Title page

"I'm sorry, my English not very good": Tracking differences between Language-Barrier and Non-Language-Barrier emergency ambulance calls for Out-of-Hospital Cardiac Arrest

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Abstract

Background: One-fifth of Australia's population do not speak English at home. International studies have found emergency calls with language barriers (LB) result in longer delays to out-of-hospital cardiac arrest (OHCA) recognition, and lower rates of bystander cardiopulmonary resuscitation (CPR) and survival. This study compared LB and non-LB OHCA call time intervals in an Australian emergency medical service (EMS).

Methods: The retrospective cohort study measured time intervals from call commencement for primary outcomes: (1) address acquisition; (2) OHCA recognition; (3) CPR initiation; (4) telecommunicator CPR (t-CPR) compressions, in all identified LB calls and a 2:1 random sample of non-LB EMS calls from January to June 2019. Results for time intervals #1, 2, and 4 were benchmarked against the American Heart Association's (AHA) t-CPR minimal acceptable time standards. Patient survival outcomes were compared.

Results: We identified 50 (14%) LB calls from a cohort of 353 calls. LB calls took longer than non-LB calls (n=100) for: address acquisition (median 29 vs 14 secs, p<0.001), OHCA recognition (103 vs 85 secs, p=0.02), and CPR initiation (206 vs 164 secs, p=0.01), but not for t-CPR compressions (292 vs 248 secs, p=0.12). Rates of OHCA recognition and 30-day-survival did not differ but smaller proportions of LB calls met the AHA standards.

Conclusion: Time delays found in LB calls point to phases of the call which need further qualitative investigation to understand how to improve communication. Overall, training call-takers for LB calls may assist caller understanding and cooperation during OHCAs.

Keywords: out-of-hospital cardiac arrest; emergency medical service; language barrier; emergency calls; ambulance dispatch; health communication; Emergency Medical Dispatch

Introduction

Health disparities, based on minority ethnic status, exist in terms of incidence of out-of-hospital cardiac arrest (OHCA) and patient survival outcomes. [1–5] Studies of language barriers (LB) in OHCA emergency ambulance calls, where the two parties (caller and call-taker) do not share fluency in the same languages (also known as language discordance or mismatch), have found that LB calls are more likely to have delayed OHCA recognition; and are less likely to receive bystander cardiopulmonary resuscitation (CPR) or survive to hospital discharge compared to calls with no language barriers. [6,7] Communication problems due to language barriers can mean that non-fluent English speakers become reluctant to use emergency medical services (EMS). [8]

Twenty-two per cent of people do not speak English at home in Australia [9], yet emergency services tend to be English-centric when it comes to communication. [10] For EMS, reliance on interpreters is time-consuming in urgent situations such as OHCA calls, where every minute counts in applying a life-saving intervention to a patient. [11] Perhaps for this reason, it has been found that EMS dispatchers tend to persevere alone with communication in LB calls, without accessing interpreters. [12] Our study aimed to: (1) identify the proportion of EMS OHCA calls where there was a language barrier (LB); (2) ascertain if there were differences between LB and non-language-barrier (non-LB) calls regarding time intervals to critical points in the call and 30-day patient survival.

Methods

Setting

St John Western Australia (SJ-WA) serves approximately 2.6 million people in Western Australia (WA), over an area of 2.5 million square kilometres. [13] The emergency call centre is located in Perth, and call-takers use a scripted protocol called the Medical Priority Dispatch System™ (MPDS) [14] to triage emergency calls (see Figure 1 for the OHCA call process).

In WA, in 2016, the number and proportion of people speaking a language other than English (LOTE) at home was 437,869 (17.7%). [15] The majority of LOTE (includes Aboriginal and foreign language) speakers were proficient in English (86%), while 14% had low proficiency or did not speak English at all. [15]

Study design

We undertook a retrospective cohort study of emergency ambulance calls relating to OHCA. The study data consisted of the audio files of emergency calls (and the accompanying system records - ProQA) [16] relating to EMS-confirmed non-traumatic OHCAs, where EMS-resuscitation was attempted, between 1 January 2019 and 30 June 2019.

Calls were identified using the SJ-WA OHCA database which captures demographic, clinical and outcome data for all OHCAs attended by SJ-WA. [17] To be included in the study cohort, calls had to involve a single patient and a second-party caller, meaning callers were on scene with the patient at call commencement. We included calls irrespective of whether OHCA was recognised by the call-taker or not; and excluded EMS-witnessed arrests. Any cases with missing call audio recordings were excluded.

First, we identified all calls with a LB. We compared critical time intervals (see Analysis section) between all LB calls identified in the study cohort and for a 2:1 random sample of non-LB calls. We also examined whether particular time intervals were consistent with the American Heart Association's (AHA) minimal acceptable standards for telecommunicator CPR. [18] We compared 30-day survival between the LB and non-LB groups based on follow-up in the WA Death Registry [19] and WA Cemetery Records [20]. Finally, we checked for the use of an interpreter in the LB cohort.

Selection of language barrier calls (exposure group)

SJ-WA call-takers do not routinely document the language or ethnicity of the callers, therefore, through an iterative consensus process, we created bespoke criteria to identify cases with a LB (Table 1).

Two authors (NP & TB) listened to the calls and separately classified them as LB or non-LB based on the address and phone number sequences, up until the call-taker uttered *Okay, tell me exactly what happened* (see Figure 1). Each call had to meet at least one of three criteria in Table 1 in order to be identified as a LB call.

Selection of non-language barrier calls (non-exposure group)

We selected a sample of non-LB calls using a pseudo-random number generator (via Excel) [22] from the calls which did not fit the LB criteria. The ratio of non-LB to LB calls was 2:1.

Analysis

Time intervals (Primary outcomes)

The primary outcomes of interest were the time intervals of call commencement (also known as call transfer) to: (1) address acquisition; (2) OHCA recognition; (3) call-taker initiation of CPR instructions (typically marked in MPDS by *listen carefully and I'll tell you how to do resuscitation)*; (4) delivery of first telecommunicator CPR compression. Intervals #1, 2 and 4 were based on steps 3, 4 and 5 of the AHA time guidelines for telecommunicator CPR [18], the steps where the caller to EMS call-taker interaction plays a key role.

To assist in defining these specific time stamps, we referred to the Cardiac Arrest Registry to Enhance Survival (CARES) Dispatcher-Assisted CPR Module Data Dictionary. [23] We used CLAN software [24] to measure time intervals #1, 3 and 4 based on the audio, and also drew from the ProQA record for each case to ascertain time interval #2 (time of OHCA recognition) (see supplementary material for details of capturing time stamps). To ensure accuracy, the first author undertook two rounds of recording time stamps in CLAN and then transferred these to Excel for analysis. Entries in CLAN and Excel were then verified by a co-author (TB).

Statistical Analysis

All timings were measured in seconds and reported as medians and interquartile ranges. Statistical analyses were conducted using SAS™ software, version 9.4. [25] Comparison of time intervals, as continuous measures, between the LB and non-LB groups was performed using the median test, available with the NPAR1WAY (one-way comparison for nonparametric measures) procedure in SAS. We used logistic regression (SAS PROC LOGISTIC) to compare the proportions of cases across the two groups that were consistent with the AHA minimal acceptable standards [18] for time intervals #1, 2 and 4.

Statistical significance was set at alpha level of 0.05, and 95% confidence intervals produced for parameter estimates of comparisons.

Ethics

The study was approved by the Curtin University Human Research Ethics Committee (HR128/2013) and SJ-WA Research Governance Committee.

Results

In the six-month study period there were 1,353 EMS-confirmed OHCA patients attended by SJ-WA of which 353 met the inclusion criteria for our study (Figure 2). In the initial stage of the LB classification process, the first author identified 48 calls with a LB, and co-author TB identified 64, with a Fleiss' kappa value of 0.73. [26] Following this outcome, the two authors conducted an in-depth review of all the discordant cases and reached final agreement to classify 50 (14.2%) as LB calls. It was the third criterion, based on accent, and arguably the most subjective of the criteria, that was the reason for most disagreements. Therefore 17 cases were classed as an "other" group (grey area) because, while it was agreed that the accent differed to a standard Australian accent, it was uncertain whether it indicated a non-English dominant background. We excluded these from the non-exposure group to minimise obscurity. We found that there were no interpreters used in the LB cohort.

The proportion of cases where OHCA was recognised were high for both LB (47/50, 94%) and non-LB (91/100, 91%) groups, as were the telecommunicator CPR initiation rates (86% vs 87%). However, we identified some significant differences between LB and non-LB OHCA calls for the median time intervals to critical steps in the progression of the call (Table 2). For the primary outcomes, time to address acquisition was 15 seconds longer for LB than non-LB calls (29 vs 14; p<0.001); time to OHCA recognition was 18 seconds longer for LB than non-LB calls (103 vs 85; p=0.02); and time to CPR initiation was 38 seconds longer for LB calls than non-LB calls (206 vs 164; p=0.01). However, while the median time to first telecommunicator CPR compression was 44 seconds longer for LB calls than non-LB calls (292 vs 248 seconds), this was not significantly different (p=0.12).

Since the time to address acquisition in LB calls was significantly longer, additional analyses were conducted to identify the obstacles (results not shown in Table 2). On average the call-taker had to prompt an extra 3.7 times for the address in the LB group (compared to 1.3 for non-LB group). This was usually in the form of repeating the prompt *what is the exact address of your emergency?*, or specifying the communication issue (e.g., "sorry, I didn't get that street name, can you repeat it?"). Other causes were callers' non-standard pronunciation of street names; or callers not providing an accurate address specifying number and street (e.g., "I live in Perth"). This resulted in callers and call-takers spelling out place names in 36% of LB as opposed to 23% of non-LB calls. In 42% of LB calls (vs 26% for non-LB), callers interrupted the address acquisition phase with other information about the emergency that was not pertinent to the address prompt, known as hijacking [27] (e.g., "help, my wife is dying"). When this occurred, call-takers had to draw callers' attention to the task at hand.

To investigate further where the hold-ups were in the OHCA calls, we calculated the time gaps between the four primary outcomes (Table 2), e.g., the time from address acquisition to OHCA recognition. We found that the median time gaps for each group did not differ significantly. Due to the apparent difference in median time gaps between OHCA recognition and CPR initiation for LB (84 secs) and non-LB cases (52 secs), the first author re-listened to and analysed this phase of the calls. We found that the time gap between OHCA recognition and CPR initiation comprised three main interactive sequences (although these did not occur in every single call): (1) a breathing check – the call-taker either asks the caller to get close to the patient's mouth and listen for breaths or they administer a test to check for agonal breathing by timing the intervals between breaths; (2) the defibrillator sequence – the call-taker prompts the caller to get a bystander to retrieve a nearby defibrillator (if available); (3) positioning the patient – the call-taker directs the caller to ensure the patient is lying on their back on the floor.

The median time for the defibrillator sequence was significantly longer (p=0.04) in the LB calls (9 secs) than the non-LB (6 secs) calls, albeit a small proportion of the time between OHCA recognition and CPR initiation.

Positioning the patient took up most of the sequence from OHCA recognition to CPR initiation, for nearly half of the calls in each group. Table 2 shows that it could take over one minute longer for LB callers to complete this sequence, compared to non-LB callers (p=0.003).

Table 3 shows results from benchmarking the applicable primary outcome time intervals for LB and non-LB groups against the AHA's minimal standards. Only 54% of the calls in the LB group met the benchmark for address acquisition (less than 30 seconds after call commencement), and this was significantly lower than the corresponding 85% of non-LB calls (p<0.001). Fewer cases (p=0.008) in the LB group (14/47 cases, 30%) met the AHA standard for OHCA recognition (within 90 seconds of call commencement) compared to the non-LB group (49/91 cases, 54%). While only 11.9% of LB calls met the benchmark for time to first telecommunicator CPR compression, there was no significant difference in terms of corresponding non-LB (20.7%) cases. Table 3 also shows that there was no significant difference in cases where OHCA was recognised and in 30-day survival rates between the LB and non-LB calls.

Figure 3 graphically displays the median times for the three benchmarks for LB and non-LB calls against the AHA standards, highlighting how the longer time to address acquisition in LB calls then delayed OHCA recognition which contributed to a longer interval to first telecommunicator CPR compression. The graph also indicates that time to first telecommunicator CPR compression was well over the AHA minimal acceptable standard for both cohorts.

Discussion

This study identified 50/353 (14.2%) LB cases in six months of non-traumatic OHCA calls handled by SJ-WA; which is close to the proportion of WA's population who speak a language other than English at home (17.7%). [15] We found significant differences in some time intervals for the LB call group that resulted in delay to OHCA recognition and to first telecommunicator CPR compression. However there was no significant difference in 30-day survival rates between groups. Two problematic parts of the OHCA LB calls were address (location) acquisition and positioning the patient in readiness for telecommunicator CPR.

Obtaining the address and phone number are the first key tasks in an OHCA call. While acquiring the phone number is optimal (in case the EMS needs to call the caller back) but not critical, without the address, the EMS is unable to send immediate assistance. Previous studies recommended that EMS community education focus on the critical importance of knowing one's address for the purpose of improving LB emergency calls. [28,29] We suggest that EMS investigate alternative ways to elicit the address in LB calls including modifying the language used, in the event of misunderstanding, and incorporating geo-spatial locator technology to locate callers. Prolonged time taken in obtaining these details means that getting to the critical question about problem description (i.e., *tell me exactly what happened*) is delayed. We also posit that speedy retrieval of the address and phone number can set the tone for the remainder of the call interaction. In an LB call, the caller may become frustrated and/or emotional if this phase takes a long time and there are repeated misunderstandings because the caller's priority is to get help sent as soon as possible. [30]

In the event that the patient is not already positioned on their back on the floor (without any cushioning, including under the head), the call-taker must direct the caller to do so, in order to commence CPR. The significant time taken to do this in LB cases is a concern given that a patient's chance of survival decreases by up to 10% for every minute without a resuscitation attempt. [31] More research is needed to understand the various obstacles that impede swift movement of patient to the floor, and this includes how variation of language in the instructions could assist in this process.

Given "unprecedented migration-driven" [32] multilingual diversity in Australian society, and the significant delays found in this LB call cohort, it is timely for EMS to review protocols for handling OHCA LB calls. It was found that interpreters were not engaged in the LB calls cohort, despite the service being available. At SJ-WA, in the event of a language barrier call, where the caller is speaking no English at all, the call-taker would have to determine what language is being used in order to access the appropriate interpreter. If the language can be identified, then an interpreter would be engaged in a three-way call. This is a lengthy process that would realistically exceed viability timeframes for CPR, however it would still be attempted at SJ-WA. However such cases did not appear in the LB cohort. In all cases, there was some evidence of English language use, however limited, by the caller. Given the findings of previous studies [11,12], our result suggests that call-takers were opting to rely on their own skills in handling LB calls rather than spend the time necessary for interpretation.

Further micro-analysis of communication during problematic phases of the calls will assist in devising strategies so that call-takers can adapt to OHCA LB calls, and this could include re-wording parts of the script with LB callers in mind. As recommended by a similar EMS study, adapting for multilingual callers could involve a whole of system approach – from community education to hiring more multilingual call-takers, and the application of digital resources (e.g. translation devices) to assist communication with non-fluent speakers. [11] Such changes could have benefits for LB emergency calls in general, not only for OHCA, and could minimise a phenomenon known as "second language-specific health communication anxiety", for callers who are not fluent in the dominant language, which can affect their willingness to engage with a health service. [33]

Study Limitations

To select the language barrier exposure group, previous studies have relied on searching for free text notation referring to a language issue, which is entered into the system by the call-taker at the time of the call. [6,28,29] However this information was not routinely collected at SJ-WA. Therefore, we designed criteria for selecting LB calls to capture the cases where it was most likely that language discordance would impact on the call's progression, that is, there was *potential* for a LB to affect communication flow. Thus, the selection criteria for LB calls was broad and not restricted to callers with low or no proficiency in English.

Furthermore, the characteristic of LB was treated as a binary issue, but we acknowledge that it exists along a spectrum, and there was subjectivity inherent in our selection process. Given that we only had access to the audio and no background information on the caller, we had to rely on an auditory assessment of accent as opposed to other studies where accent difference is self-rated by the subjects of the study. [34]

Overall, the study sample was modest and we acknowledge this as potentially reducing the power to detect differences between the LB and non-LB groups. We expected more calls to be classified as LB calls. We also acknowledge that there may be other unmeasured factors confounding the results. In addition the results may not be generalisable to other EMS or contexts with varying language profiles.

Conclusion

Despite no difference in 30-day survival outcomes between patients in the language-barrier-call and non-language-barrier-call groups, LB calls experienced longer delays to key points in the OHCA protocol compared to non-LB calls. We found two particularly problematic parts in LB cases, namely address (incident location) acquisition and positioning the patient for CPR. Communication protocols for these phases of the call could be reviewed in order to help minimise delays to OHCA recognition and telecommunicator CPR. We propose that microanalysis of the call interaction is necessary for a deeper understanding of how LBs in communication impact, and are negotiated at, every step. Communication strategies for LB calls is an area, in the Australian EMS context, that needs further investigation in order to promote equitable access to prehospital care.

Conflicts of Interest

AW and PB are employed by St John Western Australia (SJ-WA); JF and SB hold adjunct appointments with SJ-WA and JF receives research project funding from SJ-WA. JB, PB and JF are Chief Investigators on the NHMRC-funded Prehospital and Emergency Care Centre of Research Excellence.

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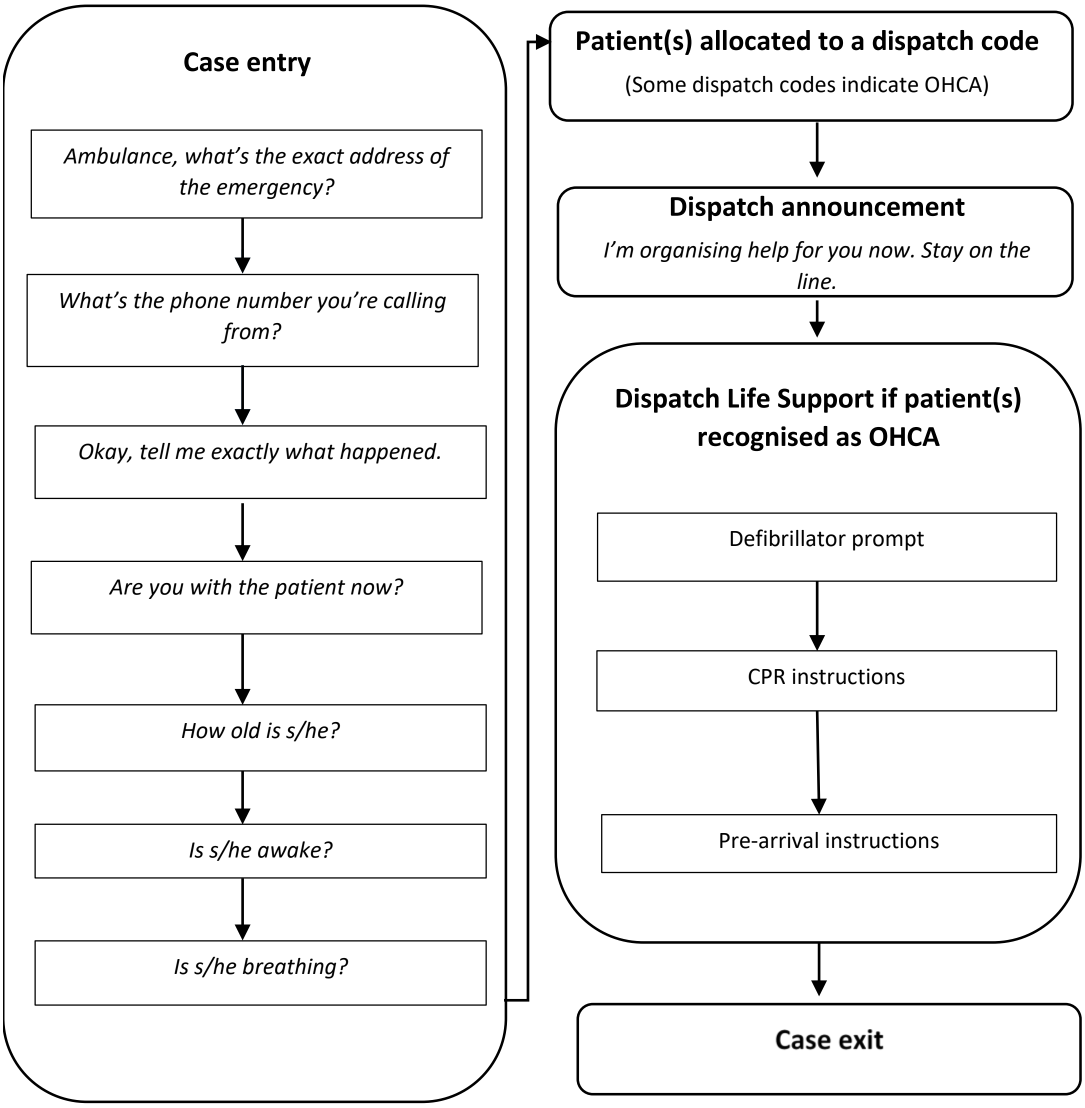
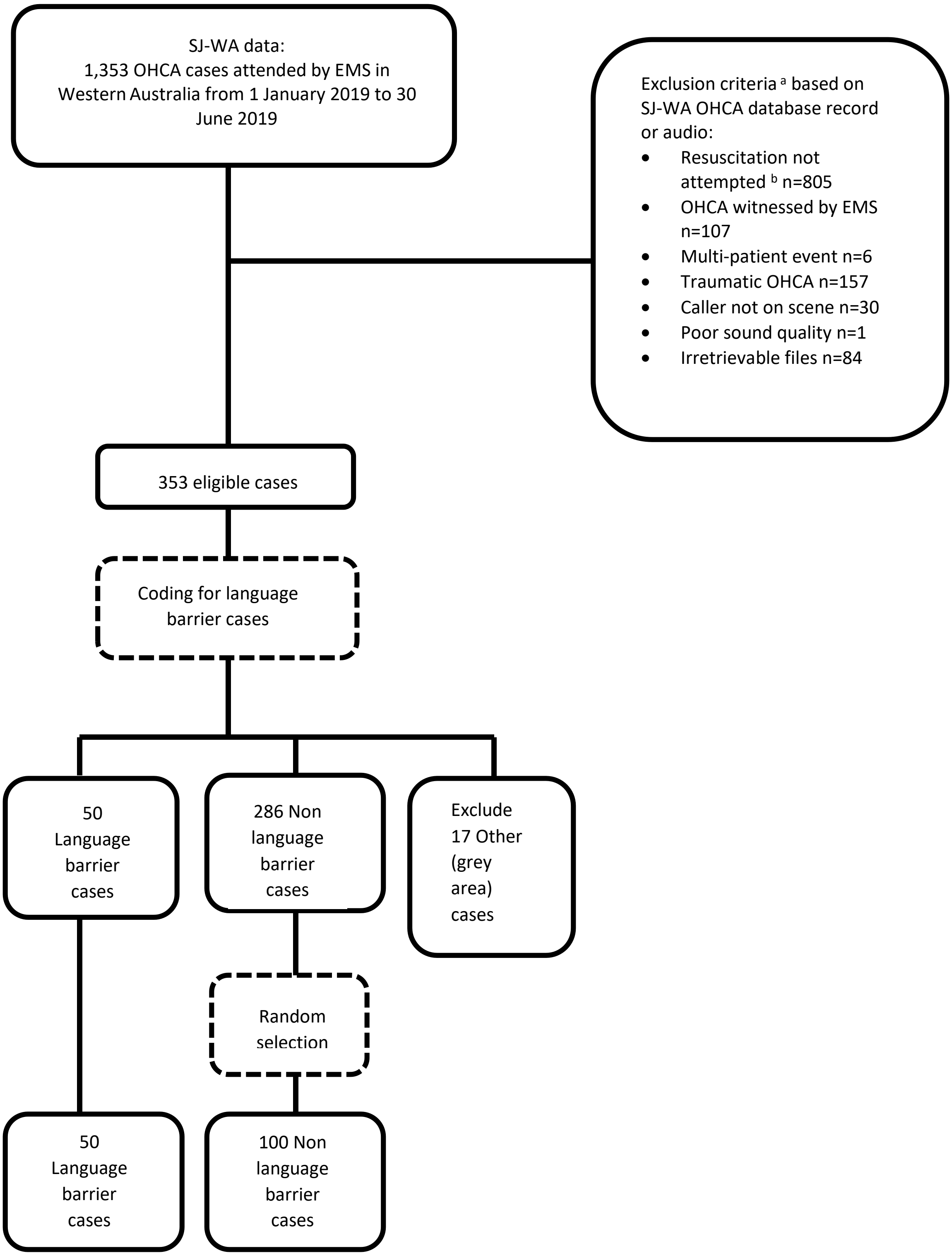


Figure 1 - The MPDS Version 13 [14] call protocol, indicating instructions for patients recognised as OHCA

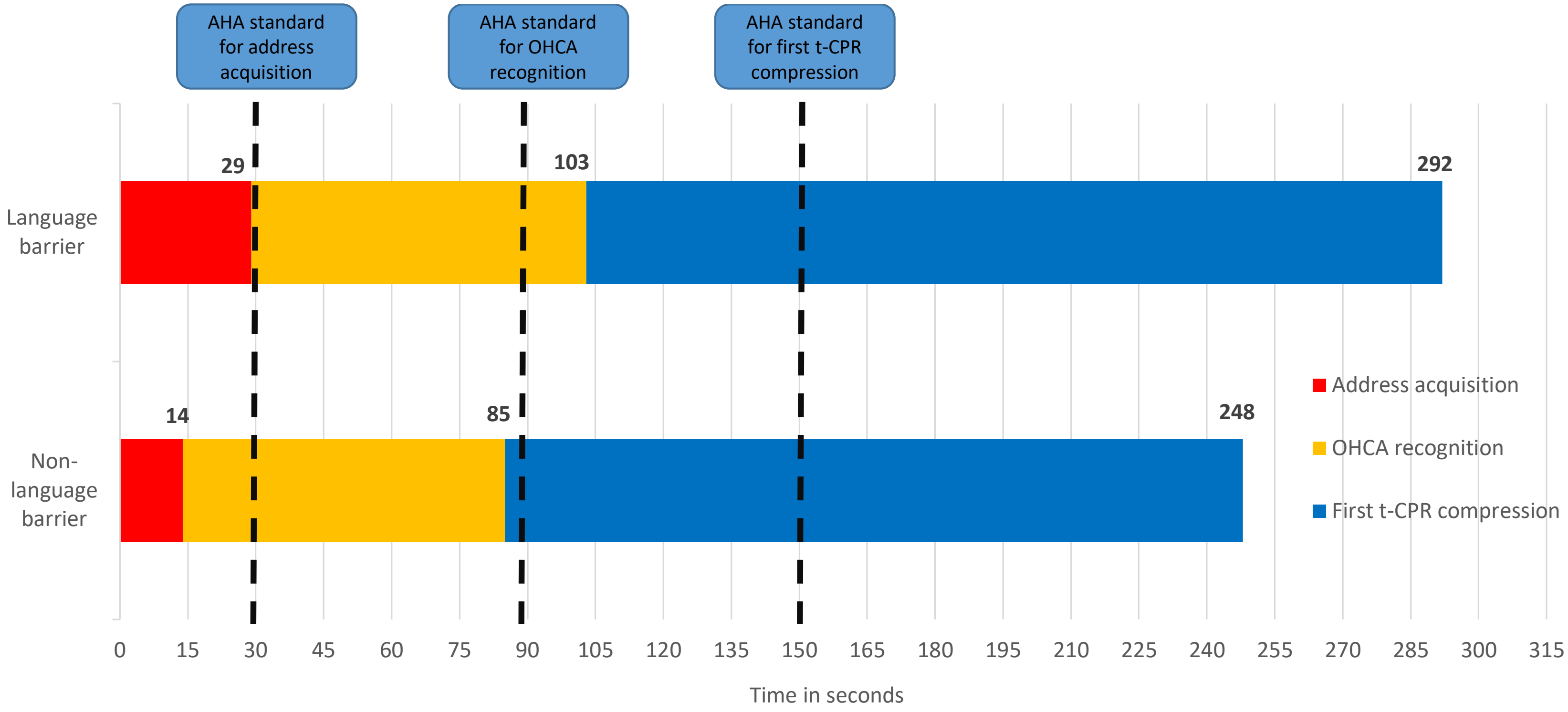


[a] cases can have one or more criteria

[b] no defibrillation or CPR by EMS, and no AED shock delivered by bystanders

Figure 2 - Data inclusion flow diagram

Figure 3 Graph comparing median critical time intervals from commencement of language barrier and non-language barrier emergency ambulance calls against American Heart Association minimal acceptable standards [18] for Steps 3, 4, and 5 of telecommunicator CPR



AHA: American Heart Association
OHCA: Out-of-hospital cardiac arrest
t-CPR: Telecommunicator cardiopulmonary resuscitation

Table 1 – Criteria for identification of Language Barrier calls

Criteria for identification of Language Barrier calls
1. There is evidence of limited English proficiency from the caller such as basic or unusual choice of vocabulary, speaking in short phrases with limited grammar – colloquially referred to as "broken English" but also known as non-standard English. The caller might refer to their proficiency such as "err how do you say" or "sorry I don't speak English". Or the caller speaks English slowly.
2. The caller or bystander speaks a language other than English (can be in the background).
3. Caller has an accent that is noticeably distant from a standard Australian accent, and likely indicates a non-Anglophone language background. [a]

[a] Callers would likely speak what is known as an Outer Circle or Expanding Circle variety of English. [21] The former represents places where English spread as a result of colonisation, e.g. India; and the latter represents places where English is acquired as a foreign language, e.g. China.

Table 2 - Comparing medians for key time indicators during EMS calls for Language-Barrier (LB, n=50) group versus non-Language-Barrier (non-LB, n=100) groups

Variable	Language Barrier (LB)		Non Language Barrier (non-LB)		Cf LB v non-LB		
	available n	median (IQR)	available n	median (IQR)	HL Est †	CI	p-value
Primary time intervals							
Address acquisition	50	29.1 (15.5 to 46.5)	100	14.3 (8.0 to 24.3)	12.4	(6.9, 18.1)	<0.001 **
OHCA recognition	47	102.7 (79.7 to 176.2)	91	85 (50.6 to 162.4)	27.4	(6.2, 46.6)	0.02 *
CPR initiation	43	206.0 (159.2 to 288.2)	87	163.9 (99.3 to 245.1)	45.4	(10.7, 84.5)	0.01 *
First t-CPR compression	42	292.2 (195.0 to 379.8)	82	248.2 (164.6 to 322.9)	36.7	(-7.5, 82.6)	0.12
Secondary time gaps							
Address to OHCA recog.	47	70.3 (40.6 to 165.9)	91	63.7 (32.1 to 142.0)	8.2	(-9.5, 25.9)	0.35

Variable	**Language Barrier (LB)**		**Non Language Barrier (non-LB)**		**Cf LB v non-LB**		
					HL		
	available n	median (IQR)	available n	median (IQR)	Est †	CI	p-value
OHCA recog. to CPR initiation	43	83.6 (30.7 to 139.8)	87	52.4 (30.2 to 99.9)	16.0	(-8.0, 46.2)	0.19
Breathing check	*7*	*19.8 (14.3 to 27.2)*	*6*	*19.8 (16.6 to 37.5)*	*2.8*	*(-10.7, 22.3)*	*0.63*
Positioning patient	*23*	*104.7 (69.3 to 141.1)*	*44*	*41.8 (29.5 to 102.3)*	*46.6*	*(20.0, 74.8)*	*0.003 **
Defib. sequence	*29*	*8.8 (6.5 to 11.2)*	*65*	*6.3 (5.0 to 8.7)*	*1.6*	*(0.1, 3.2)*	*0.04 **
CPR init. to first t-CPR comp.	39	49 (36.5 to 69.5)	81	50.8 (30.0 to 75.7)	0.9	(-10.2, 12.2)	0.91

EMS: emergency medical service

OHCA: out-of-hospital cardiac arrest

CPR: cardiopulmonary resuscitation

t-CPR: telecommunicator CPR

All time intervals were measured in seconds, with median and interquartile range (IQR)

† Hodges-Lehmann estimate. Also known as 'location shift', this is the estimated *median of the differences* between (all possible pairs between) the two groups. It is NOT necessarily the estimated *difference in the two groups' medians*

CI: 95% confidence Interval for the Hodges-Lehmann estimate

* indicates statistical significance, with p<0.05

** indicates strong statistical significance, with p<0.001

Table 3 - Comparing proportions of EMS calls (a) with OHCA recognition, (b) 30-day survival rate, and (c) those meeting AHA standards, for Language Barrier (LB, n=50) group versus non-Language-Barrier (non-LB, n=100) group

Variable	**Language Barrier (LB, n=50)**		**Non Language Barrier (non-LB, n=100)**		**Cf LB v non-LB**		
	freq	%	freq	%	OR	CI	p-value
OHCA recognised	47	94.0%	91	91.0%	1.55	(0.40, 6.00)	0.53
30-day survival rate	6	12.0%	8	8.0%	1.57	(0.51, 4.80)	0.43
Meets AHA standard †							
Address acquisition (<30 secs)	27	54.0%	85	85.0%	0.21	(0.10, 0.45)	<0.001 **
OHCA recognition (<90 secs) [a]	14	29.8%	49	53.8%	0.36	(0.17, 0.77)	0.008 *
First t-CPR compression (<150 secs) [b]	5	11.9%	17	20.7%	0.52	(0.18, 1.15)	0.23

EMS: emergency medical service

OHCA: out-of-hospital cardiac arrest

† American Heart Association minimal acceptable standards for telecommunicator cardiopulmonary resuscitation (t-CPR) [18]

[a, b, c] Percentages were calculated based on the actual number of relevant/available records in question, not necessarily the full samples (i.e., 50 or 100, for LB and non-LB groups, respectively)

OR: odds ratio

CI: 95% confidence interval

* indicates statistical significance, with $p<0.05$.

** indicates strong statistical significance, with $p<0.001$.

<u>Supplementary material</u>

Details of how time stamps were captured for language-barrier and non-language-barrier exposure groups

1. Time between call commencement (i.e., call transfer) and address acquisition: time stamps taken from the CLAN [1] file – from pause before "*Ambulance, what's the exact address of the emergency?"* until pause before "*(that matches what I've got) What's the phone number you're calling from?"*
2. The time stamp at the end of the prompt, "*tell me exactly what happened"* via CLAN file: this will indicate the time of the first keystroke on the ProQA [2] record. We add this time to the relevant time stamp for OHCA recognition on the ProQA record (see 3.) to give us the actual time of OHCA recognition.
3. Time between call commencement and OHCA recognition: time stamp taken from the ProQA record as below (further detail can be found in Medical Priority Dispatch System [3]). If first option (a) not available then go to next and move down the list until there is evidence of OHCA recognition:
    a. OHCA dispatch code + "dispatched".
    b. OHCA dispatch code + "reconfigured".
    c. If the dispatched/reconfigured codes do not indicate OHCA then look for (delayed) recognition markers. If these appear before reconfigured OHCA code, then use whichever comes first:

        DLS (PAI) Panel N4: Start Mouth-to-Mouth

        DLS (PAI) Panel A4: Start Mouth-to-Mouth

        DLS (PAI) Panel B4: Start Mouth-to-Mouth

        DLS (PAI) Panel C4: Pathway Director (select one)

        CPR landmarks C6 (equivalent)

d. If no record of delayed recognition then look for the code to indicate compressions:

DLS (PAI) Panel N6: Compressions

DLS (PAI) Panel A6: Compressions

DLS (PAI) Panel B6: Compressions

DLS (PAI) Panel C11a: CPR (Compressions Only/Refused M-T-M)

DLS (PAI) Panel C11: CPR (Compressions 1st)

DLS (PAI) Panel C7: CPR (Ventilations 1st/Unconscious Choking)

Add this to time stamp 2 to get actual time of OHCA recognition.

4. Time between call commencement and call-taker initiation of CPR instructions: time stamps taken from the CLAN file - the pause before the start of *"(inhale) listen carefully, I'll tell you how to do CPR/resuscitation"/"I'm going to tell you how to give mouth-to-mouth"* – these are the most common initiations. In cases where the caller says CPR has already commenced, we will still record the call-taker's CPR initiation.
5. Time between call commencement and delivery of first telecommunicator CPR compression: time stamps taken from the CLAN file - the point where the analysts are convinced that CPR is underway. This could be:
    a. The pause just before we hear the caller counting compressions, after they are requested to do so by the call-taker
    b. The pause before caller confirmation that CPR has commenced e.g. "*yeah they're doing it*"
    c. Background sounds that indicate pumping/compressions.

References

1. MacWhinney B. The CHILDES project: Tools for analyzing talk. 3rd ed. Mahwah, NJ: Lawrence Erlbaum Associates; 2000.

2. Priority Dispatch Corp. ProQA (version 5.1.1.28). Salt Lake City, Utah, USA; 2017.

3. Priority Dispatch Corp. Medical Priority Dispatch System (version 13). Salt Lake City, Utah, USA; 2017.