medications safety. The themes on the facilitators are described in Section 7.1.1 and the barriers in Section 7.1.2.

Table 7. 1 Themes identified of the role of pharmacists in patient care

Facilitator/ Barrier	Themes	HU1	HU2	HU3	HH1	HH2	MG	NG	PG	SG
Facilitators	Benefits of the role of pharmacists	+	+	+	+	++	+	+	+	+
	Government support	+	+	+	+	+	+	+	+	+
Barriers	Pharmacists' internal factors	++	++	+++	++	+++	+++	+++	+++	+++
	Pharmacists' external factors	+	+	+	+	+	+	+	+	+

Notes:
+++: themes identified more than 50 times
++: themes identified 25-50 times
+: themes identified less than 25 times

7.1.1 FACILITATORS FOR THE ROLE OF PHARMACISTS

Two themes were identified as facilitators for expanding the role of pharmacists, i.e. benefits and the support from the government.

(i) Benefits of the role of pharmacists

The first theme identified as a facilitator for the role of pharmacists in patient care was the participants' perceived benefits for the role of pharmacists. The participants

indicated that the pharmacists may have a role in ensuring medication safety, educating patients, as well as providing drug information to other healthcare professionals. These were identified from the three sub-themes which emerged and are listed below.

❖ **Ensuring medication safety**

> *"…they [pharmacists] are very important…because geriatrics use multiple drugs. So, I think pharmacists are important. When a patient has a possibility of having many medications, pharmacists should be there…."* (HU1)

> *"…by providing information to physician on how the medication works. I mean, they provide recommendation to the physician or if there is certain medication which may potentially interact with others, this role [the role of pharmacists] is very important. In some cases, it has been implemented."* (P6-NG)

❖ **Educating the patients**

> *"Pharmacists are highly needed to educate patients on what medication the patients were on and what for. The pharmacist should explain to the patients, although physician has also explained. And certain divisions may plan one or two drugs which are contraindicated if they are given at the same time. For instance, patients with chronic pain, for patient with cancer, who has liver damage, the patient was given high dose of paracetamol to reduce pain…"* (P6-NG)

> *"Pharmacists should explain the medication, on how to take and where to store them. We also could help them, we are flexible. I think it is about their needs to communicate, to give information, and to educate them [the patients], based on their competency…"* (P1-MG)

❖ **Providing drug information to other healthcare professionals**

> *"They [physicians] accepted it. They are happy about it and so about drug doses also just like what we had last time, on Vesicare®. The physician wrote 5 mg, it was supposed to be 2 mg. The dose written was twice a day half a tablet every day. So, we corrected and discussed this. And so we have the role to discuss the medication in a way so they won't think that we know it better"* (P5-PG)

(ii) Government support

The other theme which emerged from interviews and FGDs as a facilitator regarding the role of pharmacists in patient care was that of support from the government for the pharmacists to have a role. Participants of the present study suggested that pharmacists' engagement in patient care occurred when the government implemented a policy and/or program.

❖ **The government policy**

"The government policy which I mentioned just now, has given the opportunity in National Health Insurance [JKN- Jaminan Kesehatan Nasional]. It has also offered the possibility for pharmacists to provide health services. If pharmacists work together and they have the same voices, the rewards which will be based on fee for service not on the salary, things should be changed. The problem is on how to implement it or how to overcome it" (HH2)

"Government Policy Number 51 in 2009 and The Ministry of Health decree Number 889 in 2012 and other pharmaceutical guidelines which are available in the hospital and in the community" (HU3)

❖ **The government program**

"Some systems have supported this [the role of pharmacists], for example, there is a program on prevention of antibiotic resistance. Thus, it is regulated that a clinical pharmacist is needed…and so they [pharmacists] would be able to…." (HH2)

"Yes, support from the government I think. Sometimes, I am confused, who we are. That is what I think. For instance, previously, we worked in a good working environment. Then we are transferred to another working station. If we are not respected, I do not think, we will be fine, right? And so, for a program like tuberculosis, there should be pharmacist who responsible. Then, there will be, I think the government role, in this case is Ministry of Health, there must be pharmacist, then, it will happen" (P1-PG)

Interpretation of extract (P1-PG):

> Support for the role of pharmacists in healthcare service delivery will be possible if the government supports their role. For instance, the Ministry of Health regulated pharmacists' involvement in tuberculosis program, thus pharmacists are involved in the program.

7.1.2   BARRIERS TO THE ROLE OF PHARMACISTS

Participants in this study suggested pharmacist-related internal and external factors were barriers to expand the role of pharmacists in patient care. As can be seen from Table 7.1, participants identified pharmacists' internal factors as key themes, indicating these may be the major barrier to expand the role of pharmacists in patient care.

(i) Pharmacists' internal factors

There were four sub-themes that emerged on the pharmacists' internal factors (i.e. lack of knowledge and experience; lack of confidence; lack of pharmacists; and

pharmacists' mind-set). The lack of knowledge and experience were reported to have an impact on their confidence to communicate with other healthcare professionals. It was also suggested that a lack of confidence had a negative effect on the role of pharmacists in patient care. The lack of pharmacist numbers was identified by all participants as a barrier to pharmacists' engagement in providing patient care. The insufficient numbers of pharmacists contributed to high workloads which limited the capacity of pharmacists to deliver patient care. As a result, the level of care provided was variable. The participants of the present study indicated that the human resource shortage (limited number of pharmacists) is a significant challenge in expanding pharmacists' roles. Another pharmacists' internal factor mentioned by participants of the present study was the pharmacists' mind-set. They indicated if pharmacists intend to expand their role in patient care, they should change the mind-set that they will not only work in community pharmacies or the Pharmacy Department in the hospital setting.

❖ **Lack of knowledge and experience**
"…I think my knowledge on medication is very insufficient…because in our education, the area of learning is very wide, it's not specific…I think it would be better the knowledge on medication will be in specialties, in certain kind of medication. Automatically, I will be more confident….the knowledge that we got at university is very wide, and so I am not confident with my knowledge"
(P1-SG)

"…Yes, we have lack of practice, less experience. And so, we will be uncertain…"
(P2-SG)

❖ **Lack of confidence**

"They [pharmacists] are not confident to have an argument that this medication should not be given to patient because it is not under formularies mostly like this" (P4-NG)

"…when we call for instance, we call nurses or physicians, it will be different. Our preparation will be different. I do not know why, I just felt different. I think that is because I was not confident enough. I think I have lack of competencies, say if I want to change a prescribed medication, we have to have a good argument to talk with physicians, but it is different If we talk to nurses" (P5-PG)

❖ **Lack of pharmacists**

"The number of patients to be taken care will be different each day and so it will be enough assessment to each patient. For instance, M who assessed the patients' very details and so the number of patients assessed will be little. We should have a strategy in only for certain patients. The first stage will be the workload should be amended" (HH2)

"Yes, but we have limited number of pharmacists. The ideal scenario will be as it is in geriatric department, pharmacist is available everyday" (HH1)

"I think, what he meant, in the hospital, there are limited pharmacists but a lot of patients. They [pharmacists] don't have much time, because they have other responsibilities." (P7-MG)

❖ **Pharmacists' mind-set**

"...I think it can be started by setting pharmacists' mind-set, they [pharmacists] will not only work at pharmacies" (HU2)

"The problem was most likely from the pharmacists. For example, they are not ready mentally, not confident. For example, their level of knowledge is insufficient or communication barriers" (HH2)

(ii) Pharmacists' external factors

There were three sub-themes identified as the pharmacists' external factors (i.e. varying understanding of the role of pharmacists; no fees for service; and poor procedures of staff recruitment). The first sub-theme identified as an external factor, that is a barrier to expanding the role of pharmacists, was the varying understanding of what the pharmacists' role is in patient care; particularly to ensure medication safety. Participants indicated that currently the role of pharmacists in patient care is unclear because their role is mainly known in drug management. However, the participants suggested that the role of pharmacists in patient care may involve providing education and counselling in community pharmacy but provided no insights into their role within hospitals. No fee for service was another pharmacist external factor identified. Participants agreed that a professional fee for service is required by healthcare providers as a reward for the service provided. Unclear rules of what is expected as a fee/reward for conducting particular services were also potential contributors to the service not being delivered effectively. Stakeholders in the hospital identified there was unclear selection criteria for staff recruitments which was identified as the third sub-theme of pharmacists' external factor.

❖ **Varying understanding of the role of pharmacists.**

"The job description [of pharmacists] should be clear, and so if one asked, what is this medication for? We could say, please ask the pharmacist. We do not need to explain it. It's not our role, we may be wrong" (P5-NG)

"At the moment, most the role of pharmacists are done by nurses, even at public health services, drug dispensing and handing of the medications to the patients." (HU2)

"To my understanding, in community pharmacy, when I worked in private health service, the pharmacist explained the medication to the patient. They explained, you should take this medication in the morning, before food, this one, only in the morning. This one is taken at night only... So the patients were given information on their medication….but in this hospital, mostly the medication was given by nurses." (P2-MG)

❖ **No fee for service**

"They [pharmacists] do not feel challenge to perform better if they do not get much, right? …..It is our challenge because reward is needed." (HH1)

"They [pharmacists] provide consultation on this. It is a burden for the patients. Because they [pharmacists] work as a profession, there should be fee involved. If we work on social based, they will be bored also. Who wants to work on social bases all the time?" (HU1)

"Physicians got fee or rewards every time they visited patients, nurses' rewards are only given on the basis of salary. The same thing is in pharmacist. This is a significant gap, there are no equal rewards" (HU3)

❖ **Poor procedures of recruitment**

"Recruiting staff, it's not an easy job. Because we're under government legislation, we're public hospital. That's the problem because (pausing) …the mechanism of staff recruitment, the needs and its formation are determined by the Ministry of Health" (HH1)

"There is no standard procedure on recruitment of staff; sometimes dropping sometimes recruited from those who worked on contract bases." (HH2)

Interpretation of extract (HH2):
There is no clear standard for staff recruitment. Sometimes, the staff was recruited by the Ministry of Health in Jakarta; sometimes they were recruited from those who work on a contract basis.

7.2 RESEARCH QUESTION 2: IS IPE FEASIBLE IN THE STUDY UNIVERSITY?

This question was asked of Heads of Department in the university and in the hospital to assess the feasibility of the implementation of IPE at the study university. In general, the Heads in the hospital and university agreed the implementation of IPE in the study university was viable. This can be seen from the following extracts.

> *"…I support IPE 100% from the bottom of my heart"* (HU1)

> Investigator*:" If I could rank your level of support to adopt IPE from 1 disagree to 10 agree, where is your level of agreement?"*
> HH2: "*I would say, 10"*

From the interview data several themes emerged relating to this question such as;

- the importance of IPE,

- different learning methods and curriculum,

- different opinions on when to start IPE in healthcare education,

- level of support from the university for adopting IPE.

Table 7.2 shows themes identified based on stakeholders' opinions of the facilitators for and barriers to; the implementation of IPE at the study university. Section 7.2.1 describes themes of facilitators for and Section 7.2.2 provides themes of barriers to the implementation of IPE.

Table 7.2 Themes identified of the feasibility of adopting IPE at the study university

Facilitator/Barriers	Themes	HU1	HU2	HU3	HH1	HH2
Facilitators	Importance of IPE	+++	++	++	+	+
Barriers	Difference in curriculum between healthcare courses	++	+++	++	+	+
	Difference in opinions on when and how to start IPE	+	+	+	+	+
	Difference in opinions on the level of support from university	+	0	+	+	+

Notes:
+++: themes identified more than 50 times
++: themes identified 25 -50 times
+: themes identified less than 25 times

7.2.1 FACILITATORS FOR IPE

There was only one theme identified as a major facilitator for the implementation of IPE in this study as can be seen from Table 7.2.

(i) Importance of IPE

All interviewed stakeholders believed that IPE was very important for healthcare students to experience during their study which can be seen from in the following extracts.

❖ **Improving healthcare students' understanding of the role of healthcare professionals**.

> *"From the beginning, students have been introduced that they work in a hospital, they will work with A, B, C."* (HU2)

> *"It should be introduced from the beginning, so professionalism…is at the very beginning. And so students would understand the relationship with other professions should be started from the beginning, so it will be formed better."* (HU1)

❖ **Fostering teamwork amongst healthcare students to reduce the hierarchy**.

> *"If the education is designed for IPE from the beginning, the students already realise that they learn with other healthcare students during their study. After they graduate, they will retain the concept that they work as a team so they would not think that I am the master and you're the helper."* (HU2)

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"I want to adopt the concept of Mayo Clinic, which they call collaborative medicine. Because Mayo Clinic is also a teaching hospital and so from education, it has been taught. It is taught at university on how the students need to collaborate with others. To collaborate to treat the patients and so physicians who graduated from Mayo they already have in their mind that they already thought, I have to collaborate with other health professionals. That's why they're called it collaborative medicine." (HH1)

"In my opinion, the earlier the better which means early IPE introduction during healthcare students learning is preferable. This is because firstly, after they work as professionals, it will not be awkward to work in a team, and everyone has understood their role, and so everyone knew. They will not be surprised that they work with other healthcare professionals. Secondly, maybe classical problems will not occur such as refusal of certain profession or arrogance of a profession can be prevented by introducing the role of other professions at the earliest stage. I think starting from early of healthcare students' education." (HH2)

An interesting point identified during the interviews was the interviewed Heads of Departments in the university stated that there had been a meeting amongst Heads of the Medical, Nursing and Pharmacy Departments to discuss the possibility of including IPE in the curriculum.

"Last time, we had a meeting with management of Department of Pharmacy in our university. I hope that they are also enthusiastic about this. It is true in the first meeting, there is nothing realistic yet, but I think we have an idea in adopting IPE." (HU1)

"We already had a discussion with management from Faculty of Medicine, where they have Medical and Nursing Departments. In terms of the possibility to have IPE, we arrived in an agreement that the education may be started as an extracurricular program or other learning activities." (HU3)

One of the stakeholders in the university also identified another interesting point with regards to the feasibility of implementing IPE, that the Indonesian Ministry of Education has supported the implementation of IPE through the Health Professional Education Quality (HPEQ) Project. This Project is aimed at improving the quality of health schools in Indonesia and was ongoing while the interviews were undertaken.

"It can be concluded from the last HPEQ conference that it [IPE] is a must. All health education institutions should implement IPE. The real model on the pilot project is under development by HPEQ team to find out the ideal model to be implemented in Indonesia." (HU3)

7.2.2   BARRIERS TO IPE

Three themes relating to barriers to IPE were identified as shown in Table 7.2:

- Different curriculum between healthcare courses

- Different opinions on when and how to start of IPE in healthcare education

- Different opinions on the level of support from the study university

The sub-themes are illustrated in the following.

(i)   Different curriculum between healthcare courses.

The first theme to emerge identifying a barrier to IPE, during the interviews, was the different curriculum utilised between healthcare courses. Interviews with stakeholders identified that similar curricula of problem based learning at the Medical and Nursing Departments were mentioned as facilitators for the implementation of IPE. However, pharmacy students at the study university had little exposure to problem based learning. The different curricula may pose a significant barrier to the implementation of IPE at the study university involving medical, nursing and pharmacy students. An interesting point was raised in relation to the curriculum of the different healthcare courses and how these are influenced by different roles within the healthcare system. One of the Heads of Department in the university suggested that such differences may be a barrier to curriculum development at the study university. This is illustrated in the following extracts:

"Nursing also adapts block systems, the same as in medicine" (HU2)

"Faculty of medicine used block system, when the students finished one unit, let say the unit consist of one or two credits, they can finish the unit in one month. Meanwhile in pharmacy education, we use classical education system [teacher centred], in which 1 credit unit is equal to one meeting for one hour every week. This learning method is different significantly to implement IPE. As a result, we need to evaluate the curriculum, to evaluate how the curricula is implemented and adding more staffs which may need, we are on our way to that ." (HU3)

"Say in the first competency on the students should have competencies on professional knowledge, procedural knowledge, cognitive and affective. But, when it will go to other competencies, from assessment, diagnosis, determining type of medical activities, evaluation, the methods are the same. But in ours mostly on nursing care, but in physician, it will be curative medicine. Mostly on prescribing medication, but nursing mostly on nursing care, from our blocks. Say for instance in musculoskeletal block, we need to

identify the competencies. What the students need to know, we have the same [learning methods], type of assessment also the same with medical" (HU2)

> Interpretation of extract (HU2):
> Healthcare students should have competencies in their own professional knowledge. The learning methods and assessments in nursing and medical educations are the same. However, medical education focuses on diagnosing the disease and prescribing medication. Meanwhile, nursing education emphasises nursing care.

(ii) Different opinions on when and how to start of IPE in healthcare education

All interviewees agreed there was a need for IPE in healthcare education. However, these stakeholders had different opinions on when to start IPE. Some leaders argued that IPE should be started as early as possible in healthcare students' education, meaning that IPE should be started at undergraduate level and may also be introduced into students' curriculum at internship level. However, initiation of IPE at internship level may bring about difficulties because of the different lengths and quality of internships between the professions. The Heads of Departments interviewed argued that a professionalism unit for all healthcare students could be incorporated as part of the curriculum which could help teach and implement IPE at the study university. Students could learn communication skills and ethics of healthcare professionals in this unit. The interviewed stakeholders also had different opinions on whether IPE should be integrated within the existing curriculum or as an addition to the curriculum within each course. These differences of opinion on how to incorporate IPE into healthcare students' education may also be a barrier.

❖ **Different opinion on when to start**

> *"Internship for medical students is almost for 2 years, while for pharmacy students only 6 months. Theoretically, it needs adjustment. Internship in the hospital for pharmacist is very limited. The curriculum at pharmacy education will need adjustment, particularly for pharmacy students who preferred to work at hospital and community. This needs assessment. We expect in pharmacy education, the students could learn on how to work interprofessionally"* (HU3)

> *"To allow interaction amongst healthcare students to meet hospital's needs when those students have internships in the hospital, the duration of time should be the same for students from different professions and so the interaction will be intensive and the outcomes hopefully be the same."* (HH2)

❖ **Different opinion on how to start**

> *"With regards to IPE, we could start from the same curricula say from professionalism [block] because all professions teach about it, about communication"* (HU2)

> *"The education may be started as an extracurricular program or other learning activities which involved lecturers from those three health schools"* (HU3)

> *"I think it [IPE] is very important. I strongly agree that it should be initiated in the curriculum, it should be in intra-curriculum"* (HU1)

(iii) Different opinions on the level of support from the study university

Different opinions on the level of support from the study university for IPE were identified as one of the barriers to the implementation of IPE. It was suggested that support from the university had not been granted because IPE was a new concept in the Indonesian health curriculum. That is, no one had presented the concept to the university management. It was suggested that IPE is possible because the Departments of Medicine, Nursing and Pharmacy are all located at the study university. However, the Pharmacy Department is under the Faculty of Mathematics and Biological Sciences, meanwhile the Nursing and Medical Departments are under the Faculty of Medicine at the study university.

> *"…and the most significant barrier is the location, Pharmacy is under Faculty of Mathematics and Biological, while Nursing and Medical Departments are under the same faculty [Faculty of Medicine]."* (HU3)

> *"This [lack of support of facility and financial from university] become a barrier in our system. It will be hard for us. We have the willingness, we have the ability but the system restricted it. It's from the policy [university policy]."* (HU3)

> *"I think that is because there is no one talk about it [IPE] just yet, it is only us [Heads of Medical, Nursing and Pharmacy Department]."* (HU1)

7.3 RESEARCH QUESTION 3: IS IPP FOCUSED TO PROMOTE MEDICATION SAFETY FEASIBLE WITHIN THE CURRENT PRACTICE MODEL?

The above question was asked of Heads of Department at the study university and hospital, as well as FGDs involving university and hospital healthcare professionals (i.e. physicians, nurses and pharmacists) and pharmacy graduates at the study university. The purpose of the question was to identify potential facilitators for and barriers to the implementation of IPP focused on medication safety within the current practice model.

From the interviews and FGDs, the following themes were identified:
- Benefits of IPP,
- Expectation towards others' role,
- Interaction between healthcare professionals,
- Support of IPP from stakeholders and the government,
- Lack of competencies of IPP,
- Lack of understanding of the role of healthcare professionals,
- Superiority,
- No legislation from the government on teamwork,
- Limited staff.

Table 7.3 shows the major themes identified based on facilitators and barriers to the implementation of IPP focused on medication safety in the current practice. Descriptions on themes of facilitators can be seen in Sections 7.3.1 and on themes of barriers in Section 7.3.2. In general, the Heads of Departments in the university and hospital as well as participants in FGDs, were supportive towards IPP. The Heads of Department support can be seen in the following extracts:

"I definitely agree with it [IPP]. I would say 10 [10 of being the highest level of agreement]. If, I could share my life experience as physician, I think it is important. If we interact with people, the ego should be diminished." (HU1)

"I absolutely agree at level 10 [10 of being the highest level of agreement] because, we always think about the patients." (HH2)

Support extracted from FGDs and the participants' responses are illustrated in the following:

Facilitator: *"Do you agree to work with other profession to provide healthcare service?"* All participants in Nurse Group said yes and laugh.

Facilitator: *"…how many will…agree to work with other profession to ensure the safe use of medication? "* All participants in Pharmacy Group raised their hands.
P1-PG: *"It should be everyone as long as we keep our knowledge updated."*

Facilitator: *"Do you agree to work in a team with other team members in providing patient care?"*
P1-MG: *"Yes, we do. Happy about it, we like to communicate. We'd love to call them or text them (laughing)."*

Facilitator: *"Are you ready to work or agree to work with other healthcare providers?"* All pharmacy interns agreed.
Facilitator: Why?
P4-SG*: "Because the aim of health service is to improve patient's quality life."*

Further, to explore the current practice of working together between healthcare professionals (i.e. physicians, nurses, and pharmacists) to promote safe use of medication, the themes identified were analysed based on D'Amour et al.'s model of collaboration.[217] This model was considered to be the most appropriate in relation to collaboration because it takes into consideration individual and organisational dimensions in the collaboration. The level of collaboration at the study hospital was assessed based on dimensions and indicators of collaboration as shown in Table 1.10 and Table 1.11 (See Section 1.4.4).

Table 7.3 Themes identified as facilitators for and barriers to the implementation of IPP in medication safety

Facilitators/ Barriers	Themes	HU1	HU2	HU3	HH1	HH2	MG	NG	PG	SG
Facilitators	Benefits of IPP	++	+	+	+	++	+	+	+	+
	Expectation towards the role of others	+	+	+	+	+	+	+	+	0
	Interaction between healthcare professionals	+	+	+	+	+	+	++	+	+
	Support of IPP from stakeholders and the government	+	+	++	++	+	+	+	+	+
Barriers	Lack of competencies of IPP	++	+++	+++	++	+++	++	++	+++	+++
	Lack of understanding of the role of healthcare professional	++	+++	+	+	++	+++	+++	++	+++
	Superiority	+	+	+	+	+	+	+	+	+
	No legislation from the government on teamwork	+	+	++	++	+	+	+	+	+
	Limited staff	+	+	++	++	+	+	+	+	+

Notes:

+++: themes identified more than 50 times

++: themes identified 25-50 times

+: themes identified less than 25 times

7.3.1 FACILITATORS FOR IPP

There were four themes related to facilitators for IPP at the study hospital. The themes included participants' perceived benefits of IPP, expectations towards the roles of healthcare professionals, interaction between healthcare professionals, and support from the Indonesian Government and hospital policies. As can be seen in Table 7.3, the distribution of the themes of facilitators identified from interviews and FGDs was very similar.

(i) Benefits of IPP

Benefits of IPP were identified as one of the facilitating themes in assessing the feasibility of implementing IPP at the study hospital. Participants identified that IPP would be beneficial in reducing the blame placed on nurses when medication misadventure occurred during healthcare delivery. Participants also identified that potential risk of misuse of medication may result from unclear prescriptions. Communication amongst healthcare providers is essential particularly when there was an unclear prescription due to poor hand writing. Unclear prescriptions need to be rectified to minimise assumptions made by other healthcare professionals. This suggested that IPP may potentially improve the safe use of medications. The sub-themes of benefits of IPP were seen as the following:

❖ **Reducing blame**

> P5-NG: *"Yes, all the blame will be ours [nurses]."*
> P4-NG: *"For instance, when there is error, it is almost certain nurses will be blamed. Say, the pharmacists take the wrong medication. We did not check the accuracy of medication dispensed, nurse will be blamed."*

❖ **Minimising the potential risk of medication misadventure**.

> *"I had several experiences, in VIP wards, there were nurses for different kind of cases, and so one patient was not only treated by different physicians but also by different divisions. The patient was given medication by more than one physician, sometimes, the names of drugs were different but they had the same indication."* (P6-NG)

> *"For example, when the physician prescribed medication for a geriatric patient with higher dose than what it should be. The pharmacist may provide suggestion that according to Beer's criteria or other guidelines, this should be done or by showing alertness on certain adverse effects of medication, it can help the physician. And when there was a team meeting, and there was a discussion, and*

the pharmacist pointed out that there was a potential of drug related problems and they mentioned it."(HH2)

"Then, technically, the physician should be able to write a safe prescription. For example their hand writing, it should be a clear prescription."(HH2)

Since all participants in the study identified the benefits of IPP in ensuring medication safety, therefore, they had a shared goal of improving patient care. Hence, the present setting achieved a Level 2 (Developing Collaboration) for the dimension of Shared Goal and Vision according to indicators from D'Amour et al's model of collaboration (Table 1.11).

(ii) Expectation towards the role of healthcare providers

The interviewed Heads in the hospital articulated certain expectations of the roles of healthcare professionals. They claimed that other healthcare professionals (e.g. nurses and physicians) thought the role of pharmacists on the wards was mainly about logistics (medicine supply) and in reducing the workload involved in drug distribution. The stakeholder's expected the interaction between nurses and pharmacists on the wards was more focussed on medication advice. One also stated that pharmacists have roles beyond distribution to the wards in the hospital (see below).

"…they [nurses] are confused on something. So, interprofessionalism will make them easier to do the thing. It is not because the job load has been minimised" (HH1)

"There will be working partners who could be able to discuss about adverse drug reactions, choosing solvents etc. Pharmacist actually will help them [other healthcare professionals] to solve something. It is not because the work load has been reduced or taken over. That's not what we want. But what I get now, the work load has been reduced. And so, actually there are lots of benefits. For instance, for patients under health insurance, what can be replaced with, that sort of working relationship I expected. But what I found, they [pharmacists] only help in drug logistics…" (HH2)

According to indicators from D'Amour et al's model of collaboration (Table 1.11), what can be expected of a certain healthcare professional and what to expect of others are indicators of formalisation tools under Formalisation dimension. According to the above extract, the role of pharmacists in the hospital was less than the

expectation of stakeholders at the study hospital, thus, the practice of collaboration on this indicator was at Level 1 (Potential Collaboration).

(iii) Interaction between healthcare professionals

From the theme of interaction between healthcare professionals emerged three sub-themes (i.e. interaction between physicians and nurses; interaction between pharmacists and nurses; and interaction between physicians and pharmacists). Participants stated that there was limited interaction between healthcare providers. Participants identified that physicians mostly work with nurses but had very limited interaction with pharmacists. Interviewed pharmacists described most interaction with nurses and limited interaction with physicians. Discussion with the Pharmacist Group also revealed different opinions on the level of communication between pharmacists and physicians in the hospital. It appeared that the level of relationship was dependent upon the wards and place of work. Interviewed pharmacists indicated that the senior physicians who treated patients in VIP wards were difficult to have a discussion with and this was not a recent issue. The pharmacists claimed that they had most communication with junior physicians, such as physicians in charge of the Third Class wards where the patients are treated by residential physicians. It was also revealed that pharmacists in the Central Pharmacy suggested that they encountered difficulties communicating with physicians because they did not have information about the patients' health status. In certain wards, however, pharmacists had access to patients' status, and these pharmacists were contacted by the physicians about medication related matters.

Although the level of communication amongst physicians and pharmacists was thought to be poor, potential communication may occur when the medication prescribed was outside the hospital formularies or the prescription order was unclear due to poor hand writing. The interviewed physicians also indicated that they accepted the fact that the medications prescribed may be changed by pharmacists as long as there was confirmation by the physician. In addition, physicians were pleased if pharmacists contacted them regarding clarification of poorly hand written medication. The interviewed physicians claimed that pharmacists in the hospital were mostly unreachable, thus the physicians had lack of communication with pharmacists in the hospital. The sub-themes which emerged on the interaction between healthcare professionals are illustrated in the following extracts.

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❖ **Interaction between physicians and nurses**

P2-MG: *"To ensure patient safety, for instance, there is an event, as what I had last night, when I worked night shift. I never prescribed KSR for patient with end stage renal disease. Because theoretically these patients tended to be hyperkalaemia (pause) the Central Pharmacy sent KSR. Then, I read from the medication records, it was written KSR. I know that was not my hand writing because my writing is poor. But what was written was KSR with clear and neat hand writing. But I have written in the diagnoses that the patient suffered from end stage renal disease, and then the nurses luckily, the nurse pointed it out. I think the nurse understood that it is impossible for patients with end stage renal disease are on KSR. And so, she asked me why patient with CKD was given KSR. I thought I never wrote KSR, but in the drug order form, we use this form in the hospital. I saw, there is KSR but I never wrote it. Luckily the nurse reminded me. It will be very dangerous if the patient took KSR. I did not understand, where the source of errors. Was it from the drug order form? or was there someone write on the order form? or anything? or was pharmacist in the Central Pharmacy wrong to read to order? Or wrong to give the medication? I did not know I thought the nurse had really understood the disease, and so I did not give the medication…"*
P1-MG: *"It means that there was teamwork amongst nurses and physicians…"*
Facilitator: *"As what I could see, it's only amongst physicians and nurses, what about the pharmacist?*
P1-MG:*"with pharmacists, I think because the time is very short, there should be a moment of we [physicians] have communication with them [pharmacists]. Lack of communication with pharmacists, I think."*

"…say to delegate the job to nurses, on how to administer the medication, which route of administration. We [nurses] will do this, we need collaborative practice. It is not only dependent on physician. They will write on the patient's medication record if we write in the patient's medication records. If we do it wrongly, wrong route, the patient will be in danger." (P1-NG)

"So it may seem, strange, I think. Physicians in the current hospital were not familiar in working with other healthcare professionals. I think the physician who never gained working experiences in working with other healthcare professionals…the physician in the hospital [study hospital] may find it is strange." (HU2)

❖ **Interaction between pharmacists and nurses**

"I think I have more discussions with nurses, yes, we have more interaction with nurses. We could contact physician, we could, but it starts from the nurses. Then they [nurses] will talk to physician." (P6-PG)

"There are antibiotics which should be taken after or before food, we are not very sure, especially for new drugs. We do not have the drug leaflets; we haven't read it yet, not clear." (P5-NG)

"Actually, if the medication was not under formularies, it should be explained by pharmacist. How the medication worked and how the medication impacted the

patients. Otherwise, we will be confused because we did not have the same perception." (P3-NG)

❖ **Interaction between physicians and pharmacists**

"The physicians in other hospitals in Indonesia already get used to working with pharmacists to consult or ask about medication, in particular on drug interactions which may occur." (HH2)

"The resident physicians and I, all of us are learning in my ward…For me, because I am in drug central of Ward A, when there was something wrong with the medications the physicians contacted me." (P2-PG)

"Then, sometimes the nurse said, pharmacists should talk to physicians directly, because nurses do not know how to explain to the physician. Okay, we [pharmacists] will talk to the physician. Then, the physician explained, this was the patient's condition and because I was in the Central Pharmacy, I did not know the patient's condition, when the physician mentioned about an additional diagnosis that was the hardest bargaining position, I was clueless." (P5-PG)

P1-PG: *"In my experience, sometimes the physician is hard to have a discussion with, once, it was long time ago, I think it is much better now. Maybe 5-6 years ago, it's hard to communicate with physicians. Once, in a paediatric clinic, there was a patient who was a son of our staff. He was given antibiotics combination, of chloramphenicol and amoxicillin in powder. We know that chloramphenicol is very bitter, we wanted to counsel the physician to change it to syrup, and we haven't said anything yet. They were angry, was it you who prescribed the medication or me?"*
P6-PG*: "Yes, something like that, they used almost the same language."*
Facilitator*: "It means, it was not only happened 6 years ago?"*
P6-PG*: "I meant, communicating with senior physicians, even now, they have the same comments. That is why we prefer to speak to junior physician who may accept our opinion. But it does not always happen, some are open to discussion, and some are not. For those who are not cooperative, as what has been mentioned just now, they will say who has the competency to write the prescription? Is it me or you?"*

"I did not know how, I did not know what to do. I could not reach the pharmacy. I did not understand either maybe I am never able to be in touch with them [pharmacists]." (P7-MG)

The above findings illustrated that there was limited interaction amongst healthcare professionals and no information found regarding interaction between organisation (hospital) and individual (healthcare professionals) at the study hospital. Hence the indicator of connectivity (under Governance dimension) at the current setting was at Level 1 (Potential Collaboration) according to D'Amour et al's model of collaboration (Table 1.11).

(iv) Support of IPP

Two sub-themes emerged of this theme (i.e. support from the stakeholders and support from the government). Participants in the interviews and FGDs suggested that support from the health system for the implementation of IPP is essential. The participants stated that if the government and the hospital management have a specific policy stating that teamwork is essential for patient service provision, then the healthcare professionals will work as a team. During the data collection period, the hospital was preparing for the Joint Commission International (JCI) accreditation as part of the Indonesian Government policy to ensure patient safety. Participants of the interviews identified that the accreditation had facilitated an improved awareness of activities in patient safety including medication safety. Participants pointed out that since preparation of the accreditation, integrated notes had allowed interaction amongst healthcare professionals because every healthcare professional was required to document their care in the notes. Participants mentioned that before the accreditation, documentation of patient's information was scattered. But, after the hospital preparing for the accreditation, the documentation had gradually shifted towards integrated notes.

❖ **Support from the stakeholders**

"I think, it is very important in the future if we want to provide a holistic care. There will be comprehensive care. All this time, we only see the physician and the nurse who do the job." (HU2)

"Start from the person because it has been formed. It should be introduced from the beginning and so professionalism block is introduced at the very beginning. They will understand so the relationship with other professions should be started from the beginning. So, they will be formed better." (HU1)

This is the one at Mayo Clinic that I want to adopt which they call collaborative medicine…It is clearly mentioned at Mayo that our physician is not excellent. It is the same as other physicians in the world. But the difference is they have strong collaborative medicine and it has been prepared from their education." (HH1)

❖ **Support from the government**
"One aspect of the JCI accreditation is documentation should not be fragmented, so health providers should write on the same paper." (HU2)

"In JCI, in the integrated note there is a column for communication for health providers." (HH2)

"So, JCI can be implemented soon. If JCI is implemented, interprofessional practice will work. This is because one of JCI indicators accommodates teamwork." (HH2)

This study found that stakeholders supported IPP between healthcare professionals which may be fostered through IPE. According to indicators from D'Amour et al's model of collaboration, this was a leadership indicator under Governance dimension. Based on findings of this study, this leadership indicator was at Level 2 (Developing Collaboration).

However, although the government policy has supported JCI accreditation which may allow interaction amongst healthcare professionals because all healthcare professional should document their care on the same notes, it was not clear whether information exchanged amongst healthcare professionals has occurred. Hence, according to indicators from D'Amour et al's model of collaboration (Table 1.11), information exchange indicator (under Formalisation dimension) at the study hospital was at Level 1 (Potential Collaboration).

7.3.2 BARRIERS TO IPP

Table 7.3 shows that from the interviews and FGD data there were five barriers identified to the implementation of IPP in the study hospital:

- lack of competencies for implementation of IPP
- lack of understanding of the role of healthcare professionals
- superiority
- no legislation on teamwork from the government
- limited staff.

The most frequent theme identified as a barrier was the lack of competencies in IPP. The theme of competencies had three sub-themes, namely knowledge, skills and attitudes. The competency of knowledge not only involved knowledge within one's own profession but also knowledge of the roles of other healthcare professionals. This study found that healthcare professionals lack of competency in IPP was identified from their lack of understanding of the role of healthcare professionals and was classified as a theme (Section 7.3.2.ii). This theme was discussed frequently by

participants of this study which indicated the theme was a significant barrier to IPP at the study hospital.

(i)   Lack of competencies of IPP

Although participants agreed competencies of IPE are important, participants indicated that healthcare professionals lacked these competencies. Knowledge competency was not only within one's own profession but also knowledge of the roles of other healthcare professionals. Understanding the philosophy of healthcare professionals as care providers was also regarded as knowledge competency. Communication and teamwork skills emerged as skills or competencies of IPP in the present study. These skills included what and how to deliver a message to other healthcare professionals. Failure of clear delivery of the message might cause ineffective communication. This indicated that a lack of interpersonal skills may hinder effective communication. Participants stated that teamwork is essential in *working interprofessionally* in healthcare service delivery. However, one of the Heads interviewed highlighted that currently there was a lack of role models amongst practitioners with good communication skills who worked with other healthcare professionals in practice.

Trust and respect were identified as attitude sub-themes. Participants suggested that trust of other healthcare professionals and patients are essential in IPP. For example, if physicians doubted the pharmacists' competency to dispense medication for paediatric patients, this may reduce the physicians' trust in working with the pharmacists in a team. Respect was the most common attitude mentioned during interviews. Respect of other healthcare professionals is essential in teamwork. Lack of respect was identified during the discussion with the Physician Group where the physicians reported medications they prescribed were changed without discussion. Meanwhile, the Pharmacist Group pointed out that respect of the role of pharmacists will only occur when their involvement is regulated in the healthcare system because the pharmacists have a clear role with the regulation

❖   **Knowledge**
"If we talk about knowledge…nurses also have the same knowledge…They [nurses] could talk to others [healthcare professionals]. So others will follow them." (HH1)

"They [healthcare professionals] already have the same vision. For instance, with JCI, it is about patient safety. Actually we have the same aims. We only need to work together." (HU2)

"It [(IPP] is possible but all should have the same perspective on the patient." (P1-NG)

❖ **Skills**

"…the skill on how to deliver a message is very important. Basic knowledge, good interpersonal skills which mainly based on communication, and team work skills." (HU2)

"…how they [healthcare professionals] should communicate with others; how they communicate with patients in relation to confidentiality; what issues they could share in front of the patients. What they should say to the physician and so the communication will not put one inferior towards another. But it should be constructive to work together." (HU3)

"…when the patients come, how should we start to talk to the patients? How to greet them or introduce ourselves? How to start? We do not have a role model. Then we also give medication. And at the end, we would say, you need to be in hospital and so we need to talk to a nurse and that's it. We're never taught about this, nothing. And at the end, error occurred. Those are the holes in ours." (HH1)

❖ **Attitudes**

"…in my department I think, I have an experience in paediatrics. In dispensing parenteral dosage forms, the pharmacist could not do it." (P7-MG)

"We need to respect them [others healthcare professionals' opinion] and also feedback from other healthcare providers also needs appreciation…so respect each other's' opinion or skills." (P5-SG)

"So, each profession should take care and respect to work collaboratively." (HH2)

"In the healthcare system, pharmacists, nurses and physicians have to work together. And I felt it too from the beginning. I think there was respect towards each other. I felt it, because, the system may be (pausing) must be from pharmacist, from previous pharmacists. Now, it feels that when there is no pharmacist, there is something missing." (P7-PG)

Interpretation of extract (P7-PG):
In the healthcare service delivery, if pharmacists, nurses and physicians are designed to work in a team, respect of each other's roles will be present. Thus, if there is no pharmacist, other healthcare professionals may find something is missing.

Because of the lack of trust identified from participants of the present study, the level of collaboration on the trust indicator (under Internalisation dimension) according to D'Amour et al's model of collaboration was at Level 1 (Potential

Collaboration) at the study hospital (Table 1.11).

(ii) Lack of understanding of the role of healthcare professionals

Two sub-themes were identified of this theme (i.e. lack of understanding of own role and of other healthcare professionals roles). Lack of understanding of own role was identified when nurses see themselves as servants of the physician. The belief of the role of other healthcare professionals as physicians' helper was identified in the present study. This may reflect the culture of healthcare service delivery in Indonesia where the physician assumes highest position within the healthcare hierarchy. The lack of understanding of the roles of other healthcare professionals (in this case the pharmacist) might be due to the fact that the role of pharmacists is unclear in current practice (Section 7.1.2). Evidence of uncertainty regarding the roles of healthcare professionals is demonstrated in the following extracts:

❖ **Lack of understanding of own role.**
"During our shift if the senior physician has a patient and they recommended or called their physician's chief in charged. If the chief could not do it, they asked us to do it, so we did it." (P6-NG)

❖ **Lack of understanding of the role of other healthcare professionals**
"I think, we [physicians] do not know what their [pharmacists] role will be, and they [pharmacists] also do not know how our [physicians] role will be. And so, there might be a notion that I've delivered my responsibilities to others. Oh no this is the role of pharmacists…oh…no…this is the role of physicians." (P6-MG)

"We do not know what the role of pharmacists and they also do not know what our role." (P1-MG)

"The nurse is considered as physician's helper that image remains in physicians." (HU2)

"Pharmacists know the aim is to help physician. For instance, if there is any problem they should contact the physician. It should be like this right?" (HU1)

"Nurses are also important because they help the physician. At least they [nurses] do their role. In the past, they (nurses) were definitely physician's helper. How about now? The attitudes remain like this. Nurses should take initiative to take care for the patients." (HU1)

Because participants of the present study had a lack of understanding of the roles of healthcare professionals, the level of mutual acquaintanceship (under Internalisation

dimension) was at Level 1 (Potential Collaboration) at the study hospital based on the indicators from D'Amour et al's[217] model of collaboration (Table 1.11).

(iii)   Superiority

Another theme identified as a barrier to IPP was superiority. As per dictionary definitions, "ego" is defined as a person's self-importance (in this case the importance of certain professions within the healthcare delivery). "Hierarchy" is defined as the level of arrangement based on the importance in an organisation. "Superior" relates to higher status or power (in this case in health service delivery). Based on these definitions, ego, hierarchy, and superiority were considered as one theme of superiority. The sense of superiority of certain healthcare professionals may result in communication gaps in healthcare service delivery. This is illustrated in the following extracts:

> *"This will only occur when the three professions do realise the needs on it [IPP]. There is no super ego amongst profession. That they are the most important person, but everyone is important."* (HH2)

> *"...but it does not happen everywhere, it must be. Or even so, some of them [physicians] will be cooperative. But for those who are not cooperative as what mentioned just now. They said who has the competency to write the prescription? Is it me or you? I referred to senior physicians, even up to now, they have comments like that."* (P6-PG)

> *"The barrier to IPE was only from ego of each person because as I said, I hope with medical, we have many health courses like nurse, public health, I hope with this no one will feel superior towards each other. If one profession considered themselves as superior to another there will be a gap in communication"* (HU1)

Because of the sense of superiority identified in the present study, the indicator of client-centred orientation versus allegiances (under Shared Goals and Vision dimension) was considered at Level 1 (Potential Collaboration) according to the D'Amour et al's[217] model of collaboration (Table 1.11).

(iv) No legislation on teamwork from the government

Pharmacists in the hospital claimed that support from the government on teamwork is essential for teamwork to occur. However, stakeholders in the university suggested that there is no legislation to cover working and sharing the responsibility within a team.

"Support from hospital management is highly needed, as what I felt. Particularly when there is a program from hospital, there are some programs….There was a policy from the management that a team in which professions need to be involved, pharmacists, nurses and other healthcare professionals in a team. The role of each profession must be explained in aseptic team" (P8-PG)

"I think because in our country, there is no legal rule on this [working in a team]. As far as I known" (HU2)

"Say for instance in a case of medication error, pharmacist had reminded us, the medication has been approved by pharmacists for its safety, because the patient has a lot of medications, which have been regulated under certain legal aspect, the physicians should be benefited, right? Why we need to work our own, this is what we hope for the future" (HU1)

"….there should be a legal shared responsibility of a task or job. In a modern society, failure in medication process is associated with malpractice. If there is a legal shared responsibility amongst health professions which involved put patient safety as their primary goals, for sure, the physician will be very happy. Because at the moment, the physician feels that all of those responsibilities are in physician's hand. So they have an objection if others did not take legal responsibilities in doing such job" (HU3)

Support from the health system (i.e. the Indonesian Government policies) and stakeholders in the hospital, as well as adoption of an international accreditation at the study hospital were taken as indicators of centrality (under the Governance dimension). At the study hospital, although the government support was obtained in certain wards or patient populations, there was no explicit legislation on teamwork (collaboration) amongst healthcare professionals. Thus, the centrality indicator according to D'Amour et al's[217] model of collaboration (Table 1.11) in this study hospital was at Level 1 (Potential Collaboration).

(v) Limited staff

Limited staff was also mentioned during interviews. All participants suggested that more staff would overcome healthcare professional shortages. The lack of numbers of healthcare professionals was mentioned as one cause of sub-optimal healthcare services which could be one of barriers to the implementation of IPP. The lack of numbers of healthcare professionals (in this regard pharmacists) had also been discussed as a barrier to the expansion of the role of pharmacists in patient care (Section 7.1.2.i). The present study indicated that the lack of numbers of healthcare professionals was an indicator of support for innovation (under Governance dimension) at Level 1 (Potential Collaboration) according to D'Amour et al's model of

collaboration (Table 1.11).

7.3.3   THE CURRENT PRACTICE OF INTERPROFESSIONALISM RELATED TO MEDICATION SAFETY BASED ON D'AMOUR ET AL'S MODEL OF COLLABORATION

The levels of collaboration assessed in Section 7.3.1 and 7.3.2 were visualized according to indicators from D'Amour et al's[217] model of collaboration (Figure 7.1). The Governance dimension of D'Amour et al's model of collaboration had four indicators (centrality, leadership, connectivity, and support for innovation). Of these indicators, leadership was the only indicator at Level 2 (Section 7.3.1.iv). Connectivity (Section 7.3.1.iii), centrality (Section 7.3.2.iv) and the level of support for innovation (Section 7.3.2.v) indicators were at Level 1 (Potential Collaboration). Thus, the level of collaboration based on the Governance dimension was at Level 1 (Potential Collaboration).

Shared Goals and Vision dimension consisted of goals and client-centred orientation and allegiances. As discussed in Section 7.3.1.i, goals indicator was at Level 2. A conflicting finding towards client-centred orientation and allegiances indicator was identified. Section 7.3.1.i showed that this indicator was at Level 2 because of the fact that healthcare professionals supported IPP for the benefits to healthcare professionals. However, Section 7.3.2.iii showed superiority at the study hospital which indicated the client-centred orientation and allegiances indicator was at Level 1. The sense of superiority was also frequently discussed by the participants in the interviews and FGDs. Thus, this indicator was regarded as Level 1 (Potential Collaboration). Consequently, the level of collaboration based on Shared Goals and Vision dimension in this hospital was also considered at Level 1 (Potential Collaboration).

The Internalisation dimension had two indicators (mutual acquaintanceship and trust). This study found that healthcare professionals had lack of trust (Section 7.3.2.i) and lack of understanding of the roles of other healthcare professionals (Section 7.3.2.ii). These indicated that Internalisation dimension was at Level 1 (Potential Collaboration). The last dimension was the Formalisation dimension which

consisted of two indicators (formalisation tools and information exchange). Findings in Section 7.3.1.ii and Section 7.3.1.iv showed the two indicators were at Level 1 (Potential Collaboration). Thus, according to these findings, the Formalisation dimension was at Level 1 (Potential Collaboration) in the study hospital.

The highest level (Level 3) of each indicator on the spider-chart indicates optimal collaboration. Figure 7.1 shows that there was a wide discrepancy between the current situation and optimal collaboration. It can be concluded that based on the dimensions and indicators from D'Amour et al's model of collaboration in ensuring the safe use of medication at the study hospital was at Level 1 (Potential Collaboration).
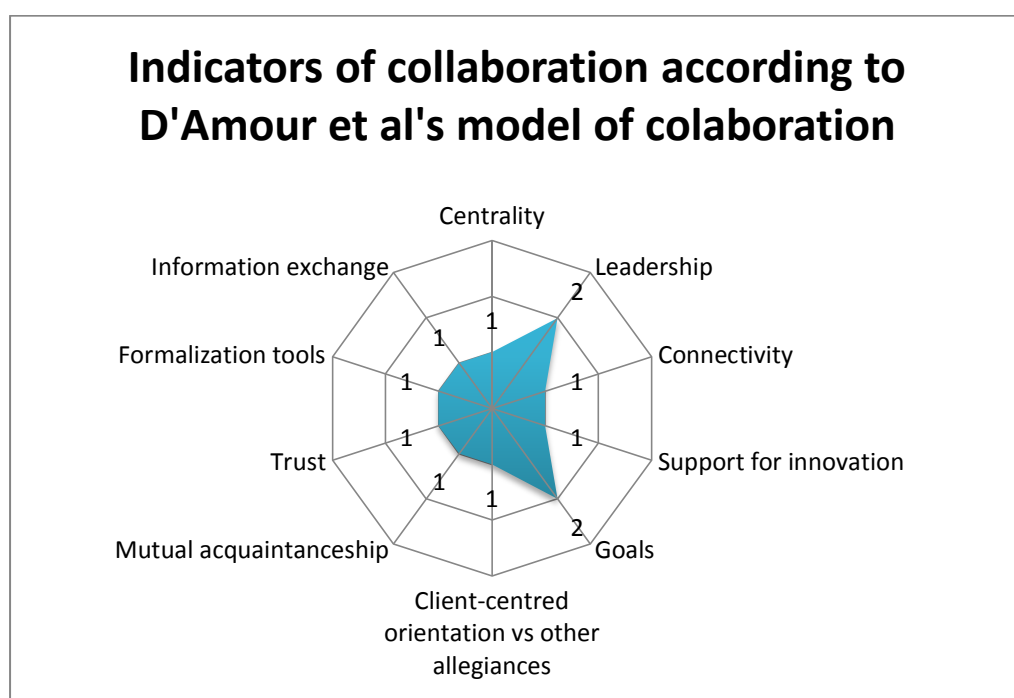

Figure 7.1 Indicators of collaboration achieved at the study hospital based on D'Amour et al's model of collaboration.[217]

7.4   DISCUSSION ON QUALITATIVE FINDINGS

7.4.1   DISCUSSION ON THE ROLE OF PHARMACISTS IN PATIENT CARE

This study aimed to determine facilitators for and barriers to the engagement of pharmacists in patient care particularly in ensuring the safe use of medication at the study hospital. The present study identified that the Indonesian Government has supported the role of pharmacists in patient care through the government policies and programs. However, barriers related to pharmacists' external and internal factors were identified. Firstly, barriers from pharmacists' internal factors were identified as the major barrier to pharmacists' engagement in patient care. The lack of knowledge and confidence, lack of communication skills, limited numbers of pharmacists in the hospital and pharmacists' mind set were identified as pharmacists' internal factors. Lack of confidence may result from the lack of knowledge and the lack of communication amongst pharmacists. If healthcare professionals have a lack of communication skills, their engagement with patients as well as with other healthcare professionals is likely to be less intensive. Another barrier identified was the limited numbers of pharmacists in the hospital. At the time of the interviews, the hospital had 700 beds and 19 pharmacists, although the Indonesian Government has indicated that the optimal ratio of pharmacist to patients is 1:30.[230] As a result the pharmacists at the study university had limited involvement in patient care (1:37). Mostly, their duties are concentrated in the Central Pharmacy with minimum involvement on the wards. Further, this study found that the pharmacists should change their mind set that they will not only work in Pharmacy Department in the hospital setting or community pharmacies, but will engage directly in patient activities.

In comparison to the well-established role of pharmacists in Australia, in the present setting, there were no clear rules of pharmacists' engagement in patient care. This was considered as one of the pharmacists' external factors. This lack of rules may lead to no fee for services. No fee in delivering pharmacists' services may cause devaluation of their profession. It was revealed from the interviews that the National Health Insurance (JKN- Jaminan Kesehatan Masyarakat) may provide a schedule of

fees for the pharmacists' services. However, how these fees for service will be implemented in practice was uncertain from the interviews.

Lack of understanding of the role of pharmacists was identified as another of pharmacists' external barriers to role expansion in patient care. Most, participants believed that the role of pharmacists is mainly in drug management, with limited engagement with patients as well as other healthcare professionals. This indicated that the role of pharmacists is fairly unclear in practice. Lack of understanding of the role of pharmacists may lead to misperception of the role. Hermansyah et al[175] indicated that the lack of pharmacists' engagement in patient care may potentially lead to de-professionalisation of the profession of pharmacists. Another of the pharmacists' external factors was poor procedures of staff recruitment at the study hospital. These procedures may result in variation in the quality of service provided by pharmacists in particular and by healthcare professionals in general. Michie and West in their framework to understand the link between organisation performance, organisation culture and the people suggested that qualified healthcare professionals are an essential factor in providing patient care in healthcare services.[339]

According to the NHS sustainability model,[176] expanding the role of pharmacists in patient care can be examined for sustainability based on three factors (i.e. process, staff and organisation). Process is the first NHS sustainability factor. The process factor involves benefits beyond helping patients, credibility of the benefits, adaptability of the process, and effectiveness of the system to monitor the process. In this study, the new initiative is the role of pharmacists in patient care in ensuring the safe use of medication. The results of the present qualitative study indicated that healthcare professionals were motivated for pharmacists' involvement in patient care as long as it brings benefits for them. This means that the benefits not only to the patients but also to healthcare professionals should be highlighted if pharmacists are to engage in patient care with other healthcare professionals. The other components of the process factor (credibility of the benefits, adaptability of improved process and the effectiveness of system to monitor the process) were not identified in this study.

The second factor of the NHS sustainability model is the staff factor which consisted of staff training, staff behaviours, and support from senior leadership and clinical

leaders. This study found that the major barrier to expand pharmacists' role was a pharmacist internal factor, i.e. lack of knowledge and experience. This indicated training of pharmacists in providing patient care is required. Thus, further exploration on the effective training for pharmacists to provide patient care, particularly in ensuring the safe use of medication, is required. The NHS model endorsed members of the new initiatives (in this regards the role of pharmacists in patient care) to identify any knowledge and skills gaps prior to its implementation. This study found that there was lack of understanding of the role of pharmacists and pharmacists were reported to have lack of knowledge and skills. These showed that in the present study there were skills and knowledge gaps in expanding the role of pharmacists in patient care. Senior leaders' support (in this regards stakeholders) has been identified. However, support of a clinical leader of the role of pharmacists was not. The NHS model recommends that a clinical leader is prominent, to use their influence to break down the barriers. Such a leader was not identified in this study.

The last factor in the NHS model is the organisational factor. Findings of this study suggested that expanding the role of pharmacists in patient care needs to fit with the organisational strategic aims and culture. The study hospital adopted the JCI accreditation which has a standard on medication management use. Pharmacists could play a significant role in this area. But there were limited numbers of pharmacists to provide patient care at the study hospital. According to NHS sustainability model, barriers identified at staff, process and organisation factors described above are required to be addressed if pharmacists are to expand their role in patient care.

In particular to analyse the feasibility of the expansion of the role of pharmacists in medication safety, the Holland-Nimmo Practice Change System (PCS) could also be employed.[59] There are three components of the PCS model. The first component is practice environment. At the study hospital, although the support from the government policies of the role of pharmacists in medication safety and support from the stakeholders were obtained, there were some significant barriers to the expansion of the role of pharmacists in medication safety. These barriers were lack of interprofessional relationships between pharmacists and other healthcare professionals, no clear role of pharmacists in patient care and different expectations of the current practice. The second component is the motivational strategies which

indicated that pharmacists must change their mind-set that they will not only work in the community pharmacies but also in hospital pharmacies if the pharmacists intend to become involved in medication safety. Another motivation strategy was the systematic motivation to drive for change in which professional socialisation plays a significant role. It was evident in the present study that there was limited professional socialisation in the pharmacy education. This could be seen in the extracts of the sub-theme of lack of knowledge and experience mentioned by the pharmacy interns (See Section 7.1.2.i). The third component of PCS model was the learning resources.[59] The resources consisted of training for the pharmacists to expand their role in medication safety. It is suggested the training should meet pharmacists' learning needs and be accessible, affordable and available in a timely manner. In the present study, this component was not identified. Thus, this kind of training requires further exploration in the future.

This study found that in order to expand the role of pharmacists in medication safety, support from the government in terms of providing a greater pharmacist workforce and clear procedures for their recruitment is essential. In addition, training for pharmacists as care providers and creation of a schedule of fees for pharmacists providing services is required. Pharmacists in the hospital need to engage with other healthcare professionals and the patients particularly in ensuring the safe use of medication. This could then provide evidence of the role of pharmacists in patient care and medication safety. In doing so, getting a clinical leader to acknowledge the role of pharmacists and to act as a champion to reduce potential barriers of expanding the role of pharmacists in the future is needed. It was also indicated in the present study that adjustment of the pharmacy curriculum to allow more exposure to professional socialisation for pharmacy students is required.

7.4.2 DISCUSSION ON THE FEASIBILITY OF THE IMPLEMENTATION OF IPE AT THE STUDY UNIVERSITY

The aims of interviewing stakeholders were to identify facilitators and barriers to the implementation of IPE at the study university. Interviews with stakeholders showed that there had been an initial meeting amongst the Heads of Medical, Nursing and Pharmacy Departments to discuss possible implementation of IPE within their courses. This indicated that the Heads of Department were giving consideration for the implementation of IPE. Their support as leaders in health education institutions is important. According to D'Amour and Oandasan framework of Interprofessional Education for Collaborative Patient-centred Practice (IECPCP),[79] leadership was an institutional factor at the Meso level (See Figure 1.6). This indicated that support at the Meso level had been obtained at the study university. Stakeholders also identified the importance of IPE (i.e. to improve understanding of the roles of healthcare professionals and to initiate teamwork skills). These benefits were also one of outcomes of IPE discussed in the literature (See Section 1.4.1).[82, 85]

However, support from stakeholders of the study university required further clarification if IPE was to be implemented. This was because the stakeholders had different opinions on when and how IPE should be initiated. They had different opinions whether the IPE should be introduced as an intra or extra curriculum activity and had different opinions on whether IPE should be initiated at the undergraduate or internship level. The stakeholders also had different opinions on the level of support from the university board. This may reflect the lack of communication from university to faculty members. Stakeholders also believed that other barriers (support from university board and different curriculum) may be encountered in the adoption of IPE at the study university. These findings were potential barriers in the implementation of IPE at the study university. The barriers identified at the study university were similar to potential barriers found in the literature.[214, 340-342]

Hall[211] suggested that different roles of caring amongst healthcare professions may be one of the barriers in the implementation of IPE. She further indicated that the different roles of healthcare professionals may lead to communication barriers. Hall[211] argued that the main aim of the physician is to diagnose and treat disease and they rely on objective data in providing their services. Meanwhile, nurses listen to

subjective patient histories in providing their care. Thus, she recommended that the differences which are mostly invisible should be made visible if IPE is to be implemented. In the present study, the different roles were identified during discussion with one of stakeholders in the university. The stakeholder suggested that the physician aimed to cure the disease meanwhile nurses provide nursing care which focused on the patient's everyday well-being. The different roles of healthcare professionals may have an impact on healthcare students' training.

Although the HPEQ Project was mentioned by only one stakeholder, it was also reported. This was because further review indicated that the HPEQ Project showed that the Indonesian Government has supported the importance of IPE in the development of IPP amongst healthcare professionals. This support was shown by the Indonesian Ministry of Education and the Directorate General of Higher Education (Direktorat Jenderal Pendidikan Tinggi) which established a joint accreditation body in early 2014 as one of outcomes of HPEQ Project. This joint accreditation body consists of higher health education and professional organisations. The accreditation body is named IAAHEH - Indonesian Accreditation Agency for Higher Education in Health (LamPTKes - Lembaga Akreditasi Mandiri Perguruan Tinggi Kesehatan).[228] The establishment of the IAAHEH as a joint accreditation body indicates that the Indonesian Government supports IPE in healthcare education curricula.

The establishment of the IAAHEH identified in the present study was one factor in the Macro level of D'Amour and Oandasan on IECPCP framework from education and from professional organisation system.[79] The role of the professional organisations in the implementation of IPE has been highlighted in the literature.[340] Professional organisations may create organisational climates and cultures. Organisation climates may be created by members' behaviours, procedures, policies and routine in their practice. Further, cultures are rooted from beliefs and values of an organisation. The beliefs, values and behaviours of members of the organisation will influence how they interact and engage with others. Ginsburg and Tregunno suggested that in order to change an organisation's climate, certain practices should be stopped and new practices should be commenced.[340] This qualitative finding demonstrated that according to D'Amour and Oandasan's on IECPCP framework (See Figure 1.6),

support at the Macro and Meso levels for IPE has been obtained at the study university.[79]

7.4.3 DISCUSSION ON FEASIBILITY OF THE IMPLEMENTATION OF IPP IN THE STUDY HOSPITAL

The present study aimed to identify facilitators for and barriers to the implementation of IPP at the study hospital from interviews and FGDs activities. This study identified that healthcare professionals realised the importance of IPP in ensuring medication safety at the study hospital. Participants in interviews as well as FGDs discussed the benefits not only to the patient but also to healthcare professionals. In this regards, the healthcare professionals had identified that IPP may bring about positive benefits to the staff. If staff perceived gaining advantages from IPP, this may also positively influence organisation performance in patient care. Ginsburg and Tregunno stated that organisational culture (i.e. values, beliefs, and attitudes) and climate (i.e. policies, procedures, and staff's belief in their organisation) have a strong influence in the successfulness of organisational performance in patient care.[340] Thus, staff's positive behaviour is an important factor if IPP is to occur. The results of the present study indicated that healthcare professionals were supportive towards IPP. This showed that support at Micro level (healthcare professionals) of frameworks of IECPCP from D'Amour and Oandasan's (See Figure 1.6) existed.

This study identified knowledge, skills and attitudes were competencies required in IPP. These competencies were also outlined in the literature.[159, 160] The knowledge competency included competency within one's own profession, as well as understanding of the roles of other healthcare professionals. However, this study found that healthcare professionals had a lack of knowledge of the roles of other healthcare professionals. This was considered as one of barriers to the implementation of IPP. Skills competency involved ability to communicate effectively amongst healthcare professionals as well as with the patients. Meanwhile, attitudes related to respect towards others. Suter et al suggested that communication skills are an important competency of healthcare providers in IPP.[343] The skills involved using the appropriate language and ability to negotiate with others. This means that healthcare professionals are required to learn dual identities (their own professional

identity as well as interprofessional identity).[315] One of the outcomes of IPE is the improvement in these competences.[85] According to the WHO Framework (See Figure 1.7), if IPE is fostered during healthcare professionals' education they will obtain competencies to be practice ready in working with other healthcare professionals.

The model of collaboration from D'Amour et al was employed in the present study because it relates to individual and organisational factors to determine the level of collaboration in a practice setting. According to indicators of this model, finding of this qualitative study showed that the current practice of collaboration in the hospital at Level 1 (Potential Collaboration) which meant that collaboration on medication safety at the study hospital did not yet exist. Findings on the level of collaboration in the present study emphasised the importance of WHO framework for IPE-PC in ensuring the safe use of medication at the study hospital.

This study found that the level of government support was not fully gained. Studies showed that support from the government is essential to the implementation of IPP into practice.[63, 79, 82] The government needs to provide clear policy, support, and incentive to key players in fostering IPP in the organisation.[340] If the health system imposes a policy on working in a team (centrality indicator) and provides sufficient numbers of healthcare professionals to work in the team (support for innovation), healthcare professionals will work collaboratively with others. This will improve interaction amongst healthcare professionals (connectivity indicator). The lack of understanding of other healthcare professionals' roles and the lack of trust identified in this study may result from the nature of healthcare service delivery in Indonesia where the physician is considered as the primary healthcare professional to provide patient care. This study found the role of physicians is superior, nurse is inferior and pharmacist is unclear. Understanding the role of other healthcare professionals is one of major competencies in patient-care based healthcare services.[343] The varying understanding of the roles of healthcare professionals needs to be addressed prior to the implementation of IPP. It is recommended the academics and practitioners may use constructive conflict to challenge underlying assumptions and to build shared mental models to enhance the ability to understand the role of other healthcare professionals in working interprofessionally.[340]

In relation to the Collaborative of Pharmacy Practice (CPP) initiative from the International Pharmaceutical Federation-FIP[25], (See Figure 1.8), the level of CPP at the study hospital was at Level 1. This was identified from limited interaction between pharmacists and other healthcare professionals (See Section 7.3.1.iii). As discussed in Section 7.1.2, barriers related to pharmacists' internal factors need to be addressed if the pharmacists aim to engage in patient care to ensure the safe use of medication in collaboration with other healthcare professionals is to be achieved.

The qualitative findings of this study showed some relationships between themes in answering research questions. These relationships may result from the nature of interpretation in the qualitative study where one quote may be categorised into several themes. The first relationship was on the theme of understanding of the role of healthcare professionals. This theme was identified in all three questions of this qualitative study (See Section 7.2.1.i; Section 7.1.2.ii; and Section 7.3.2.ii). Varying understanding of the roles of healthcare professionals (in this case pharmacist) is a barrier to pharmacists' expansion of their role in patient care and in their involvement in IPP. However, as discussed in Section 7.2.1.i, interviewed stakeholders believed that IPE may improve the understanding of the roles of other healthcare professionals. This suggests that IPE may develop understanding amongst other healthcare professionals of the role of pharmacists in patient care.

Another relationship sub-theme, namely reducing unclear prescriptions through interaction between healthcare professionals (See Section 7.3.1.iii) was also identified as one of benefits of IPP (See Section 7.3.1.i). This indicated there was a possibility of interaction between healthcare professional in ensuring the safe use of medication because healthcare professionals have realised the benefits of IPP. The last relationship was on the theme of limited staff in answering the feasibility of pharmacists' engagement in patient care (See Section 7.1.2.i.b) and IPP (See Section 7.3.2.iv). This indicated that in order to include pharmacists in IPP, the lack of numbers of pharmacists needs to be addressed.

Despite the fact that this study identified the feasibility of expanding the role of pharmacists and IPE and IPP, there were some potential biases in this qualitative study. The bias may result from participants as well as researchers.[344] Bias from participants may be associated with their positive motivation to be involved in

research. This may influence positive participants' responses towards the questions asked. This was beyond the control of investigator. Meanwhile, bias from interviewer may results from the data collection and analysis process. Potential bias from interviewer was minimised by using a triangulation data collection method in which similar data was collected from interviews and FGDs.

7.5   SUMMARY OF QUALITATIVE FINDINGS

In terms of determining the feasibility of expanding the role of pharmacists in patient care, barriers identified need to be addressed if pharmacists are to engage in patient care in ensuring the safe use of medication with other healthcare professionals. Although the level of collaboration at the study hospital based on D'Amour et al was at Level 1 (Potential Collaboration), this study found that implementing IPE at the study university and IPP at the study hospital was feasible if the barriers identified are addressed accordingly. This is because support at the education and practice settings has been identified based on the IECPCP framework from D'Amour and Oandasan' (See Figure 1.6). At the education setting, support at the Macro level (the establishment of accreditation body- IAAHEH) and the Meso level (stakeholders at university) have been obtained. Support at the Micro level (healthcare students) has not been identified in this qualitative study. In the practice setting, although support from the Macro level (Health system) has not been fully obtained, some degree of support at the Meso level (stakeholders at hospital) and Micro level (healthcare professionals' perceived benefits of IPP) was identified.

CHAPTER 8 GENERAL DISCUSSION AND RECOMMENDATIONS

8.1   INTRODUCTION

The primary aim of this study was to determine the feasibility of expanding the role of pharmacists in medication safety through IPE and IPP. Three research questions were employed to identify the feasibility of pharmacists' engagement in patient care to ensure medication safety, the feasibility of implementing IPE in the study university and IPP in the study hospital.

This chapter outlines key findings on:

- Role of pharmacists in patient care to ensure medication safety (Chapter 4)

- Healthcare students' attitudes towards IPE (Chapter 5)

- Healthcare professionals' attitudes towards IPP in medication safety (Chapter 6)

- Qualitative findings on the feasibility of the role of pharmacists, the feasibility of the implementation of IPE and IPP in medication safety (Chapter 7)

The relationship of each of these topics to the research questions of this study are illustrated in Figure 8.1. Medication Safety (MS) where the three circles intersect is the key subject of this study.

Circle **A** represents research activities in the present study on the feasibility of expanding the role of pharmacists in patient care to ensure medication safety. The data consists of;

- Pharmacy graduates perceived attainment of attributes as patient care providers (Section 4.1)

- Pharmacist conducted clinical review activity as a means of identifying medication errors in an Indonesian hospital (Section 4.2)

- Qualitative findings on the feasibility of expanding the role of pharmacists in patient care to ensure medication safety (Section 7.1).

Circle **B** depicts research activities to identify the feasibility of the implementation of IPE in the study university. The information consists of;

- Healthcare students' responses from an RIPLS questionnaire on attitudes towards IPE (Section 5.1)

- Findings from an IPL workshop on medication safety (Section 5.2)

- Qualitative findings on the feasibility of the implementation of IPE (Section 7.2).

Circle **C** represents research activities into the feasibility of IPP implementation in the study hospital. This area includes;

- Healthcare professionals' responses from RIPLS questionnaire on attitudes towards IPE (Section 6.1)

- Healthcare professionals' understanding of professionals responsible for and factors contributing to medication errors depicted in case vignettes (Section 6.2)

- Qualitative findings on the feasibility of IPP in medication safety (Section 7.3).
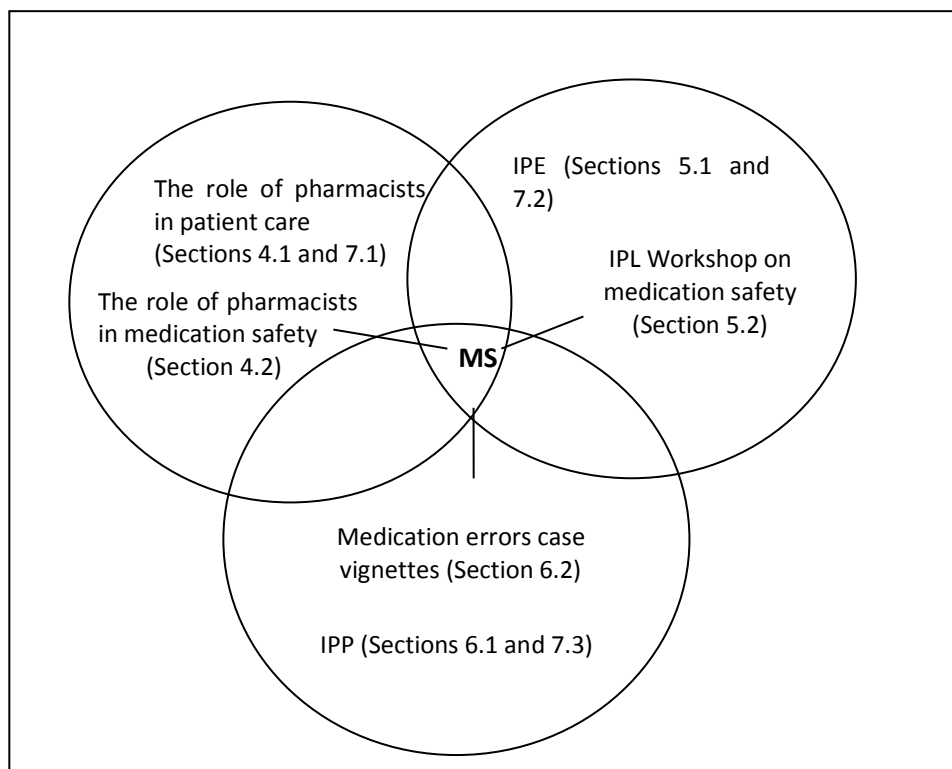
Notes: A: Feasibility of the role of pharmacists in patient care; B: Feasibility of IPE; C: Feasibility of IPP; MS: Medication Safety

Figure 8.1 Venn diagram depicting the association between sections of the present study

A summary of the key findings of this study is shown in Table 8.1. The table lists research questions, aims and findings identified from both qualitative and quantitative results as applicable.

Table 8.1 A summary of key findings of this study

Research Questions	Aims	Quantitative Findings	Qualitative Findings
Feasibility of expanding the role of pharmacists in patient care to ensure the safe use of medication	Assess pharmacy graduates preparedness in patient care (Section 4.1)	Pharmacy graduates questionnaire: • Pharmacy interns perceived they had attained less of attributes to provide patient care than registered pharmacists (**) • 60% of pharmacy interns from the study university perceived they had developed three attributes of patient care fully and four attributes partially (**) • Amongst pharmacy interns, a higher proportion of males than females perceived they had leadership potential	FGDs: Lack of knowledge and limited experience are likely to influence graduates' lack of preparedness in delivering patient care (**)
	Assess the role of pharmacist in medication safety (Section 4.2)	• Pharmacist could identify where medication errors occurred in the medication delivery process and could intercept medication errors in a geriatric ward (*) • 35% acceptance rate of pharmacist's interventions	NA
	Stakeholders', pharmacy students', and healthcare professionals' attitudes towards the feasibility of expanding the role of pharmacists in patient care to ensure medication safety (Section 7.1)	NA	Interviews and FGDs: Facilitators: (*) Benefits of the role of pharmacists and support from the Indonesian government for the role of pharmacists Barriers: (**) • internal (pharmacists' mind set, lack of knowledge and confidence; low number of pharmacists) • external (varying understanding of the role of pharmacists; no fee for services; poor staff recruitment)
Feasibility of IPE in the study university	Assess healthcare students' attitudes towards IPE (Section 5.1)	RIPLS in healthcare students: ***Analysis 1*** (Year 1 to 4 healthcare students' attitudes towards IPE in Survey Year 2012) - Medical, nursing and pharmacy students were positive (*) - Medical students were less positive than nursing and pharmacy students(**) - Medical students were more positive towards Statement 14 than	NA

Research Questions	Aims	Quantitative Findings	Qualitative Findings
		nursing and pharmacy students (**) ***Analysis 2*** (Year 2 to 4 of healthcare students' attitudes towards IPE in a repeated cross sectional study in Survey Years 2012 and 2013) - Medical students were more positive on the PI sub-scale than nursing and pharmacy students in both survey years (**) - No significant difference on the PI sub-scale between nursing and pharmacy students in either survey year ***Analysis 3*** (Year of Study analysis in Survey Years 2012 and 2013) - Year 3 medical students in 2013 who were older and had no health related activities had significantly more positive attitudes towards the PI sub-scale than in Year 3 medical students in 2012 (**) - Year 3 medical students in 2012 had more positive attitudes on Statement 8 but less positive attitudes on support Statement 14 than in Year 3 medical students in 2013 (*). ***Analysis 4*** (Trend Study Analysis): - Year 2 Cohort medical students moved towards more positive attitudes on the PI sub-scale and moved towards less positive attitudes towards Statement 8 as their study progressed (**) - All cohorts of medical students moved towards more positive attitudes towards the PI sub-scale but less positive attitudes towards the SLT sub-scale (**) - Year 1 Cohort students in medical, nursing and pharmacy moved towards less positive attitudes on the SLT sub-scale (**)	
	Assess healthcare students' attitudes towards IPE after attending an IPL workshop on medication safety (Section 5.2)	IPL Workshop: • Learning with other healthcare students (medical, nursing and pharmacy students) improved the students' attitudes towards the SLT sub-scale (*) • Medical students had less positive attitudes towards Statement 4 than nursing and pharmacy students after the workshop (**)	IPL Workshop (*): • Improved understanding of the role and responsibilities of healthcare professionals • Improved understanding of the importance of teamwork and communication skills in healthcare service delivery in medication safety • Improved respect, trust and confidence

Research Questions	Aims	Quantitative Findings	Qualitative Findings
(*)	Stakeholders attitudes towards IPE (Section 7.2)	NA	<u>Interview findings:</u> Facilitator: Importance of IPE (*) Barriers: • Differences in school curriculum (**) • Differences in opinion on when to start IPE and on the level of support from the university (**)
Feasibility of IPP in the study hospital	Healthcare professional attitudes toward IPP (Section 6.1)	<u>RIPLS in healthcare professionals</u> ***Analysis 1*** (Healthcare professional attitudes towards IPP): - Healthcare professionals regardless of their profession or place of work were positive (*) - Healthcare professionals had no significant difference in their attitudes towards the Patient Centredness and SLT sub-scales (*) - The Physician Group had more positive attitudes towards Statement 17 and 19 than the Nurse and Pharmacist Groups, whilst there was no significant differences amongst Nurse and Pharmacist Groups (**) - The Physician Group had more positive attitudes towards Statements 18 and 21 than the Nursing Group but did not differ significantly from the Pharmacist Group (**) ***Analysis 2*** (Comparison of healthcare professional practitioners' and academics' attitudes towards IPP) - Healthcare academics had more positive attitudes than practitioners towards Statement 19 (**) - Nurse practitioners had significantly more positive attitudes towards Statement 19 than nursing academics (**) ***Analysis 3*** (Comparison of healthcare professionals' and healthcare students' responses to the idea that the function of other healthcare professionals is mainly to support doctors) - The Physician Group were more positive than the medical students (**) - The Nurse Group were more positive than the nurse students (**)	NA

Research Questions	Aims	Quantitative Findings	Qualitative Findings
	Healthcare professionals understanding of medication errors and agreement on healthcare professionals responsible for errors (Section 6.2)	Medication errors case vignettes • Pharmacist Group members showed higher accuracy but older participants (>50 years old) had less accuracy to provide anticipated correct answers for the case vignettes(*) • A small proportion of participants believed that communication barriers may result in medication errors (**) • Healthcare professionals had varying views on the professionals who were responsible for the various medication errors (**)	NA
	Stakeholders', pharmacy students', and healthcare professionals' attitudes towards the feasibility of IPP implementation (Section 7.3)	NA	Interview findings Facilitators: (*) • Benefits of IPP • Expectations regarding other healthcare professionals' role • Potential interaction between healthcare professionals • Support from government and hospital policies Barriers: (**) • Lack of understanding of the role of healthcare professionals • Sense of superiority • No government legislation on teamwork • Limited staffs numbers • Lack of competency in IPP

Notes: NA: Not Available; *: Facilitator ; **: Barrier

PI: Professional Identity; SLT: Shared Learning and Teamwork; PC: Patient-centredness

Statement 4 in RIPLS healthcare students: Team working skills are essential for all healthcare students to learn

Statement 8 in RIPLS healthcare students: It is not necessary for undergraduate healthcare students to learn together

Statement 14 in RIPLS healthcare students: *The function of allied health professionals is mainly to provide support for doctors*

Statement 17 in RIPLS healthcare professionals: *I like to understand the patient's side of problem*

Statement 18 in RIPLS healthcare professionals: *I try to communicate compassion to my patients*

Statement 19 in RIPLS healthcare professionals: *The function of nurses and therapists is mainly to provide support for doctors*

Statement 21 in RIPLS healthcare professionals: *I have to acquire much more knowledge and skills than other healthcare professionals*

8.2 DISCUSSION OF KEY FINDINGS

Pharmacists in Indonesia currently have a limited role in patient care.[54, 175] Although the Indonesian Government has supported their role in patient care[51] in ensuring medication safety,[345] little is known on how this has been implemented. This may be associated with pharmacists having limited engagement with patients and with other healthcare professionals. The theory, learning model, and the outcomes of IPE have been discussed extensively in the literature.[74, 77, 213, 346, 347] One of the key outcomes of IPE is to improve communication and to develop understanding of the roles of other healthcare professionals.[82, 85] In the present study, the Interprofessional education for Collaborative Patient-centred Practice (IECPCP) theoretical framework from D'Amour and Oandasan was employed because the framework suggests that health academics and healthcare professionals involvement are interdependent in patient care.[79] They also recommended that the cross-link between factors of the health system and health education are required to create a supportive environment for collaborative practice to occur.[79] D'Amour and Oandasan described factors in both education and practice settings at the Micro, Meso and Macro levels which were relevant to the aims of the present study. Table 8.2 shows the findings of the present study based on IECPCP framework.

Table 8.2 Factors identified at Micro, Meso and Macro level in the study university and hospital settings according to IECPCP framework.[79]

Setting	Micro	Meso	Macro
Education	Teaching factors: healthcare students and academics' attitudes towards IPE	Institutional factors: - support of leaders at the institutions	Joint accreditation (IAAHEH)
Practice (Hospital)	Healthcare professionals' attitudes towards IPP; the level of interaction amongst healthcare professionals; social and cultural values	Organisation factors: - support of leaders at the hospital	No policy on teamwork; limited staff; social and cultural values

The WHO framework for action on Interprofessional Education and Collaborative Practice (IPE-CP) highlights the importance of IPE in improving health system and health outcomes.[84] According to this framework, if healthcare students (i.e. medical, nursing and pharmacy students) study the topic of medication safety together, those

students are better prepared to work interprofessionally with other healthcare professionals to ensure the safe use of medication. The topic of medication safety was selected in the present study because healthcare professionals (i.e. physicians, nurses, and pharmacists) are responsible in the medication delivery process and they may all contribute to medication errors during healthcare service delivery. This topic is also one of the issues recommended for the implementation of IPE.[348]

It is anticipated that understanding of the role of pharmacists in patient care to ensure the safe use of medication through IPE will allow the expansion of the role of pharmacists in medication safety. This study explored IPE in education and IPP in practice settings in an Indonesian context. The results of the present study should provide evidence for stakeholders and decision makers regarding the current practice of IPP in Indonesia. Changes to the health system, health education and health professional organisations may be required to foster healthcare professionals who are more practice ready to work in collaboration. The goal is to ensure patient safety in the Indonesian setting and to be consistent with the recommendations from the WHO framework for action on IPE-CP. This study also provides recommendations to prepare future pharmacists for engagement in patient care in collaboration with other healthcare professionals to ensure medication safety. The present study is the first study conducted in Indonesia to study the possible expansion of the role of pharmacists in medication safety through the introduction of IPE.

8.2.1 ASSESSMENT OF THE FEASIBILITY OF THE ROLE OF PHARMACISTS IN PATIENT CARE TO ENSURE MEDICATION SAFETY

During a clinical review activity conducted in a ward of the study hospital, the investigator (a pharmacist) detected and prevented medication errors in the medication delivery process. This shows that pharmacists have a role in medication safety by conducting clinical review activities and medication reconciliation which confirmed findings from studies outlined in the literature.[27, 148, 150] The Geriatric Department in the study hospital was selected because this population has a higher risk of medication errors occurring.[349] This study found that medication errors occurred in every stage of the medication delivery process. This indicated that healthcare professionals involved in the medication delivery process shared the

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responsibility to ensure the safe use of medication. The majority of medication errors identified were during the administration stage. In the present healthcare service, nurses have the role to administer and document medication administration. The high administration errors identified in the present study may be related to the nurses' high workload in the study ward or may be associated with a system issue identified during the study (i.e. the documentation of drug distribution and three pharmacies dispensing medication to the wards). Errors in the transcribing process indicated the need to improve the information management in the study hospital. This was also confirmed from the results of the qualitative findings (See Section 7.3.2.iii) which illustrated that pharmacists at the Central Pharmacy found difficulties in communicating with the physicians because the pharmacists had no access to the patients' health medical records. The finding of a lack of access to patients' health status mirrored that of studies found in the literature.[63, 212] This lack of access to patient data was considered as one of the practical barriers to the implementation of healthcare professional collaboration in developing countries. Cohen highlighted that interconnecting systems of information management, structured environment, and human resources highly influenced the process of medication delivery.[26] Findings of the present study confirmed the study hospital needs to improve its information management system, to enhance the environment of safety culture in the medication delivery process, and to allocate sufficient numbers of healthcare professionals to ensure medication safety.

The investigator identified a number of potential interventions through the clinical review activity. However, the rate of acceptance of the interventions were low (around 35%), when compared to the high acceptance rate (more than 60%) found in the literature.[47, 147, 350] The low acceptance rate in this study may have been associated with a lack of acceptance of the role of pharmacists in patient care, a lack of rapport with doctors, and the investigator's minimum level of clinical experience in the activity.

A possible role for pharmacists in medication safety was also identified from the findings of medication error case vignettes (See Section 6.2) involving academics and practising healthcare professionals in the study university and hospital. It was found that pharmacists, both pharmacy academics (OR = 1.68; 95% CI 1.19 - 2.38) and hospital pharmacists (OR= 1.61; 95% CI 1.16 - 2.06) were more likely to provide the

predicted correct answers to the vignettes. The pharmacists were particularly better in answering cases related to dispensing errors in terms of determining the types of errors, why the errors had occurred, what can be done to prevent the errors from occurring again, and the level of severity of the errors. Participants of the interviews and FGDs were supportive towards the role of pharmacists in patient care to ensure medication safety (See Section 7.1). However, the participants identified a number of pharmacist internal and external factors as barriers to the expansion of the role pharmacists in medication safety.

Pharmacists' internal factors

In the present study, pharmacists' internal factors were the themes frequently discussed by the participants in interviews and FGDs. This indicated that the pharmacists' internal factors were the major barriers to the expansion of the role of the pharmacist in patient care to ensure medication safety (i.e. pharmacists' mind-set, the lack of knowledge and confidence and the low number of pharmacists to engage in patient care). Pharmacists' internal factors identified in the present study were similar to other Indonesian studies (See Section 1.2.1).[55, 56] The lack of knowledge was also reflected in the findings from the pharmacy graduates questionnaire on attributes in patient care (See Section 4.1). In that survey the pharmacy graduates from the study university believed they had only partially attained the required attributes to deliver patient care. Pharmacy students have little practical experience and hence limited opportunities to interact with patients. Consequently, pharmacists may have a lack of confidence in engaging with patients. A similar finding was noted by Anderson[275] who stated that *"Indonesian pharmacists tend to have a wide knowledge of all areas of pharmacy practice but insufficient experience of one branch of practice."* Further, this study found that the number of pharmacists in the study hospital did not meet the specified ratio of pharmacists to patients in providing patient care. The Indonesian Ministry of Health regulates the ratio is 1:30,[230] however, the study hospital has 19 pharmacists for 700 beds (which gave a ratio of 1 in 37). Additionally, the pharmacists in the study hospital are mostly involved in drug logistics with limited engagement in patient care. The lack of engagement may in part reflect an inadequate number of pharmacists to provide patient care services.

Pharmacists' external factors

The external barriers to the expansion of the role of pharmacists in patient care identified in the present study included: healthcare professionals varying in the understanding of the role of pharmacists, no fee for delivering patient care, and poor staff recruitment. These findings mirrored those of other studies found in the literature (See Section 1.2.1)[56, 165, 166] Pharmacists in developing countries are mainly known for their dispensing and business roles.[139] The varying understanding of the role of pharmacists identified in this study may be related to their ambiguous role in healthcare service delivery. Noble et al. suggested that pharmacy education is important in the development of the professional identity of pharmacists to minimise the role ambiguity of pharmacists.[314] A lack of a fee for service for pharmacists for delivering patient care may also result from this ambiguity of role. Another barrier to the expansion of the role of pharmacists in patient care was poor staff recruitment. Michie and West[339] highlighted that Human Resource Management (HRM) referred to *"the management practices such as recruitment, selection, induction, training, appraisal, design and application of rewards systems which all aim to enhance organisational performance by improving the performance of individuals within the organisation."* This indicated that HRM as part of people management is essential in determining the organisational performance.

The Holland-Nimmo Practice Change System (PCS) was employed to determine the feasibility of the role of pharmacists in medication safety. The three components of PCS (See Section 1.2.2) were used to assess factors to identify the feasibility in the present study.

Practice environment

The practice environment has three levels of change (i.e. society, health system and practice site). The results of the present study identified some factors at each of these levels. Firstly, the Indonesian Government provides guidelines[52, 232] and policies[51, 230] as to the role of pharmacists in patient care which showed support at the society level was granted. Secondly, the health administrators at the hospital also supported the role of the pharmacist which indicated support at the health system was achieved. However, barriers to the expansion of the role of pharmacists in medication safety at the health system and practice site were also identified. At the health system level, the pharmacists had no access to information (patients'

information in this regard) and no supportive infrastructure such as computer or internet facilities to support the pharmacists' activity at the hospital setting. At the practice site level, it was found that the pharmacists had no clear job description detailing their role in ensuring the safe use of medication; different expectations of the current role of pharmacists from the desired practice; and a lack of communication between pharmacists and other healthcare professionals in the study hospital. Barriers identified to the health system and the practice environment must be addressed if the pharmacists are to engage in ensuring medication safety in the study hospital.

Motivational strategies

The participants of the qualitative study supported the role of pharmacists for the perceived benefits of their role to ensure the safe use of medication, educating the patients and providing drug information to other healthcare professionals (Section 7.1.1). This is one of motivational strategies in the Holland and Nimmo Practice Change System. As suggested by Holland and Nimmo, professional socialisation is necessary for the expansion of the role of pharmacists in medication safety. However, the present study found that there was limited exposure to facilitate socialisation in the pharmacy education. Pharmacy interns explained that they had little opportunity to engage with the patient as care providers during their learning. This suggests that the pharmacy educators need to redesign their curriculum to provide experiential learning where interns act as care providers. Hughes suggested that experiential learning includes continuing reflections of the learning activities which provide an illustration of the role of pharmacist in practice.[351] The learning could range from simulation on campus to practical placement by observing pharmacist practitioners. The results from the present study indicated that the pharmacy education providers in collaboration with the Indonesian Pharmacists Association (IAI-Ikatan Apoteker Indonesia) should facilitate that pharmacy interns gain more experiential learning.

In relation to the expansion of the role of pharmacists to ensure medication safety, Nimmo and Holland suggested a motivational strategy which focused on the pharmacists' internal drivers to be involved medication safety in collaboration with other healthcare professionals need to be emphasised.[59] As suggested by participants in the present study pharmacists need to change their mind-set such that they

believe that they do not only work in drug distribution but also provide patient care by working in collaboration with other healthcare professionals in ensuring the safe use of medication. This requires support from the pharmacists (as individuals), the IAI (as the professional organisation) and the health institution (as the health organisation). A fee for service or remuneration for the role may be an essential pharmacist external driver. Studies have shown that lack of remuneration for pharmacists is one of external factors which impact negatively on the role of pharmacists in patient care.[56, 166, 168] The introduction of a fee for service needs support from the health institution management and the IAI, as well as from the government. The strong support and commitment of the management at the hospital is crucial. This was supported from a personal communication with a colleague in one hospital in Indonesia (Budiarti E, oral communication, 8th February 2015). In that hospital, the pharmacists provide patient care in ensuring medication safety and receive a fee for the service they provide. The hospital management had set up a schedule fees for this service.

Learning resources

According to Holland and Nimmo, learning resources may be in the form of modification of the pre-existing procedure or new training which fits the initiative of the proposed practice change model. The learning resources are important because they consist of learning materials/programs required by the healthcare professionals in order to perform the tasks the professionals are expected to do (in this instance pharmacists' delivered patient care to ensure medication safety). However, it was unclear whether learning resources to support the role of pharmacists in medication safety are available in the study hospital. Thus, future research is required to determine existence and adequacy of these resources.

Therefore, in order to expand the role of pharmacists in medication safety, factors identified based on the PCS framework are required to be addressed. Conversations with pharmacists in hospitals in other provinces in Indonesia (Martini E and Budiarti E, oral communication, Feb 2015) revealed that the introduction of pharmacists into patient care in their hospitals has evolved from the pharmacists' involvement in drug supply management and in the drug information centre. The pharmacists in the hospitals started to deliver patient care services after more than 10 years of engagement in those activities. In the two hospitals, pharmacists deliver patient

counselling, provide recommendations to physicians, and conduct monitoring and personal or joint visits with the physician on some wards. These personal communications suggest that the pharmacists' engagement in patient care took time and required a strong commitment from the respective pharmacists as the role models (i.e. local champion) in the institution, as well as support from the health institutions' management.

8.2.2 THE FEASIBILITY OF THE IMPLEMENTATION OF IPE

In evaluating the feasibility of the implementation of IPE in the study university the framework of IECPCP from D'Amour and Oandasan[79] was used. Whilst, stakeholders of the present study were generally supportive towards IPE, some potential barriers were identified and these would need to be addressed if IPE is to be implemented in the study university.

Micro level

The first barrier identified at Micro level to the implementation of IPE in the study university was related to teaching. Stakeholders at the university suggested the implementation of IPE included practical issues such as differences in curricula, learning methods, and the length of clinical training in medical, nursing and pharmacy student courses (See Section 7.2.2). These barriers are similar to those reported in the literature.[212, 214, 341] To overcome the Micro level barriers, reformation of health education system is required. This will be discussed in the Macro level section.

Healthcare students' attitudes towards IPE are also included at the Micro level of the IECPCP framework. In the present study, the healthcare students' attitudes towards IPE were positive (See Section 5.1). However, the medical students had less positive attitudes towards IPE than nursing and pharmacy students in the study university. Medical students had significantly more positive attitudes towards the PI sub-scale and Year 2 medical students throughout their study had more positive attitudes towards the same sub-scale. This suggests that there was a strong sense of professional identity in medical students possibly resulting from the strong professional socialisation at the medical school. The strong sense of professional identity amongst medical students was considered a barrier at the Micro level to the implementation of IPE in the study university.

Weaver et al. found that professional inclusivity, social exclusivity, and a close relationship of the two generated a strong professional identity in medical students.[352] Professional inclusivity developed during clinical placement while the social exclusivity derived from the shared sense of identity amongst medical students as being separated from non-medical students. This strong sense of professional identity may be a potential barrier to the implementation of IPE in the study university. This is because those with a strong sense of uni-identity may be less accepting of working with other healthcare professionals and thus this may inhibit interprofessional learning.[315, 316]

The influence of academics on professional socialisation is also confirmed in the present study. The strong sense of professional identity amongst medical students may also be associated with the findings of attitudes amongst the medical academics in the study university. Medical academics responses to Statement 19 (*The function of nurses and therapists is mainly to provide support for doctors)* were more positive than any of other groups (See Section 6.3). The Year 2 Cohort medical students who displayed more positive attitudes towards the PI sub-scale as they progressed through their course of study may also be influenced by professional socialisation of medical academics. Medical students started to learn about their core units in Year 2. Mostly, medical practitioners teach these students. Weidman et al. stated that academics have primary control of the process of professional socialisation.[353] Medical academics therefore are likely to play a significant role in the professional socialisation of medical students. The strong sense of professional identity in medical academics was also considered as another barrier to the implementation of IPE at the Micro level in the study university. This finding further indicated the need for faculty development in the study university as suggested in the literature as one of the keys to the successful implementation of IPE.[354, 355]

While all healthcare students were supportive of IPE, Year 1 healthcare students of all cohorts who participated in the study had less agreement on the SLT sub-scale. This result warrants the introduction of IPE at the beginning of healthcare students' education. Coster et al. also recommended introducing IPE early in healthcare students' learning to prevent negative stereotypes.[196] Findings from an IPL workshop on medication safety (See Section 5.2) involving final year medical, nursing and pharmacy students from the study university, indicated that the workshop improved

the students' attitudes towards the SLT sub-scale. This indicates that IPL workshops could be a means of starting IPE in the study university. Similar to a report in the literature,[203] this study found that IPL improved students' understanding of other healthcare professionals' roles.

According to the results of the present study, in terms of promoting IPE in the study university, healthcare education providers should design their curriculum to allow students to develop not only a strong uni-professional identify but also an interprofessional identity. Khalili et al.[315] recommended adopting interprofessional socialisation (IPS), intergroup contact theory and social identify in healthcare students' curriculum which allows the development of interprofessional values, beliefs, behaviours, knowledge and skills. In parallel, Wackerhausen[316] suggested a second order reflection is required to overcome the strong professional identity which is potentially a significant barrier to IPE. He further suggested that although this reflection may be hard to have, it is an essential transformation in the implementation of IPE.

Meso level
Support from stakeholders for the importance of IPE was considered as a facilitator at the Meso level. However, how this support is implemented in practice requires further investigation. This was because interviews with stakeholders in the present study showed that there were differences in opinion between the stakeholders on when and on how to start IPE, and on the level of support from the university board. This may require further clarification if IPE is to be implemented in the study university because equal support and commitment from executive leaders of the various health courses is essential prior to the implementation of IPE.[341]

Macro level
Support at the Macro level (the Indonesian Government) was identified from one stakeholder of the interview. While only mentioned by one stakeholder, this was considered a facilitator because the literature on this point indicated that the Indonesian Government has supported IPE-CP implementation in the country.[356] Hammick et al. stated that support from the government was considered as the top down driver.[80] They further concluded that the call from the government to improve collaboration may be seen as the adoption of IPE at the education and practice setting levels. In Indonesia, the Ministry of Health and Directorate General of Higher

Education have supported IPE to improve the quality of healthcare professionals in the country with the Health Professionals Education Quality (HPEQ) initiative. As a result, in early 2014, a joint accreditation body, namely the Indonesian Accreditation Agency for Higher Education in Health (IAAHEH) consisting of seven health education institutions and their professional organisation bodies, was established.[228] The IAAHEH is intended to ensure healthcare graduates gain teamwork skills to assist them in working interprofessionally. This will consequently improve IPP in the future leading to better patient care. By means of the IAAHEH the Indonesian Government supports the importance of IPE to enhance patient care through collaborative practice. It is anticipated the adoption of IAAHEH may address barriers at the Micro level including differences in curriculum in healthcare courses in the study university which may impede IPE.

Although Meads et al.[178] claimed that the WHO framework influenced national policy in developed and developing countries differently, Rodger et al.[186] found that the perception of benefits of IPE for education and for health policy in developed and developing countries were the same. The WHO[355] highlighted that transformation and scaled up healthcare professionals' education and training is required in improving the quantity, quality and relevance of healthcare professionals of a country and to empower the health system of a country. The WHO also recommended that the transformation of education and training institutions; accreditation and regulation; financing and sustainability; monitoring and evaluating; and governance and planning are essential for the implementation of IPE to strengthen the health system of the country.

Barriers identified in the present study were congruent with those found in other developing countries. Sunguya et al.[357] in a systematic review found that there were three barriers to the introduction of IPE in developing countries, namely; IPE curriculum, resource limitation and stereotypes. Sunguya et al.[357] also suggested that apart from the three barriers, leadership, student diversity, IPE concept, teaching, enthusiasm, professionals' jargon and accreditation were barriers of IPE implementation in developed countries. Facing the fact that the three barriers identified in developing countries were also found in developed countries, they recommended that the other barriers found in the developed countries should be

anticipated in the developing countries if the developing countries aimed to implement IPE.

8.2.3 THE FEASIBILITY OF THE IMPLEMENTATION OF IPP

As described in Table 8.2, the facilitators for and barriers to the implementation of IPP at Micro, Meso and Macro levels of the IECPCP framework of D'Amour and Oandasan were identified in the study hospital.

Micro level

The results from the quantitative study (i.e. the RIPLS questionnaire involving healthcare professionals) showed that although healthcare professionals had positive attitudes towards SLT and PC sub-scales, the Physician Group had a more positive attitude towards the statement "*The function of nurses and therapists is mainly to provide support for doctors*" than the Nurse and Pharmacist Groups. This suggests that physicians had a stronger sense of superiority towards other healthcare professionals. In addition, physicians had more positive attitudes than the medical students towards the RIPLS statement "*The function of nurses and therapists is mainly to provide support for doctors.*" Although nurses disagreed with this statement, they had statistically more positive attitudes towards the statement than did nursing students. In contrast, there was no significant difference in attitudes between pharmacists and pharmacy students on the statement. These results may be influenced by informal learning in the current healthcare service delivery model where physicians sit atop the hierarchy in the healthcare service. In the present study, nurses work closely with the physicians, whereas pharmacists have limited engagement with other healthcare professionals. The informal learning which occurs over time between healthcare professionals may lead to role transition.[358] This indicates that the informal learning gained from the hierarchical model of healthcare service delivery in the present study may influence the role transition of healthcare professionals involved in the service delivery.

In support of the quantitative findings, the qualitative results also indicated the sense of superiority in medical practitioners which may lead to the limited interaction between healthcare professionals. This superiority could be one of the barriers to the implementation of IPP at the Micro level at the hospital setting. The sense of superiority could be influenced by strong professional socialisation amongst

physicians. Much research in the literature has discussed the development of professional socialisation in physicians.[326, 353] The socialisation may be developed in an informal curriculum. Hafferty and Frank stated that professional identity in physicians was developed in an informal curriculum namely, a hidden curriculum.[326] Similarly, Weidman et al. also described the informal stage as an important part of professional socialisation in graduates.[353] Whitehead suggested that physicians' involvement in professional collaboration should be designed in a model which provided evidence of improving patient outcomes.[359]

The sense of superiority in healthcare service delivery found in the present study may result from a lack of understanding of the role of other healthcare professionals. This lack of understanding was identified as the major barrier in the qualitative results for the implementation of IPP. This was similar to findings from the medication safety case vignettes (See Section 6.2). The vignettes illustrated healthcare professionals had different views as to which professionals were responsible for the errors and only a small proportion of them believed communication barriers contributed to the medication errors. The findings of the present study should help healthcare professionals be aware of their contribution and help to prevent the occurrence of future errors. Healthcare professionals should be aware that communication barriers in healthcare service may jeopardise the safe use of medication. This is because communication failure has been identified as a significant contributor to medication errors.[360, 361] The present study supported the importance of communication and teamwork between healthcare professionals in the study hospital as outlined in the literature to ensure medication safety.[61, 362]

Meso level

Stakeholders in the present study believed that IPP could potentially minimise the risk of medication misadventure. This represents support at the Meso level in the study hospital. This support is essential for the implementation of IPP.[63, 84] However, there was no standard protocol at the hospital to work in a team with other healthcare professionals. Although the study hospital adopted an international accreditation which made communication amongst healthcare professionals inevitable with the introduction of integrated notes, it is unknown whether the integrated notes had facilitated information exchange amongst healthcare professionals in performing their duties. The lack of standard protocols and the lack

of facilities to work with other healthcare professionals were also discussed in the literature as barriers to the implementation of IPP (See Table 1.9).[63, 84]

Macro level

At the Macro level, the participants indicated that the Indonesian Government supported interprofessional collaboration amongst healthcare professionals in certain populations. However, participants felt that there was no clear legislation on teamwork in the provision of healthcare service in the present practice. Additionally, support from professional organisations towards IPP was not identified in the present study. Thus, further study may be required to identify support from the professional organisations. This is because support from the government and professional organisations is considered as significant drivers to the implementation of IPP.[63,84] The present study also identified another barrier to the implementation of IPP namely limited pharmacist workforce to engage in the collaboration. The present study identified no fee for service as one of the pharmacists' external factors as care providers (See Section 7.1.2.ii). One of the participants in the present study stated that lack of equal rewards received by the healthcare professionals may be a significant gap in the present healthcare service delivery. Review of the literature suggested that the different rewards earned by the healthcare professionals may be a barrier to the implementation of IPP.[63, 215]

As described in Table 1.9, there are a number of barriers and facilitators to the implementation of IPP in developed and developing countries. The communication barriers, the model of healthcare delivery, and the lack of facilities on health information system (no centralisation in the information system) identified in the present study hospital mirrored barriers found in other developing countries.[63, 84] Similarly, support from the government and policy makers were also identified in the present study. However, as opposed to the report from the WHO,[84] there were no clear guidelines of collaboration and financial support for the interprofessional collaboration amongst healthcare professionals in the present study hospital.

Based on indicators of D'Amour et al.'s[217] model of collaboration, the level of collaboration between healthcare professionals on medication safety in the study hospital was at Level 1 (Potential Collaboration). This indicates that collaboration in medication safety (hence IPP) in the study hospital does not yet exist. In this model,

indicators of collaboration were evaluated based on individual and organisational factors. The individual factors showed that healthcare professionals had a common goal in the healthcare service (i.e. patient care). This was also confirmed from the results of RIPLS questionnaire to healthcare professionals (See Section 6.1) which demonstrated they had no significant differences in attitudes on the Patient Centredness sub-scale. Yet, qualitative findings (See Section 7.3) showed that it was unclear whether these goals had been communicated amongst the healthcare professionals. Another individual factor identified in the present study was lack of understanding of the role of healthcare professionals which was a significant barrier to implementation of IPP. In regards to organisational factors (Governance dimension), it was found that there were limited staff numbers and no clear policy on teamwork in the study hospital. The results of the present study demonstrated that the barriers at the Micro, Meso and Macro levels must be addressed if IPP in medication safety is to be implemented in the study hospital

8.2.4 MODEL OF HEALTHCARE SERVICE

According to the findings of the present study, the model of healthcare service in the study hospital in relation to medication safety was hierarchical. Physicians had the highest hierarchy in providing healthcare service to the patient, while nurses and pharmacists support the physicians. Thus, in the hierarchical model, physicians are the only professionals who are responsible for the patient's well-being. Hierarchy in healthcare service may lead to inevitable errors in the provision of healthcare service.[363] Sutcliffe et al.[361] highlighted that the hierarchical differences, conflicting role, role ambiguity, conflicts of interest, and interpersonal factors may lead to communication failure where errors are more likely to occur.

Leatherman and Sutherland identified that organisational and healthcare delivery model changes are interventions to improve health quality.[364] In the present study, it is proposed to change the model of the healthcare service delivery to one that is patient-centred by adopting a collaborative practice to ensure medication safety (Figure 8.2). In this model, physicians, pharmacists and nurses work in collaboration to ensure the patient's safe use of medication, in doing so they share the responsibility for the patient's health outcomes.

However, changing the model of the provision of healthcare service from hierarchical to collaborative is not an easy task. Leatherman and Sutherland[364] proposed a multi-tier method in order to change the health system. The method has four levels (i.e. national, regional, institutional, and individual). According to their method, improving medication safety through IPP requires legislation on collaboration (teamwork) at the national level which is translated to regional policy, at the institutional (hospital) level and to the individual level (healthcare professional). Studies indicated that support and strong commitment from the health system and health education providers is essential in the implementation of IPP.[80, 84, 315 339, 340, 365] In the study university, the establishment of a joint accreditation body in the health education system involving professional organisations may support the change of model of healthcare service. However, it may require further clarification to identify support at the regional and institutional (hospital) levels in changing the model.

Leape et al. identified five essential concepts to the transformation of a safe healthcare service.[365] The concepts were transparency, care integration, patient engagement, restoration of joy and meaning in work and reformation in medical education. The first three concepts focused on the patient-centredness in the provision of healthcare services in collaborative practice which is similar to IECPCP framework.[79] Meanwhile, the restoration of joy and meaning in work is related to people

management in the organisational context.[339] The last concept of reformation of medical education may be done through Interprofessional Professional Socialisation (IPS) proposed by Khalili et al.[315] The organisational context and IPS framework will be discussed.
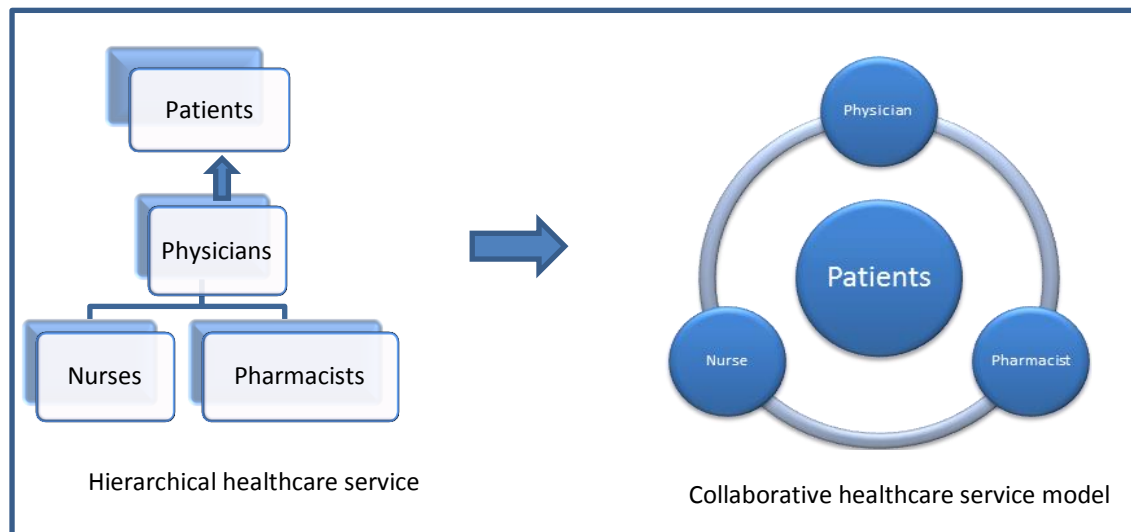

Figure 8.2 Changes of healthcare service model (Ernawati, 2015)

Ginsburg and Tregunno[340] stated organisational context is influenced by the culture and climate of the organisation. The culture consists of hierarchy, job description, informal practice and norms. The organisational culture relates to the values, beliefs and attitudes of healthcare professionals in the organisation. The climate is dependent upon the procedures, policy of the organisation, and employees' perception towards their organisation. The organisational context (i.e. the climate and culture) may significantly influence employees' behaviour in people management. It may accelerate well-being and performance of healthcare professionals as individuals, as members of the group and as members of the organisation. The employees' behaviour met one of the concepts (i.e. restoration of joy and meaning in work) from Leape et al. in transforming a safe healthcare service.[365] Thus, this indicates the management leader should manage the people and practice of Human Resources Management (HRM) in hiring, selecting, and training workforce. Those are essential to achieve the desired climate and culture of an organisation delivering patient care. Thus, to change the model of the healthcare service, the culture and climate of the organisation needs to be changed.

Other proponents of the change of organisational context to ensure patient-centred care in the provision of healthcare service are Michie and West, who stated that "*people and their performance are key to organisation effectiveness*".[339] The organisational effectiveness is referred to patient-centred care service. They created a framework of the organisational context (consisting of organisational culture and inter-group relations; resources; and physical environment) which may

influence the performance of healthcare service delivery (Figure 8.3). The organisational context influences the people management which may impact psychological aspects of healthcare professionals and their behaviour in the organisation. Subsequently, all of these factors will determine the performance of the organisation in its delivery of patient care.
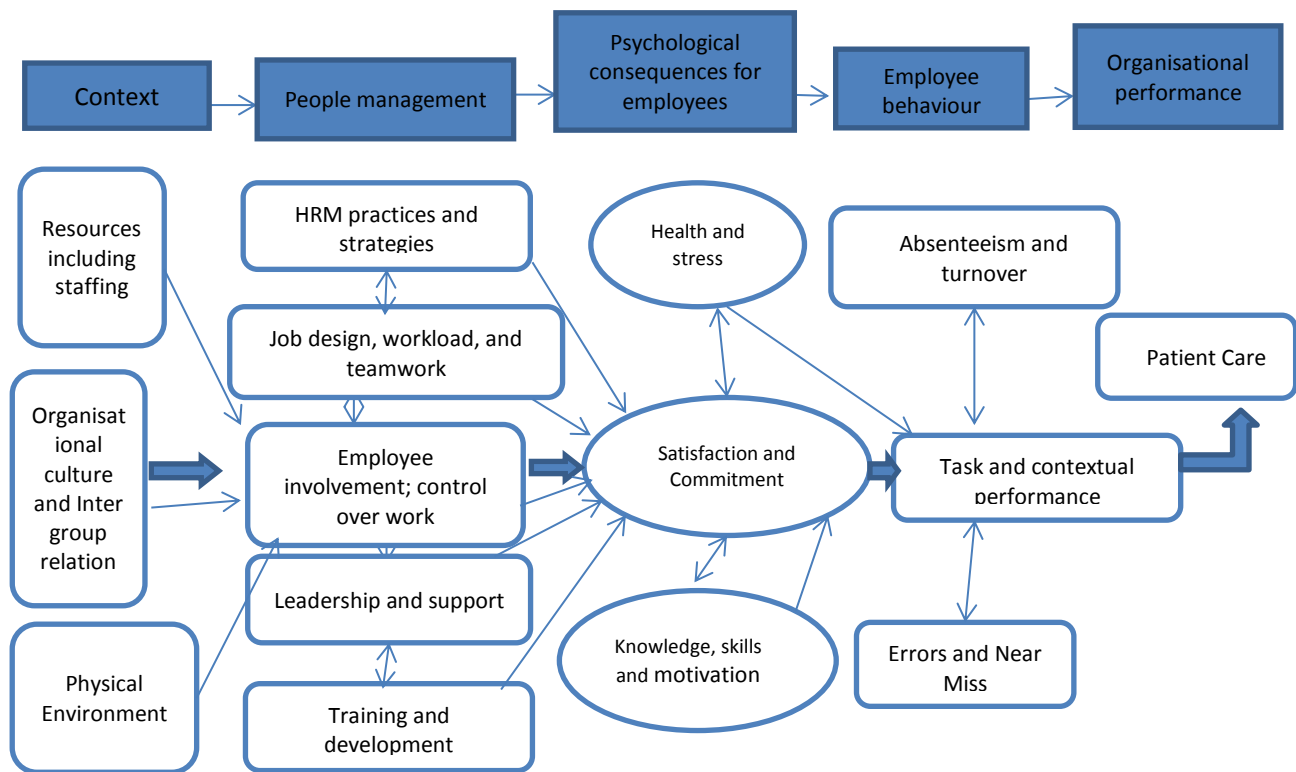
Figure 8.3 Framework for understanding the links between organisation context, people management, and psychological consequences for employees, employee behaviour and organisational performance[339]

To address reformation in medical education in the transformation to a safe healthcare environment as suggested by Leape et al.,[365] Khalili et al.[315] proposed an IPS framework to facilitate IECPCP. They suggested that the IPS framework is influenced by systemic factors (i.e. professional education programs, professional regulation, and the model of healthcare service) and personal factors (i.e. beliefs and behaviours towards IPE; individualistic and collectivistic orientation; and previous experience of IPE). This indicated that IPS amongst healthcare professionals is also influenced by the model of healthcare service delivery.

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The IPS framework has three stages (i.e. breaking down barriers, interprofessional role learning, and dual identity development).[315] The first stage may break down the misconception of the strong or unclear uni-professional identity. The second stage may facilitate the development of knowledge, skills and attitudes of the role of healthcare professionals in collaboration. Although some learning theories discuss in the literature in the development of interprofessional learning,[80, 181, 331, 353] informal and experiential learning are considered the most effective in improving positive attitudes towards IPE. This may be due to the influence of social factors in experiential learning.[80, 181, 366] The last stage was the development of dual identity which may foster the sense of belonging to a profession and to a collaboration. Hammick et al. recommended that the key factor of socialisation is staff development.[80] Socialisation requires role models from healthcare academics and practitioners to support the interconnections between health education and practice settings. The role models should portray the acknowledgement of the role of other healthcare professionals with respect and trust, as well as with good communication and teamwork skills. This would indicate that medical academics in the study university should be the role models for collaborative practice aimed at ensuring a safe healthcare service. This is because in the present study it was evident that the less positive attitudes of medical students towards IPE in the study university may be influenced by the strong agreement of medical academics towards the role of other healthcare professionals as a support for physicians. It is anticipated if the medical academics had more positive attitudes towards collaboration, it may lead to more positive attitudes towards IPE amongst medical students. Once again, this result indicated the need of faculty staff development if IPE is to be implemented in the study university.
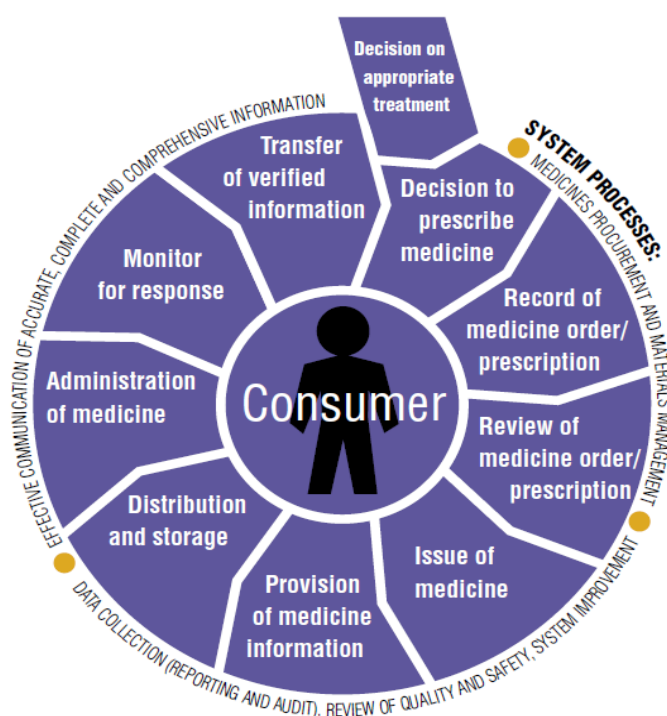
8.2.5 MEDICATION MANAGEMENT AND COMMUNICATION SYSTEM

Ginsburg and Tregunno recommended that changing a process is more feasible than changing the culture of an organisation.[340] For this reason, from the present study, changing the process of medication management and the communication system is also recommended. As discussed previously, support from the health system is required in order to change the process of medication management to ensure a safe healthcare service by preparing the human resources, supportive health information system and structural environment.[1, 32, 367] Preparing the human resources has been discussed in the previous section (i.e. HRM in hiring, selecting and training of healthcare professionals). In terms of a supportive health information system, it was found that there was a lack of an information system in the study hospital. This was similar to a review from the Health Metrics Network which found that the overall health information system in Indonesia was present but it was

not adequate.[368] Improving the health information system and technology may require further exploration in the study hospital.

The Australian Pharmaceutical Advisory Council (APAC) indicated that there are two essential components to ensure safe and quality use of medicine (i.e. standard operating procedures of medication management and identification of the position or person who is responsible during the medication delivery process).[367] The first component requires support from the leaders to ensure and endorse the procedure of medication management practised. The second component involves the leaders and healthcare professionals participating actively and responsibly in ensuring, sustaining and monitoring the medication delivery process. Active participation may be in the form of effective communication amongst healthcare professionals.

To address the first component recommended by the APAC,[368] in the present study hospital, a structured environment may be improved by adopting a medication management system. The APAC created a Medication Management Cycle which can be employed in any setting. The cycle has nine key components (See Figure 8.4) which covers system processes of medicine procurement; data collection; review of quality and safety; effective and accurate communication; as well as complete and comprehensive information. One cycle is an episode of care. Continuity of medication management occurs when accurate information is transferred between the episodes of care.


[adapted from the Australian Pharmaceutical Advisory Council (APAC)]

Figure 8.4 Medication Management Cycle [368]

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To address the second component suggested by the APAC, adoption of a model of communication may be implemented. Communication in healthcare service can be formal and informal.[369] Team meetings, emails, and communication logs are formal communication. Informal communication can be in verbal and face to face conversations. Several ways are offered in the literature to improve formal and informal communication, for instance the SBAR (**S**ubjective, **B**ackground, **A**ssessment and **R**ecommendation) technique, improvement of health information technology and the adoption of a model of communication. [215, 370-372]

In terms of adoption of a model of communication, Liu et al.[373] classified the model of communication used in medication safety into Causal and Exploratory models. The Causal model aims to identify the causes of communication failure (such as human and system errors). Exploratory models discuss the behaviours which occur in the process of medication management which included the APAC Partnership Model and Medication Communication Model. However, Kitson et al. recommended that the Circle of Care Modelling as the framework of medication communication across a continuum of care settings (See Figure 8.5).[372] They stated that their framework was built upon a Medication Communication Model[373] and Interdisciplinary Team Communication Framework[371] to understand communication amongst healthcare professionals and across settings to ensure patient safety. There were six communication activities on medication in this model which include: determine the need of medication, prescribe, dispense, administer, monitor and coordinate the communication.
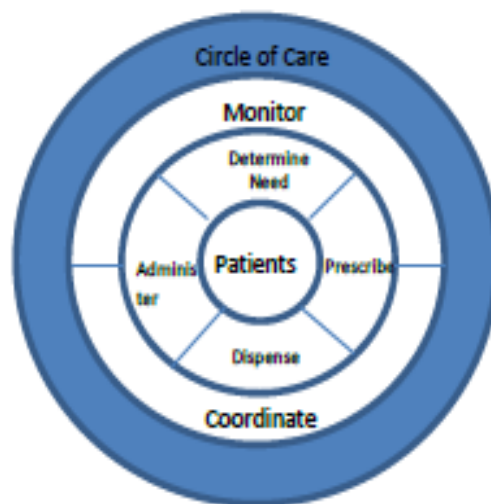
(with permission from Creative Commons Attribution Licence)

Figure 8.5 Medication Communication Framework [372]

Kitson et al.[372] proposed an officer to arrange the coordination of the role between activities in this model. The role of coordination may include transferring information between healthcare professionals in the process of medication delivery. Rather than assigning a medical office assistance as a coordinator of communication in the process of medication delivery at the hospital setting, it is proposed to involve pharmacists as the coordinator knowing that pharmacists have a potential role in ensuring the safe use of medication. In fact, the activities in the Medication Communication Framework (i.e. determine the need of medication, dispense and monitor the medication administration) for parts of clinical pharmacy services.[31] Thus, employing pharmacists as coordinators in the model should improve communication in the process of medication delivery to ensure medication safety and at the same time it may expand the role of pharmacists in patient care.

8.3   RECOMMENDATIONS

The present study demonstrated that pharmacists have a role in patient care in Indonesian hospitals to ensure medication safety. In order to expand the role of pharmacists in patient care to ensure the safe use of medication through the implementation of IPE and IPP in the Indonesian setting, a number of recommendations have been made at the education and practice levels.

8.3.1   RECOMMENDATIONS AT THE EDUCATION LEVEL

1. **Pharmacy education providers need to redesign their curriculum.** This recommendation is made to address barriers in the pharmacists' internal factors. In terms of expanding the role of pharmacists in patient care, this study identified that pharmacy education providers need to redesign their curriculum because of the perceived partial attainment of attributes required to provide patient care amongst recent graduates. Khan suggested that pharmacy education is required to adjust to the needs of patient care delivery of a country.[284] This present study found that pharmacy graduates self-reported a lack of knowledge and training during their education. The pharmacy graduates believed that their lack of knowledge may result from the broad pharmacy topics covered during their learning. The present study also identified that the graduates believed they had very short clinical placements to gain experience in engaging in patient care. This suggests that the pharmacy curriculum in the study university needs to be redesigned to allow pharmacy students to have more experience in delivering patient care. This also indicates that the pharmacists may require further postgraduate degree or placement courses to equip them and to improve their confidence in providing the services as care providers. In fact, such postgraduate courses are offered in many parts of the world. Hughes who studied the relevance of pharmacy curriculum to prepare the future graduates as care providers found that the pharmacists who participated in the study stated that

clinical pharmacy, pharmacology, pharmacy practice, pharmaceutics and dispensing as the five most relevant topics in the pharmacy curriculum. [351] In the present study university, some of these units are already included. However, clinical pharmacy, pharmacology and pharmacy practice need to be emphasised in the pharmacy education in the study university.

Pharmacy curriculum redesign is essential to develop pharmacy graduates attributes as patient carers. This redesign may include more practical experience early in the pharmacy course. Studies have shown the importance of the clinical placement or practice experiences in providing patient care.[274, 374] The curriculum may include integrated experiential learning with other healthcare students in IPE. Pharmacy students should engage with other healthcare students in units which require interaction and teamwork as part of IPE. Pearson et al.[375] in their review suggested that despite the fact that curriculum integration needs commitment from the pharmacy education institutions in terms of time, resources, method of teaching and learning, and assessment strategies, the curricular integration and integrative learning are crucial in the pharmacy education to allow students to obtain the required knowledge, skills and attitudes to be care providers in complex environments.

2. **Involving members of the Indonesian pharmacy organisation (IAI) in the pharmacy intern training program.** This is another recommendation to address the pharmacists' internal factors. The IAI could facilitate clinical placements for pharmacy students to gain professional socialisation in providing patient care. The organisation may encourage its members (registered pharmacists) who may have practised patient care to facilitate pharmacy interns gaining the experiential learning. The registered pharmacists could be the role models as care providers for the pharmacy interns. At the moment, the IAI creates standard competencies for pharmacists and arranges registration for pharmacists with limited engagement in the learning process.

3. **Commencing IPE early and maintaining it continuously throughout healthcare students' learning**. This recommendation is made to address barriers of the strong positive attitudes towards PI sub-scale in the medical students (Micro level). Early IPE exposure may minimise the effect of strong uni-professional socialisation on the negative stereotyping.[82] The initiation of IPE requires an interactive learning method to improve the understanding of each other's role and thereby enhance collaboration.[77, 203] An IPL workshop activity conducted as part of the present study improved healthcare students' understanding of the role of other healthcare professionals. However, further investigation may be needed with regards to the appropriate learning method of IPE to be adopted given the different learning methods and curriculum employed in the Medical, Nursing and

Pharmacy Departments in the study university. Inserting one common module into the healthcare students' curriculum may be one way to the implementation of IPE.[191] In the study university, a topic to improve communication skills may be inserted in a professional unit within each curriculum. In case of working interprofessionally in patient safety, the WHO has created a multiprofessional patient safety curriculum guide for healthcare students.[376] The guide may also be incorporated in the study university. The guide aims to assist health education institutions in preparing their graduates to promote patient safety in their future practice as healthcare professionals. The guide also assists academics in the implementation of the WHO patient safety curriculum into their own curriculum. Buring et al.[348] suggested that the benefits of obtaining competent future healthcare professionals to work collaboratively should be highlighted in the IPE learning process.

4. **Training of academics as facilitators or mentors in IPE.** This recommendation is to address the strong sense of professional identity in academics highlighted in the present study (Micro level). The training of academics is needed prior to implementation of IPE in the study university because staff development is the key to effective IPE.[80] Faculty development is often associated with staff development.[354] Steinert et al. suggested that the staff development should enhance teaching skills.[354] This may improve students' learning experience which may be beneficial for their learning outcomes. Facilitators (academics) are required to have experience of interprofessional activities as well as understanding group dynamics.[77] These need support from the university board in terms of funding and resources. Ho et al. recommended that healthcare educators learn to work together prior to the implementation of IPE in order to better anticipate the hierarchy between medicine and nursing.[377]

5. **Reforming the medical education**. This recommendation was also suggested by Leape et al. into the transformation of a safe healthcare service.[365] As discussed in the previous recommendations, knowledge of patient safety may need to be incorporated into the medical curriculum.[376] The knowledge may involve information management, the concept of human interaction, the theory of healthcare system and quality, teamwork and communication skills in ensuring patient safety is incorporated into the healthcare service. The IPS framework proposed by Khalili et al.[315] may facilitate the development of the competencies of IPP. Further, Confield and Kelly recommended that medical academics should not only consist of medical practitioners, but also other healthcare professionals.[200] They suggested that academics other than medical practitioners should be given an opportunity to emphasise the impact of disease on the patients. They claimed that this opportunity may be lacking if the academics are all medical practitioners. The academics should demonstrate

collaborative practice in terms of acknowledging the role of and showing respect and trust for other healthcare professionals. These academics could be then the role models of IPE.

6. **Obtaining firm support from the university board in terms of facilities, human resources and funds for the implementation of IPE.** This is to address barriers identified at Meso level. The Indonesian Government, in this instance the health system as well as health education supports the implementation of IPE in the health education with the establishment of the IAAHEH accreditation body. However, the government also needs to support the implementation of IPE by providing policies and regulations on IPE at the institutional levels (university) of the health education. This should be in parallel with support from stakeholders at the university in the form of providing sufficient facilities, human resources and funds for the implementation of IPE.

8.3.2 RECOMMENDATIONS AT THE PRACTICE LEVEL

1. **Changing the mindset of pharmacists from drug distributor to care provider**. In the present study, it was evident that the pharmacists found difficulties in expanding their role in patient care in the hospital setting. The present study showed that the internal pharmacists' barriers as the most important barriers identified by the participants. The mindset is developed from a mental model of an individual or group or organisation.[378] The mental model can be used to enhance the understanding of why people behave in certain ways.[379] Based on the results from the present study, in order to expand the role of pharmacists, it is recommended that changing the mindset of the pharmacists' such that they accept that their role as care providers is essential. This may be done by initially introducing the role of pharmacists in ensuring the safe use of medication as part of the current drug management system. If the mental model of the pharmacists is changed towards a role which is more manageable (i.e. a safe drug management), this should allow more positive acceptance of their role as care providers. The change of mental model needs to be done at both individual and organisational levels. The positive impact of the drug management system as an approach to introduce the role of pharmacist in medication safety was revealed from a personal communication with a pharmacist in another province in Indonesia who stated that the role of pharmacists gained recognition after 10 years of pharmacists' activity in drug management (Martini E, oral communication, 5th February 2015). This showed that expanding the role of pharmacists took time and required support from a pharmacist as an individual as well as from the hospital as an organisation.

2. **Enhancing the understanding of the role of healthcare professionals.** This recommendation is made to counter barriers at the Micro level and the pharmacists' external factors. This study identified the differences in the understanding of the role and expectations of healthcare professionals, superiority, and the lack of trust as barriers to IPP. IPP may clarify the different understanding and expectations towards the roles of healthcare professionals.[85, 380] Boscche et al.[381] indicated that team learning allows the development of shared mental models amongst healthcare professionals allowing them to work in teams. The shared mental model improves team performance of healthcare professionals because it allows healthcare professionals to share knowledge. One of the important pieces of knowledge which can be shared among members of healthcare team is the role of healthcare professionals. The findings in the present study support the importance of the implementation of IPP in the study hospital. This was because in an effective IPP, respect and trust are the basis of communication to learn from, with and about each other.[71, 185]

Baker et al. stated that the use of the theory of closure strategy could identify power relationships amongst healthcare professionals.[382] They found that IPE created an opportunity to improve the understanding of the role of nurses and allied healthcare practitioners. Improved understanding of the role of pharmacists in patient care requires organisational changes and sustainability of those changes.[383] The organisational changes should address barriers to and facilitators for the role of pharmacists in patient care. Westrick suggested that the leaders of the organisation (the IAI, in this instance) could adapt Lewin's model and Force Field Analysis to the changes of the organisation.[383] He further recommended using Force Field Analysis because it is more specific to accomplish a specific goal. To achieve the goals, driving forces should be greater than restraining forces.

In the present study, the government legislation of the role of pharmacists as well as perceived benefits of pharmacists' involvement in patient care were the driving forces, while, pharmacists' internal factors were the restraining forces. The sustainability of the change requires a champion who can modify, integrate and continuously evaluate the service of patient care within the organisation.[383] In relation to findings of the present study, it is recommended that the restraining forces (i.e. pharmacists' internal barriers) need to be addressed in the expansion of the role of pharmacists in patient care in Indonesian practice. Driving forces should be emphasised; in this regards the benefits of pharmacists' engagement in patient care in collaboration with other healthcare professionals (i.e. ensure medication safety).

3. **Providing effective legislation on teamwork in the healthcare service delivery.** This recommendation is made to accommodate barriers identified at the Macro level at the practice setting. This study found there was no clear legislation on the role of healthcare professionals within a collaborative practice model. This suggests that there is a need for the government to provide regulations on teamwork and clear roles for healthcare professionals in the teamwork. Health system regulation is essential in order to implement IPP in the study hospital. The regulation should also be supported by the healthcare professional organisations. These organisations should provide standards/guidelines for collaborative practice. The guidelines should be part of roles and responsibilities of healthcare professionals in delivering their service. The leaders of department should ensure that teamwork is established in the healthcare service delivery.

4. **Having role models of pharmacists in patient care and healthcare professionals in collaborative practice.** The role models should portray ideal collaboration amongst healthcare professionals and should demonstrate positive attitudes towards the role of other healthcare professionals in practice. Further, the role models are also required in terms of expanding the role of pharmacists in patient care.[383] As recommended earlier at the education level, pharmacist practitioners who may have delivered patient care may act as role models and mentors to other pharmacists and pharmacy interns. If the pharmacist role models could work in collaboration with other healthcare professionals, the professionals could provide evidence of the benefits of pharmacists' engagement in patient care. The importance of role models was also indicated in personal communications with pharmacists in other provinces in Indonesia. Thus, future pharmacists could foresee their future role as care providers.

5. **Having a clinical leader who champions the benefits of pharmacists' involvement in IPP**. This recommendation is made to address the pharmacists' external factor of the lack of understanding of the role of pharmacists. Support from a clinical leader is required to reinforce the importance of pharmacists and their involvement in IPP in the study hospital. The Head of Pharmacy Department in the hospital should consider how to establish a positive relationship between pharmacists and the clinical leaders. Further, D'Amour et al. suggested the leadership role may need to be explored in IPP.[384] If clinical leaders gain benefits from pharmacists' involvement in IPP, they will use their power to recommend pharmacists' involvement. In this study, a clinical leader was not identified. Thus, further study may be required to identify a clinical leader who supports pharmacists' involvement in IPP in medication safety in the study hospital.

6. **Providing qualified and sufficient numbers of healthcare professionals (in this regards pharmacists) to be involved in IPP.** This recommendation is made to address a barrier at the Macro level in the study hospital and the pharmacists' external factor. The lack of pharmacists needs to be addressed to allow a sufficient workforce to engage in collaboration. A transparent staff recruitment process is required to improve organisational performance in regards to providing patient care.[339] The issue of low numbers of pharmacists in patient care was identified as one of pharmacists' external barriers. Although the Indonesian Ministry of Health has determined the number of pharmacists to provide service to inpatients to allow sufficient care (1:30),[230] in the study hospital the ratio was higher (1:37). Further, pharmacists in the study hospital mostly do logistics role with little engagement in patient care. Support from the health system as well as from the hospital management is essential to recruit sufficient numbers of appropriately qualified healthcare professionals for the provision of healthcare services.

7. **Facilitating a supportive environment for pharmacists to gain skills in patient care by the IAI.** This recommendation is made to accommodate a barrier identified amongst the pharmacists' internal factors, namely lack of clinical experience. A supportive environment should also be accompanied by sufficient learning resources to support pharmacists in the expansion of their role in patient care. As discussed previously (See Section 8.2.1), learning resources are one of the components of Nimmo and Holland PCS framework which was not identified in the present study. Thus, future studies on the effective training for pharmacists in providing patient care are required. The IAI could improve pharmacists' skills in patient care by conducting training related to the role of pharmacists in patient care, for instance training in counselling and communication skills with patients, as well as with other healthcare professionals. Additionally, pharmacists are also required to continuously improve their drug knowledge. Active members (pharmacist practitioners) who may have delivered patient care in their practice could be involved in the pharmacists' professional socialisation.

8. **Developing a clear pharmacist job description prior to allocating fee for services provided by the pharmacists.** This recommendation is made to address the pharmacists' external factor of no fee for pharmacists' services. The IAI needs to clearly define the role of pharmacists in patient care prior to the introduction of fees for their services. Jorgensen et al.[171] in their review also recommended that if pharmacists are to work in teams with other healthcare professionals, then pharmacists need to develop a clear role as members of the team. The other team members also require to be educated about the role of the pharmacist. The fee for pharmacists' services should be reasonable based on the benefit derived by the patient. Existence of such fees would also benefit the pharmacy profession and facilitate practice change. The IAI needs to create a schedule for fees for service. Support from

the health system, the pharmacy education institution and the IAI are all essential for the expansion of the role of pharmacists in patient care to ensure medication safety in the Indonesian context.

9. **Improvement of information management systems to ensure the safe use of medication.** In the study hospital, in addition to pharmacists' involvement in ensuring medication safety, it is suggested that communication of patient information amongst healthcare professionals may be enhanced by improving the health information system and technology.[370] This is to address errors identified in the transcribing process and difficulties encountered due to a lack of patient information in the Central Pharmacy and on the wards. The use of information and technology may require financial support in terms of providing more facilities (i.e. computers, internet, and software program) and trained human resources. Littlejohns et al.[385] recommended that assessment of the social and professional cultures of the healthcare organisation and the complexity of the healthcare processes may be required prior to the adoption of new information management systems.

8.3.3   RECOMMENDATIONS FOR FUTURE RESEARCH

In a recent review, Brandt et al. recommended focusing on the triple aims to the implementation of IPE-CP.[386] The aims consist of the outcomes of patient care and safety, cost-effectiveness and experiences for the healthcare professionals and the patients. As mentioned earlier, support from clinical leaders and effective training for pharmacists in providing patient care are required for the expansion of the role of pharmacists in patient care to ensure medication safety. Further investigations into the impact of the implementation of IPP on patient outcomes, determining the level of support from clinical leaders and professional organisations, the effective training for pharmacists in delivering patient care and the adaptable health information system are recommended for future research.

8.4   STUDY LIMITATIONS

Limitation of methods employed in this study has been incorporated in the respected chapters. This section summarises the limitations identified. Firstly, this study was only conducted in one university and one hospital. Thus, generalisation to other settings in Indonesia should be made cautiously due to differences of healthcare students' learning and differences of the model of healthcare service. Secondly, this study used translated established questionnaires found in the literature. There were some discussions in the literature on cross cultural research.[254, 255, 387] Translation and back translation is considered one way to ensure validity and reliability of translated questionnaires.[387] However, validity of translated questionnaires may be obtained from an independent person who

reviewed the accuracy of translation and the questionnaires were piloted to representative participants. These steps were considered sufficient.[255, 257] Another limitation was potential research method bias which may result from participants who tended to be agree to positive statements and disagreed to negative statements or participants tended to be more positive if they accepted the invitation to participate in a study, namely social desirability bias.[304, 388] However, this was beyond the investigator's control. The mixed methods design employed in the present study should minimise bias because the results of both quantitative and qualitative studies were the same. Finally, the present study did not investigate patients' perception of the role of the pharmacist in ensuring safe medication use. Thus, a future study focused on the understanding of IPP from the patients' perspective as well as the patient outcomes may be necessary.

CHAPTER 9 CONCLUSION

This is the first study in the Indonesian context to explore the feasibility of the expansion of the role of pharmacists in patient care to ensure medication safety through the process of implementing Interprofessional Education (IPE) and Interprofessional Practice (IPP). The topic of medication safety was selected because of the range of healthcare professionals (i.e. physicians, nurses, and pharmacists) involved in the medication delivery process. Three research questions were employed: 1) Is it feasible to expand the role of pharmacists in patient care to better ensure the safe use of medication?; 2) Is the introduction of IPE feasible in a public university in Indonesia?;and 3) Is the introduction of IPP feasible within a teaching hospital in Bali, Indonesia? There were five phases of the research employed in the present study involving both qualitative and quantitative approaches.

This study sought to determine the feasibility of expanding the role of pharmacists in patient care in ensuring medication safety through the implementation of IPE and IPP based on conclusions drawn from testing the study's nine hypotheses (See Page 71).

Hypothesis 1: Male and female pharmacy graduates have no significant difference in terms of perceived attainment of all the attributes required to deliver patient care

A higher proportion of male than female pharmacy interns believed they had the leadership potential attribute (p=0.004). Based on this finding, the hypothesis was not proven. More than half of pharmacy interns at the study university believed they had only three of 16 attributes required for patient care provision (i.e. the ability to listen, a caring and compassionate nature, and the motivation to provide patient care). Pharmacy interns perceived they had less attainment of the seven attributes of patient care than did registered pharmacists. The results of the focus group discussion (FGD) with the pharmacy interns indicated that the lack of attainment of attributes as care providers was associated with the lack of knowledge and limited experience in providing patient care during their education.

Hypothesis 2: Pharmacists conducting clinical review have no means of identifying medication errors in Indonesian hospitals

As a new initiative, it was found that a pharmacist providing clinical pharmacy services, including medication reconciliation, clinical review and patient counselling and education in a geriatric ward at the study hospital was able to identify and intercept medication errors that occurred during the medication delivery process, thus the hypothesis was not proven. The results demonstrated that

pharmacists had a role in patient care to ensure medication safety. However, there was a low rate of acceptance of the pharmacist's interventions in comparison with literature reports which may have been associated with unfamiliarity of the pharmacy service amongst healthcare professionals, the lack of rapport with doctors and the minimum level of clinical experience of the investigator.

Hypothesis 3: Stakeholders', healthcare professionals' and pharmacy graduates would not be supportive towards the role of pharmacists in patient care

Stakeholders in interviews and FGDs supported the role of pharmacists in patient care because of the perceived benefits of pharmacists' engagement in patient care through ensuring medication safety, educating the patient and providing drug information to other healthcare professionals. According to these findings, the hypothesis was not confirmed. However, pharmacists' internal and external factors were found to be barriers to the expansion of their role. The present study confirmed pharmacists' internal factors (i.e. lack of knowledge and experience, lack of confidence, lack of pharmacist workforce and pharmacists' mind-set) as the major barriers. The pharmacists' external factors highlighted in the present study were varying understanding by other healthcare professionals of the role of pharmacists, lack of fee for service, and poor recruitment procedures. All of these need to be addressed to enhance pharmacists' impact on patient care.

Hypothesis 4: Medical, nursing and pharmacy students have no significant difference in attitudes towards IPE and there will be no significant differences in attitudes towards IPE as they progressed through their degrees

Despite the fact that medical, nursing, and pharmacy students who participated in the present study were supportive towards IPE, medical students had less positive attitudes towards IPE when compared to nursing and pharmacy students. The medical students less positive attitudes towards IPE were also reflected in more positive attitudes towards their own professional identity (as indicated by the RIPLS PI sub-scale) in the two survey years (2012 and 2013). The Year 2 Cohort medical students had strong positive attitudes to the PI sub-scale and to statement "*It is not necessary for undergraduate healthcare students to learn together".* Year 1 Cohorts of medical, nursing and pharmacy students moved towards a less positive attitude to the Shared Learning and Teamwork (SLT) sub-scale as they progressed through their respective courses. These results showed that the hypothesis was rejected.

Hypothesis 5: Interprofessional Learning (IPL) activities would not have an influence on medical, nursing and pharmacy students' attitudes towards IPE

IPL workshop on medication safety involving final year medical, nursing and pharmacy students improved the healthcare students' attitudes towards the Shared learning and teamwork (SLT) sub-scale. Participants of the workshop agreed it enhanced their understanding of the role and the responsibility of healthcare professionals; to gain respect, trust and confidence; and to experience teamwork as well as improve their communication skills. These findings therefore did not support hypothesis that no such change would occur. Given that the Year 1 Cohort of medical, nursing and pharmacy students moved to less positives attitude towards SLT sub-scale during their course of study, it may be that early exposure to IPL workshops may be appropriate if IPE is to be implemented at the study university.

Hypothesis 6: Stakeholders would not be supportive towards IPE

Although stakeholders at the study university and study hospital suggested curriculum differences may be encountered between the health courses, the stakeholders supported the implementation of IPE at the study university. Hence, the hypothesis was not confirmed. This was because of the perceived benefits of IPE such as improving the understanding of the role of healthcare professionals; fostering teamwork skills amongst healthcare students; and reducing hierarchy in the provision of healthcare service. Interviews with stakeholders at the study university also revealed that the Indonesian Government supports IPE in the Indonesian health curriculum with the Health Profession Education Quality (HPEQ) project.

Hypothesis 7: Healthcare professionals regardless of place of work and profession would have no significant difference in attitudes towards IPP

Healthcare professionals regardless of their profession or place of work had positive attitudes towards IPP and no significant differences of attitudes towards the RIPLS sub-scales. However, the Physician Groups had significantly more positive attitudes than the Nurse and Pharmacist Groups towards Statement 17 (*I like to understand the patient's side of problem)* and Statement 19 (*The function of nurses and therapists is mainly to provide support for doctors).* The Physician Group also had significantly more positive attitudes than the Nurse Group towards Statement 18 (*I try to communicate compassion to my patients*) and Statement 21 (*I have to acquire much more knowledge and skills than other healthcare professionals).* This indicated that the Physician Group had a greater sense of professional identity than the Nurse and Pharmacist Groups. Thus, the hypothesis was rejected. Further, it was found that healthcare academics showed more positive

attitudes than practitioners towards Statement 19. The strong positive attitudes of medical academics found in the present study towards Statement 19 may explain the strong sense of professional identity seen amongst medical students. This indicates that the role of academics in development of professional socialisation in the healthcare education is significant. This also suggests the needs of faculty development if IPE is to be implemented in the study university. Nurse practitioners had significantly more positive attitudes towards Statement 19 than their nursing academic counterparts. This may be associated with informal learning in the place of work which reflects the hierarchical model of healthcare service delivery at the study hospital.

Hypothesis 8: Physicians, nurses and pharmacists would have no significant difference regarding their evaluation of the medication error case vignettes and no significant difference in respect to which healthcare professionals are responsible for and the factors that contributed to the medication errors

In comparison to other healthcare professionals who participated in the present study, pharmacy academics in the study university and pharmacists in the study hospital showed higher accuracy, while older participants (>50 years old) were less accurate in providing anticipated correct answers for the medication error case vignettes. This indicated that pharmacists may have had a better understanding of the medication errors provided in the study. In general, although healthcare professionals agreed on which professions were responsible for the medication errors in the case vignettes based on the profession's role in the process of medication delivery, the healthcare professionals who had that role did not agree that they were the only professionals who were responsible for the errors. This may reflect the importance of shared responsibility in the provision of healthcare service. The present study also found that only a small proportion of participants believed that communication failure was a contributor to the errors. According to these findings, the hypothesis was not confirmed.

Hypothesis 9: Stakeholders' and healthcare professionals' would not support IPP implementation at the study hospital

Stakeholders in the interviews and FGDs supported the implementation of IPP at the study hospital because of the perceived benefits (i.e. reducing blame and minimising the risk of medication misadventure). These findings did not confirm the hypothesis. However, the participants indicated that the major barrier to the implementation of IPP was the lack of understanding of the role of healthcare professionals (knowledge competencies). The other barrier was the strong sense of

superiority of certain healthcare professionals which may lead to communication barriers in the provision of healthcare services.

The expansion of the role of pharmacists in patient care to ensure the safe use of medication though IPE/IPP is feasible for a number of reasons. Firstly, support from the Indonesian Government with the establishment of joint accreditation in health education, one of the outcomes of the HPEQ project, should pave the way to foster collaborative practice for future healthcare professionals. Secondly, participants in the qualitative study were supportive towards expanding the role of pharmacists in patient care given the perceived benefits, such as ensuring medication safety, educating the patients and providing drug information to healthcare professionals. Lastly, pharmacist conducted clinical pharmacy service activities were able to identify and prevent medication errors.

Although participants support expanding the role of pharmacists, barriers in the education and practice settings must be addressed. In the education setting, in order to reduce the strong sense of professional identity in medical students and to recognise more of the role of other healthcare professionals, it is recommended to implement IPE early and continuously in the students' curriculum and to involve professionals other than medical practitioners as medical academics. Healthcare academics should role model collaboration, acknowledging the role of, and showing respect to and trust for other healthcare professionals. Support from health institutions in terms of facilities, human resources, and funds from the university are essential in the implementation of IPE at the study university.

Pharmacy curriculum redesign in the area of experiential learning and the involvement of members of the Indonesian pharmacy organisation (IAI) who have practised patient care would facilitate pharmacy graduates gaining experiential learning as care providers. Further, pharmacy education in collaboration with the IAI should design and provide a supportive environment to foster competent pharmacists as care providers in the future. The IAI also needs to clearly explain the role of pharmacists in patient care to ensure the safe use of medication. Once the role is clear, the IAI with the support from Indonesian Government should introduce fees for the pharmacists' services to patients. Further, a postgraduate degree may be required if pharmacists are to expand their roles in patient care.

At the practice setting, the sense of superiority amongst medical practitioners may have led to a lack of understanding of the role of other healthcare professionals in the present study. This would hinder

communication amongst healthcare professionals. This in turn may explain the low level of collaboration identified at the study hospital which correlates to Level 1 (Potential Collaboration) in the D'Amour et al model of collaboration. This finding indicates that the implementation of IPP at the study hospital is essential. In addition, the high rate of medication errors identified in the present study also indicated the need to improve the medication management system in the study hospital. The Indonesian Government should enact legislation on teamwork and recruit sufficient qualified staff if pharmacists are to be involved in IPP in improving the safe use of medication

In order to enhance the understanding of the role of the pharmacist in medication safety, support from clinical leaders is essential because these leaders can use their influence to shape the role pharmacists play in patient care. The support from clinical leaders will be ensured if the pharmacists establish good rapport with clinical leaders, and the leaders gain benefits from pharmacists' involvement in patient care to ensure medication safety. All in all, the expansion of the role of pharmacists in patient care to ensure medication safety through IPE requires support from the health system, health education institutions, and professional organisations.

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APPENDICES

Appendix 1 Ethical approval from the Curtin University Human Research and Ethics Committee

Curtin University

Memorandum

		Office of Research and Development
To	Professor Jeff Hughes, Pharmacy	Human Research Ethics Committee
From	Professor Stephan Millett, Chair, Human Research Ethics Committee	
Subject	Protocol Approval HR 175/2011	TELEPHONE 9266 2784
Date	29 February 2012	FACSIMILE 9266 3793
Copy	Desak Ketut Ernawati, Pharmacy	EMAIL hrec@curtin.edu.au
	Dr Ya Ping Lee, Pharmacy	
	Graduate Studies Officer, Faculty of Health Sciences	

Thank you for providing the additional information for the project titled *"Medication Safety in Indonesia: Expanding pharmacists' roles through Interprofessional Education (IPE) and Interprofessional Practice (IPP)"*. The information you have provided has satisfactorily addressed the queries raised by the Committee. Your application is now **approved**.

CONDITIONS

1. Please provide confirmation of Sanglah Hospital Ethics Committee approval.
2. Please provide the name and contact details of the contact person at Sanglah Hospital.

- You have ethics clearance to undertake the research as stated in your proposal.
- The approval number for your project is HR 175/2011. *Please quote this number in any future correspondence.*
- Approval of this project is for a period of twelve months 28-02-2012 to 28-02-2013. To renew this approval a completed Form B (attached) must be submitted before the expiry date 28-02-2013.
- If you are a Higher Degree by Research student, data collection must not begin before your Application for Candidacy is approved by your Faculty Graduate Studies Committee.
- The following standard statement must be included in the information sheet to participants:
- *This study has been approved by the Curtin University Human Research Ethics Committee (Approval Number HR 175/2011). The Committee is comprised of members of the public, academics, lawyers, doctors and pastoral carers. If needed, verification of approval can be obtained either by writing to the Curtin University Human Research Ethics Committee, c/- Office of Research and Development, Curtin University, GPO Box U1987, Perth, 6845 or by telephoning 9266 2784 or by emailing hrec@curtin.edu.au.*

Applicants should note the following:

It is the policy of the HREC to conduct random audits on a percentage of approved projects. These audits may be conducted at any time after the project starts. In cases where the HREC considers that there may be a risk of adverse events, or where participants may be especially vulnerable, the HREC may request the chief investigator to provide an outcomes report, including information on follow-up of participants.

The attached FORM B should be completed and returned to the Secretary, HREC, C/- Office of Research & Development:
When the project has finished, or
- If at any time during the twelve months changes/amendments occur, or
- If a serious or unexpected adverse event occurs, or
- 14 days prior to the expiry date if renewal is required.
- An application for renewal may be made with a Form B three years running, after which a new application form (Form A), providing comprehensive details, must be submitted.

Yours sincerely,

Professor Stephan Millett
Chair Human Research Ethics Committee

RESEARCH AND DEVELOPMENT UNIT
MEDICAL FACULTY UNIVERSITY OF UDAYANA /
SANGLAH HOSPITAL DENPASAR

Jln. Kesehatan No. 1 Denpasar   Telp. 227911 (Ext.227)

ETHICAL CLEARANCE

NO.: 64/UN.14.2/Litbang/II/2012

This is to certify that following study project entitled :

"Medication Safety in Indonesia: Expanding pharmacists' roles through Interprofessional Education (IPE) and Interprofessional Practice (IPP)"

Principal Investigator : Desak Ketut Ernawati, Apt, MPharm

Has been evaluated in accordance with the ethical aspects in using human being as a study subject and considered proper to be executed.

Denpasar, February 18, 2012

Research and Development Unit,   Research Ethic Committee,
Medical Faculty University of Udayana /   Medical Faculty University of Udayana /
Sanglah Hospital Denpasar   Sanglah Hospital Denpasar

Dr. dr. Dewa Made Sukrama, SpMK,MSi   Prof. Dr. dr. Putu Astawa,SpOT(K) M.Kes

Appendix 3 Study approval from the Research and Development Department at the study hospital and university

KEMENTERIAN KESEHATAN RI
DIREKTORAT JENDERAL BINA UPAYA KESEHATAN
RUMAH SAKIT UMUM PUSAT SANGLAH DENPASAR

Jalan Diponegoro Denpasar Bali (80114)
Telepon. (0361) 227911-15, 225482, 223869, Faximile. (0361) 224206
Email : info@sanglahhospitalbali.com,   Website : www.sanglahhospitalbali.com

SURAT IJIN
Nomor: LB..02.01./II.C5.D11/ᵧₒₒₗₐ/2012

Sehubungan dengan surat dari Ketua Komisi Etik Penelitian Fakultas Kedokteran Universitas Udayana/RSUP Sanglah Denpasar Nomor: 64/UN.14.2/Litbang/II/2012 tertanggal 18 February 2012 prihal seperti tersebut diatas dengan ini kami mengijinkan Saudara:

Principal Investigator   :   Desak Ketut Ernawati, Apt, MPharm

Untuk melakukan penelitian tentang"**Medication Safety in Indonesia: Expanding pharmacists' roles through Interprofessional Education (IPE) and Interprofessional Practice (IPP)"** di RSUP Sanglah Denpasar

Demikian surat ijin ini kami buat untuk dipergunakan sebagaimana mestinya.

April 2012
Direktur SDM & Pendidikan

Drg. Tripura Nugroho, M.Kes
NIP. 195801191984101002

Tembusan:
1. Ka. Instalasi Farmasi RSUP Sanglah Denpasar
2. Yang bersangkutan

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Appendix 4a Medication errors case vignettes English version

CASE VIGNETTES

Please circle or tick the most appropriate option (√)

1. A 78 year old man complained about having pain in his joints. He went to the nearest pharmacy and the pharmacist gave him 200 mg ibuprofen tablet three times daily and 500 mg paracetamol tablet three times daily. After taking the medications for 2 days, his symptom did not improve. He went to a general practitioner who prescribed 200 mg of celecoxib once daily. The patient took both the ibuprofen tablet and celecoxib tablets together for the next few days. After three days, the patient complained about a gastrointestinal discomfort.

   1. What is the problem for this case?
      a. The dose of Celecoxib is too high
      b. Patient is suffering from pain on his joints
      c. Patient is experiencing side effect of medications

   2. What type of medication error do you think occurred in this case?
      a. Prescribing error
      b. Dispensing error
      c. Administration error

   3. What do you think might be the potential cause of the error?
      a. Lack of patient's information
      b. Lack of drug knowledge in healthcare providers
      c. Lack of communication between healthcare providers

   4. Who do you think is responsible for the error in this case?

	Strongly Disagree	Disagree	Agree	Strongly Agree
Physician				
Pharmacist				
Nurse				

   5. What can be done to prevent this type of error from occurring in the future?
      a. Elicit detailed patient information prior to prescribing
      b. Improve drug knowledge in healthcare providers
      c. Communicate actively between healthcare providers

   6. How serious do you think the outcomes of this error might be?
      a. Mild
      b. Moderate
      c. Severe

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II. A 5 year old boy (16 kg) had a cold. He developed a high temperature and had yellowish sputum in the last two days. He was diagnosed with acute upper respiratory tract infection. The physician prescribed 5 mL of Bactrim® Syrup (every 5 mL contains 40 mg of trimethoprim and 200 mg of sulfamethoxazole) for this patient. A few hours after the administration of this medication the patient's body temperature elevated significantly and he complained of sore throat and his mucous membranes were swollen.

1. What is the problem for this case?
    a. Patient suffered from fever, sore throat and swelling of his mucous membranes
    b. Patient suffered from bronchitis
    c. Patient suffered from allergic reaction of medication

2. What type of medication error do you think occurred in this case?
    a. Prescribing error
    b. Dispensing error
    c. Administration error

3. What do you think might be the potential cause of the error?
    a. Lack of patient's information
    b. Lack of drug knowledge in healthcare providers
    c. Lack of communication between healthcare providers

4. Who do you think is responsible for the error in this case?

	Strongly Disagree	Disagree	Agree	Strongly Agree
Physician				
Pharmacist				
Nurse				

5. What can be done to prevent this type of error from occurring in the future?
    a. Elicit detailed patient information prior to prescribing
    b. Improve drug knowledge in healthcare providers
    c. Communicate actively between healthcare providers

6. How serious do you think the outcomes of this error might be?
    a. Mild
    b. Moderate
    c. Severe

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III. A 75 year old woman was diagnosed with peptic ulcer disease. On admission, she looked pale and was hypotensive. The physician prescribed 40 mg of Losec® (omeprazole) OD, 500 mg of Amoxil® (amoxicillin) TID, 500 mg of Abbotic® (clarithromycin) BD, Mylanta Forte® (antacid) one tablet QID. The nurse ordered the medications through the pharmacy department. At the pharmacy department, it was a busy day and there were only two pharmacists on duty. The pharmacist dispensed 40 mg of Lasix®, 500mg of Amoxil®, and 500 mg of Abbotic®. When the medications arrived in the ward, the nurse realised the wrong medication was dispensed.

1. What is the patient problem?
   a. A 75 year old woman who was diagnosed with peptic ulcer disease.
   b. A 75 year old woman who almost receive the wrong medication
   c. A 75 year old woman was suffering from hypotension

2. What type of medication error do you think occurred in this case?
   a. Prescribing error
   b. Dispensing error
   c. Administration error

3. What do you think might be the potential cause of the error?
   a. Lack of access to patient's information
   b. Wrong drug selection at dispensing
   c. Lack of communication between healthcare providers

4. Who do you think is responsible for the error in this case?

	Strongly Disagree	Disagree	Agree	Strongly Agree
Physician				
Pharmacist				
Nurse				

5. What can be done to prevent this type of error from occurring in the future?
   a. Elicit detailed patient information prior to prescribing
   b. Implement appropriate checking procedure at point of dispensing
   c. Communicate actively between healthcare providers

6. How serious do you think the outcomes of this error might be?
   a. Mild
   b. Moderate
   c. Severe

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IV. A 80 year old man received prescription containing 5 mg of Amlodipine once daily. At the pharmacy department, the pharmacist dispensed 10 mg of Amlodipine. At the ward, the nurse administered the 10 mg of Amlodipine tablet. The patient experiencing headache and hypotension after receiving the medication.

1. What is the patient problem?
   a. A 80 year old man experienced headache and hypotension
   b. A 80 year old man received the wrong medication
   c. A 80 year old man experiencing overdose of medication

2. What type of medication error do you think occurred in this case?
   a. Prescribing error
   b. Dispensing error
   c. Administration error

3. What do you think might be the potential cause of the error?
   a. Lack of appropriate checking procedure at point of dispensing
   b. Lack of drug knowledge by healthcare providers
   c. Lack of communication between healthcare providers

4. Who do you think is responsible for the error in this case?

	Strongly Disagree	Disagree	Agree	Strongly Agree
Physician				
Pharmacist				
Nurse				

5. What can be done to prevent this type of error from occurring in the future?
   a. Ensure drugs with multiple strengths are clearly distinguishable from each other
   b. Healthcare providers should improve drug knowledge
   c. Improve communication between healthcare providers

6. How serious do you think the outcomes of this error might be?
   a. Mild
   b. Moderate
   c. Severe

V. An 83 year old woman was hospitalized due to immobilization. She has a history of diabetes, pneumonia, and peptic ulcer. She was on Actrapid° drip 1 IU per hour, plus Lantus° 6 IU OD, 40 mg of omeprazole intravenously OD, 1 g of sucralfate BD, 500 mg of ciprofloxacin orally BD, and 1 g of cefotaxime intravenously TID. The nurse administered the medication as the following: omeprazole once daily in the evening, while cefotaxime was administered three times at 8 hourly intervals, sucralfate and ciprofloxacin were administered twice daily concurrently.

1. What is the patient problem?
   b. An 83 year old woman who is immobilized
   c. An 83 year old woman having poly-pharmacy
   d. An 83 year old woman receiving drugs with the potential interaction

2. What type of medication error do you think occurred to this case?
   a. Prescribing error
   b. Dispensing error
   c. Administration error

3. What do you think might be the potential cause of the error?
   a. Lack of patient's information
   b. Lack of drug knowledge in healthcare providers
   c. Lack of communication between healthcare providers

4. Who do you think is responsible for the error in this case?

	Strongly Disagree	Disagree	Agree	Strongly Agree
Physician				
Pharmacist				
Nurse				

5. What can be done to prevent this type of error from occurring in the future?

   a. Elicit detailed patient information prior to prescribing
   b. Improve drug knowledge in healthcare providers
   c. Communicate actively between healthcare providers

6. How serious do you think the outcomes of this error might be?
   a. Mild
   b. Moderate
   c. Severe

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VI. A 75 year old woman was diagnosed with acute gastritis. The physican prescribed one spoon of Antacida Syrup three times daily, 400 mg of cimetidine tablet twice daily. The Antacida syrup was not supplied with a measuring spoon. Thus, the nurse gave the Antacida Syrup using a teaspoon which was available in the ward. The patient complained that gastritis symptoms remained after three days of therapy.

1. What is the patient problem?
   a. A 75 year old man with acute gastritis and received the wrong medication
   b. A 75 year old man who experienced unresolved gastritis due to wrong dose of medication
   c. A 75 year old man who experienced unresolved gastritis due to unknown cause

2. What type of medication error do you think occurred to this case?
   a. Prescribing error
   b. Dispensing error
   c. Administration error

3. What do you think might be the potential cause of the error
   a. Lack of access to patient's information
   b. Wrong drug selection at dispensing
   c. Lack of communication between healthcare providers

4. Who do you think is responsible for the error in this case?

	Strongly Disagree	Disagree	Agree	Strongly Agree
Physician				
Pharmacist				
Nurse				

5. What can be done to prevent this type of error from occurring in the future?
   a. Elicit detailed patient information prior to prescribing
   b. Improve drug knowledge in healthcare providers
   c. Communicate actively between healthcare providers

6. How serious do you think the outcomes of this error might be?
   a. Mild
   b. Moderate
   c. Severe

Thank you for time and participation

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Appendix 4b. Medication errors case vignettes Bahasa Indonesian version

CASE VIGNETTES

Mohon lingkari atau berikan tanda rumput (√) pada pilihan yang menurut saudara paling sesuai

I. Seorang laki-laki berumur 78 tahun mengeluhkan nyeri di sendinya. Dia pergi ke apotek terdekat dan diberikan tablet yang mengandung kombinasi 200 mg ibuprofen dan 500 mg paracetamol tablet, yang diminum tiga kali sehari. Setelah mengkonsumsi obat tersebut selama 2 hari, keluhan belum hilang, sehingga pasien pergi ke praktek dokter umum. Dokter meresepkan sehari sekali 200 mg celecoxib. Pasien mengkonsumsi ibuprofen tablet dan celecoxib tablet selama beberapa hari. Setelah tiga hari, pasien mengeluhkan ketidaknyamanan di lambungnya.

1. Menurut anda, apa permasalahan yang dimiliki oleh pasien ini?
   a. Dosis Celecoxib terlalu tinggi
   b. Pasien mengalami nyeri sendi
   c. Pasien mengalami efek samping obat

2. Menurut anda, pasien ini mengalami *medication errors* yang mana?
   a. *Prescribing error*
   b. *Dispensing error*
   c. *Administration error*

3. Menurut anda, apa kira-kira penyebab potensial *error* tersebut?
   a. Kurangnya akses terhadap informasi pasien
   b. Kurangnya pengetahuan tenaga kesehatan tentang obat
   c. Kurangnya komunikasi antara tenaga kesehatan

4. Menurut anda, siapa yang bertanggungjawab terhadap terjadinya *error* pada kasus ini?

	Sangat tidak setuju	Tidak setuju	Setuju	Sangat setuju
Dokter				
Apoteker				
Perawat				

5. Apa yang bisa dilakukan untuk mencegah terjadinya error ini dimasa depan?
   a. Informasi pasien harus lengkap sebelum proses penulisan resep obat
   b. Tenaga kesehatan harus meningkatkan pengetahuannya tentang obat
   c. Meningkatkan komunikasi antar dengan tenaga kesehatan

6. Menurut anda, sejauh mana akibat dari *error* ini kepada pasien?
   a. Ringan
   b. Sedang
   c. Berat

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II. Seorang anak laki-laki berumur 5 tahun (16 kg) menderita batuk dan pilek. Sejak 2 hari sebelumnya, pasien mengalami demam dan batuk dahak berwarna kekuningan. Dokter mendiagnosis pasien mengalami infeksi saluran pernafasan atas akut. Dokter menuliskan sehari dua kali 5 mL sirup Bactrim® (setiap 5 mL syrup mengandung 40 mg trimethoprim dan 200 mg sulfamethoxazole). Beberapa jam kemudian suhu tubuh pasien meningkat dan mengeluhkan sulit menelan dan mukosa mulutnya mulai menebal.

1. Menurut anda, apa permasalahan yang dimiliki oleh pasien ini?
   a. Pasien mengalami demam, sakit tenggorokan dan pembengkakan membran mukosa
   b. Pasien menderita bronchitis
   c. Pasien mengalami reaksi alergi yang disebabkan oleh obat

2. Menurut anda, pasien ini mengalami *medication errors* yang mana?
   a. Prescribing error
   b. Dispensing error
   c. Administration error

3. Menurut anda, apa kira-kira penyebab potensial *error* tersebut?
   a. Kurangnya akses terhadap informasi pasien
   b. Kurangnya pengetahuan tenaga kesehatan tentang obat
   c. Kurangnya komunikasi antar tenaga kesehatan

4. Menurut anda, siapa yang bertanggungjawab terhadap terjadinya *error* pada kasus ini?

	Sangat tidak setuju	Tidak setuju	Setuju	Sangat setuju
Dokter				
Apoteker				
Perawat				

5. Apa yang bisa dilakukan untuk mencegah terjadinya *error* ini dimasa depan?
   a. Informasi pasien harus lengkap sebelum proses penulisan obat
   b. Tenaga kesehatan harus meningkatkan pengetahuannya tentang obat
   c. Meningkatkan komunikasi antar tenaga kesehatan

6. Menurut anda, sejauh mana akibat dari *error* ini kepada pasien?
   a. Ringan
   b. Sedang
   c. Berat

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III. Seorang wanita yang berusia 75 year didiagnosis mengalami tukak lambung. Pada saat masuk rumah sakit, pasien terlihat pucat dan hipotensi. Dokter memberikan 40 mg Losec° (omeprazole) sekali sehari, 500 mg Amoxil° (amoxicillin) tiga kali sehari, 500 mg Abbotic° (clarithromycin) dua kali sehari, Mylanta Forte° (antasida) empat kali sehari. Perawat mengorder obat tersebut melalui instalasi farmasi. Saat itu, di instalasi sedang banyak pasien dan hanya ada 2 apoteker yang sedang bertugas. Apoteker menyiapkan 40 mg Lasix°, 500mg Amoxil°, and 500 mg Abbotic°. Pada saat perawat menerima obat tersebut, perawat menemukan kesalahan obat yang akan diterima oleh pasien.

1. Menurut anda, apa permasalahan yang dimiliki oleh pasien ini?
   a. Seorang wanita berumur 75 tahun yang didiagnosa dengan tukak lambung
   b. Seorang wanita berumur 75 tahun yang hampir salah menerima obat
   c. Seorang wanita berumur 75 tahun yang menderita hipotensi.

2. Menurut anda, pasien ini mengalami *medication errors* yang mana?
   a. *Prescribing error*
   b. *Dispensing error*
   c. *Administration error*

3. Menurut anda, apa kira-kira penyebab potensial *error* tersebut?
   a. Kurangnya akses terhadap informasi pasien
   b. Kurangnya prosedur yang baik dalam peracikan obat
   c. Kurangnya komunikasi dengan tenaga kesehatan yang lain

4. Menurut anda, siapa yang bertanggungjawab terhadap terjadinya error pada kasus ini?

	Sangat tidak setuju	Tidak setuju	Setuju	Sangat setuju
Dokter				
Apoteker				
Perawat				

5. Apa yang bisa dilakukan untuk mencegah terjadinya error ini dimasa depan?
   a. Informasi pasien harus lengkap sebelum proses penyerahan obat
   b. Tenaga kesehatan harus memperbaiki prosedur peracikan obat
   c. Meningkatkan komunikasi antara pasien dengan tenaga kesehatan

6. Menurut anda, sejauh mana akibat dari *error* ini kepada pasien?
   a. Ringan
   b. Sedang
   c. Berat

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IV. Seorang laki-laki berumur 80 tahun menerima resep yang mengandung 5 mg Amlodipine tablet sekali sehari. Di instalasi farmasi, apoteker menyerahkan 10 mg Amlodipine tablet. Sesampainya di ruangan, perawat langsung memberikan 10 mg Amlodipine tablet. Pasien kemudian mengalami pusing dan hipotensi setelah mengkonsumsi obat tersebut.

1. Menurut anda, apa permasalahan yang dimiliki oleh pasien ini?
   a. Seorang pasien berumur 80 tahun mengalami sakit kepala dan hipotensi
   b. Seorang pasien berumur 80 tahun menerima obat yang salah
   c. Seorang pasien berumur 80 tahun mengalami reaksi overdosis obat

2. Menurut anda, pasien ini mengalami *medication errors* yang mana?
   a. Prescribing error
   b. Dispensing error
   c. Administration error

3. Menurut anda, apa kira-kira penyebab potensial *error* tersebut?
   a. Kurang prosedur yang baik dalam peracikan obat
   b. Kurangnya pengetahuan profesi tenaga kesehatan tentang obat-obatan
   c. Kurangnya komunikasi dengan tenaga kesehatan yang lain

4. Menurut anda, siapa yang bertanggungjawab terhadap terjadinya *error* pada kasus ini?

	Sangat tidak setuju	Tidak setuju	Setuju	Sangat setuju
Dokter				
Apoteker				
Perawat				

5. Apa yang bisa dilakukan untuk mencegah terjadinya *error* ini dimasa depan?
   a. Teknik penyimpanan obat dengan dosis berbeda harus dapat dibedakan dengan jelas
   b. Tenaga kesehatan harus meningkatkan pengetahuannya tentang obat
   c. Meningkatkan komunikasi antara tenaga kesehatan

6. Menurut anda, sejauh mana akibat dari *error* ini kepada pasien?
   a. Ringan
   b. Sedang
   c. Berat

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v. Seorang pasien yang berumur 83 tahun masuk rumah sakit karena tidak bisa bergerak (immobile). Pasien memiliki riwayat diabetes, pneumonia, dan tukak lambung. Di rumah sakit, pasien memperoleh Actrapid® drip 1 IU per jam, Lantus® 6 IU sekali sehari, 40 mg omeprazole intravena sekali sehari, 1 g sucralfate dua kali sehari, 500 mg ciprofloxacin dua kali sehari, dan 1 g cefotaxime yang diberikan secara intravena tiga kali sehari. Perawat memberikan obat-obat tersebut dengan cara memberikan omeprazole sekali sehari sore hari, cefotaxime diberikan tiga kali dengan jarak 8 jam, sedangkan sucralfate dan ciprofloxacin diberikan dua kali sehari secara bersamaan. Setelah dirawat selama seminggu, tidak ada perbaikan berarti terhadap kondisi pasien.

1. Menurut anda, apa permasalahan yang dimiliki oleh pasien ini?
   a. Pasien berumur 83 tahun yang tidak bisa bergerak (immobile).
   b. Pasien berumur 83 tahun yang mendapatkan polifarmasi
   c. Pasien berumur 83 menerima obat yang berpotensi berinteraksi

2. Menurut anda, pasien ini mengalami *medication errors* yang mana?
   a. *Prescribing error*
   b. *Dispensing error*
   c. *Administration error*

3. Menurut anda, apa kira-kira penyebab potensial *error* tersebut?
   a. Kurangnya akses terhadap informasi pasien
   b. Kurangnya pengetahuan tenaga kesehatan tentang obat
   c. Kurangnya komunikasi dengan tenaga kesehatan yang lain

4. Menurut anda, siapa yang bertanggungjawab terhadap terjadinya *error* pada kasus ini?

	Sangat tidak setuju	Tidak setuju	Setuju	Sangat setuju
Dokter				
Apoteker				
Perawat				

5. Apa yang bisa dilakukan untuk mencegah terjadinya error ini dimasa depan?
   a. Informasi pasien harus lengkap sebelum proses penyerahan obat
   b. Tenaga kesehatan harus meningkatkan pengetahuannya tentang obat
   c. Meningkatkan komunikasi antara pasien/tenaga kesehatan

6. Menurut anda, sejauh mana akibat dari *error* ini kepada pasien?
   a. Ringan
   b. Sedang
   c. Berat

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VI. Seorang pasien laki-laki berumur 75 tahun didiagnosis menderita gastritis akut. Dokter meresepkan satu sendok sirup antasida sehari tiga kali dan 400 mg simetidin tablet sehari dua kali. Antasida sirup tidak berisi sendok saat sampai di ruangan. Sehingga, perawat memberikan sirup antasida menggunakan sendok yang ada di ruangan yaitu sendok teh. Pasien mengeluhkan nyeri lambungnya tidak hilang setelah tiga hari menggunakan obat tersebut.

1. Menurut anda, apa permasalahan yang dimiliki oleh pasien ini?
   a. Seorang pasien laki-laki berumur 75 tahun mengalami gastritis akut yang menerima obat yang salah
   b. Seorang pasien laki-laki berumur 75 tahun yang mengalami gastritis yang tidak kunjung sembuh karena kesalahan dosis.
   c. Seorang pasien laki-laki berumur 75 tahun yang mengalami gastritis akut tanpa penyebab yang jelas

2. Menurut anda, pasien ini mengalami *medication errors* yang mana?
   a. Prescribing error
   b. Dispensing error
   c. Administration error

3. Menurut anda apa penyebab error ini?
   a. Kurangnya akses terhadap informasi pasien
   b. Kurangnya pengetahuan tenaga kesehatan tentang obat
   c. Kurangnya komunikasi antara tenaga kesehatan

4. Menurut anda, siapa yang bertanggungjawab terhadap terjadinya *error* pada kasus ini?

	Sangat tidak setuju	Tidak setuju	Setuju	Sangat setuju
Dokter				
Apoteker				
Perawat				

5. Apa yang bisa dilakukan untuk mencegah terjadinya error ini dimasa depan?
   a. Informasi pasien harus lengkap sebelum proses pemberian obat
   b. Tenaga kesehatan harus meningkatkan pengetahuannya tentang obat
   c. Meningkatkan komunikasi antara tenaga kesehatan

6. Menurut anda, sejauh mana akibat dari *error* ini kepada pasien?
   a. Ringan
   b. Sedang
   c. Berat

Terima kasih atas waktu dan partisipasi anda

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Appendix 4c Information sheet on medication errors English version

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INFORMATION SHEETS ON MEDICATION ERRORS

What is medication error?

There are many different terms to describe medication errors. The National Coordinating Council for Medication Errors Reporting and Prevention (NCC MERP) urges the researchers and institution to use the following definition in identifying errors[1]:

"A medication error is any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer. Such events may be related to professional practice, health care products, procedures, and systems, including prescribing; order communication; product labelling, packaging, and nomenclature; compounding; dispensing; distribution; administration; education; monitoring; and use."

In the NCC MERP definition is clearly stated that medication errors are not only related to human errors but also system errors. This definition also has broader definition on medication errors which associate with medication process from prescribing, dispensing, labelling, administration, monitoring and communication process.

What are the classifications of medication errors?

Medication errors can be classified according to:

1. **Medication Process[2]**
   a. Prescribing errors; errors which may occur during prescribing process. This error is associated with incorrect drug selection for a patient. Prescribing errors may include wrong drug selection, wrong dose, wrong quantity, wrong indication, and prescribing of contraindicated drugs. This error may occur as a result from lack of knowledge on the prescribed drugs, its recommended dose, lack of patient's information and lack of communication between healthcare providers. Other contributing factors of prescribing errors may include poor handwriting, inaccurate medication history, confusion of drug name, use of verbal order, and inaccurate decimal points.
   b. Dispensing errors; errors which may occur during dispensing process from receipt of the prescription in the pharmacy to the supply of a dispensed medicine to the patient. Dispensing errors may include dispensing high risk drugs (such as potassium chloride and cytotoxic drugs), looks alike drugs (drugs which have similar drug labelling) and sound alike drugs (such as Amlodipine and Amiloride). Contributing factors for dispensing errors such as lack of knowledge on drug dispensing procedures, poor technique on storing drugs which have similar name or appearance, interruption during dispensing, high workload and lack of communication between healthcare providers.
   c. Administration errors; errors which may occur when there is a discrepancy occurs between drug received by the patient and drug prescribed by the physician. Administration errors include incorrect administration technique, incorrect dose, incorrect drug, incorrect time or route. Contributing factors for administration errors may include lack of knowledge of medications and its administration technique, interruption during drug administration, high workload and lack of communication between healthcare providers.

2. **Outcomes[3]**
   a. Mild: an error has occurred but did not reach the patient
   b. Moderate: the patient has experienced drug related problems which may lead to adverse outcomes or require intervention
   c. Severe: the patient has experienced an error which results in permanent harm or potential death

3. **Type of Errors[3]**
   Wrong patient; Wrong drug; Wrong dose; Wrong route; Adverse drug reactions; Drug interaction

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Appendix 4d Information sheet of medication errors Bahasa Indonesian version

INFORMASI TENTANG MEDICATION ERRORS

Apa itu Medication Errors?

Di literature, *medication errors* dijelaskan dengan berbagai definisi. The National Coordinating Council for Medication Errors Reporting and Prevention (NCC MERP) menyarankan untuk menggunakan definisi berikut untuk menjelaskan medication errors[1]:

"A medication error is any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer. Such events may be related to professional practice, health care products, procedures, and systems, including prescribing; order communication; product labelling, packaging, and nomenclature; compounding; dispensing; distribution; administration; education; monitoring; and use."

Definisi ini menjelaskan bahwa medication errors tidak hanya berhubungan dengan kesalahan yang disebabkan oleh manusia (*human errors*) tetapi juga melibatkan kesalahan pada sistem (*system errors*). Definisi dari NCC MERP ini memberikan definisi yang lebih luas dimana medication errors bisa terjadi selama proses pemberian obat dari proses penulisan obat, penyiapan obat, pemberian obat, pengawasan pemakaian obat dan juga proses komunikasi dengan pasien.

Apa saja klasifikasi *medication errors*?

Medication errors bisa digolongkan sebagai berikut:

1. **Proses pengobatan**[2]

   a. *Prescribing errors*; *errors* (kesalahan) yang mungkin terjadi selama proses penulisan resep. Error ini berkaitan dengan kekeliruan dalam memilih obat untuk pasien. *Prescribing errors* dapat meliputi kesalahan pemilihan obat, salah dosis, salah pemberian jumlah obat, salah indikasi dan menuliskan obat yang kontraindikasi dengan dengan kondisi pasien. *Errors* ini bisa disebabkan oleh kurangnya knowledge (pengetahuan) tentang obat yang diresepkan, dosis yang direkomendasikan, dan juga kurangnya informasi tentang pasien. Penyebab lain misalnya tulisan yang tidak jelas, pengambilan riwayat pasien kurang lengkap dan kurangnya komunikasi dengan tenaga kesehatan lainnya, kebingungan dengan berbagai macam merek obat, permintaan obat melalui telepon, kesalahan pemakaian tanda koma dalam satuan obat.

   b. *Dispensing errors*; *errors* (kesalahan) yang terjadi selama proses penyiapan obat dari resep diterima di apotek/ instalasi farmasi sampai obat tersebut diserahkan kepada pasien. *Dispensing errors* bisa meliputi kesalahan dalam menyiapkan dan menyerahkan obat-obatan yang beresiko tinggi (seperti potassium chloride (KCl) dan obat-obat sitotoksik), *looks alike drugs* (obat yang kemasan nya mirip/serupa) dan *sound alike drugs* (obat-obat yang bunyinya mirip seperti Amlodipine and Amiloride). Penyebab *dispensing errors* seperti kurangnya pengetahuan tentang prosedur penyiapan obat, kurangnya teknik penyimpanan obat untuk obat-obatan yang memiliki kemiripan dalam kemasan maupun bunyi – look alike and sound alike, gangguan selama proses penyiapan obat tingginya beban kerja dan juga kurangnya komunikasi dengan tenaga kesehatan lainnya.

   c. *Administration errors*; *errors* (kesalahan) yang terjadi dimana terjadi ketidaksesuaian antara obat yang diresepkan oleh dokter dengan obat yang diterima oleh pasien. *Administration errors* meliputi kesalahan teknik pemberian obat, salah dosis saat memberikan obat, kesalahan waktu dan kesalahan rute pemberikan obat. Faktor penyebab dalam *administration errors* ini meliputi kurangnya pengetahuan tentang teknik pemberian obat, adanya gangguan dalam pemberian obat, tingginya beban kerja dan kurangnya komunikasi dengan tenaga kesehatan lainnya.

2. **Outcomes/Akibat**[3]

   a. **Ringan**: error terjadi namun tidak sampai merugikan pasien

   b. **Sedang**: pasien mengalami efek merugikan oleh karena obat atau membutuhkan perawatan akibat efek obat tersebut.

   c. **Berat**: pasien mengalami efek merugikan yang bersifat permanen atau berpotensi mengakibatkan kematian oleh karena obat

3. **Tipe Error**[3]

   Berdasarkan tipe error, medication errors dapat digolongkan menjadi: **salah pasien; salah obat; salah dosis; salah rute pemberian obat; efek samping obat; interaksi obat**

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3. Muchid A. Buku saku tanggung jawab apoteker terhadap keselamatan pasien (patient safety). Direktorat Bina Farmasi Komunitas dan Klinik Ditjen Bina Kefarmasian dan Alat Kesehatan Departemen Kesehatan RI; 2008.

Appendix 5 Semi structured questions of interviews and focus group discussions (FGDs)

Semi-structure questions asked during interviews with heads at the study university
1. What do you think about healthcare professional working in a team to ensure the safe use of medication in the current healthcare service?
2. What do you think are required to implement interprofessional practice (IPP)?
3. In your opinion, will healthcare providers ready to work with other healthcare professional in IPP in the study hospital to ensure the safe use of medication? Why?
4. What do you think the barriers and drivers for IPP in ensuring medication safety in the current healthcare service?
5. What do you think about adopting interprofessional education (IPE) involving medical, nursing and pharmacy students in the current health curricula?
6. What do you think drivers and barriers to IPE implementation in the current health curricula in the study university?
7. When do you think IPE should be adopted in the health curricula? Why?
8. In your opinion, does pharmacist have role in patient care? What do you think pharmacists' role in ensuring the safe use of medication?
9. Do you agree if pharmacist involved in IPP in ensuring the safe use of medication in the study hospital? What do you think could be done to expand pharmacist role in patient care in current healthcare service?
10. What do you think barriers and drivers of pharmacists' engagement in patient care to ensure the safe use of medication?
11. Do you think the current pharmacy curricula had supported pharmacists' roles in patient care? Particularly in ensuring the safe use of medication? (this question was asked of Head of Pharmacy Department)

Semi structured questions asked during interviews with stakeholders at the study hospital and FGDs
1. What do you think about healthcare professional working in a team to ensure the safe use of medication?
2. What are required to implement IPP?
3. In your opinion, will healthcare providers ready to work with other healthcare professional in the current hospital to ensure the safe use of medication? Why?
4. What do you think drivers and barriers to IPP in ensuring medication safety in the current healthcare service?
5. What do you think drivers and barriers to IPE implementation in the current health curricula in the study university? When do you think IPE should be adopted in the health curricula? Why? (this question was asked of stakeholders at the hospital)
6. In your opinion, does pharmacist have role in patient care? What do you think pharmacists' role in ensuring the safe use of medication?
7. Do you agree if pharmacist involved in IPP in ensuring the safe use of medication in the study hospital? What do you think could be done to expand pharmacist role in patient care in the study hospital?
8. Are you prepared as care providers in the current healthcare service? Why? (this question was asked during FGD with Pharmacist Group and pharmacy interns)
9. What do you think drivers and barriers to pharmacists' engagement in patient care to ensure the safe use of medication in the study hospital?
10. Why the majority of pharmacy interns reported to have lack of attributes from the pharmacy graduates questionnaire? (this question was asked during FGD with pharmacy interns)
11. What were attributes (other than the lists provided in the pharmacy graduates questionnaire) gained when you undertook pharmacy degree at the study university? (this question was asked during FGD with pharmacy interns)

Appendix 6 Confirmation letter of translation accuracy from independent lecturer

Denpasar, 10 October 2011

To whom it may concerns,

I, dr. Anak Agung Sagung Sawitri, MPH acknowledge that the questionnaires and participation information sheets documents for Desak Ketut Ernawati's research project entitle

" Medication Safety in Indonesia: Expanding pharmacists' roles through Interprofessional Education (IPE) and Interprofessional Practice (IPP)"

are true and accurate translation. If there are any queries with regards to the accuracy of the documents, please do not hesitate to contact me to my contact details.

Sincerely yours,

Dr Anak Agung Sagung Sawitri, MPH

Department of Community and Prevention
Faculty of Medicine Udayana University
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E mail: sawitri56@hotmail.com

Appendix 7a The Readiness for Interprofessional Education Learning Scale (RIPLS) questionnaire for healthcare students English version

READINESS FOR INTERPROFESSIONAL LEARNING FOR HEALTHCARE STUDENTS
Investigator: Desak K Ernawati (desak.ernawati@postgrad.curtin.edu.au)
Department of Pharmacy School of Medicine Udayana University
Jl. P. B Sudirman Denpasar Bali. Phone: +62361222510 ext 110
Supervisors: Prof Jeff Hughes (J.D.Hughes@curtin.edu.au)
Ya Ping Lee, PhD (Yaping.Lee@curtin.edu.au)
Curtin University Western Australia

Interprofessional Education (IPE) is an occasion where two or more professionals learn from and about each other to improve quality of care. IPE has been identified as an important component of healthcare training internationally. We would like to invite you to be participated in the growing body of literature on IPE by completing the questionnaires which will be delivered to you. This project will identify the attitudes of healthcare students toward IPE in Indonesian practice. The information will be highly valuable for the development of IPE in Indonesian practice. Please note that you are not required to put your name on the evaluation and all response will be treated confidentially.

The answers that you provided within this questionnaire are used for quality improvement and research purpose. The questionnaire will be analysed collectively and entirely anonymously, so please feel free to answer without inhibition. The questionnaire will take about 10 minutes.

Demographic Information

1. Gender   Male/ Female

2. Age   ....years

3. Affiliation   Medicine/ Nursing/ Pharmacy

4. Which semester are you in now?   I / II / III / IV / V / VI / VII / VIII

5. Previous tertiary qualification   Yes/ No

   If yes, please specify   --------------------------------------

6. Previous work experience in health related care   Yes/ No

   If yes, please specify   --------------------------------------

7. Previously experience in interprofessional learning   Yes/ No
   If yes, please specify   --------------------------------------

	Strongly Agree	Agree	Disagree	Strongly Disagree
Learning with other students will help me become a more effective member of a health care team	1	2	3	4
Patient would ultimately benefit if health care students worked together	1	2	3	4
Shared learning with other health care students will increase my ability to understand clinical problems	1	2	3	4

Team working skills are essential for all healthcare students to learn	1	2	3	4
Shared learning will help me understand my own professional limitations	1	2	3	4
Learning between healthcare students before qualification would improve working relationships after qualification	1	2	3	4
Shared learning will help me think positively about other healthcare professionals	1	2	3	4
It is not necessary for undergraduate healthcare students to learn together	1	2	3	4
Shared learning with other healthcare students will help me communicate better with patients	1	2	3	4
Shared learning with other healthcare students will help me communicate better with other professionals	1	2	3	4
I would welcome the opportunity to work together with other healthcare students	1	2	3	4
Shared learning will help me clarify the nature of patient problems	1	2	3	4
Shared learning before qualification will help me become a better team worker	1	2	3	4
The function of allied health professionals is mainly to provide support for doctors	1	2	3	4
I am not sure what my professional role will be	1	2	3	4
I have to acquire much more knowledge than other healthcare students	1	2	3	4
I have to acquire many more skills than other healthcare students	1	2	3	4

Thank You for Participation
This survey is adopted from RIPLS questionnaires of Curtin University version

Appendix 7b The Readiness for Interprofessional Education Learning Scale (RIPLS) questionnaire for healthcare students Bahasa Indonesian version

Curtin University

KESIAPAN MAHASISWA KESEHATAN UNTUK BELAJAR SECARA INTERPROFESIONAL
Peneliti: Desak K Ernawati (desak.ernawati@postgrad.curtin.edu.au)
Bagian Farmasi Kedokteran FK UNUD
Pembimbing: Prof Jeff Hughes (J.D.Hughes@curtin.edu.au)
Ya Ping Lee, PhD (Yaping.Lee@curtin.edu.au)
Curtin University Western Australia

Interprofessional Education (IPE) merupakan suatu kegiatan yang melibatkan dua atau lebih profesi dalam hal ini profesi kesehatan, dimana mereka belajar dari, dengan dan tentang satu sama lain untuk meningkatkan kualitas pelayanan kesehatan. Secara internasional, IPE telah diakui memiliki peranan penting dalam pendidikan profesi mahasiswa kesehatan. Kami ingin mengundang saudara untuk berpartisipasi dalam perkembangan IPE ini dengan cara mengisi survey yang akan diberikan kepada saudara. Penelitian ini bertujuan untuk mengetahui sikap mahasiswa kesehatan terhadap IPE di Indonesia. Informasi yang anda berikan akan sangat berarti bagi perkembangan IPE di Indonesia. Mohon dicatat bahwa anda tidak perlu menuliskan nama pada lembar ini. Semua informasi yang diperoleh dari survey ini bersifat rahasia
Jawaban yang anda berikan pada survey ini dipergunakan untuk penelitian. Hasil survey bersifat anonim dan analisis dilakukan secara kolektif. Untuk menjawab survey ini diperlukan waktu kurang lebih 10 menit.
(* : coret yang tidak sesuai)

Data Demografi
1. Jenis Kelamin   Laki-laki/ Perempuan*
2. Umur   ....tahun
3. Pendidikan   Kedokteran/Keperawatan/Farmasi*
4. Saat ini anda kuliah di semester berapa?   I / II / III/ IV / V / VI / VII / VIII
5. Apakah anda memiliki latar belakang pendidikan
   kesehatan sebelum pendidikan anda sekarang?   Ya/ Tidak*
6. Jika ada, mohon dituliskan   ....
   Apakah anda pernah melakukan kegiatan yang
   berkaitan dengan kesehatan sebelumnya?   Ya/ Tidak*
   Jika ya, mohon dituliskan   ....
7. Apakah sebelumnya anda pernah mengikuti
   pendidikan/pelatihan secara interprofesional?   Ya/ Tidak*
   (misalnya: workshop atau training)
   Jika ada, mohon dituliskan   ....

Lingkarilah pernyataan yang sesuai dengan pendapat anda

	Sangat Setuju	Setuju	Tidak Setuju	Sangat tidak Setuju
Belajar bersama mahasiswa profesi kesehatan lainnya akan membantu saya untuk menjadi anggota tim kesehatan yang lebih efektif	1	2	3	4
Pasienlah yang pada akhirnya akan mendapatkan manfaat jika mahasiswa profesi kesehatan bekerja bersama	1	2	3	4
Belajar bersama dengan mahasiswa profesi kesehatan lainnya akan meningkatkan kemampuan saya untuk mengerti masalah klinik	1	2	3	4

Ketrampilan untuk bekerja dalam tim sangat penting untuk dipelajari mahasiswa profesi kesehatan	1	2	3	4
Belajar bersama mahasiswa profesi kesehatan lainnya akan membantu saya mengerti tentang keterbatasan profesi saya	1	2	3	4
Belajar dengan mahasiswa profesi kesehatan lainnya sebelum lulus kuliah profesi akan meningkatkan hubungan kerjasama setelah praktek profesi nanti	1	2	3	4
Belajar bersama akan membantu saya untuk berpikiran positif terhadap profesi kesehatan yang lain	1	2	3	4
Tidak penting bagi mahasiswa profesi kesehatan untuk belajar bersama	1	2	3	4
Belajar bersama dengan mahasiswa profesi kesehatan lainnya akan membantu saya untuk berkomunikasi lebih baik dengan pasien	1	2	3	4
Belajar bersama dengan mahasiswa profesi kesehatan lainnya akan membantu saya berkomunikasi lebih baik dengan tenaga kesehatan lainnya.	1	2	3	4
Saya akan menerima kesempatan untuk bekerja bersama dengan mahasiswa profesi kesehatan lainnya	1	2	3	4
Belajar bersama akan membantu saya untuk mengklarifikasi masalah pasien	1	2	3	4
Belajar bersama sebelum lulus profesi akan membantu saya untuk menjadi anggota tim yang lebih baik	1	2	3	4
Tujuan utama dari kerjasama profesi kesehatan lainnya adalah untuk membantu dokter	1	2	3	4
Saya tidak yakin akan peranan profesi saya nanti	1	2	3	4
Saya harus mendapatkan lebih banyak pengetahuan dibandingkan dengan mahasiswa profesi kesehatan lainnya	1	2	3	4
Saya harus mendapatkan lebih banyak ketrampilan dibandingkan dengan mahasiswa profesi kesehatan lainnya	1	2	3	4

Terima kasih atas partisipasi saudara
Survey ini merupakan terjemahan dari RIPLS questionnaires versi Curtin University

Appendix 8a Invitation letter of participation in the IPE/IPP surveys English version

Curtin University

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School of Pharmacy

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Web curtin.edu.au

INVITATION TO PARTICIPATE IN AN IPE SURVEY
as part of the study looking at

Medication Safety in Indonesia: Expanding pharmacists' roles through Interprofessional Education (IPE) and Interprofessional Practice (IPP)

IPE is an activity where two or more professions learn from and with each other to improve health care service. IPE has been identified as an important area of healthcare training internationally. The investigator would like to invite you to participate in IPE survey. This survey would identify your attitude toward IPE. The survey is anonymous and data will pool together. So there will be no individual data reported in this study. The information will be highly valuable for the development of IPE in developing countries like Indonesia. The investigator had selected students randomly from the School of Medicine, School of Pharmacy and School of Nursing at Udayana University to complete a survey on readiness to participate in IPE and your name is selected. If you wish to participate, you will need to complete the survey and return it to the investigator within one week. However, if you do not wish to participate in the survey, you will not be required to fill out the survey but please return the survey to the investigator. If you choose not to participate in the survey, it will not impact on your study at the university. Your participation is entirely voluntary. It will only take approximately 10 minutes to complete the survey. Your participation is highly valuable to IPE development in Indonesian practice, and your participation is highly appreciated in this research.

Further information
This study has been reviewed and given approval by Curtin University Human Research Ethics Committee (Approval number HR175/2011). If you would like further information about this study, please feel free to contact me on +62361 222510 ext 110 or by email: desak.ernawati@postgrad.curtin.edu.au. Alternatively you can contact my supervisor Prof Jeff Hughes on +618 9266 7367 or by email J.D.Hughes@curtin.edu.au.

Appendix 8b Invitation letter of participation in the IPE/IPP surveys Bahasa Indonesian version

UNDANGAN UNTUK BERPARTISIPASI DALAM SURVEY INTERPROFESIONAL EDUCATION (IPE)
Sebagai bagian dalam penelitian yang berjudul

Keamanan Pemakaian Obat di Indonesia: Meningkatkan peranan apoteker melalui Interprofessional Education (IPE) dan Interprofessional Practice (IPP)

IPE adalah suatu aktifitas dimana dua atau lebih profesi bekerja dari dan dengan satu dan lain untuk meningkatkan pelayanan kesehatan. IPE/IPP telah terbukti berperan dalam pelatihan tenaga kesehatan secara internasional. Saat ini anda diundang oleh peneliti untuk berpartisipasi dalam perkembangan pengetahuan tentang IPE. Survey ini bertujuan untuk mengetahui sikap anda tentang IPE/IPP. Survey ini bersifat anonim dan data akan diolah secara kolektif, jadi tidak ada data yang akan dilaporkan secara individual. Informasi ini akan sangat bermanfaat untuk perkembangan IPE/IPP di negara berkembang seperti Indonesia. Penelitian ini bersifat sukarela. Peneliti telah memilih mahasiswa Kedokteran, Farmasi, atau Keperawatan di Universitas Udayana secara random untuk berpartisipasi dalam penelitian ini dan anda telah masuk dalam daftar tersebut. Jika anda ingin berpartisipasi, maka diharapkan untuk mengisi lembar survey dan peneliti akan mengambil satu minggu setelah anda menerima survey tersebut di kelas anda. Namun, jika anda tidak ingin berpartisipasi, hal ini tidak akan mempengaruhi studi anda. Waktu yang diperlukan untuk mengisi survey ini kurang lebih 10 menit. Partisipasi anda sangat penting untuk perkembangan IPE/IPP di Indonesia, dan partisipasi anda sangat kami hargai dalam penelitian ini.

Ada pertanyaan?
Jika anda memiliki pertanyaan atau ingin mendiskusikan hal-hal yang berhubungan dengan penelitian ini, dipersilakan untuk menghubungi peneliti di alamat email berikut: desak.ernawati@postgrad.curtin.edu.au atau menghubungi ke +62361 222510 ext 110. Atau anda bisa menghubungi supervisor saya Prof Jeff Hughes di +618 9266 7367 atau melalui email J.D.Hughes@curtin.edu.au.

Appendix 8c Participation information sheet in IPE survey English version

Participation Information Sheet

Medication Safety in Indonesia: Expanding pharmacist's roles through Interprofessional Education (IPE) and Interprofessional Practice (IPP)

My name is Desak Ketut Ernawati. I am currently completing a piece of research for my Doctor of Philosophy degree of Pharmacy at Curtin University, Western Australia.

Purpose of Research
I am investigating on Interprofessional Education (IPE)/ Interprofessional Practice (IPP) in healthcare service and on expanding pharmacist's roles in medication safety in Indonesia.

Your Role
I am interesting in finding out health students' attitudes towards IPE/IPP. Please note that you are not required to put your name on the evaluation. In this survey, I would like to ask you to:

- Complete Interprofessional Learning survey to identify your attitude towards IPP

- Return the above forms to enclosed replied enveloped.

These activities will take approximately 10 minutes.

Consent to Participate
Your involvement in the research is entirely voluntary. If you choose to complete and return the survey with the attached reply paid enveloped, we will accept this as your consent to participate in the study.

Confidentiality
Due to anonymous nature of this survey, you will not be able to withdraw your response once submitted. Your decision to participate in this study has no implication for your course. The survey will be kept in a locked cabinet for five years, before it is destroyed. Any publication or presentation will involve collated group results. No individual results will be published in any form.

Further information
This study has been reviewed and given approval by Curtin University Human Research Ethics Committee (Approval number HR175/2011). If you would like further information about this study, please feel free to contact me on +62361 222510 ext 110 or by email: desak.ernawati@postgrad.curtin.edu.au. Alternatively you can contact my supervisor Prof Jeff Hughes on +618 9266 7367 or by email J.D.Hughes@curtin.edu.au.

Thank you very much for your involvement in this research, your participation is greatly appreciated.

Appendix 8d Participation information sheet in IPE survey Bahasa Indonesian version

Curtin University

Faculty of Health Science

School of Pharmacy

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Lembar Informasi
IPE/IPP Survey

Keamanan Pemakaian Obat di Indonesia: Meningkatkan Peranan Apoteker Melalui Interprofessional Education (IPE) dan Interprofessional Practice (IPP)

Nama saya Desak Ketut Ernawati. Saat ini saya sedang menjalani penelitian berkaitan dengan pendidikan saya untuk mendapatkan gelar S3 (Doctor of Philosophy) di bidang Farmasi di Curtin University, Western Australia.

Tujuan Penelitian

Saya sedang meneliti tentang pelayanan kesehatan dengan menggunakan pendekatan Interprofessional Education (IPE)/ Interprofessional Practice (IPP) dan meneliti tentang peranan apoteker dalam keamanan pemakaian obat di Indonesia.

Cara Kerja

Saya tertarik untuk mengetahui sikap mahasiswa kesehatan terhadap IPE/IPE. Mohon dicatat bahwa anda tidak perlu menuliskan nama anda pada lembar survey ini. Jika anda bersedia, saat ini saya mohon anda untuk melakukan kegiatan sebagai berikut:

- Mengisi survey tentang Interprofesional Learning untuk mengetahui sikap anda terhadap IPE/IPP

- Mengembalikan survey ke amplop terlampir dan mengembalikan kepada koordinator kelas anda.

Aktifitas ini kurang lebih akan memakan waktu selama 10 menit.

Kesediaan untuk Berpartisipasi

Keterlibatan anda dalam survey ini bersifat sukarela. Jika anda mengisi dan mengembalikan survey ini, kami akan menerima hal ini sebagai persetujuan anda untuk terlibat dalam penelitian ini.

Kerahasian Data

Karena penelitian ini bersifat anonim, anda tidak dapat menarik kembali respon jika anda sudah mengumpulkan survey ini. Partisipasi anda tidak berhubungan dengan kuliah yang sedang anda ikuti di kampus. Hasil survey akan disimpan di lemari terkunci selama 5 tahun sebelum akhirnya dihancurkan. Presentasi maupun publikasi terhadap hasil penelitian akan dilakukan secara keseluruhan, jadi tidak ada informasi yang bersifat individu.

Informasi lebih lanjut

Penelitian ini telah mendapatkan ijin dari Curtin University Human Research Ethics Committee (Ijin No: HR175/2011). Jika anda menginginkan informasi lebih lanjut tentang penelitian ini, silakan untuk menghubungi peneliti ke +62361 222510 ext 110 atau ke email: desak.ernawati@postgrad.curtin.edu.au. Selain itu anda juga dapat menghubungi supervisor saya, Prof Jeff Hughes on +618 9266 7367 atau dengan mengirimkan email ke J.D.Hughes@curtin.edu.au.

Terima kasih atas partisipasi anda dalam penelitian ini. Partisipasi anda sangat kami hargai.

Appendix 9a The Readiness for Interprofessional Education Learning Scale (RIPLS) questionnaire for healthcare professional English version

READINESS FOR INTERPROFESSIONAL PRACTICE FOR HEALTHCARE PROFESSIONAL
Investigator: Desak K Ernawati (desak.ernawati@postgrad.curtin.edu.au)
Department of Pharmacy School of Medicine Udayana University
Jl. P. B Sudirman Denpasar Bali. Phone: +62361222510 ext 110
Supervisors: Prof Jeff Hughes (J.D.Hughes@curtin.edu.au)
Ya Ping Lee, PhD (Yaping.Lee@curtin.edu.au)
Curtin University Western Australia

Interprofessional Practice (IPP) is an activity where two or more professionals learn with and from each other with an intention to improve quality of care. IPP has been identified to promote the use of safe medication and professional integration. IPP is an important component in healthcare training internationally. We would like to invite you to be participated in the growing body of literature on IPP by completing the questionnaires which will be delivered to you. This project will identify healthcare professionals' attitude toward IPP in Indonesian practice. The information will be highly valuable for the development of IPP in Indonesia. Please note that you are not required to put your name on the evaluation and all response will be treated confidentially.

The answers that you provided within this questionnaire are used for research purpose. The questionnaire will be analysed collectively and entirely anonymously, so please feel free to answer without inhibition. The questionnaire will take about 10 minutes.

Demographic Information
1. Gender   Male/ Female
2. Age   ....years
3. Affiliation   Medicine/ Nursing/ Pharmacy
4. How long have you been working as health practitioner?--------------------years
5. Previous tertiary qualification   Yes/   No
   If yes, please specify   ------------------------------------
6. Previously experience in interprofessional learning   Yes/ No
   If yes, please specify   ------------------------------------

	Strongly Agree	Agree	Disagree	Strongly Disagree
Shared learning will help me to think positively about other health care professionals	1	2	3	4
Shared learning helps to clarify the nature of patients problems	1	2	3	4
Shared learning with other health care professional will help me to communicate better with patients and other professionals	1	2	3	4
Shared learning before qualification would help health care professionals become better team workers	1	2	3	4
Shared learning with other health care professionals will increase my ability to understand clinical problems	1	2	3	4
Shared learning will help me understand my own limitation	1	2	3	4
Learning with other health care professionals will help me to be a more effective member of health care team	1	2	3	4
Learning with health care students from other disciplines before qualification would improve relationships after qualification	1	2	3	4
Communication skills should be learned with other health care professionals	1	2	3	4
I would welcome the opportunity to work on small-group projects with other health care professionals	1	2	3	4
Team-working skills are essential for all health care professionals to learn	1	2	3	4
For small group learning to work, health care professionals need to trust and respect each other	1	2	3	4
Patients ultimately benefit if health care professionals work together to solve patient problems	1	2	3	4
Establishing trust with my patients is important to me	1	2	3	4
In my profession one needs skills in interacting and co-operating with patients	1	2	3	4

Thinking about the patient as a person is important in getting treatment right	1	2	3	4
I like to understand the patient's side of the problem	1	2	3	4
I try to communicate compassion to my patients	1	2	3	4
The function of nurses and therapists is mainly to provide support for doctors	1	2	3	4
Clinical problem-solving skills should only be learned with professionals from my own discipline	1	2	3	4
I have to acquire much more knowledge and skills than other health care professionals	1	2	3	4
I would feel uncomfortable if another health care professionals knew about a topic that I did	1	2	3	4
There is little overlap between my role and that of other health care professionals	1	2	3	4

Thank You for Participation

This questionnaire is adopted from Reid R, Bruce D, Allstaff K, McLernon D. Validating the readiness for interprofessional learning scale (RIPLS) in the postgraduate context:are health care professionals ready for IPL? Med Educ. 2006; 40:415-422.

Appendix 9b The Readiness for Interprofessional Education Learning Scale (RIPLS) questionnaire for healthcare professional Bahasa Indonesian version

KESIAPAN PROFESI TENAGA KESEHATAN UNTUK BEKERJA SECARA INTERPROFESIONAL
Peneliti: Desak K Ernawati (desak.ernawati@postgrad.curtin.edu.au)
Bagian Farmasi Kedokteran FK UNUD
Pembimbing: Prof Jeff Hughes (J.D.Hughes@curtin.edu.au)
Ya Ping Lee, PhD (Yaping.Lee@curtin.edu.au)
Curtin University Western Australia

Interprofessional Practice (IPP) adalah suatu kegiatan yang melibatkan dua atau lebih profesi bekerja dan belajar dari dan dengan satu sama lain untuk meningkatkan kualitas pelayanan kesehatan. IPP telah terbukti meningkatkan keamanan pemakaian obat yang tercakup dalam penggunaan obat yang rasional. IPP juga meningkatkan integrasi profesi kesehatan. Secara internasional, IPP merupakan komponen penting dalam pelatihan tenaga kesehatan. Kami ingin mengundang sejawat Dokter/Perawat/Apoteker untuk berpartisipasi untuk perkembangan IPP di Indonesia dengan mengisi survey yang diberikan. Penelitian ini akan mengidentifikasi sikap dari profesi kesehatan tentang IPP di Indonesia. Informasi yang diperoleh ini akan sangat bermanfaat untuk perkembangan IPP di Indonesia. Mohon diingat bahwa nama tidak perlu dicantumkan dalam lembaran ini. Semua informasi yang diperoleh dari survey ini adalah bersifat rahasia.
Jawaban yang diberikan pada survey ini hanya untuk penelitian. Survey akan dianalisa secara kolektif dan anonim. Diharapkan untuk memberikan jawaban pada survey tanpa ada tekanan. Waktu yang diperlukan untuk mengisi survey ini kurang lebih 10 menit. (*: coret yang tidak perlu)

Data Demografi
1. Jenis Kelamin — Pria/ Wanita (*)
2. Tahun Lahir — ....
3. Profesi anda saat ini? — Dokter/Perawat/Apoteker (*)
4. Tahun kelulusan profesi — ....
5. Sudah berapa lamakah anda berpraktek profesi ini? — ....tahun
6. Apakah saudara memiliki latar belakang pendidikan kesehatan selain profesi anda sekarang? — Ya/ Tidak (*)
   (misalnya: Master/Doktor/Spesialis/Subspesialis)
   Jika ada, mohon dituliskan — ....
7. Apakah saudara memiliki pengalaman untuk bekerja secara interprofesional sebelumnya? — Ya/ Tidak (*)
   (misalnya: pelatihan/training tentang IPP)
   Jika ada, mohon dituliskan — ....

Lingkarilah pernyataan yang sesuai dengan pendapat anda

	Sangat Setuju	Setuju	Tidak Setuju	Sangat Tidak Setuju
Bekerja secara interprofesional dengan profesi kesehatan lain membuat saya berpikir positif tentang profesi tenaga kesehatan lainnya	1	2	3	4
Bekerja secara interprofesional dengan profesi kesehatan lainnya membantu menjelaskan permasalahan kesehatan pasien	1	2	3	4
Bekerja secara interprofesional dengan profesi kesehatan lainnya membantu saya untuk berkomunikasi lebih baik kepada pasien dan profesi tenaga kesehatan lainnya	1	2	3	4
Belajar bersama dengan mahasiswa profesi kesehatan lainnya secara interprofessional sebelum lulus pendidikan profesi akan membantu mahasiswa untuk menjadi anggota tim kesehatan yang lebih baik	1	2	3	4
Bekerja secara interprofesional dengan profesi tenaga kesehatan lainnya dapat meningkatkan kemampuan saya untuk mengerti permasalahan klinik pasien	1	2	3	4
Bekerja secara interprofesional dapat membantu saya untuk memahami keterbatasan profesi saya	1	2	3	4

Belajar bersama dengan profesi tenaga kesehatan lainnya dapat membantu saya untuk menjadi anggota tim kesehatan yang lebih efektif.	1	2	3	4
Belajar bersama dengan mahasiswa profesi kesehatan lainnya sebelum lulus pendidikan profesi akan membantu meningkatkan kerjasama antar profesi kesehatan setelah praktek profesi nanti	1	2	3	4
Ketrampilan berkomunikasi seharusnya dipelajari bersama dengan profesi tenaga kesehatan lainnya.	1	2	3	4
Saya akan menerima kesempatan untuk bekerja sama dalam kelompok kecil dengan profesi kesehatan lainnya	1	2	3	4
Ketrampilan untuk bekerja dalam tim sangat penting untuk dipelajari bagi semua tenaga kesehatan	1	2	3	4
Agar kelompok kecil bisa bekerja dengan baik, diperlukan kepercayaan dan saling menghargai antar profesi tenaga kesehatan	1	2	3	4
Pasienlah yang akan mendapatkan manfaat jika profesi tenaga kesehatan bekerja secara interprofesional untuk menyelesaikan masalah pasien	1	2	3	4
Membangun kepercayaan pasien sangat penting dalam praktek profesi saya	1	2	3	4
Dalam profesi saya, diperlukan ketrampilan untuk berinteraksi dan bekerjasama dengan pasien	1	2	3	4
Mendudukkan pasien sebagai individu sangat penting dalam memberikan pelayanan kesehatan yang benar	1	2	3	4
Saya ingin mengetahui masalah lain selain masalah kesehatan yang dimiliki oleh pasien	1	2	3	4
Saya berusaha berempati kepada pasien saya	1	2	3	4
Peranan utama dari perawat dan apoteker adalah untuk membantu dokter	1	2	3	4
Ketrampilan menyelesaikan masalah klinik seharusnya hanya bisa dipelajari bersama dengan sejawat seprofesi saya	1	2	3	4
Saya harus mendapatkan lebih banyak pengetahuan dan ketrampilan dibandingkan dengan profesi tenaga kesehatan lainnya	1	2	3	4
Saya akan merasa tidak nyaman jika profesi tenaga kesehatan lainnya mengerti tentang topik yang telah saya kerjakan	1	2	3	4
Ada sedikit tumpang tindih antara peran profesi saya dengan profesi tenaga kesehatan lainnya	1	2	3	4

Terima kasih atas partisipasinya
Survey ini merupakan terjemahan dari Reid R, Bruce D, Allstaff K, McLernon D. Validating the readiness for interprofessional learning scale (RIPLS) in the postgraduate context:are health care professionals ready for IPL? Med Educ. 2006; 40:415-422.

Appendix 10a Participation information sheet in IPP and case vignettes survey for healthcare professionals English version

Participation Information Sheet

Medication Safety in Indonesia: Expanding pharmacist's roles through Interprofessional Education (IPE) and Interprofessional Practice (IPP)

My name is Desak Ketut Ernawati. I am currently completing a piece of research for my Doctor of Philosophy degree of Pharmacy at Curtin University, Western Australia.

Purpose of Research
I am investigating on Interprofessional Education (IPE)/ Interprofessional Practice (IPP) in healthcare service and on expanding pharmacist's roles in medication safety in Indonesia.

Your Role
I am interesting in finding out healthcare professionals' attitudes towards IPE/IPP and your attitudes towards pharmacist's roles in ensuring the safe use of medication. Please note that you are not required to put your name on the evaluation.
In this survey, I would like to ask you to:

- Complete Interprofessional Learning survey to identify your attitude towards IPP

- Complete the case studies attached

- Return the above forms to enclosed replied enveloped.

These activities will take approximately 20 minutes.

Consent to Participate
Your involvement in the research is entirely voluntary. If you choose to complete and return the survey and case studies with the attached reply paid enveloped, we will accept this as your consent to participate in the study.

Confidentiality
Due to anonymous nature of this survey, you will not be able to withdraw your response once submitted. Your decision to participate in this study has no implication for your course at workplace. The survey will be kept in a locked cabinet for five years, before it is destroyed. Any publication or presentation will involve collated group results. No individual results will be published in any form.

Further information
This study has been reviewed and given approval by Curtin University Human Research Ethics Committee (Approval number HR175/2011). If you would like further information about this study, please feel free to contact me on +62361 222510 ext 110 or by email: desak.ernawati@postgrad.curtin.edu.au. Alternatively you can contact my supervisor Prof Jeff Hughes on +618 9266 7367 or by email J.D.Hughes@curtin.edu.au.

Thank you very much for your involvement in this research, your participation is greatly appreciated.

Appendix 10b Participation information sheet in IPP and case vignettes survey for healthcare professionals Bahasa Indonesian version

Lembar Informasi
IPE/IPP Survey

Keamanan Pemakaian Obat di Indonesia: Meningkatkan Peranan Apoteker Melalui Interprofessional Education (IPE) dan Interprofessional Practice (IPP)

Nama saya Desak Ketut Ernawati. Saat ini saya sedang menjalani penelitian berkaitan dengan pendidikan saya untuk mendapatkan gelar S3 (Doctor of Philosophy) di bidang Farmasi di Curtin University, Western Australia.

Tujuan Penelitian
Saya sedang meneliti tentang pelayanan kesehatan dengan menggunakan pendekatan Interprofessional Education (IPE)/ Interprofessional Practice (IPP) dan meneliti tentang peranan apoteker dalam keamanan pemakaian obat di Indonesia.

Cara Kerja
Saya tertarik untuk mengetahui sikap tenaga kesehatan terhadap IPE/IPE dan juga sikap saudara terhadap peranan apoteker dalam memastikan keamanan pemakaian obat di Indonesia. Mohon dicatat bahwa saudara tidak perlu menuliskan nama saudara pada lembar survey ini. Jika saudara bersedia, saya mohon untuk melakukan kegiatan sebagai berikut:

- Mengisi survey tentang Interprofesional Learning untuk mengetahui sikap saudara terhadap IPE/IPP

- Mengisi kasus dalam survey ini

- Mengembalikan kedua lembar form tersebut ke amplop terlampir dan mengirimkan ke alamat yang telah dituliskan di amplop.

Aktifitas ini kurang lebih akan memakan waktu selama 20 menit.

Kesediaan untuk Berpartisipasi
Keterlibatan saudara dalam survey ini bersifat sukarela. Jika saudara mengisi dan mengembalikan survey ini, kami akan menerima hal ini sebagai persetujuan saudara untuk terlibat dalam penelitian ini.

Kerahasiaan Data

Karena penelitian ini bersifat anonim, saudara tidak dapat menarik kembali respon jika saudara sudah mengumpulkan survey ini. Partisipasi saudara tidak berhubungan dengan pekerjaan saudara saat ini. Hasil survey akan disimpan di lemari terkunci selama 5 tahun sebelum akhirnya dihancurkan. Presentasi maupun publikasi terhadap hasil penelitian akan dilakukan secara keseluruhan, jadi tidak ada informasi yang bersifat individu.

Informasi lebih lanjut
Penelitian ini telah mendapatkan ijin dari Curtin University Human Research Ethics Committee (Ijin No: HR175/2011). Jika saudara menginginkan informasi lebih lanjut tentang penelitian ini, silakan untuk menghubungi peneliti ke +62361 222510 ext 110 atau ke email: desak.ernawati@postgrad.curtin.edu.au. Selain itu saudara juga dapat menghubungi supervisor saya, Prof Jeff Hughes on +618 9266 7367 atau dengan mengirimkan email ke J.D.Hughes@curtin.edu.au.

Terima kasih atas partisipasi saudara dalam penelitian ini. Partisipasi saudara sangat kami hargai.

Appendix 11a Graduate survey as care providers English version

PHARMACY GRADUATE SURVEY

Investigator: Desak K Ernawati (desak.ernawati@postgrad.curtin.edu.au)
Department of Pharmacy School of Medicine Udayana University
Jl. P. B Sudirman Denpasar Bali. Phone: +62361222510 ext 110
Supervisors: Prof Jeff Hughes (J.D.Hughes@curtin.edu.au)
Ya Ping Lee, PhD (Yaping.Lee@curtin.edu.au)
Curtin University Western Australia

Pharmacists' ability to provide patient care is crucial to the expansion of their roles. Development of the knowledge, skills and attributes to engage in patient care takes time.

This project seeks to establish graduates perceptions about how well they feel they are prepared to provide patient care.

Instruction for completion of the questionnaires
- This questionnaire will take about 10 minutes
- Please answer each question by ticking the appropriate box as where indicated
- In the case of most of the questions your opinion is being sought so there is no correct answer
- The answers to the questionnaire will be analysed collectively and entirely anonymously. It will not be possible to identify individual respondents so please feel free to answer without inhibition

Please indicate the extent to which you believe you possessed the attributes listed by the time you graduated by (a) ticking one only of the boxes marked "Yes", "Partially", "No", **AND** (b) whether you believe these characteristics are indeed "desirable" by entering "Yes" or "No" in the last column.

	Yes	Partially	No	Desirable? (Yes/No)
Ability to recognize own limitations and strength				
Ability to inspire confidence in others, i.e patients				
Ability to listen				
Ability to work in a team				
Adaptability in a changing environment				
Capacity for independent learning for life				
Capacity for self-audit				
Caring and compassionate nature				
Excitement with the subject of pharmacy				

Leadership potential

Motivation

Open-mindedness

Perseverance

Satisfactory at interpersonal relationships in
your professional life

Spirit of curiosity

Tolerance of ambiguity and uncertainty, i.e
decision making with inadequate data

Please give below any other comments you have on this aspect of your development (If none, please state none)

Finally, we would like to ask some questions about you to help interpret the results
Your gender: Male / Female
Age: _____ years
Place of Employment   (Community pharmacy, hospital, company, others; please specify)

Do you hold another professional degree other than your pharmacy degree?
Yes, please specify... No

Thank you for your participation
**This questionnaire is adopted from Nova Southeastern University and Curtin University on
Pharmacy Graduate Survey**

Curtin University is a trademark of Curtin University of Technology.   CRICOS Provider Code 00301J (WA), 02637B (NSW)

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Appendix 11b Graduate survey as care providers Bahasa Indonesian version
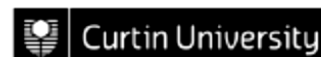
SURVEY LULUSAN APOTEKER

Peneliti: Desak K Ernawati (desak.ernawati@postgrad.curtin.edu.au)
Bagian Farmasi Kedokteran FK UNUD
Pembimbing: Prof Jeff Hughes (J.D.Hughes@curtin.edu.au)
Ya Ping Lee, PhD (Yaping.Lee@curtin.edu.au)
Curtin University Western Australia

Kemampuan apoteker untuk dapat memberikan pelayanan kepada pasien adalah sangat penting untuk mengembangkan peranan apoteker. Mengembangkan pengetahuan, ketrampilan, dan kemampuan untuk memberikan pelayanan kepada pasien memerlukan waktu.

Penelitian ini bertujuan untuk mendapatkan gambaran tentang persepsi lulusan Apoteker tentang kesiapan untuk dapat memberikan pelayanan kepada pasien.

Petunjuk pengisian survey
- Survey ini dapat diselesaikan dalam waktu **10 menit**
- Mohon untuk memberikan tanda rumput (√)pada kotak yang sesuai
- Karena untuk mengisi kuesioner ini adalah pendapat anda, jadi tidak ada pertanyaan yang salah maupun benar
- Jawaban pada survey ini akan dianalisa secara kolektif dan bersifat anonim. Peneliti tidak akan bisa mengidentifikasi informasi perorangan, jadi diharapkan untuk tidak ragu dalam menjawab survey ini.

Isilah kolom yang anda percaya telah anda miliki setelah anda lulus dengan cara (a) memberikan tanda rumput (√) pada kolom Ya/Sebagian/Tidak **DAN** (b) jika anda setuju bahwa kemampuan ini, ingin anda miliki untuk menjadi seorang apoteker, mohon menuliskan Ya atau Tidak dikolom terakhir.

	Ya	Sebagian	Tidak	Anda Ingin Miliki? Ya/Tidak
Menyadari kekuatan dan kelemahan sendiri				
Menginspirasi kepercayaan diri pada orang lain misalnya pasien				
Mampu mendengarkan				
Mampu bekerja sama dalam team				
Mampu beradaptasi dengan lingkungan yang berubah-ubah				
Mampu belajar mandiri sepanjang hidup				
Mampu menilai diri sendiri				
Memiliki rasa peduli dan simpati				
Ketertarikkan dengan materi yang berhubungan dengan kefarmasian				

Potensi menjadi pemimpin				
Motivasi untuk melakukan pelayanan kepada pasien				
Berpikiran terbuka				
Tekun				
Kepuasan untuk menjalin hubungan interpersonal dalam kehidupan profesi				
Rasa keingintahuan yang tinggi				
Memiliki rasa toleransi terhadap sesuatu yang tidak jelas misalnya mengambil keputusan dengan data yang sangat terbatas				

Tuliskanlah kemampuan yang anda yakin anda peroleh selama kuliah selain yang dituliskan diatas. (Jika tidak ada, tuliskan tidak ada)

_____

_____

_____

Terakhir, kami ingin mengetahui informasi tentang anda untuk dapat menginterpretasikan hasil penelitian ini.

Jenis Kelamin   Laki-laki/Perempuan

Umur   ....tahun

Tempat kerja   (Apotek, Rumah Sakit, Industri Farmasi, Lainnya; mohon di sebutkan................................)

Apakah anda memiliki gelar lain selain Apoteker?

Jika Ya, mohon dituliskan................................   Tidak

Terima kasih atas waktu dan partisipasi anda

Survey ini merupakan terjemahan dari Nova Southeastern University dan Curtin University tentang Pharmacy Graduate Survey

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Appendix 12a Invitation letter of participation in graduate questionnaire English version

Invitation To Participate In a Pharmacy Graduate Survey
as part of the study looking at

Medication Safety in Indonesia: Expanding pharmacists' roles through Interprofessional Education (IPE) and Interprofessional Practice (IPP)

Pharmacists' preparedness to provide care is crucial to the enrichment of patient care. Some individuals may have acquired these attributes during their undergraduate training while others may develop that through their working experience. There has not been much study conducted to identify whether pharmacists are well prepared to deliver patient care in Indonesia. Thus, part of this study aims to determine pharmacy graduate's preparedness to deliver patient care. You have been selected to take part in this research by the investigator because you are a recent pharmacy graduate from Udayana University. We would like to invite you to take part in this study by completing a survey on pharmacy graduate's preparedness in delivering patient care. It will only take approximately 10 minutes to complete the survey.

The information will be highly valuable for the development of pharmacist's role in delivering patient care in Indonesia. Your participation is highly appreciated. The survey is anonymous and data will be pooled together for analysis. There will be no individual data reported in this study.

Any questions?

This study has been reviewed and given approval by Curtin University Human Research Ethics Committee (Approval number HR175/2011). If you would like further information about this study, please feel free to contact me on +62361 222510 ext 110 or by email: desak.ernawati@postgrad.curtin.edu.au. Alternatively you can contact my supervisor Prof Jeff Hughes on +618 9266 7367 or by email J.D.Hughes@curtin.edu.au.

Appendix 12b Invitation letter of participation in graduate questionnaire Bahasa Indonesian version

Faculty of Health Science

School of Pharmacy

Telephone +61 8 9266 7369
Facsimile +61 8 9266 2769
Email pharmacy@curtin.edu.au
Web curtin.edu.au

Undangan untuk Berpartisipasi dalam Survey Lulusan Apoteker
Sebagai bagian dalam penelitian yang berjudul

Keamanan Pemakaian Obat di Indonesia: Meningkatkan Peranan Apoteker Melalui Interprofessional Education (IPE) dan Interprofessional Practice (IPP)

Persepsi apoteker tentang kemampuan mereka untuk melayani pasien sangat penting untuk melakukan pelayanan yang berfokus kepada pasein (*patient-centredness*). Beberapa orang mungkin telah memiliki persepsi ini sebelum mereka memasuki bangku kuliah. Beberapa orang lain mungkin baru memilikinya setelah mereka belajar sebagai seorang apoteker. Belum banyak penelitian yang dilakukan untuk mengetahui kesiapan lulusan apoteker untuk memberikan pelayanan langsung kepada pasien/masyarakat di Indonesia. Sehingga, penelitian untuk mengetahui persepsi lulusan apoteker untuk memberikan pelayanan kepada pasien perlu untuk dilakukan. Kami ingin mengundang lulusan apoteker dari Jurusan FMIPA Universitas Udayana untuk berpartisipasi dalam penelitian ini dengan mengisi survey tentang persepsi lulusan apoteker tentang memberikan pelayanan kepada pasien. Peneliti akan mengirimkan survey ke alamat lulusan apoteker dari semua angkatan. Jika saudara sebagai lulusan apoteker menerima survey tersebut, diharapkan untuk mengisi dan mengembalikan survey ke amplop yang telah disediakan. Informasi ini akan sangat bermanfaat untuk meningkatkan peranan apoteker dalam pelayanan kepada pasien. Partisipasi anda sangat kami hargai. Survey ini bersifat anonim dan data akan dianalisis secara kolektif, jadi tidak ada data yang akan dilaporkan secara individual. Dibutuhkan waktu kurang lebih 10 menit untuk mengisi survey ini.

Ada pertanyaan?

Jika anda memiliki pertanyaan atau ingin mendiskusikan hal-hal yang berhubungan dengan penelitian ini, dipersilakan untuk menghubungi peneliti di alamat email berikut: desak.ernawati@postgrad.curtin.edu.au atau menghubungi ke +62361 222510 ext 110. Atau anda bisa menghubungi supervisor saya Prof Jeff Hughes di +618 9266 7367 atau melalui email J.D.Hughes@curtin.edu.au.

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Appendix 12c Participation information sheet in graduate questionnaire English version

Participation Information Sheet

Medication Safety in Indonesia: Expanding pharmacist's roles through Interprofessional Education (IPE) and Interprofessional Practice (IPP)

My name is Desak Ketut Ernawati. I am currently completing a piece of research for my Doctor of Philosophy degree of Pharmacy at Curtin University, Western Australia.

Purpose of Research
I am investigating on Interprofessional Education (IPE)/ Interprofessional Practice (IPP) in healthcare service and on expanding pharmacist's roles in medication safety in Indonesia.

Your Role
I am interesting in finding out pharmacy graduates' preparedness in delivering patient care in Indonesia. I would like to deliver Pharmacy Graduate Survey to identify your attitudes towards pharmacists' roles in delivering patient care. Please note that you are not required to put your name on the evaluation. I would like to ask you to:
- Complete Pharmacy Graduate Survey to identify your preparedness in delivering patient care
- Return the above forms to enclosed replied enveloped.
This activity will take approximately for 10 minutes.

Consent to Participate
Your involvement in the research is entirely voluntary. If you choose to complete and return the survey and case studies with the attached reply paid enveloped, we will accept this as your consent to participate in the study.

Confidentiality
Due to anonymous nature of this survey, you will not be able to withdraw your response once submitted. Your decision to participate in this study has no implication for your course at workplace. The survey will be kept in a locked cabinet for five years, before it is destroyed. Any publication or presentation will involve collated group results. No individual results will be published in any form.

Further information
This study has been reviewed and given approval by Curtin University Human Research Ethics Committee (Approval number HR175/2011). If you would like further information about this study, please feel free to contact me on +62361 222510 ext 110 or by email: desak.ernawati@postgrad.curtin.edu.au. Alternatively you can contact my supervisor Prof Jeff Hughes on +618 9266 7367 or by email J.D.Hughes@curtin.edu.au.

Thank you very much for your involvement in this research, your participation is greatly appreciated.

Appendix 12d Participation information sheet in graduate questionnaire Bahasa Indonesian version

Curtin University

Faculty of Health Science

School of Pharmacy

Telephone +61 8 9266 7369
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Email pharmacy@curtin.edu.au
Web curtin.edu.au

Lembar Informasi
Survey Lulusan Apoteker

Keamanan Pemakaian Obat di Indonesia: Meningkatkan Peranan Apoteker Melalui Interprofessional Education (IPE) dan Interprofessional Practice (IPP)

Nama saya Desak Ketut Ernawati. Saat ini saya sedang menjalani penelitian berkaitan dengan pendidikan saya untuk mendapatkan gelar S3 (Doctor of Philosophy) di bidang Farmasi di Curtin University, Western Australia.

Tujuan Penelitian
Saya sedang meneliti tentang pelayanan kesehatan dengan menggunakan pendekatan Interprofessional Education (IPE)/ Interprofessional Practice (IPP) dan meneliti tentang meningkatkan peranan apoteker dalam keamanan pemakaian obat di Indonesia.

Cara Kerja
Saya tertarik ingin mengetahui kesiapan lulusan apoteker dalam memberikan pelayanan kepada pasien di Indoneisa. Saya ingin menyampaikan Survey Lulusan Apoteker kepada anda untuk mengetahui sikap dan kesiapan anda terhadap peranan apoteker dalam memberikan pelayanan kepada pasien. Mohon dicatat bahwa anda tidak diharapkan untuk menuliskan nama anda pada survey ini. Pada kesempatan ini, saya mohon anda untuk melakukan hal sebagai berikut:

- Mengisi Survey Lulusan Apoteker untuk mengetahui kesiapan anda untuk memberikan pelayanan kepada pasein.
- Mengembalikan survey tersebut ke amplop terlampir ke alamat yang telah dituliskan

Kegiatan ini kurang lebih membutuhkan waktu 10 menit.

Kesediaan untuk Berpartisipasi
Keterlibatan anda dalam survey ini bersifat sukarela. Jika anda mengisi dan mengembalikan survey ini, kami akan menerima hal ini sebagai persetujuan anda untuk terlibat dalam penelitian ini.

Kerahasian Data

Karena penelitian ini bersifat anonim, anda tidak dapat menarik kembali respon jika anda sudah mengumpulkan survey ini. Partisipasi anda tidak berhubungan dengan pekerjaan anda saat ini. Hasil survey akan disimpan di lemari terkunci selama 5 tahun sebelum akhirnya dihancurkan. Presentasi maupun publikasi terhadap hasil penelitian akan dilakukan secara keseluruhan, jadi tidak ada informasi yang bersifat individu.

Informasi lebih lanjut
Penelitian ini telah mendapatkan ijin dari Curtin University Human Research Ethics Committee (Ijin No: HR175/2011). Jika anda menginginkan informasi lebih lanjut tentang penelitian ini, silakan untuk menghubungi peneliti ke +62361 222510 ext 110 atau ke email: desak.ernawati@postgrad.curtin.edu.au. Selain itu anda juga dapat menghubungi supervisor saya, Prof Jeff Hughes on +618 9266 7367 atau dengan mengirimkan email ke J.D.Hughes@curtin.edu.au.

Terima kasih atas partisipasi anda dalam penelitian ini. Partisipasi anda sangat kami hargai.

Appendix 13a The Readiness for Interprofessional Learning Scale (RIPLS) pre-workshop questionnaire English version

INTERPROFESSIONAL LEARNING PRE-WORKSHOP QUESTIONNAIRE
Investigator: Desak K Ernawati (desak.ernawati@postgrad.curtin.edu.au)
Department of Pharmacy School of Medicine Udayana University
Jl. P. B Sudirman Denpasar Bali. Phone: +62361222510 ext 110
Supervisors: Prof Jeff Hughes (J.D.Hughes@curtin.edu.au)
Ya Ping Lee, PhD (Yaping.Lee@curtin.edu.au)
Curtin University Western Australia

The answers that you provided within this questionnaire are used for research purpose. The questionnaire will be analysed collectively and entirely anonymously, so please feel free to answer without inhibition. Remember this is just to capture your immediate views, so there is no need to spend too long on each question.

Demographic Information

1. Gender — Male/ Female

2. Age — ....years

3. Affiliation — Medicine/ Nursing/ Pharmacy

4. Previous tertiary qualification — Yes/ No
   If yes, please specify — ------------------------------

5. Previous work experience in health related are — Yes/ No
   If yes, please specify — ------------------------------

6. Previously experience in interprofessional learning — Yes/ No
   If yes, please specify — ------------------------------

	Strongly Agree	Agree	Disagree	Strongly Disagree
Learning with other students will help me become a more effective member of a health care team	1	2	3	4
Patient would ultimately benefit if health care students worked together	1	2	3	4
Shared learning with other health care students will increase my ability to understand clinical problems	1	2	3	4
Team working skills are essential for all healthcare students to learn	1	2	3	4
Shared learning will help me understand my own professional limitations	1	2	3	4
Learning between healthcare students before qualification would improve working relationships after qualification	1	2	3	4
Shared learning will help me think positively about other healthcare professionals	1	2	3	4
It is not necessary for undergraduate healthcare students to learn together	1	2	3	4

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Shared learning with other healthcare students will help me communicate better with patients	1	2	3	4
Shared learning with other healthcare students will help me communicate better with other professionals	1	2	3	4
I would welcome the opportunity to work together with other healthcare students	1	2	3	4
Shared learning will help me clarify the nature of patient problems	1	2	3	4
Shared learning before qualification will help me become a better team worker	1	2	3	4
The function of allied health professionals is mainly to provide support for doctors	1	2	3	4
I am not sure what my professional role will be	1	2	3	4
I have to acquire much more knowledge than other healthcare students	1	2	3	4
I have to acquire many more skills than other healthcare students	1	2	3	4

Thank You for Participation

Appendix 13b The Readiness for Interprofessional Learning Scale (RIPLS) pre-workshop questionnaire Bahasa Indonesian version

Interprofessional Learning Pre-Workshop Questionnaire

Jawaban yang anda berikan pada survey ini dipergunakan untuk penelitian IPE di Indonesia. Hasil survey bersifat anonim dan analisis dilakukan secara kolektif. Diharapkan untuk mengisi survey ini tanpa ada halangan. Mohon diingat bahwa survey ini bertujuan untuk mendapatkan gambaran secara umum, jadi diharapkan untuk tidak terlalu lama untuk menjawab setiap pertanyaan yang tersedia. (*: coret yang tidak sesuai)

Data Demografi
1. Jenis Kelamin   Laki-laki/ Perempuan*
2. Umur   ....
3. Pendidikan   Kedokteran/Keperawatan/Farmasi*
4. Apakah saudara memiliki Kualifikasi pendidikan kesehatan sebelumnya   Ya/ Tidak*
   Jika ada, mohon dituliskan   --------------------------------------
5. Apakah anda pernah bekerja yang berkaitan dengan kesehatan sebelumnya?   Ya/ Tidak*
   Jika ya, mohon dituliskan   --------------------------------------
6. Apakah sebelumnya anda pernah mengikuti pendidikan secara interprofesional?   Ya/ Tidak*
   Jika ada, mohon dituliskan   --------------------------------------

Lingkarilah pernyataan yang sesuai dengan pendapat anda

	Sangat Setuju	Setuju	Tidak Setuju	Sangat tidak Setuju
Belajar bersama mahasiswa kesehatan lainnya akan membantu saya untuk menjadi anggota team kesehatan yang lebih efektif	1	2	3	4
Pasien akan sangat diuntungkan jika mahasiswa kesehatan bekerja bersama	1	2	3	4
Belajar bersama dengan mahasiswa kesehatan lainnya akan meningkatkan kemampuan saya untuk mengerti masalah klinik	1	2	3	4
Ketrampilan untuk bekerja dalam team sangat penting untuk dipelajari mahasiswa kesehatan	1	2	3	4
Belajar bersama akan membantu saya mengerti tentang keterbatasan profesi saya	1	2	3	4
Belajar antara mahasiswa kesehatan sebelum lulus kuliah profesi akan meningkatkan hubungan kerjasama setelah lulus kuliah	1	2	3	4
Belajar bersama akan membantu saya untuk berpikiran positif terhadap profesi kesehatan yang lain	1	2	3	4

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Tidak penting bagi mahasiswa kesehatan untuk belajar bersama	1	2	3	4
Belajar bersama dengan mahasiswa kesehatan lainnya akan membantu saya untuk berkomunikasi lebih baik dengan pasien	1	2	3	4
Belajar bersama dengan mahasiswa kesehatan launnya akan membantu saya berkomunikasi lebih baik dengan tenaga kesehatan lainnya.	1	2	3	4
Saya akan menerima kesempatan untuk bekerja bersama dengan mahasiswa kesehatan lainnya	1	2	3	4
Belajar bersama akan membantu saya menjelaskan masalah pasien	1	2	3	4
Belajar bersama sebelum lulus profesi akan membantu saya untuk menjadi anggota team yang lebih baik	1	2	3	4
Tujuan utama dari aliansi tenaga kesehatan aadalah untuk membantu dokter	1	2	3	4
Saya tidak yakin akan peranan professional saya nanti	1	2	3	4
Saya harus mendapatkan lebih banyak pengetahuan dibandingkan dengan mahasiswa kesehatan lainnya	1	2	3	4
Saya harus mendapatkan lebih banyak ketrampilan dibandingkan dengan mahasiswa kesehatan lainnya	1	2	3	4

Terima kasih atas partisipasi saudara
Survey ini merupakan terjemahan dari RIPLS questionnaires yang dipergunakan di Curtin University

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Appendix 13c The Readiness for Interprofessional Learning Scale (RIPLS) post-workshop questionnaire English version
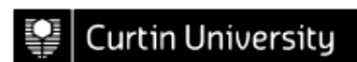
Interprofessional Learning Post-Workshop Questionnaire
Please answer the following questions by circling the appropriate response

	Strongly Agree	Agree	Disagree	Strongly Disagree
Learning with other students will help me become a more effective member of a health care team	1	2	3	4
Patient would ultimately benefit if health care students worked together	1	2	3	4
Shared learning with other health care students will increase my ability to understand clinical problems	1	2	3	4
Team working skills are essential for all healthcare students to learn	1	2	3	4
Shared learning will help me understand my own professional limitations	1	2	3	4
Learning between healthcare students before qualification would improve working relationships after qualification	1	2	3	4
Shared learning will help me think positively about other healthcare professionals	1	2	3	4
It is not necessary for undergraduate healthcare students to learn together	1	2	3	4
Shared learning with other healthcare students will help me communicate better with patients	1	2	3	4
Shared learning with other healthcare students will help me communicate better with other professionals	1	2	3	4
I would welcome the opportunity to work together with other healthcare students	1	2	3	4
Shared learning will help me clarify the nature of patient problems	1	2	3	4
Shared learning before qualification will help me become a better team worker	1	2	3	4
The function of allied health professionals is mainly to provide support for doctors	1	2	3	4
I am not sure what my professional role will be	1	2	3	4
I have to acquire much more knowledge than other healthcare students	1	2	3	4
I have to acquire many more skills than other healthcare students	1	2	3	4

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Knowledge Evaluation Form

This workshop increased my understanding on ensuring the use of medication safely	1	2	3	4
Understanding on medication safety will be useful in my future practice	1	2	3	4
Healthcare students need to learn about medication safety at undergraduate level	1	2	3	4
Medical doctors are responsible to ensure the use of medication safely	1	2	3	4
Nurses are responsible to ensure the use of medication safely	1	2	3	4
Pharmacists are responsible to ensure the use of medication safely	1	2	3	4

How has this workshop changed your views on other health professional's roles? Please describe

_____

_____

_____

How has this workshop enhanced your ability to interact with other health professionals in the workplace?

_____

_____

The best aspects of the workshops were:

_____

_____

Comments and suggestions:

_____

Thank You for Participation

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Appendix 13d The Readiness for Interprofessional Learning Scale (RIPLS) post-workshop questionnaire Bahasa Indonesian version
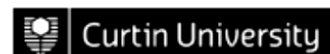
Interprofessional Learning Post-Workshop Questionnaire

Mohon dilingkari pertanyaan yang sesuai dengan pendapat anda

	Sangat Setuju	Setuju	Tidak Setuju	Sangat tidak Setuju
Belajar bersama mahasiswa kesehatan lainnya akan membantu saya untuk menjadi anggota team kesehatan yang lebih efektif	1	2	3	4
Pasien akan sangat diuntungkan jika mahasiswa kesehatan bekerja bersama	1	2	3	4
Belajar bersama dengan mahasiswa kesehatan lainnya akan meningkatkan kemampuan saya untuk mengerti masalah klinik	1	2	3	4
Ketrampilan untuk bekerja dalam team sangat penting untuk dipelajari mahasiswa kesehatan	1	2	3	4
Belajar bersama akan membantu saya mengerti tentang keterbatasan profesi saya	1	2	3	4
Belajar antara mahasiswa kesehatan sebelum lulus kuliah profesi akan meningkatkan hubungan kerjasama setelah lulus kuliah	1	2	3	4
Belajar bersama akan membantu saya untuk berpikiran positif terhadap profesi kesehatan yang lain	1	2	3	4
Tidak penting bagi mahasiswa kesehatan untuk belajar bersama	1	2	3	4
Belajar bersama dengan mahasiswa kesehatan lainnya akan membantu saya untuk berkomunikasi lebih baik dengan pasien	1	2	3	4
Belajar bersama dengan mahasiswa kesehatan launnya akan membantu saya berkomunikasi lebih baik dengan tenaga kesehatan lainnya.	1	2	3	4
Saya akan menerima kesempatan untuk bekerja bersama dengan mahasiswa kesehatan lainnya	1	2	3	4
Belajar bersama akan membantu saya menjelaskan masalah pasien	1	2	3	4
Belajar bersama sebelum lulus profesi akan membantu saya untuk menjadi anggota team yang lebih baik	1	2	3	4
Tujuan utama dari kerjasama tenaga kesehatan aadalah untuk membantu dokter	1	2	3	4
Saya tidak yakin akan peranan professional saya nanti	1	2	3	4

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Saya harus mendapatkan lebih banyak pengetahuan dibandingkan dengan mahasiswa kesehatan lainnya	1	2	3	4
Saya harus mendapatkan lebih banyak ketrampilan dibandingkan dengan mahasiswa kesehatan lainnya	1	2	3	4

Lembar evaluasi setelah workshop

Kegiatan workshop ini meningkatkan pengetahuan saya tentang pemakaian obat yang aman.	1	2	3	4
Memahami tentang pemakaian obat yang aman akan sangat bermanfaat untuk praktek profesi saya dimasa depan	1	2	3	4
Mahasiswa kesehatan perlu belajar tentang pemakaian obat yang aman pada tingkat sarjana	1	2	3	4
Dokter adalah yang paling bertanggungjawab terhadap pemakaian obat yang aman	1	2	3	4
Perawat adalah yang paling bertanggungjawab terhadap pemakaian obat yang aman	1	2	3	4
Apoteker adalah yang paling bertanggungjawab terhadap pemakaian obat yang aman	1	2	3	4

Sejauh mana workshop ini telah mengubah pandangan anda terhadap peranan tenaga kesehatan yang lain? Mohon dijelaskan

_____

_____

Menurut anda, sejauh mana workshop ini meningkatkan kemampuan anda untuk bekerjasama dengan tenaga kesehatan lainya?

_____

_____

Hal terbaik dalam workshop ini adalah:

_____

_____

Terima kasih atas partisipasi anda

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Appendix 14a Invitation letter of participation in IPL workshop English version

Faculty of Health Science

School of Pharmacy

Telephone +61 8 9266 7369
Facsimile +61 8 9266 2769
Email pharmacy@curtin.edu.au
Web curtin.edu.au

Invitation To Participate in Interprofesional Learning Workshop as part of the study on

Medication Safety in Indonesia: Expanding pharmacists' roles through Interprofessional Education (IPE) and Interprofessional Practice (IPP)

IPE is an activity where two or more professions learn from and with each other to improve collaboration and health care service. IPE has been identified as an important area of healthcare training internationally. We would like to invite you to be involved in the growing body of literature on IPE. We would like to invite current fourth year students in the School of Medicine, Nursing, and Pharmacy at Udayana University to participate in a workshop on

"Interprofessional Learning on Medication Safety and Root Cause Analysis".

This is a two-day **free** workshop. There will be lectures on Medication Safety and Root Cause Analysis. You will learn about the roles of health care providers in ensuring the safe use of medication and possible causes of errors in the use of medication in this workshop. You will also learn and develop your skills on interprofessional practice to ensure the safe use of medication in practice. These skills may be beneficial in your career development as future health care providers. Upon completion of the two-day workshop, you will receive certificate of participation.

Who will participate?

The investigator will randomly select 24 fourth year students from School of Pharmacy, Nursing and Medicine at Udayana University to attend the workshop. If your name is selected, you will be contacted by the investigator shortly through your class coordinator. Participation in the workshop is voluntary. If your name is selected but you do not wish to participate in the workshop, you may decline the invitation without reason and without prejudice . If you have any enquiries regarding this study, please do not hesitate to send an email to the following email address: desak.ernawati@postgrad.curtin.edu.au or call to +62 361 22510 ext 110.

Further information

This study has been reviewed and given approval by Curtin University Human Research Ethics Committee (Approval number HR175/2011). If you would like further information about this study, please feel free to contact me on +62361 222510 ext 110 or by email: desak.ernawati@postgrad.curtin.edu.au. Alternatively you can contact my supervisor Prof Jeff Hughes on +618 9266 7367 or by email J.D.Hughes@curtin.edu.au.

Appendix 14b Invitation letter of participation in IPL workshop Bahasa Indonesian version

Curtin University

Faculty of Health Science

School of Pharmacy

Telephone +61 8 9266 7369
Facsimile +61 8 9266 2769
Email pharmacy@curtin.edu.au
Web curtin.edu.au

Undangan untuk Berpartisipasi dalam Interprofessional Learning Workshop

Keamanan Pemakaian Obat di Indonesia: Meningkatkan peranan apoteker melalui Interprofessional Education (IPE) dan Interprofessional Practice (IPP)

IPE adalah suatu aktifitas dimana dua atau lebih profesi bekerja dari dan dengan satu dan lain untuk meningkatkan pelayanan kesehatan. IPE telah terbukti berperan penting dalam pelatihan tenaga kesehatan secara internasional. Kami ingin mengundang anda untuk berpartisipasi dalam perkembangan pengetahuan tentang IPE dengan berpartisipasi dalam workshop. Saat ini saudara dipilih oleh peneliti untuk mengikuti workshop tentang IPE karena saudara adalah mahasiswa Kedokteran, Farmasi, dan Keperawatan semester akhir, kami ingin mengundang anda untuk berpartisipasi dalam workshop yang berjudul

"Interprofessional Learning on Medication Safety and Root Cause Analysis".

Workshop akan diselenggarakan selama dua hari dan **gratis**. Dalam workshop ini akan diberikan kuliah tentang Keamanan pemakaian obat dan Root Cause Analysis. Anda juga akan belajar tentang peranan masing-masing tenaga kesehatan untuk memastikan pemakaian obat yang aman dan juga kemungkinan sumber dari kesalahan pemakaian obat. Anda juga akan belajar dan mengembangkan ketrampilan anda untuk dapat bekerja dalam team untuk mengatasi permasalahan yang berkaitan tentang keamanan pemakaian obat. Ketrampilan ini akan sangat bermanfaat dalam perkembangan karir anda sebagai tenaga kesehatan di masa depan. . Setelah anda menghadiri workshop ini selama 2 hari penuh maka anda akan menerima sertifikat untuk partisipasi anda dalam workshop ini yang mungkin nanti anda butuhkan dalam karir anda sebagai tenaga kesehatan.

Siapa yang bisa ikut di workshop?

Peneliti akan memilih 24 mahasiswa semester akhir dari Fakultas Kedokteran, Keperawatan dan Farmasi secara acak. Jika nama anda terpilih, peneliti akan menghubungi anda melalui koordinator kelas anda. Partisipasi anda dalam penelitian ini bersifat sukarela. Anda dipersilakan untuk menolak berpartisipasi dalam penelitian ini, jika nama anda terpilih dan anda tidak bersedia untuk berpartisipasi dalam penelitian ini. Jika anda memiliki pertanyaan tentang penelitian ini, dipersilakan untuk menghubungi peneliti di alamat email berikut: desak.ernawati@postgrad.curtin.edu.au atau menghubungi +62 361 222510 ext 110

Informasi lebih lanjut

Penelitian ini telah mendapatkan ijin dari Curtin University Human Research Ethics Committee (Ijin No: HR175/2011). Jika anda menginginkan informasi lebih lanjut tentang penelitian ini, silakan untuk menghubungi peneliti ke +62361 222510 ext 110 atau ke email: desak.ernawati@postgrad.curtin.edu.au. Selain itu anda juga dapat menghubungi supervisor saya, Prof Jeff Hughes on +618 9266 7367 atau dengan mengirimkan email ke J.D.Hughes@curtin.edu.au.

Appendix 14c Participation information sheet in IPL workshop English version

Curtin University

Participation Information Sheet

Medication Safety in Indonesia: Expanding pharmacist's roles through Interprofessional Education (IPE) and Interprofessional Practice (IPP)

My name is Desak Ketut Ernawati. I am currently completing a piece of research for my Doctor of Philosophy degree of Pharmacy at Curtin University, Western Australia.

Purpose of Research
I am investigating on Interprofessional Education (IPE)/ Interprofessional Practice (IPP) in healthcare service and on expanding pharmacist's roles in medication safety in Indonesia.

Your Role
I am interesting in finding out health students' attitudes towards IPP after they attend an Interprofessional Learning on Medication Safety workshop. You will need to attend the two-day workshop. I would like to deliver questionnaires before and after the workshop to gain your experience in the Interprofessional learning process. Please note that you are not required to put your name on the evaluation and all response will be treated confidentially. The information will be highly valuable for the development of IPE in Indonesian practice.

Consent to Participate
Your involvement in the research is entirely voluntary. If you choose to complete and return the survey and attend the two-day workshop, we will accept this as your consent to participate in the study.

Confidentiality
Due to anonymous nature of this survey, you will not be able to withdraw your response once submitted. Your decision to participate in this study has no implication for your course. The survey will be kept in a locked cabinet for five years, before it is destroyed. Any publication or presentation will involve collated group results. No individual results will be published in any form.

Further information
This study has been reviewed and given approval by Curtin University Human Research Ethics Committee (Approval number HR175/2011). If you would like further information about this study, please feel free to contact me on +62361 222510 ext 110 or by email: desak.ernawati@postgrad.curtin.edu.au. Alternatively you can contact my supervisor Prof Jeff Hughes on +618 9266 7367 or by email J.D.Hughes@curtin.edu.au.

Thank you very much for your involvement in this research, your participation is greatly appreciated.

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Appendix 14d.Participation information sheet in IPL workshop Bahasa Indonesian version

Lembar Informasi
Workshop

Keamanan Pemakaian Obat di Indonesia: Meningkatkan Peranan Apoteker Melalui Interprofessional Education (IPE) dan Interprofessional Practice (IPP)

Nama saya Desak Ketut Ernawati. Saat ini saya sedang menjalani penelitian berkaitan dengan pendidikan saya untuk mendapatkan gelar S3 (Doctor of Philosophy) di bidang Farmasi di Curtin University, Western Australia.

Tujuan Penelitian
Saya sedang meneliti tentang pelayanan kesehatan dengan menggunakan pendekatan Interprofessional Education (IPE)/ Interprofessional Practice (IPP) dan meneliti tentang meningkatkan peranan apoteker dalam keamanan pemakaian obat di Indonesia.

Cara Kerja
Saya tertarik ingin mengetahui sikap mahasiswa kesehatan setelah mereka menghadiri workshop tentang "*Interprofessional Learning on Medication Safety*". Dalam workshop ini diharapkan kehadiran anda selama dua hari. Saya akan memberikan kuesioner sebelum dan sesudah workshop untuk mengetahui pengalaman anda setelah mengikuti workshop ini. Mohon diingat bahwa anda tidak diharapkan untuk menuliskan nama anda dan semua informasi yang diperoleh akan dipergunakan secara rahasia. Informasi yang kami dapatkan akan sangat bermanfaat untuk perkembangan IPE di Indonesia.

Kesediaan untuk Berpartisipasi
Partisipasi anda bersifat sukarela. Jika anda memutuskan untuk mengisi survey dan mengikuti workshop selama 2 hari ini, maka kami akan menganggap bahwa anda bersedia untuk berpartisipasi dalam penelitian ini.

Kerahasiaan Data
Semua informasi yang diperoleh akan dipergunakan dengan rahasia dengan diproteksi menggunakaan kata kunci, dimana hanya peneliti utama yang akan memiliki akses ke informasi anda. Untuk mematuhi ketentuan dari universitas, informasi yang diperoleh akan disimpan di lemari terkunci selama 5 tahun sebelum akhirnya data akan dihancurkan.

Informasi lebih lanjut
Penelitian ini telah mendapatkan ijin dari Curtin University Human Research Ethics Committee (Ijin No: HR175/2011). Jika anda menginginkan informasi lebih lanjut tentang penelitian ini, silakan untuk menghubungi peneliti ke +62361 222510 ext 110 atau ke email: desak.ernawati@postgrad.curtin.edu.au. Selain itu anda juga dapat menghubungi supervisor saya, Prof Jeff Hughes on +618 9266 7367 atau dengan mengirimkan email ke J.D.Hughes@curtin.edu.au.

Terima kasih atas partisipasi anda dalam penelitian ini. Partisipasi anda sangat kami hargai.

INTERPROFESSIONAL LEARNING WORKSHOP

ON

Medication Safety and Root Cause Analysis

Materials are adopted from Curtin University Interprofessional Learning Workshop on Medication Safety and Root Cause Analysis

HANDOUT OF INTERPROFESSIONAL LEARNING WORKSHOP

MEDICATION SAFETY AND ROOT CAUSE ANALYSIS

AIMS OF THE WORKSHOP

- To allow medical, nursing, and pharmacy students to learn together as a team to improve quality in healthcare
- To promote patient safety through interprofessional education on root cause analysis

ATTENDANCE

- 72 of Fourth year undergraduate students of medical, nursing, and pharmacy programes
- Academic staffs

LEARNING OUTCOMES

At the end of the workshop, participants should be able to:
- Work within an interdisciplinary team to contribute to the high quality of healthcare
- Determine the cause of an adverse healthcare events
- Assess and monitor an adverse healthcare events
- Promote the safe use of medications as part of an interdisciplinary health team
- Construct an action plan to prevent medical mishaps and improve the quality of healthcare

LEARNING METHODS

- There will be 12 groups (6 students/ group) which have been allocated, indicated by numbers on the students/participants list. The small group will work together in 1 large group during parts of the course
- Investigator will deliver the 6 case studies on medication errors. Thus, 2 groups will discuss the same case study.
- Each group will consist of 2 students from different disciplines (nursing, medical doctor, and pharmacy)
- Each small group will be given 1 case outlining medication errors
- A facilitator will be assigned to the group to guide the activities and facilitate the process of identifying problems, discussing the case, formulating a response and developing an action plan
- Each small group is required to product a brief report (1page) to be handed in at the end of the workshop outlining from the case:
    1. The problem (root cause)
    2. What should be done to prevent a similar event occurring
    3. How success in preventing this event occurring again could be measured

One group will present for each case at the final session to the assembled participants and facilitators from the School of Medicine, Nursing, and Pharmacy. These groups will be chosen randomly. After each presentation members of other groups with the same case will be asked to comment on and add to the presentation of the first group.

Workshop Schedule

Time	Activity	Group Size	PIC
Day 1			
08.30 – 08.50	Registration and pre-workshop survey	Large	
08.50 – 09.00	Welcoming address	Large	Head of School of Medicine
09.00 – 09.45	Lecture 1. Quality and Safety in Healthcare	Large	Ni Nyoman Ayuningsih
09.45 – 10.00	Break		
10.00 – 10.45	Lecture 2. Introduction to Root Cause Analysis	Large	Prof Jeff Hughes
10.45 – 11.30	Lecture 3. Medication Safety	Large	Yulia Trisna
11.30 – 12.00	Q and A	Large	
12.00 – 13.00	Lunch		
13.00 – 13.45	Lecture 4. What Happened? Errors vs Violations	Large	Yulia Trisna
13.45 – 14.30	Lecture 5. Developing Interventions	Large	Prof Jeff Hughes
14.30 – 15.00	Q and A		
Day 2			
08.30 – 09.30	Activity 1.1 Safety Assessment code for vignettes and Select team members of discussion	Small	Facilitators
09.30 – 10.30	Activity 2.1 Decide who to be interviewed. Decide what data and information to be collected.	Small	Facilitators
10.30 – 10.45	Break		

10.45 – 11.45	Activity 2.2 Identify Contributing factors. Define problem Statement	Small	Facilitators
11.45 – 12.45	Activity 2.3 Identify root causes and Brainstorm intervention for each root cause. Develop action plan and outcome measure	Small	Facilitators
12.45 – 13.30	Lunch		
13.30 – 15.30	Group Presentation	Large	
15.30 – 15.45	Break		
15.45 – 16.30	Post-work evaluation and Closing	Large	

LEARNING OUTCOMES

	Title	Learning Outcomes (At the end of the session, students should be able to)	Content Outline
Session 1	Lecture 1 Quality and Safety in Healthcare	• Apply knowledge of current healthcare policies to patient care both currently and the future • Explain two approaches to the problem of human fallibility: the person and the system approaches	› Overview of healthcare in Indonesia › Government Policies in Patient Safety › Fatigue and performance, no blame culture › Person and System approaches
	Activity 1. Classifying an event		› Ice breakers › Classify event using safety assessment matrix › Review event flow chart › Select investigation team members
Session 2	Lecture 2. Introduction to Root Cause Analysis (RCA)	• Determine root cause of an adverse event using an appropriate RCA technique • Differentiate medication errors from adverse drug reactions in an adverse healthcare event	› Different RCA Technique › Medication errors, ADR › Swiss cheese model
	Lecture 3. Medication Safety		
	Activity 2 Gather Information and identity contributing		› Decide who to be interviewed › Decide what data and information to be collected › Identify contributing factors › Define problem statement

	factors			
Session 3.	Lecture 4. What Happened? Errors vs Violations	•	Determine the difference between error and violation in an adverse healthcare event	› Errors vs Violations › Lessons from aviation
	Lecture 5.Developing Interventions	•	Create an intervention plan and determine appropriate clinical outcome measures for measuring its impact	› Practicality of action plans › Measuring outcomes and endpoints of RCA
	Activity 3. List of root causes and develop an intervention plan			› Identify root cause › Brainstorm interventions for each root cause › Prepare to present findings to the whole group

CASE STUDY 1

A 78 year old man complained about having pain on his joints. He went to the nearest pharmacy and the pharmacist gave tablet which contains 200 mg of ibuprofen and 500 mg of paracetamol tablet three times daily. After taking the medication for 2 days, the symptom remained, then, he went to a general practitioner, and the physician prescribed 200 mg of celecoxib once daily. The patient took ibuprofen tablet and celecoxib for few days. After three days, the patient complaining on having gastrointestinal discomfort.

CASE STUDY 2

A 5 year old boy (16 kg) was suffered from cold and cough since 5 days earlier. He also had yellowish sputum and fever in the last two days. Then, he was admitted to hospital. The physician diagnosed the patient suffered from an acute upper respiratory tract infection. The physician prescribed 2.5 mL of Bactrim® Syrup (40 mg of trimethoprim and 200 mg of sulfamethoxazole) for this patient. A few hours after the administration of this medication the patient's body temperature elevated significantly and he complained of sore throat and his mucous membranes were swollen.

CASE STUDY 3

A 75 year old woman was diagnosed with peptic ulcer disease. On admission, she looked pale and was hypotensive. The physician prescribed 40 mg of Losec® (omeprazole) OD, 500 mg of Amoxil® (amoxicillin) TID, 500 mg of Abbotic® (clarithromycin) BD, Mylanta Forte® (antacid) one tablet QID. The nurse ordered the medications through the pharmacy department. At the pharmacy department, it was a busy day and there were only two pharmacists on duty. The pharmacist dispensed 40 mg of Lasix®, 500mg of Amoxil®, and 500 mg of Abbotic®. When the medications arrived in the ward, the nurse found out the patient received wrong medication.

CASE STUDY 4

A 80 year old man received prescription containing 5 mg of Amlodipine once daily. At pharmacy department, the pharmacist dispensed 10 mg of Amlodipine. At the ward, the nurse administered the 10 mg of Amlodipine tablet. The patient experiencing headache and hypotension after receiving the medication.

CASE STUDY 5

An 83 year old woman was hospitalized due to immobilization. She has a history of diabetes, pneumonia, and peptic ulcer. She was on Actrapid® drip 1 IU per hour, plus Lantus® 6 IU OD, 40 mg of omeprazole intravenously OD, 1 g of sucralfate BD, 500 mg of ciprofloxacin orally BD, and 1 g of cefotaxime intravenously TID. The nurse administered the medication as the following: omeprazole once daily in the evening, while cefotaxime was administered three times at 8 hourly intervals, sucralfate and ciprofloxacin were administered twice daily concurrently.

CASE STUDY 6

A 75 year old woman was diagnosed with gastritis acute. The physican prescribed one spoon of Antacida Syrup three times daily, 400 mg of cimetidine tablet twice daily. The Antacida syrup did not come with its spoon when arrived at the ward. Thus, the nurse gave the Antacida Syrup using spoon which was available in the ward which was a tea spoon. The patient complained the gastritis remained after three days of therapy.

Activity 1.1 Classify the incident using a safety assessment matrix

Safety assessment code for vignettes

TABLE 1. RISK ASSESSMENT CODE (RAC)

OUTCOMES/CONSEQUENCES: Use this table to determine the "MOST LIKELY WORST CASE REASONABLE SCENARIO". Remember to consider all risk categories (see over for likelihood/probability categories). All incidents or identified gaps must be assessed for ACTUAL and/or POTENTIAL outcome/consequence.

Risk Category	EXTREME	MAJOR	MODERATE	MINOR	INSIGNIFICANT
CLINICAL RISK	Patient death unrelated to the natural course of the illness and differing from the immediate expected outcome of the patient management OR any of the following: Procedures involving wrong patient or body part Completed suicide of a patient Retained instruments or other material requiring further surgical procedure Intravascular gas embolism resulting in death or neurological damage Haemolytic blood transfusion Medication error leading to death Maternal death or serious morbidity associated with labour or delivery Infant abduction or discharge to wrong family Escape of forensic patient at risk to	Patients/client with major permanent loss of function (sensory, motor, physiologic or intellectual) unrelated to the natural course of the illness and differing from the expected outcome of patient management OR any of the following: • Disfigurement • Surgical intervention required • Physical abuse, aggression, assault of staff, patient or visitor • Absconding of an involuntary patient at risk to self or others • Serious of self-harm • Absent without leave (involuntary patient) Visitors: Hospitalisation of 1 or 2 visitors	Patients/client with permanent lessening or bodily functioning (sensory, motor, physiologic or intellectual) unrelated to the natural course of the illness and differing from the expected outcome of patient management OR any of the following: • Increased length of stay • Occasion of service or • Additional operation or procedure • Moderate self-harm • Inappropriate behaviour (including sexual behaviour) • Physical abuse, aggression or assault of staff, patient or visitor (threatening, attempting to hit another) Visitors: medical expenses incurred or treatment of 1 or 2 visitors but not requiring hospitalization	Patient/client increase level of care including: • Review and evaluation • Additional investigations • Referral to another clinician • Absent without leave (voluntary patient) • Verbal abuse • Non-compliance (failing to follow requests or instruction • Minor self-harm Visitors: evaluation and treatment with no expense	Patient/client with no injury or increased level of care or length of stay, will include near misses Visitors: no treatment required or refused treatment

	the community Visitors: death of visitor or hospitalization of 3 or more visitors				
STAFF RISK	Staff: Death of staff member or hospitalization of 3 or more staff	Staff: any of the following permanent injury to staff member, hospitalization of staff or staff experiencing lost time/restricted duty/illness anticipated in excess of 20 working days	Staff: any of the following: medical expenses, lost time or restricted duties or injury/illness for 1 or 2 staff anticipated to be between 1-20 working days	Staff: any of the following: first aid treatment and or GP consultation. Lost time or restricted duties less than 1 working day where a review may be required	Staff: no injury/illness/lost time/restricted duties or review required
BUSINESS RISK	Services: Complete loss of service or output	Services: prolonged suspension of work. Additional resources and budget required. Management assistance required. Performance criteria compromised	Services: Medium term temporary suspension of work. Backlog requires extended work or overtime or additional resources to clear. Management impact	Services: short term temporary suspension of work. Backlog cleared in day. No public impact	Services: No material disruption to work
	Financial: critical financial loss > $ 1,000,000	Financial: Major financial loss $100,000 - $1,000,000	Financial: Moderate financial loss $10,000 - $100,000	Financial: Minor financial loss $ 10,000	Financial: No financial loss
	Reputation: Maximum multiple high-level exposure. Ministerial/ board censure. Direct intervention. Loss of credibility and public/key stakeholder support. Highly probable legal actions	Reputation: Headline profile. Repeated exposure. Unresolved complexities impacting public or key groups. Ministerial/ Board involvement. Threat of legal action	Reputation: Repeated non-headlines exposure. Slow resolution. Ministerial/Board enquiry/briefing. Possible risk of legal action	Reputation: Non headline exposure. Possible risk of legal action. Settled quickly by local management response. Negligible impact. Possible complaint	Reputation: Non-headline exposure. Settled quickly by local management response. No impact. Negligible risk of complaint.

TABLE 2. PROBABILITY/LIKELIHOOD

Frequent (almost certain)	It is expected to occur either immediately or within a short period of time (to occur most weeks or months)
Probable (likely)	Will probably occur in most circumstances (several times a year)
Occasional (possible)	Probably will recur – might occur at some time (may happen every 1-2 year)
Uncommon (unlikely)	Possibly will recur – could occur at some time in 2-5 years
Remote (rare)	Unlikely to recur – may occur only in exceptional circumstances – may happen every 5 – 30 years)

TABLE 3. RISK ASSESSMENT CODE –Select the outcome/consequence column and move down the column until you reach the appropriate PROBABILITY/LIKELIHOOD row

Probability/Likelihood	Outcome/Consequences				
	Extreme	Major	Moderate	Minor	Insignificant
Frequent (almost certain)	1	1	2	3	3
Probable (likely)	1	1	2	3	3
Occasional (possible)	1	2	2	3	4
Uncommon (unlikely)	1	2	3	4	4
Remote (rare)	2	3	3	4	4

TABLE 4. RESPONSIBILITIES AND TIMELINES

All incidents/risks require immediate management at site at time of occurrence		Reporting	Risk Management Action Plan	Monitoring Time Frames
Extreme Risk	1	Immediate report to operations and thereby CEO and relevant director and through normal incident reporting process eq OSH/AIMS etc	Timelines for action plan and executive endorsement agreed by director and HSM	Reported to executive as determined by director and HSM at least monthly until risk reduced to 3 or below
High Risk	2			
Medium Risk	3	Within 3 days reporting process as above	Action plan and relevant director endorsement within 6 weeks of incidence	Monthly to relevant site/area committee
Low Risk	4	Through normal incident reporting process eq OSH/AIMS etc	Via normal site or area level incident management process	

ACTIVITY 1.2 Select team members of investigation

Select the people for the investigation team

Bring together people who have an intimate knowledge of the 'normal process.'

What Expertise do I need?	Who fits this role?	Selected

ACTIVITY 2.1 Decide who to be interviewed. Decide what data and information to be collected

DATA OR INFORMATION SOURCES	INFORMATION AVAILABLE FORM EACH SOURCES
People to be interviewed	
Site visits required	
Organisational policies and procedures or other documents to be reviewed	
Literature to be reviewed	

ACTIVITY 2.2 IDENTIFY CONTRIBUTORY FACTORS

1	CONTRIBUTING FACTORS AND ROOT CAUSES		
1.1	Where appropriate policies/procedures or guidelines – or lack/misunderstanding or a misuse thereof – a factor in this event?	Yes ☐ No ☐	If Yes, tick appropriate box or boxes AND describe how it appeared to contribute Behavioural assessment ☐ Coordination of Care ☐ Patient observation process ☐ Identification process ☐ Clinical guidelines ☐
1.2	Were there issues related to Human resources in this event?	Yes ☐ No ☐	If Yes, tick appropriate box or boxes AND describe how it appeared to contribute Staff allocation ☐ Staff training ☐ Staff supervision ☐ Recruitment ☐ Staff appraisals ☐
1.3	Was communication a factor in this event?	Yes ☐ No ☐	If yes, tick appropriate box or boxed AND describe the perceived deficiency Communication between staff ☐ Communication between staff and family ☐

1.5	What equipment (or the use of lack of use of equipment) involved in this event in any way?	Yes ☐ No ☐	If Yes, tick appropriate box or boxes AND describe how it appeared to contribute Faulty equipment ☐ Lack of equipment ☐ Incorrect use of equipment ☐
1.6	Was the physical environment of the health service or suitability of the environment to support the function it was being used for a factor in this event?	Yes ☐ No ☐	If Yes, describe how it appeared to contribute
1.7	Were external factors an issue in this event? E.q service provision from an external organisation/lack of beds at an external organisation	Yes ☐ No ☐	If yes, describe the external factors that may have contributed
1.8	Other factors	Yes ☐ No ☐	If yes, describe the other factors that may have contributed

ACTIVITY 2.3 Define problem statements

Problem statement:

1. Why

2. Why

3. Why

4. Why

5. Why

References and links

Office of Safety and Quality in Healthcare Department of Health, Western Australia

http://www.safetyandquality.health.wa.gov.au/home/

Australian Patient Safety Foundation

http://apsf.net.au

National Centre for Patient Safety

http://www.va.gov/NCPS/matrix.html#/matrix

NHS National Patient Safety Agency

http://www.npsa.nhs.uk.health

Canadian Patient Safety Institute

http://patientsafetyinstitute.ca/index.html

***These materials are adopted from Curtin University Health Science Workshop on Interprofessional Learning

Appendix 15a Participation information sheet in interviews and focus group discussion (FGDs) English version

Curtin University

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Participation Information Sheet

Medication Safety in Indonesia: Expanding pharmacist's roles through Interprofessional Education (IPE) and Interprofessional Practice (IPP)

My name is Desak Ketut Ernawati. I am currently completing a piece of research for my Doctor of Philosophy degree of Pharmacy at Curtin University, Western Australia.

Purpose of Research
I am investigating on Interprofessional Education (IPE)/ Interprofessional Practice (IPP) in healthcare service and on expanding pharmacist's roles in medication safety in Indonesia.

Your Role
I am interesting in finding out healthcare providers' attitudes towards IPE/IPP as well as attitudes towards pharmacists' roles in medication safety in Indonesia. I would like to find out the benefits, barriers to the implementation of IPE/IPP in healthcare service in Indonesia and the readiness of healthcare providers to work interprofessionally in ensuring the safe use of medicine in Indonesian practice. I will ask you about the feasibility of IPE/IPP as well as your attitudes towards pharmacist' roles in medication safety. The discussion/interview will take approximately 60 minutes. The time and venue of discussion/interview will be confirmed later.

Consent to Participate
Your involvement in the research is entirely voluntary. You have the right to withdraw at any stage without it affecting your rights or my responsibilities. When you have signed the consent form. I will assume that you have agreed to participate and allow me to use data collected for the purpose of this research.

Confidentiality
The information you provide will be de-identified and kept in a password protected documents. Only the chieft investigator will have access to this. In adherence to university policy, the discussion tapes and transcribed information will be kept in a locked cabinet for five years, before it is destroyed.

Further information
This study has been reviewed and given approval by Curtin University Human Research Ethics Committee (Approval number HR175/2011). If you would like further information about this study, please feel free to contact me on +62361 222510 ext 110 or by email: desak.ernawati@postgrad.curtin.edu.au. Alternatively you can contact my supervisor Prof Jeff Hughes on +618 9266 7367 or by email J.D.Hughes@curtin.edu.au.

Thank you very much for your involvement in this research, your participation is greatly appreciated.

Appendix 15b Participation information sheet in interviews and focus group discussion (FGDs) Bahasa Indonesian version

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Lembar Informasi
Interview

Keamanan Pemakaian Obat di Indonesia: Meningkatkan Peranan Apoteker Melalui Interprofessional Education (IPE) dan Interprofessional Practice (IPP)

Nama saya Desak Ketut Ernawati. Saat ini saya sedang menjalani penelitian berkaitan dengan pendidikan saya untuk mendapatkan gelar S3 (Doctor of Philosophy) di bidang Farmasi di Curtin University, Western Australia.

Tujuan Penelitian
Saya sedang meneliti tentang pelayanan kesehatan dengan menggunakan pendekatan Interprofessional Education (IPE)/ Interprofessional Practice (IPP) dan meneliti tentang meningkatkan peranan apoteker dalam keamanan pemakaian obat di Indonesia.

Cara Kerja
Penelitian saya bertujuan untuk mengetahui sikap tenaga kesehatan tentang IPE/IPP juga sikap terhadap peranan apoteker dalam menjamin keamanan pengobatan di Indonesia. Saya ingin mengetahui manfaat dan hambatan untuk dapat menerapkan IPE/IPP dalam pelayanan kesehatan di Indonesia. Saya juga ingin mengetahui kesiapan tenaga kesehatan untuk dapat bekerjasama dengan tenaga kesehatan lainnya untuk menjamin keamanan pemakaian obat. Saya akan menanyakan kepada saudara kemungkinan untuk dapat terlaksananya IPE/IPP dan juga pendapat saudara tentang peranan apoteker dalam menjamin keamanan pemakaian obat di Indonesia. Diskusi/interview akan berlangsung kurang lebih selama 60 menit. Waktu dan tempat akan dikonfirmasikan kemudian.

Kesediaan untuk Berpartisipasi
Keterlibatan saudara dalam penelitian ini bersifat sukarela. Saudara dapat berhenti kapan saja tanpa prasangka apapun. Jika saudara telah menandatangani consent form, kami menganggap saudara telah setuju berpartisipasi dan mengijinkan saya untuk menggunakan data yang saya peroleh untuk dimasukkan ke dalam penelitian saya.

Kerahasian Data
Semua informasi yang diperoleh akan dipergunakan dengan sangat rahasia dengan diproteksi menggunakaan kata kunci, dimana hanya peneliti utama yang akan memiliki akses ke informasi saudara. Untuk mematuhi ketentuan dari universitas, hasil diskusi dan juga informasi dari rekaman yang diperoleh akan disimpan di lemari terkunci selama 5 tahun sebelum akhirnya data akan dihancurkan.

Informasi lebih lanjut
Penelitian ini telah mendapatkan ijin dari Curtin University Human Research Ethics Committee (Ijin No: HR175/2011). Jika saudara menginginkan informasi lebih lanjut tentang penelitian ini, silakan untuk menghubungi peneliti ke +62361 222510 ext 110 atau ke email: desak.ernawati@postgrad.curtin.edu.au. Selain itu saudara juga dapat menghubungi supervisor saya, Prof Jeff Hughes on +618 9266 7367 atau dengan mengirimkan email ke J.D.Hughes@curtin.edu.au.

Terima kasih atas partisipasi saudara dalam penelitian ini. Partisipasi saudara sangat kami hargai.

Appendix 15c Informed consent interview English version

Faculty of Health Science

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Informed Consent Interview

Medication Safety in Indonesia: Expanding pharmacist's roles through Interprofessional Education (IPE) and Interprofessional Practice (IPP)

I _____ have read the information on the participation

information sheet. Any questions I have asked have been answered to my satisfaction. I agree

to participate in this research but understand that I can change my mind or withdraw from this

study at any time without prejudice.

I understand that all information provided is treated as confidential.

I agree that data gathered for this study may be published provided my name or other identifying information is not used.

Name _____   Signature _____

Date _____

Investigator _____   Signature _____

This study has been approved by the Curtin University Human Research Ethics Committee (Approval Number HR175/2011). The committee is comprised of members of the public, academics, lawyers, doctors, and pastoral carers. If needed, verification of approval can be obtained either by writing to Curtin University Human Research Ethics Committee, c/- Office of Research and Development, Curtin University, GPO Box U1987, Perth 6845 or by calling +61892662784 or by emailing hrec@curtin.edu.au

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CRICOS Provider Code 00301J (WA), 02637B (NSW)

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Appendix 15d Informed consent interview Bahasa Indonesian version

Informed Consent Interview

Keamanan Pemakaian Obat di Indonesia: Meningkatkan Peranan Apoteker Melalui Interprofessional Education (IPE) dan Interprofessional Practice (IPP)

Saya _____ telah memahami informasi yang diberikan.

Pertanyaan yang saya tanyakan kepada peneliti telah terjawab dengan baik. Saya setuju

untuk berpartisipasi dalam penelitian ini namun saya mengerti bahwa saya dapat berubah

pikiran dan berhenti untuk berpartisipasi kapan saja.

Saya memahami bahwa semua informasi yang diperoleh akan dipergunakan secara rahasia.

Saya menyetujui bahwa hasil penelitian ini mungkin akan dipublikasikan dengan

memberikan nama atau informasi yang dapat mengidentifikasi kami, tidak akan

dipergunakan.

Nama_____   Tandatangan   _____

Tanggal _____

Peneliti _____   Tandatangan   _____

Appendix 16a Participant information sheet in clinical pharmacy service English version

Curtin University

Faculty of Health Science

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Participation Information Sheet

Medication Safety in Indonesia: Expanding pharmacist's roles through Interprofessional Education (IPE) and Interprofessional Practice (IPP)

My name is Desak Ketut Ernawati. I am currently completing a piece of research for my Doctor of Philosophy degree of Pharmacy at Curtin University, Western Australia.

Purpose of Research
I am investigating on Interprofessional Education (IPE)/ Interprofessional Practice (IPP) in healthcare service and on expanding pharmacist's roles in medication safety in Indonesia.

Procedure
I am interesting in finding out the feasibility of pharmacist's roles in ensuring the safe use of medication in Indonesia. I would like to review your medication, your medical history, and other information needed to ensure the use of medication safely. If the pharmacist identified any problems, these will be discussed with your physician and nurses to ensure you receive the most appropriate medication during your stay in the hospital.

Consent to Participate
Your involvement in the research is entirely voluntary. You have the right to withdraw at any stage without prejudice. When you have signed the consent form. I will assume that you have agreed to participate and allow me to use your data in this research.

Confidentiality
All information provided will be treated in the strictest confidence, with only the primary investigator having access to your information. All recommendation made by the primary investigator after reviewing your medication will be presented to your doctor who has ultimate responsibility for your care.

Further information
This study has been reviewed and given approval by Curtin University Human Research Ethics Committee (Approval number HR175/2011). If you would like further information about this study, please feel free to contact me on +62361 222510 ext 110 or by email: desak.ernawati@postgrad.curtin.edu.au. Alternatively you can contact my supervisor Prof Jeff Hughes on +618 9266 7367 or by email J.D.Hughes@curtin.edu.au.

Thank you very much for your involvement in this research, your participation is greatly appreciated.

Appendix 16b Participant information sheet in clinical pharmacy service Bahasa Indonesian version

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Lembar Informasi untuk Berpartisipasi dalam Review Klinik

Keamanan Pemakaian Obat di Indonesia: Meningkatkan Peranan Apoteker Melalui Interprofessional Education (IPE) dan Interprofessional Practice (IPP)

Nama saya Desak Ketut Ernawati. Saat ini saya sedang menjalani penelitian berkaitan dengan pendidikan saya untuk mendapatkan gelar S3 (Doctor of Philosophy) di bidang Farmasi di Curtin University, Western Australia.

Tujuan Penelitian
Saya sedang meneliti tentang pelayanan kesehatan dengan menggunakan pendekatan Interprofessional Education (IPE)/ Interprofessional Practice (IPP) dan meneliti tentang meningkatkan peranan apoteker dalam keamanan pemakaian obat di Indonesia.

Cara Kerja
Saya ingin mengetahui peranan apoteker dalam keamanan pemakaian obat di Indonesia. Saat ini saya ingin meninjau obat-obatan yang anda terima, riwayat pengobatan anda, dan beberapa informasi lain yang saya butuhkan untuk memastikan obat yang anda terima aman. Jika saya sebagai apoteker menemukan adanya masalah yang berkaitan dengan pengobatan anda, hal ini akan didiskusikan dengan dokter dan perawat yang merawat anda saat ini untuk memastikan pengobatan selama anda di rumah sakit sudah aman.

Kesediaan untuk Berpartisipasi
Keterlibatan anda dalam penelitian ini bersifat sukarela. Anda dapat berhenti kapan saja tanpa prasangka apapun. Jika anda telah menandatangani consent form, kami menganggap anda telah setuju berpartisipasi dan mengijinkan saya untuk menggunakan data anda dalam penelitian saya.

Kerahasiaan Data
Semua informasi yang diperoleh akan diperlakukan dengan sangat rahasia, dimana hanya peneliti utama yang akan memiliki akses ke informasi anda. Semua rekomendasi yang diberikan oleh peneliti akan diinformasikan kepada dokter yang memiliki tanggungjawab penuh terhadap perawatan anda selama di rumah sakit.

Informasi lebih lanjut
Penelitian ini telah mendapatkan ijin dari Curtin University Human Research Ethics Committee (Ijin No: HR175/2011). Jika anda menginginkan informasi lebih lanjut tentang penelitian ini, silakan untuk menghubungi peneliti ke +62361 222510 ext 110 atau ke email: desak.ernawati@postgrad.curtin.edu.au. Selain itu anda juga dapat menghubungi supervisor saya, Prof Jeff Hughes on +618 9266 7367 atau dengan mengirimkan email ke J.D.Hughes@curtin.edu.au.

Terima kasih atas partisipasi anda dalam penelitian ini. Partisipasi anda sangat kami hargai.

Appendix 17 Medication errors identified during clinical pharmacy services (Phase 3)

CODE	DESCRIPTIONS	TOTAL	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16	W17	W18	W19	W20
PE1	Incomplete drug history	8	2							1	3						1		1			
PE2	Duplication	4						1		1		1					1					
PE3	Wrong drug	3				2																1
PE4	Unclear indication	8			1			1					4		1			1				
PE5	Wrong dose	15		1	2	1		1			2						3	2	1		2	
PE6	Wrong time	1			1																	
PE7	Wrong dosage form	2									1							1				
PE8	Unclear duration of antibiotics	8						1			1	1		1	2			1		1		
PE9	Contraindication	2														2						
PE10	Drug not given although it was indicated/omission	7		2						2	1			2								
PE11	Drug given although it was not indicated	1		1																		
PE12	Drug prescribed beyond hospital formulary	0																				
PE13	Illegible hand writing	4													1			1	1			1
PE14	Drug not written on patient's progress notes	37			4	5	3		2	3				3			1	1	3	2	6	4
PE15	Others	1			1																	
	TOTAL PRESCRIBING ERRORS	**101**																				
TE1	Wrong dose	43	5		2	4	1	1	1	2	3	3	5			5	2	4	1	2	2	
TE1 - AE4	wrong dose transcribed led to wrong dose administered	9	2									1		2	1	1	1	1				
TE2	Wrong time	5	1								2										2	
TE3	Wrong frequency	7		1	2						1			1		1		1				

CODE	DESCRIPTIONS	TOTAL	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16	W17	W18	W19	W20
TE4	Drug needed not transcribed	72		5		1	1	5	2	4	5	4	4	4	7	6	3	2	1	5	10	3
TE4 - AE10	Drug needed not transcribed caused drug omission	7			1									1						4	1	
TE4 - AE11	Drug needed not transcribed caused drug administered late	2									1										1	
TE5	Illegible hand writing	0																				
TE6	Drug not needed transcribed	10		1						1			2		2		3	1				
TE7	Drug ceased has not been transcribed	35					1			1	6	2	1		3		2	1	4	4	7	3
TE7 - AE8	Drug ceased has not been transcribed; the patient was given the drug	29	1			1	5	4	2	1	4	1	2		1					1	3	3
TE8	Wrong drug	8					1		1		1	1			1				1	1		1
TE9	Wrong dosage form	2						1	1													
TE10	Wrong patient	1																			1	
	TOTAL TRANSCRIPTION ERRORS	**230**																				
DE1	Wrong patient	1																1				
DE2	Duplication	13						5	4				2				1					1
DE3	Wrong drug	10	2							1	2	2	1		1							
DE4	Wrong dose	17		1		2				1	1	3	1	2			1	1	4			
DE5	Near miss	24	2	1	2	2		1	1	5	4	1				1	1		2		1	
DE6	Labelling	41	1	2	3	6		2	2	6	7	1	2	1			2	3		2	1	
DE7	Wrong dosage form	4										1	1	1			1					
DE8	Wrong number of drug	21			3	1					2	1	1	7	1		2	3				
DE9	Drug dispensed although it was not ordered	5			1						1		1			1			1			

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CODE	DESCRIPTIONS	TOTAL	W 1	W 2	W 3	W 4	W 5	W 6	W 7	W 8	W 9	W 10	W 11	W 12	W 13	W 14	W 15	W 16	W 17	W 18	W 19	W 20
DE10	Drug omission in dispensing	26		2			1		2		3		2	5	1	1		3	2		4	
DE10 - AE10	Dispensing omission causing drug omission in administration	57			1	3		2			1	1	3	10	15		4	8	1	2	5	1
DE10 - AE11	Dispensing omission causing drug administered late	6											1	1				2			2	
	TOTAL DISPENSING ERRORS	**225**																				
AE1	Wrong patient	0																				
AE2	Duplication	3						1												1	1	
AE3	Wrong drug	8			1	1					1				2	1					2	
AE4	Wrong dose	37	4		2				1		6		6	1			8	3	2	3	1	
AE5	Near miss	8			1							1				1		1	1		2	1
AE6	Documentation	0																				
Doc1	Medication given not documented	513		13	23	31	22	23	48	10	44	28	21	23	27	47	44	20	15	19	29	26
Doc2	Medication not given but documented	80				1		4	1	6	14	3	16	6	1	5	2	5	9	4	3	
	Medication not given and not documented **(added to AE10)**	56		1	1	1	6	1		1	3		16	3	3	7	3	5	1		4	
AE7	Wrong dosage form	2					1	1														
AE8	Drug given not indicated	10				1	2	2		1										3		1
AE9	Wrong drug instruction	19		1			2	1	1	1			1	1	2		2	2		4		1
AE10	Drug omission	98			3	2	3	2	5	6	11	5	7	7	10	17	10	2	2	2		4
AE10a	Drug omission because of the patient refused	35						16					4	5	1	1				4		4
AE10b	Drug omission because of medical examination	23				8					2			5							7	1
AE11	Wrong time	35				2				4	6	1		5	1	4	2	3	3		1	3

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CODE	DESCRIPTIONS	TOTAL	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16	W17	W18	W19	W20
	TOTAL ADMINISTRATION ERRORS	927																				
ME	Monitoring errors	2										1									1	
SE1	Drug Distribution System	52	1		1	4	1	1	3	1	4	2	2	2	12	2	8	3	1	2	2	
SE1 - AE10	Drug distribution system led drug omission in administration	3															1			1		1
SE2	Health insurance System	13			5							1					3		1		3	
SE2 - AE10	Health insurance System led drug omission in administration	5																	1	2		2
SE3	Technical problems	5		4														1				
TOTAL ERRORS		1563	21	36	61	79	50	70	85	58	134	74	90	106	105	99	116	79	56	77	102	65
NUMBER OF DRUG		3485	157	266	328	90	136	166	187	118	236	183	194	214	187	161	180	148	102	120	162	150
TOTAL DRUG DOSES		7662	302	483	628	548	287	378	440	244	545	430	406	437	449	321	350	296	219	266	347	286
Intervention Accepted		49		3	6	7	3	3	1	1		1	6	1	1	3	2	3	3	2	1	2
Intervention Not Accepted		53	3	11	6	3	2	3		2	4	2	1	2	1	2	2	1	2	1	2	3
Intervention Unable to Follow Up		38			4		5		8	5	4	1	2	1	3	1	1	2				1
	TOTAL INTERVENTION	140																				

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