Impact of incident osteoarthritis on health services use of 'baby boomer' women in Australia

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Abstract

Objective: To explore impact of incident osteoarthritis (OA) on health services use by Australian women born 1946-51.

Methods: Secondary analysis of Australian Longitudinal Study on Women's Health survey data linked to Medicare Australia databases (2002 to 2011). Medicare health services use was compared for two groups: OA group (n=761) reported incident OA in 2007; Never group (n=4346) did not report arthritis in time frame. Interrupted time series regression compared health services use over time.

Results: OA group had higher health services use than Never group. Rate of services use increased over time for both groups. Rate of increase in quarterly doctor attendances was significantly lower for OA group after first report of OA, with no corresponding change after 2007 for Never group.

Conclusions: A pre-existing higher use of health services is associated with reporting incident OA, compared to those who never report arthritis. After incident OA, rate of doctor use reduced and allied health use increased, consistent with recommended Australian treatment guidelines.

Implications: This study provides a rare insight into change in health care use for people reporting incident OA, against an appropriate comparison group, highlighting the importance of early diagnosis of OA to optimise effective use of health services.

Introduction

Osteoarthritis (OA) is a common, disabling, progressive chronic disease, which affects more women than men globally.(1, 2) The Global Burden of Disease project found that OA ranks in the top 20 causes of disability in every region except central sub-Saharan Africa.(3) OA is also a costly condition. OA was estimated to cost $AUD 1.6 billion in direct health expenditure in Australia in 2008-9.(4)

The prevalence of OA is increasing due to population ageing. The United Nations estimates that 20% of the global population will be aged over 60 years by 2050.(5). Assuming a conservative estimate that 15% of that 20% will have symptomatic OA, with one-third of these people severely disabled,(6) we can expect that by 2050, 130 million people will have OA worldwide, and 40 million people will be severely disabled by OA.(6, 7)

There is currently no cure for OA, consequently treatment focuses on pain management and maintenance of joint mobility, function and well-being.(8) Thus, in an environment of constrained government spending, it is important for policymakers to understand the factors that enable people with OA to remain active and independent in the community, with optimal functional capacity.

One of the factors impacting maintenance of functional capacity is access to effective health care services to manage OA. Population-level studies (using aggregated data) have shown that people who report musculoskeletal conditions use more out of hospital services than those with other types of chronic conditions.(2, 9) Population-level estimates of health services use are essentially estimates of the total expenditure for each condition by the health system. Whilst these estimates provide good approximations of costs for specific populations and concordance with known expenditures, they cannot provide the detailed information on health service use for musculoskeletal conditions which comes from analysis of individual-level data.(9) Regularly released government reports on health care use by people with arthritis, based on national and regional (aggregated) data,(10) cannot track change in health care use related to incidence of disease, or increasing severity of disease. Individual level data is needed to understand the course of health care access and demand in relation to specific disease. There are very few studies which have examined health care use using individually linked administrative datasets for people with arthritis,(11-14) and very few studies describing health care use by those reporting incident arthritis.(15)

The aim of this study was to explore the effect of self-reported incident OA on patterns of health services use over time in a representative group of community living baby-boomer Australian women using person-level health survey data linked with administrative data.

Methods

Design and setting

A retrospective population based cohort study was undertaken, using data from participants in Australian Longitudinal Study on Women's Health (ALSWH) with or without incident OA between 2001 and 2010. ALSWH is an Australian national study which began in 1996 with a random sample of more than 40,000 women in three birth cohorts.(16) The ALSWH surveys a range of health, social, psychological and demographic variables.(17) Retention rates over the duration of the study have been consistently high; over 90% for each survey of 1946-51 cohort.(18) Detailed methods for ALSWH are available from www.alswh.org.au.

Sample

This study included women from 1946-51 cohort of the ALSWH who reported a diagnosis of incident OA in 2007 (when aged 56-61 years) and a comparison sample of women in the same cohort who never reported any form of arthritis (between 2001 and 2010). The sample comprised women living in the community, whose health care use would include mostly doctor, allied health, and self-managed care.

Ethical approval for data collection and analyses within the ALSWH project was obtained through the relevant ethics committees [removed to retain anonymity].

Data Sources

ALSWH survey data: This paper focuses on women in the 'baby boomer' cohort of ALSWH (born 1946-51) who completed Survey 1 in 1996 (n=13716), and three-yearly follow-up surveys since 1998. They were aged 45-50 years at Survey 1 and 59-64 years at Survey 6 (n=10011) in 2010.

Sociodemographic variables included: year of birth, country of birth, Socio-Economic Indexes for Areas (SEIFA ranks areas in Australia according to relative socio-economic advantage and disadvantage, based on information from the five-yearly Census),(19) Australian state of residence, accessibility to services (area of residence), Aboriginal or Torres Strait Islander status, education, marital status, ability to manage on income, current sources of income, current employment status, occupation, partner occupation, concessional health care card status, private health insurance (hospital or ancillary), and caregiver status. Health variables included: smoking status, alcohol use, WHO Body Mass Index,(20) physical activity, report of chest pain, headaches/migraine or pain in joints or back in the last 12 months, report of doctor diagnosis of cardiovascular disease, anxiety/depression, osteoporosis, chronic obstructive pulmonary disease/asthma, diabetes, or other medical condition in the last three years, depression (SF36 Mental Component Scores: Score less than or equal to 52 means not depressed; score greater than 52 means depressed(21))

Medicare Australia data:

Medicare Australia data includes claims for health services funded by Medicare and Department of Veterans' Affairs (See: http://www.medicareaustralia.gov.au/provider/medicare/mbs.jsp), and records of subsidised prescriptions under the Pharmaceutical Benefits Scheme (See: http://www.pbs.gov.au/pbs/home). These datasets provide information about consumer beneficiary status, medical and allied health services, dates of services, and cost of services. They do not include reason for service. For this study, ALSWH survey data are linked to Medicare Australia's health services records from 2002 to 2011 for consenting participants (67% of this ALSWH cohort). There are no specific health services items related to OA, so attendances are classified according to Medicare Broad Type of Service, (22) and some specific higher volume services (general practitioners (GPs), specialists and allied health services). Medicines specifically related to arthritis were used to define the sample groups.

Definition of study groups

At ALSWH Survey 5 (2007), women were asked: "In the past three years have you been diagnosed or treated for": a) osteoarthritis; b) rheumatoid arthritis; c) other arthritis. Women could report having more than one type of arthritis. "Doctor diagnosed arthritis" is an internationally accepted measure of self-reported arthritis, used in World Health Organisation (WHO) surveys,(23) and an appropriate arthritis case definition for population level studies.

Two groups were defined, from ALSWH survey and Pharmaceutical Benefits Scheme medicines data:

- **OA Group met the criteria of:** Reported 'OA' or 'other arthritis' (i.e. not rheumatoid arthritis) at Survey 5 (2007); did not report arthritis of any type at Survey 3 (2001) or Survey 4 (2004); did not self-report use of "arthritis medicines" at any survey before Survey 5, did not use DMARDs (disease-modifying anti-rheumatic drugs) at any time (by self-report in ALSWH or Pharmaceutical Benefits Scheme data).

- **Never Group met the criteria of:** Never reported arthritis of any kind at any survey (Survey 3[2001] to Survey 6[2010]); did not report use of medications for arthritis at any survey; did not use DMARDs at any time.

Analyses

Self-reported sociodemographic and health characteristics of the two groups (OA and Never) in 2007 were described and compared using chi-square analyses. Only variables where the differences between groups were statistically significant at $p < 0.01$ are reported here.

The rate of Medicare Broad Type of Service attendance (Unreferred-Vocationally Registered General Practitioners, Unreferred-Other, Specialists, Pathology Tests, Unreferred-Enhanced Primary Care, Allied Health, Miscellaneous)(22) was compared between groups, for two time segments relative to Survey 5 (2007) (when the OA group first reported OA), (2002 to 2006; 2007 to 2011), using person time at risk of utilisation as the denominator.

Annual rates of specific Medicare service types (GP, Specialist and allied health services) were graphed to examine changes over time for both groups. Interrupted Time Series regression models were used to examine the differences in quarterly rates of use of GP and other Specialist services in relation to Survey 5.(24) All tests were conducted at 5% significance level. The majority of analyses were undertaken in SPSS (v. 19); with Interrupted Time Series analyses undertaken in STATA (v. 11).

Results

Sample characteristics

There were 761 women who met the inclusion criteria for the OA group, and 4346 women in the Never Group. **Table 1** shows the sociodemographic and health variables which were significantly different between groups at the p<0.01 level, in 2007, when both groups were aged 56 to 61 years. The OA group had poorer sociodemographic indicators than the Never group, with more women reporting no formal education, difficulty managing on their income, and greater dependence on government support payments; and fewer women reporting having an employed partner, or private hospital insurance. The OA group also reported significantly poorer health than the Never group, with fewer women reporting a healthy weight and more reporting obesity, comorbid conditions, pain, stress and depression.

Table 1 here

Medicare Broad Type of Service attendances

Before 2007, OA group had a significantly higher rate of all service type attendances except Unreferred-Other and Miscellaneous, compared to Never group: For Unreferred–Vocationally Registered GPs, a rate of 5.70 (95%CI:5.60-5.80) compared to 3.98 (95%CI:3.95-4.02); for Specialists, 1.24 (95%CI:1.19-1.29) compared to 0.86 (95%CI:0.85-0.88); for Pathology tests, 0.83 (95%CI:0.79-0.97) compared to 0.59 (95%CI:0.58-0.61); for Enhanced Primary Care, 0.05 (95%CI:0.04-0.06)

compared to 0.02 (95%CI:0.02-0.02); and for Allied Health, 0.09 (95%CI:0.07-0.11) compared to 0.01 (95%CI:0.01-0.01).

After 2007, OA group had significantly higher rates than Never group for all broad service categories except Miscellaneous: For Unreferred–Vocationally Registered GPs, a rate of 5.51 (95%CI:5.40-5.63) compared to 3.90 (95%CI:3.86-3.94); for Unreferred-Other, 0.21 (95%CI:0.19-0.23) compared to 0.14 (95%CI:0.13-0.15); for Specialists, 1.27 (95%CI:1.22-1.33) compared to 0.91 (95%CI:0.90-0.93); for Pathology tests, 1.42 (95%CI:1.36-1.48) compared to 1.16 (95%CI:1.14-1.18); for Enhanced Primary Care, 0.19 (95%CI:0.17-0.22) compared to 0.09 (95%CI:0.08-0.09); and for Allied Health, 0.15 (95%CI:0.13-0.17) compared to 0.05 (95%CI:0.05-0.06).

For OA group, attendance rates increased significantly after 2007 for Pathology tests (0.83[95%CI: 0.79-0.87] compared to 1.42[95%CI:1.36-1.48]), Enhanced Primary Care (0.05[95%CI:0.05-0.06] compared to 0.19[95%CI:0.17-0.22]), and Allied Health (0.09[95%CI:0.07-0.11] compared to 0.15[95%CI:0.13-0.17]). Attendance rates similarly increased significantly after 2007 for Never group for Pathology tests (0.59[95%CI:0.58-0.61] compared to 1.16[95%CI:1.14-1.18]), Enhanced Primary Care (0.02[95%CI:0.02-0.02] compared to 0.09[95%CI:0.08-0.09]), and Allied Health (0.01[95%CI:0.01-0.01] compared to 0.05[95%CI:0.05-0.06]).

Rates of specific Medicare health services attendances

Over the study period (2001 to 2011), the OA group always had higher General Practitioner and Specialist annual attendances, compared to the Never group; and increasingly higher Allied health services annual attendances, from around 2007, as shown in **Figure 1**.

Figure 1 here

Interrupted Time Series regression models

General Practitioner (GP) services

There was a significant difference in the trends for GP service use over time across the two groups. In the OA group, the quarterly rate of GP use was statistically significantly higher than in the Never group prior to reporting OA, following which it reduced to be not statistically significantly different to the Never group. In comparison, the rate of GP services in the Never group (representing the background rate of service use) did not change significantly over the two time periods. (See **Figure 2**)

Figure 2 here

Specialist services

There was also a significant difference in the trends for Specialist services by OA status, with changes similar to those observed for GP service use. Before 2007, OA group had a significantly higher number of Specialist services per person than the Never group (0.238 [95%CI:0.225-0.252] compared to 0.195 [95%CI:0.182-0.208); and a significantly higher rate of Specialist services per person per quarter than the Never group (0.006 [95%CI:0.005-0.007] compared to 0.001 [95%CI:0.000-0.002]). However, after 2007, neither number nor rate of Specialist services were significantly different between groups.

Discussion

This study explored the effect of incident self-reported doctor diagnosed OA on health services use in a group of 'baby boomer' Australian women, using health survey and linked longitudinal administrative health services data from an ongoing cohort study (ALSWH). There was a pre-existing higher level of use of health services by women who reported OA, in the period prior to first reporting having a doctor diagnosis of OA, compared to those who never reported arthritis during the study period. After reporting a diagnosis of OA, rate of increase in quarterly doctor attendances was significantly lower for those reporting OA, with no corresponding change for those not reporting arthritis. Women reduced their rate of GP and Specialist visits and increased visits to Allied health

services, consistent with current Australian treatment guidelines.(8) This difference occurred despite higher levels of comorbidity in the group with OA.

While government reports on the use of health care by people with arthritis from national and regional (aggregated) data are released regularly,(10) this study is exceptional in that it examines change in health care use over a substantial time period, with individually linked administrative datasets, for people reporting incident arthritis, against an appropriate comparison group .

There are some limitations to this study which may impact interpretation of results. ALSWH surveys are administered every three years, so while "incident OA" is defined as a "first report" at the 2007 survey, OA may have been incident for some time between administration of surveys. We cannot track when this occurred precisely, thus this is a "gross" measure of incidence. However, arthritis, like other chronic diseases, does develop on a continuum, so it is always difficult to define when it first occurred. Our definition of first report of OA is as valid and as robust as possible from a community-based survey. Defining arthritis by self-report is always problematic; however, our previous research has shown that women were much more likely to report joint symptoms (pain and stiffness) when they reported having OA than when they did not report having OA (odds ratio for within-person association: 7.3[95%CI:7.1-7.5]) ,(25) and we can argue that self-report OA is a measure of symptomatic OA. Furthermore, a recent systematic review of diagnostic accuracy showed that self-report has acceptable validity when used in population-based studies where rheumatologist examination is not feasible. (26) Additionally, this study does not base case definition of OA on self-report only, as we have excluded those with DMARD use, defined from the PBS and self-report, providing some confidence that women do have OA rather than rheumatoid or other inflammatory arthritis.

This study demonstrates that after first report of a diagnosis of OA, women reduce doctor visits while increasing allied health services, relative to the rates observed in those without a diagnosis. This change in the rate of type of health services utilised following an OA diagnosis is consistent with

clinical guidelines for OA treatment in Australia. (8) The increase in allied health services items is of particular interest, as these items are limited by both eligibility and in number (they are rebated only for community-based patients with a chronic or terminal medical condition where their GP has initiated a Chronic Disease Management plan; and rebate is available for an absolute maximum of five services each calendar year).(27) These findings suggest the importance of making a positive diagnosis of OA, and have particular significance to GP practice. The overall higher use of services by women who eventually report OA could in part be explained by higher comorbidity compared to those who never report arthritis, but the differential change in rate of use of services happens despite this disparity. The comorbidity profile of women traveling along the continuum to diagnosis of OA could perhaps delay the eventual diagnosis, with OA-related symptoms misinterpreted, leading to frequent GP visits until the diagnosis of OA is made.

Whilst this study provides much needed information on the nature of health service change for people with OA, it has not been able to provide details about the context of medical attendances, as this is a limitation of the source data. Studies on the frequency of OA as the main reason for the consultation, and the decision process by which OA patients reach a particular treatment option are needed to address the current paucity of research on how individuals with OA make informed decisions regarding their treatment options. Information on the way in which informed OA patients are likely to navigate through the health system may assist policymakers in planning for future costs related to this disease; costs that are expected to increase substantially as the population ages.

Conclusion

Prior to reporting incident OA, there is a pre-existing need for health services by those who report OA, in comparison to those who never report arthritis. After incident reporting of OA, rate of increase in doctor use was reduced but allied health use increased, consistent with recommended treatment guidelines.(8) This study highlights the importance of making an early diagnosis of OA to optimise effective use of health services and potential for health benefits.

Table 1. Characteristics of Never group (women who never reported arthritis, 2001 to 2010) compared to OA group (women who reported incident OA [osteoarthritis] in 2007) in 2007 (where p<0.01 only).

Characteristic		Never Group		OA Group		P
		N	%	N	%	
Education	No formal education	540	12.4%	128	16.8%	0.007
	High school level education	2092	48.1%	362	47.6%	
	Tertiary level education	1676	38.6%	266	35.0%	
Manageing on income	Difficult	1272	29.3%	278	36.5%	<.0001
	Not Difficult	3033	69.8%	478	62.8%	
Current income source	Pension or Allowance	667	15.3%	174	22.9%	<.0001
	Superannuation	519	11.9%	49	6.4%	
	Wage or salary	1589	36.6%	316	41.5%	
	Investment or business	1476	34.0%	207	27.2%	
	Other	61	1.4%	11	1.4%	
Partner Occupation	No paid job	1327	30.5%	200	26.3%	0.001
	Professional	1079	24.8%	182	23.9%	
	Skilled trade or advanced clerical or intermediate sales	400	9.2%	93	12.2%	
	Unskilled trade or elementary clerical, sales, service	380	8.7%	91	12.0%	
	Unknown or no partner	1160	26.7%	195	25.6%	
PHI Hospital	Yes	1264	29.1%	268	35.2%	0.003
WHO BMI	Underweight, BMI < 18.5	75	1.7%	8	1.1%	<.0001
	Healthy weight, 18.5 <= BMI < 25	1771	40.8%	237	31.1%	
	Overweight, 25 <= BMI < 30	1482	34.1%	266	35.0%	
	Obese, 30 <= BMI	907	20.9%	231	30.4%	
CVD	Yes	1160	26.7%	240	31.5%	0.006
Anxiety/Depression	Yes	314	7.2%	177	23.3%	<.0001
Osteoporosis	Yes	207	4.8%	73	9.6%	<.0001
COPD/Asthma	Yes	417	9.6%	110	14.5%	<.0001
Diabetes	Yes	292	6.7%	80	10.5%	<.0001
Chest pain	Yes	742	17.1%	194	25.5%	<.0001
Headache or migraine	Yes	3025	69.6%	587	77.1%	<.0001
Pain in joints or back	Yes	3534	81.3%	720	94.6%	<.0001
Depression (SF36 MCS)	Yes	2697	62.1%	346	45.5%	<.0001

BMI=body mass index; COPD=chronic obstructive pulmonary disease; CVD=cardiovascular disease; SF36 MCS= SF36 Mental Component Score; PHI=private health insurance; WHO=World Health Organisation
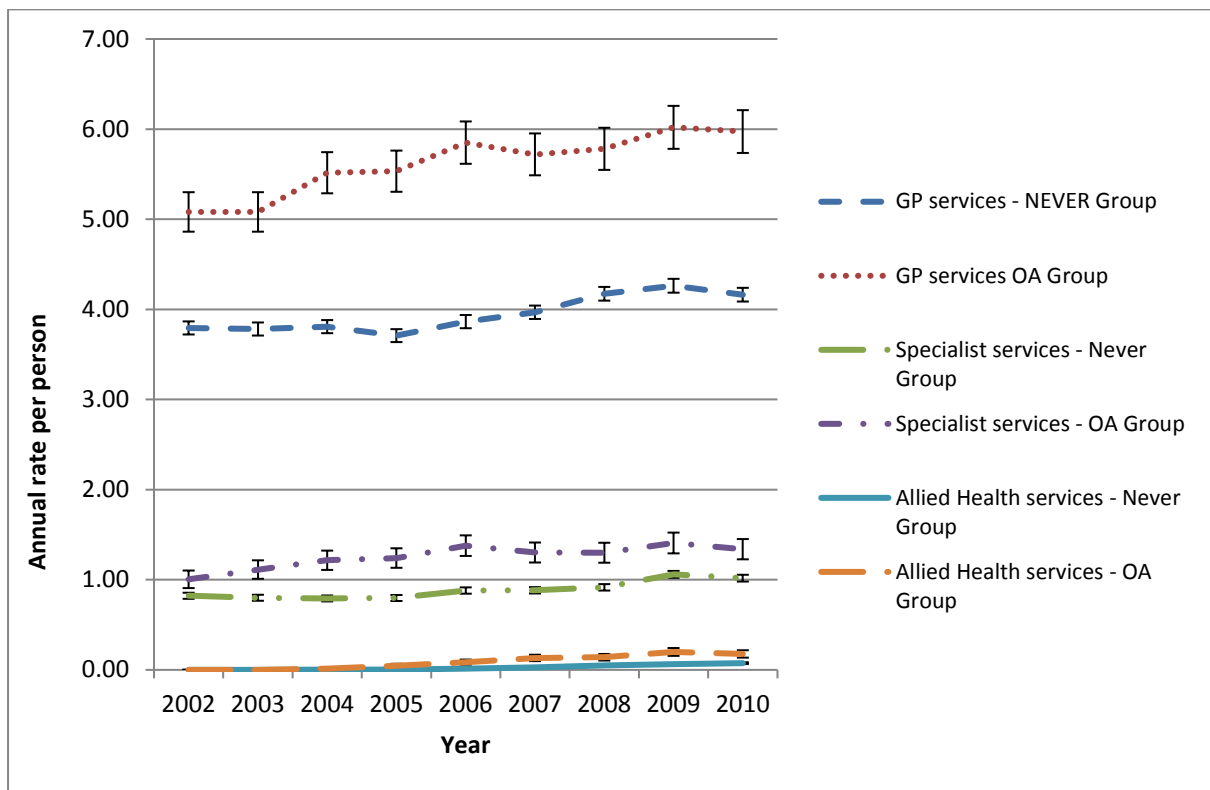
Figure 1: Annual rate of Medicare Australia services, Never group (women who never reported arthritis, 2001 to 2010) compared to OA group (women who reported incident OA [osteoarthritis] in 2007). (GP=General Practitioner)
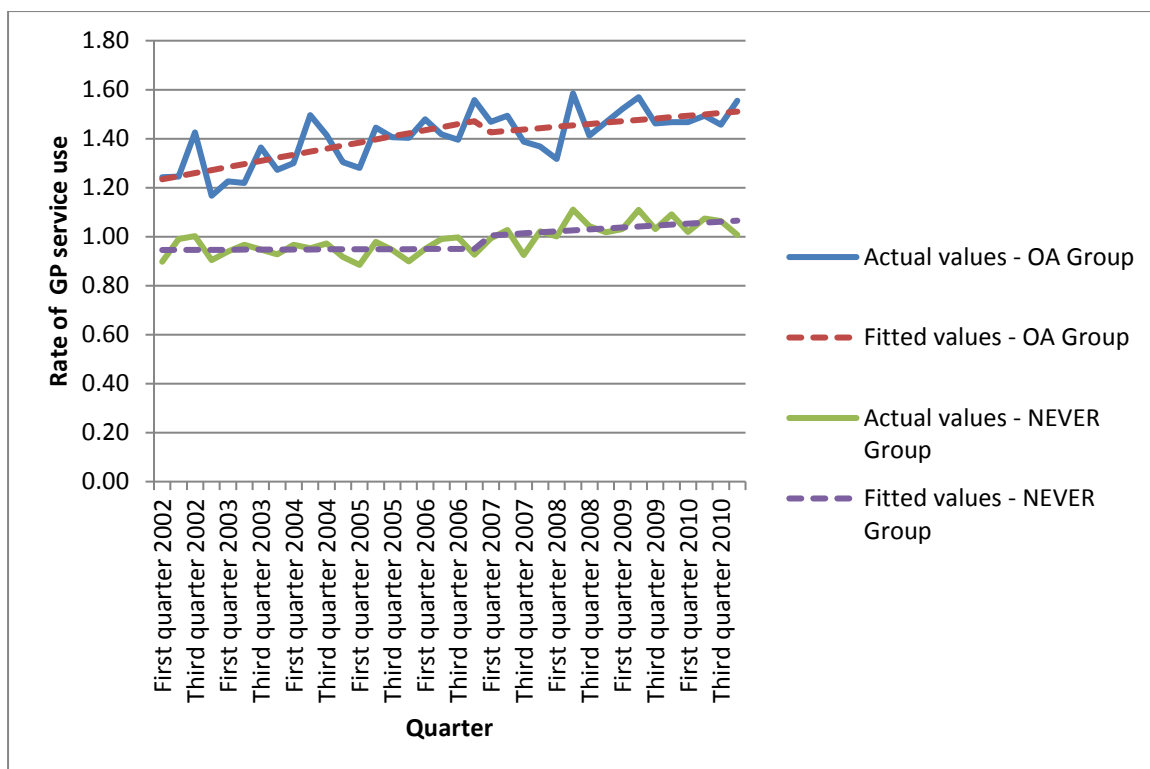
	General Practitioner (GP) services per person per quarter					
		Newey-West				
	Rate	Coeff.	SE	t	P>|t|	[95% CI]
OA Group	Intercept (initial No of GP services per person)	1.222	0.025	48.2	0	[1.170, 1.273]
	Initial Rate of GP service use	0.013	0.002	7.1	0	[0.009, 0.016]
	Immediate change in use of GP services Intercept at S5	-0.051	0.030	-1.7	0.096	[-0.112, 0.010]
	Change in rate of GP use	-0.007	0.003	-2.3	0.028	[-0.013, -0.001]
NEVER Group	Intercept (initial No of GP services per person)	0.945	0.0104	91.1	0	[0.924, 0.966]
	Initial Rate of GP service use	0.0002	0.001	0.3	0.804	[-0.002, 0.002]
	Immediate change in use of GP services Intercept at S5	0.051	0.022	2.3	0.028	[0.006, 0.096]
	Change in rate of GP use	0.004	0.002	1.8	0.085	[-0.0005, 0.008]

Figure 2: Interrupted Time Series regression models for Medicare General Practitioner (GP) services (step at 2007), Never group (women who never reported arthritis, 2001 to 2010) compared to OA group (women who reported incident OA [osteoarthritis] in 2007). [CI=Confidence Interval; Coeff=coefficient; S5=survey 5; SE =standard error]

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