

BMJ Open What is the healthcare utilisation and out-of-pocket expenditure associated with osteoarthritis? A cross-sectional study

David Sibbritt,¹ Tobias Sundberg,² Lesley Ward,¹ Alex Broom,³ Jane Frawley,¹ Jessica Bayes ,¹ Jon Adams¹

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¹Faculty of Public Health, University of Technology Sydney Faculty of Health, Sydney, New South Wales, Australia

²Musculoskeletal and Sports Injury Epidemiology Center, Karolinska Institute, Stockholm, Sweden

³Faculty of Arts and Social Sciences, University of New South Wales, Sydney, New South Wales, Australia

Correspondence to

Jessica Bayes;
jessica.bayes@yahoo.com

ABSTRACT

Objective To examine the use and out-of-pocket expenses resulting from consultations, products and practices across conventional, self-care, and complementary medicine (CM) treatments for osteoarthritis (OA) among Australian women.

Design, setting and participants A cross-sectional survey of 800 women from the 45 and Up Study who had reported a clinical diagnosis of OA.

Outcome measures Women's use of conventional, CM and self-prescribed treatments for OA and the associated out-of-pocket cost.

Results Completed questionnaires were returned by 403 women (50.4%). Their average time since the first diagnosis of OA was 15.4 years, and self-rated severity of OA was 5.1 (out of 10) over the past 12 months. During the previous year, 67.0% of the women consulted a doctor, 39.2% consulted an allied health practitioner and 34.7% consulted a CM practitioner for their OA. Some women (19%) consulted with practitioner(s) from all three practitioner groups, 27% consulted with practitioner(s) from two of the three practitioner groups, while 6% consulted with a CM practitioner only. Women with a greater time since diagnosis had more consultations, as did women who rated their OA as more severe. Women's average combined out-of-pocket expenditure for OA-related healthcare consultations, prescription medications, products, and practices was \$673 per annum. Extrapolated to all Australian women with OA, aged 50 years and over, the total out-of-pocket expenditure for this condition is estimated to be \$873 million per annum.

Conclusions Australian women with OA use a range of conventional and CM consultations, self-care, products and practices to manage their condition, incurring significant out-of-pocket expenses. Given the high individual and societal burden of OA, there is a need for further research into the concurrent use of different healthcare resources with a view to providing safe, cost-effective management of OA across the healthcare system and the wider community.

INTRODUCTION

Osteoarthritis (OA) is one of the most common forms of non-communicable disease globally.¹ A chronic, degenerative

Strengths and limitations of this study

- Data for this study were obtained from a substudy of the Sax Institute's 45 and Up Study, which is the largest study of healthy ageing conducted in the Southern Hemisphere.
- This study collected comprehensive data on what type of healthcare practitioners are assessed by women with osteoarthritis, including both conventional medical practitioners and CM practitioners.
- This study calculated the out-of-pocket expense to consult with practitioners and purchase CM products or prescription medications for OA over a 12-month period.
- The data are based on respondents' self-report of health and health resource utilisation and as such may be affected by recall-bias.

condition, OA is predominantly associated with weight-bearing joints, including the knees, hips, ankles and spine. Typical OA symptoms include moderate to severe pain, stiffness, deformity and swelling² and the functional impact of OA presents as reduced mobility and dexterity, associated with gait problems and instability.³ Additionally, OA negatively affects psychosocial health. In Australia, people with OA are more than two times as likely to report poor health and five times more likely to report very high levels of distress compared with those who do not have the condition.⁴

The disease and economic burdens of OA are high, and increasing. Global prevalence of OA is estimated at 12%–21%⁵ and in Australia an estimated 9% of the population self-report OA, equating to 2.1 million people.⁴ OA prevalence increases with age and gender, with females at higher risk of developing OA than men.⁶ A meta-analysis found that females also have more severe knee OA, which is more prevalent after menopause.⁶ An estimated

17.1 million years were lost to disability due to OA in 2010 representing a 64% increase over the previous two decades.⁷ In Australia, the direct health expenditure of OA is estimated at \$1.6 billion.⁸ However, as many forms of self-management do not involve accessing healthcare services, the individual use and cost of managing OA is unclear in this national population.

OA management aims to modify symptoms, limit disease progression and improve health-related quality of life through the combination of pharmacological and non-pharmacological treatments.^{9 10} Treatments may be self-directed and managed or accessed via medical doctors, allied health professionals or complementary medicine (CM) practitioners, with treatments ranging from, specific exercises and tai chi, through to analgesic prescriptions and joint replacement surgery.¹⁰ International guidelines provide mixed evidence for the effectiveness of conventional and CM treatments for the management of OA.^{9 11} While CM supplements including glucosamine and chondroitin sulphate show moderate evidence for pain reduction, results are limited by poor quality trials and publication bias;⁹ with the American College of Rheumatology recommending against their use for hip and knee OA.¹¹ Land-based exercise, however, is now recommended as a core treatment for knee OA, with strengthening evidence for the effectiveness of tai chi for pain and physical function.⁹ Due to increased safety concerns the use of opioids is considered as having uncertain appropriateness in all patients, and the use of non-steroidal anti-inflammatory drugs (NSAIDs) may not be appropriate in patients with a high cardiovascular co-morbidity risk.⁹

The aim of this study was to examine the utilisation and out-of-pocket expenses of consultations, products and practices across conventional, self-care and CM treatments for the management of OA among Australian women.

MATERIALS AND METHODS

Sample

Data were obtained from a substudy of the Sax Institute's 45 and Up Study, which is conducted in Australia and is the largest study of healthy ageing conducted in the Southern Hemisphere.¹² The baseline questionnaire collected information from 267 153 men and women aged 45 and above who reside in the State of New South Wales, Australia. The 45 and Up Study is described in detail elsewhere;¹² but briefly, participants were randomly sampled from the Department of Human Services (formerly Medicare Australia) enrolment database, which provides near complete coverage of the population. The sample is representative of the Australian population in regard to education level and household income.¹³ Individuals aged 80+ years and residents of rural and remote areas were over-sampled. A total of 267 153 participants joined the study by completing a baseline questionnaire (between January 2006 and December 2009) and giving signed consent for

follow-up and linkage of their information to routine health databases.¹² About 18% of those invited participated and participants included about 11% of the NSW population aged 45 years and over.¹² The substudy survey of women from this cohort occurred between August and November 2016. For this substudy, 800 women who had previously indicated on the baseline 45 and Up Study that a doctor had diagnosed them as having OA were mailed a questionnaire, with 403 (50.4%) returning the questionnaire.¹²

Patient and public involvement

Patients or the public were not involved in the design, or conduct, or reporting or dissemination plans of this research.

Demographic characteristics

Women were asked a number of questions, which included their date of birth, current marital status, highest educational qualification they had completed, their ability to manage on their income (ie, no or little difficulty, some difficulties, struggled), and whether they had private health insurance.

The Accessibility Remoteness Index of Australia Plus score for each participant's postcode (ie, major city, inner regional area, outer regional or remote area) was used to assign area of residence.¹⁴

Healthcare utilisation

The women were presented with a list of three conventional medical practitioners (ie, medical specialists, general practitioner, hospital doctor) and seven allied health practitioners (ie, nurse, counsellor, psychologist, pharmacist/chemist, dietitian, physiotherapist, occupational therapist)¹³ and asked to indicate if they consulted any of them for their OA in the previous 12 months. The women were also supplied with a list of 11 CM practitioners (ie, homeopath, acupuncturist, massage therapist, chiropractor, nutritionist, naturopath/herbalist, yoga instructor, meditation instructor, osteopath, traditional Chinese medicine practitioner and an 'other' CM practitioner option), and asked to specify if they consulted with any of these practitioners for their OA in the previous 12 months.¹⁵

The women were provided with an additional list of 11 CM products/practices (ie, homeopathic remedies, aromatherapy oils, herbal medicine, multivitamins, glucosamine/chondroitin, fish oil, meditation without an instructor, yoga without an instructor and two 'other' CM products/practices options) and asked to specify if they used any of these products/practices during the previous 12 months. Women were also asked to list any prescription medications they had used for their OA during the previous 12 months.

Women were also asked how much expense they incurred (ie, out-of-pocket expense) to consult with all practitioners, undertake CM practices and purchase CM

products or prescription medications for their OA during the previous 12 months.

OA status

The women were asked to indicate the time (years/months) since they were first diagnosed with OA. The women were also asked to rate the severity of their OA during the previous 12 months, on a 10-point scale ranging from 0 (least severe) to 10 (most severe). Previous research has found self-reported OA severity to be understandable by participants and show convergent validity with standardised measures of physical and functional outcomes.¹⁶

Statistical analyses

χ^2 tests were used to determine if there was an association between the use of prescription medications and years since diagnosis or severity of illness. χ^2 tests were also used to determine if there was an association between the number of different CM products/practices used and OA features (years since diagnosis and severity).

Two-sample t-tests were used to determine if there was a difference between the number of consultations with healthcare practitioners and years since diagnosis or severity of illness. Two-sample t-tests also evaluated if differences between cost of consultations with healthcare practitioners differed as a function of OA features (years since diagnosis and severity). Spearman's correlation coefficient was used to determine if there was an association between the 12-month and 4-week self-rated severity of OA. A Bonferroni correction was applied to the statistical tests to correct for multiple comparisons. All analyses were conducted using the statistical software Stata, V.14.

RESULTS

Demographic characteristics

The sample from the 45 and Up Study is representative of the Australian population in regard to education level and household income, however, people 80+ years of age and residents of rural and remote areas were over-sampled.¹² In our substudy of women, the average age of participants was 70.6 (SD=8.8) years, with a minimum age of 53 years and a maximum age of 94 years. Most of the women (59.1%) were married or in a de facto relationship, with 35.9% widowed, divorced or separated, and 5.0% single. A university degree was attained by 30.6% of the women, while 28.8% gained a certificate or diploma, 34.1% had a high school education and 6.5% had no formal education. Half of the women (51.4%) resided in a major city, 38.6% resided in an inner regional area and 10.0% resided in an outer regional or remote area. In regards to the ability to manage on available income, 66.5% had no or little difficulty, 22.4% had some difficulties and 11.1% found it difficult to manage. Most of the women (69.7%) had private health insurance.

Osteoarthritis characteristics

In regard to the time since the first clinical diagnosis of OA, the average time was 15.4 (SD=11.8) years. For the

self-rated severity of OA (out of 10; with 10 being most severe), the average severity was 5.1 (SD=2.4) over the past 12 months and 5.1 (SD=2.4) over the past 4 weeks. Note that the 12-month and 4-week self-rated severity of OA was highly correlated ($\rho=0.833$, $p<0.001$).

Consultations with healthcare practitioners

Most women (76.4%; $n=308$) consulted with at least one healthcare practitioner in the previous 12 months for their OA. Specifically, 67.0% ($n=270$) consulted a doctor, 39.2% ($n=158$) consulted an allied health practitioner and 34.7% ($n=140$) consulted a CM practitioner in the previous 12 months. Overlaps were also observed with 19% of women consulting with practitioner(s) from all three practitioner groups, 27% consulted with practitioner(s) from two of the three practitioner groups, while 6% consulted with a CM practitioner only.

Table 1 presents the consultations respondents had with different healthcare practitioners by years since diagnosis of OA and severity of OA over the past 12 months. Women diagnosed with OA for 10 years or more had a larger number of consultations with healthcare practitioners, particularly doctors ($p<0.001$) and allied health practitioners ($p<0.001$), compared with women who had been diagnosed with OA for less than 10 years. Similarly, women who rated their severity of OA as being 5 or more points (out of 10) had a larger number of consultations with healthcare practitioners, particularly doctors ($p<0.001$) and allied health practitioners ($p<0.001$), compared with women who rated their severity of OA as less than 5 points. Overall, the average number of consultations for OA with various healthcare practitioners in the previous 12 months was 7.67 consultations.

Use of prescription medications

The use of prescription medications for OA by years since diagnosis of OA and severity of OA over the past 12 months is presented in table 2. Three categories of prescription medications were determined based on the information provided by the women: (1) NSAIDs (such as celebrex, mobic and meloxicam); (2) opioids such as endone, norspan and fentanyl and (3) 'other' prescription medications including steroidal anti-inflammatory drugs such as cortisone, anticonvulsant medication such as lyrica, and bisphosphonates such as actonel.

A greater percentage of women who rated their severity of OA as being 5 or more points (out of 10) used NSAIDs, compared with women who rated their severity of OA as being less than 5 points ($p<0.001$). In addition, a greater percentage of women who rated their severity of OA as being 5 or more points (out of 10) used opioids ($p<0.001$), compared with women who rated their severity of OA as being less than 5 points.

Use of CM products and practices

Table 3 shows the use of CM products and practices by years since diagnosis of OA and severity of OA over the past 12 months. There was no statistically significant

Table 1 Consultations with healthcare practitioners by years since diagnosis of osteoarthritis and severity of osteoarthritis over the past 12 months

Osteoarthritis characteristics			Average number of consultations			
			Doctor	Allied health	CM	Total
			Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Years since diagnosis	<10 years	(n=120)	2.1 (2.4)	1.1 (2.4)	2.6 (5.2)	5.8 (7.2)
	≥10 years	(n=253)	3.5 (3.8)	2.8 (4.4)	2.7 (4.9)	8.9 (9.7)
	P value		<0.001*	<0.001*	0.810	0.002*
Severity of osteoarthritis†	<5 points	(n=151)	1.3 (1.9)	1.0 (2.4)	2.3 (4.2)	4.6 (6.4)
	≥5 points	(n=244)	4.0 (3.7)	3.0 (4.5)	2.8 (5.3)	9.8 (9.7)
	P value		<0.001*	<0.001*	0.275	<0.001*
Total sample		(n=403)	2.94 (3.41)	2.19 (3.93)	2.54 (4.88)	7.67 (8.94)

*Statistically significant after Bonferroni correction.

†Self-rated severity score out of 10 (1=least severe and 10=most severe).

CM, complementary medicine.

difference identified between the number of different CM products and practices used for OA and years since diagnosis with OA, nor severity of OA.

Out-of-pocket expenses

The out-of-pocket expenses by years since diagnosis of OA and severity of OA over the past 12 months are presented in table 4. Women diagnosed with OA for 10 years or more had a greater out-of-pocket expenditure, specifically for doctors and allied health practitioner expenditure ($p<0.001$), compared with women who had been diagnosed with OA for less than 10 years. Similarly, women who rated their severity of OA as being 5 or more points (out of 10) had a greater out-of-pocket expenditure with, specifically doctors and allied health

practitioners expenditure ($p<0.001$), and prescription medications ($p<0.001$), compared with women who rated their severity of OA as being less than 5 points.

On average, the combined healthcare out-of-pocket expenditure by the women in our study was \$672.70 per annum. In Australia, in 2016, there were 4 165 907 women aged 50 years and over,¹⁷ with an estimated 1 297 633 (31%) having OA.¹⁸ Extrapolating from these figures, and assuming an average individual out-of-pocket expenditure in line with that of the women from this study (\$672.70), we estimate the total out-of-pocket expenditure on OA treatment for Australian women age 50 years and over to be approximately \$A873 million per annum.

Table 2 Use of prescription medications by years since diagnosis of osteoarthritis and severity of osteoarthritis over the past 12 months

Osteoarthritis characteristics			Prescription medication							
			NSAIDs*		Opioids†		Other medications‡		Total	
			Yes (n=84) %	No (n=319) %	Yes (n=28) %	No (n=375) %	Yes (n=34) %	No (n=369) %	Yes (n=128) %	No (n=275) %
Years since diagnosis										
<10 years	(n=244)	23.2	34.7	21.4	33.0	23.3	32.9	23.8	36.3	
≥10 years	(n=253)	76.8	65.3	78.6	67.0	76.7	67.1	76.2	63.7	
P value		0.048		0.206		0.280		0.015		
Severity of osteoarthritis§										
<5 points	(n=151)	22.6	42.4	7.4	40.5	20.6	39.9	21.3	46.3	
≥5 points	(n=244)	77.4	57.6	92.6	59.5	79.4	60.1	78.7	53.7	
P value		<0.001¶		<0.001¶		0.027		<0.001¶		

*Non-steroidal anti-inflammatory drugs (NSAIDs) such as celebrex, mobic and meloxicam.

†Opioids such as endone, norspan and fentanyl.

‡Steroidal anti-inflammatory drugs such as cortisone, anticonvulsant medication such as lycrica, and bisphosphonates such as actonel.

§Self-rated severity score out of 10 (1=least severe and 10=most severe).

¶Statistically significant after Bonferroni correction.

Table 3 Use of complementary medicine (CM) products and practices by years since diagnosis of osteoarthritis and severity of osteoarthritis over the past 12 months

		Number of different CM products and practices used				P value
		None (n=108) %	1 (n=88) %	2 (n=83) %	3 or more (n=94) %	
Osteoarthritis characteristics						
Years since diagnosis						
<10 years	(n=120)	33.3	27.5	22.5	16.7	0.059
≥10 years	(n=253)	26.9	21.7	22.1	29.3	
Severity of osteoarthritis†						
<5 points	(n=151)	28.5	27.8	25.8	17.9	0.030*
≥5 points	(n=244)	28.7	21.3	19.7	30.3	

*Statistically significant after Bonferroni correction.

†Self-rated severity score out of 10 (1=least severe and 10=most severe).

DISCUSSION

This study, investigating the utilisation of different healthcare resources and associated out-of-pocket expenses among older Australian women with OA, has produced a number of significant findings. Women in our study had, on average, 7.67 consultations with a wide range of conventional and CM practitioner types for their OA. As such, it appears that older women with OA are calling on a range of healthcare providers located beyond the conventional healthcare system to seek help with their OA. This finding supports those of previous research which have identified relatively high levels of CM use, both in terms of practitioners and products, among target groups of patients living with arthritis and OA.¹⁹

Women's selective use of conventional medical care, over the counter pharmaceutical management, and CM treatments, may reflect the need for broader pain coping strategies for symptom control and the day-to-day challenges of living with chronic pain.^{20 21} While there are significant

knowledge gaps related to the clinical and cost-effectiveness of comprehensive integrated care models for managing OA, pilot research in patients with chronic back and neck pain suggests such care may be cost-effective.²² Additionally, recent literature reviews and meta-analyses indicate that some selected CM treatments, such as yoga, acupuncture and tai chi, may result in favourable outcomes for patients with OA.^{23–26} Notably, tai chi and traditional Chinese acupuncture are now recommended for the non-pharmacological management of knee OA.^{10 11} However, there is conflicting evidence regarding the effectiveness of other practitioner-based CM therapies for OA, such as biofeedback massage therapy, and yoga, which cannot be concluded to be more or less effective than other types of conventional care.²⁷ Notwithstanding, there have only been a few reported adverse events related to such CM²⁷ use and so further research is needed to elucidate potential opportunities and challenges for integrative care models in the management of complex, long-term conditions involving pain and OA.

Table 4 Out-of-pocket expenses by years since diagnosis of osteoarthritis and severity of osteoarthritis over the past 12 months

		Average cost				Total Mean (SD)
		Doctor/allied health practitioner Mean (SD)	CM practitioner Mean (SD)	Prescription medications Mean (SD)	CM products and practices Mean (SD)	
Osteoarthritis characteristics						
Years since diagnosis						
<10 years	(n=120)	\$140.8 (237.5)	\$123.3 (305.9)	\$66.7 (174.3)	\$177.1 (248.5)	\$507.9 (672.4)
≥10 years	(n=253)	\$272.9 (415.7)	\$153.6 (314.9)	\$120.6 (241.7)	\$239.3 (305.3)	\$786.4 (898.3)
P value		0.001*	0.383	0.029	0.052	0.003*
Severity of osteoarthritis†						
<5 points	(n=151)	\$130.8 (254.7)	\$118.5 (296.3)	\$46.0 (125.2)	\$177.1 (248.5)	\$474.2 (630.6)
≥5 points	(n=244)	\$282.2 (408.1)	\$156.6 (314.6)	\$134.6 (254.5)	\$239.3 (305.3)	\$813.5 (905.9)
P value		<0.001*	0.234	<0.001*	0.052	<0.001*
Total sample	(n=403)	\$220.1 (362.1)	\$139.2 (305.5)	\$98.9 (216.8)	\$214.5 (284.7)	\$672.7 (823.6)

*Statistically significant after Bonferroni correction.

†Self-rated severity score out of 10 (1=least severe and 10=most severe).
CM, complementary medicine.



The average out-of-pocket expenditure by women for OA in our study was \$672.70 per annum. Not only does this attest to the high economic burden of OA for individual women, but extrapolating this figure to a national level also suggests that the overall out-of-pocket expenditure for Australian women aged 50 years and over with OA is approximately \$A873 million per annum. This significant cost is in line with previous research showing high out-of-pocket spending (on both conventional and CM care) among Australian women with back pain.²⁸ This finding attests to the need for policy makers and health service providers to acknowledge these costs and provide support services for women who cannot afford out-of-pocket expenses for maintaining their health and well-being. In particular, the significant spending associated across conventional care, CM treatments, self-care and products for OA, warrants further in-depth investigations that target clinical effectiveness and safety as well as costs and savings in the longer term. Outcomes from such studies can help to prioritise safe, effective management strategies that are also economically sound. Ultimately, the evidence gained from such investigations is of importance not only for patients, but also for health-care providers and policy makers managing OA health services across the health system.

Our analyses show that the longer a woman has lived with OA, and consequently the more severe her OA due to the deterioration of the condition over time, the more likely she is to seek help from a doctor and allied health practitioner, and to use NSAIDs, opioids and other prescription medications (ie, following a conventional model of care by using prescription medications). This suggests similar healthcare seeking behaviour to that identified in previous research showing that women with more severe pain are more likely to use conventional care first, whereas women with less pain have different healthcare seeking behaviour including visits to CM providers.²⁹

Potentially, more severe pain in OA may be interpreted by the patients as more pathology, which may be a significant motivator for consulting conventional biomedical practitioners for help with pathoanatomic diagnosis and care. Correspondingly, less intensive pain in OA may, to a larger extent, motivate self-care and treatments that promote relaxation and well-being, which is generally found with CM practices.²⁸ Future prospective research designs are warranted to test such hypotheses. Accordingly, more research is also needed to explore the varied healthcare options that are available inside and outside the conventional healthcare system, investigating, for example, the significance of keeping patient-provider and interprofessional dialogues about healthcare choices to further improve the alignment of patients' needs and rational use of available healthcare resources.²⁰

There are some limitations to our study that need to be taken into consideration when interpreting the findings, primarily surrounding self-reporting. Previous research in mid-aged and older Australian women has found reliable accuracy and agreement of patients self-reporting survey

responses and administrative hospital record data,³⁰ however, there is still the potential for recall bias. Additionally, self-reporting OA diagnosis could be a potential source of error, however, previous studies have shown high agreement between self-reported OA and rheumatologists' clinical diagnosis.³¹

Another important limitation to note is that some participants may consult with practitioners who were not listed on the questionnaire, such as exercise physiologists, which may have affected the results. Additionally, the preliminary extrapolation to the larger OA population of Australian women made here, requires validation in a broader study using a random sample.

Older women use a wide range of conventional, allied and CM providers, as well as self-care products and practices to manage their OA and this health-seeking behaviour is associated with significant annual out-of-pocket expenses. Given the high individual and societal burden of OA, there is an urgent need for further research exploring barriers and facilitators of self-care and informal care among OA sufferers, as well as investigation of the potential costs and savings of such use in the longer term.

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Contributors DS, JA and AB conceptualised and designed the study. DS analysed the data and performed the statistical analysis. All authors (DS, TS, LW, AB, JF, JB and JA) contributed to the manuscript and approved the final version. DS is the guarantor for this manuscript.

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Competing interests None declared.

Patient consent for publication Not required.

Ethics statements Ethical approval for the use of the substudy dataset from the 45 and Up Study was gained from the Human Research Ethics Committees at the University of Technology Sydney on 7 October 2015 (UTS HREC REF NO. 2015000683).

Provenance and peer review Not commissioned; externally peer reviewed.

Data Sharing Statement The data set could potentially be made available to other researchers if they obtain the necessary approvals. Further information on this process can be obtained from the 45 and Up Study (45andUp.research@saxinstitute.org.au).

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ORCID iD

Jessica Bayes <http://orcid.org/0000-0003-0601-6129>

REFERENCES

- Murray CJL, Vos T, Lozano R, *et al*. Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990–2010: a

- systematic analysis for the global burden of disease study 2010. *The Lancet* 2012;380:2197–223.
- 2 Manek NJ, Lane NE. Osteoarthritis: current concepts in diagnosis and management. *Am Fam Physician* 2000;61:1795–804.
 - 3 World Health Organization. Chronic diseases and health promotion: chronic rheumatic conditions, 2016. Available: <http://www.who.int/chp/topics/rheumatic/en>
 - 4 Australian Institute of Health and Welfare. Osteoarthritis, 2020. Available: <https://www.aihw.gov.au/reports/arthritis-other-musculoskeletal-conditions/osteoarthritis/contents/how-does-osteoarthritis-affect-quality-of-life>
 - 5 Palazzo C, Nguyen C, Lefevre-Colau M-M, *et al.* Risk factors and burden of osteoarthritis. *Ann Phys Rehabil Med* 2016;59:134–8.
 - 6 Srikanth VK, Fryer JL, Zhai G, *et al.* A meta-analysis of sex differences prevalence, incidence and severity of osteoarthritis. *Osteoarthritis Cartilage* 2005;13:769–81.
 - 7 Vos T, Flaxman AD, Naghavi M, *et al.* Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990–2010: a systematic analysis for the global burden of disease study 2010. *The Lancet* 2012;380:2163–96.
 - 8 Australian Institute of Health and Welfare. Health expenditure for arthritis and musculoskeletal conditions, 2009. Available: <https://www.aihw.gov.au/reports/health-welfare-expenditure/health-expenditure-for-arthritis-and-musculoskeletal/contents/summary>
 - 9 McAlindon TE, Bannuru RR, Sullivan MC, *et al.* OARSI guidelines for the non-surgical management of knee osteoarthritis. *Osteoarthritis Cartilage* 2014;22:363–88.
 - 10 Zhang W, Moskowitz RW, Nuki G, *et al.* OARSI recommendations for the management of hip and knee osteoarthritis, part II: OARSI evidence-based, expert consensus guidelines. *Osteoarthritis Cartilage* 2008;16:137–62.
 - 11 Hochberg MC, Altman RD, April KT, *et al.* American College of rheumatology 2012 recommendations for the use of nonpharmacologic and pharmacologic therapies in osteoarthritis of the hand, hip, and knee. *Arthritis Care Res* 2012;64:465–74.
 - 12 Profile C. The 45 and up study. *Int J Epidemiol* 2008;37:941–7.
 - 13 Adams J, Bayes J, Hosseini M, *et al.* Annual out-of-pocket expenditure associated with healthcare use among Australian older women with osteoporosis: a cross-sectional study. *Arch Osteoporos* 2021;16:1–9.
 - 14 Rural A. Regional and remote health: a guide to remoteness classifications. Canberra: Australian Institute of Health and Welfare *AIHW Cat No PHE* 2004;53.
 - 15 Sibbritt D, Steel A, Peng W, *et al.* Utilisation of self-care products and practices and its associated factors among stroke survivors. *Int J Clin Pract* 2021;75:e13821.
 - 16 Cross M, Nguenyon Sime W, March L, *et al.* The burden of osteoarthritis: self-reported severity in the KHOALA population-based cohort. *Rheumatology* 2020;59:2368–73.
 - 17 Australian Bureau of Statistics (ABS). Australian demographic statistics, Jun 2016, 2017 Australian Bureau of Statistics. Available: <https://www.abs.gov.au/ausstats/abs@.nsf/previousproducts/3101.0feature%20article1jun%202016>. [Accessed 10 Nov 2018].
 - 18 Australian Bureau of Statistics. National health survey: first results, 2014–15. 2015 Australian Bureau of Statistics. Available: <https://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/4364.0.55.001~2014-15~Main%20Features~Arthritis%20and%20osteoporosis~8> [Accessed 10 Nov 2018].
 - 19 Lapane KL, Sands MR, Yang S, *et al.* Use of complementary and alternative medicine among patients with radiographic-confirmed knee osteoarthritis. *Osteoarthritis Cartilage* 2012;20:22–8.
 - 20 Khan MU, Jamsheed SQ, Ahmad A, *et al.* Use of complementary and alternative medicine among osteoarthritic patients: a review. *J Clin Diagn Res* 2016;10:JE01–6.
 - 21 Papandony MC, Chou L, Senevickrama M, *et al.* Patients' perceived health service needs for osteoarthritis (OA) care: a scoping systematic review. *Osteoarthritis Cartilage* 2017;25:1010–25.
 - 22 Andersson S, Andersson S, Sundberg T, Johansson E, *et al.* Patients' experiences and perceptions of integrative care for back and neck pain. *Altern Ther Health Med* 2012;18:25.
 - 23 Sundberg T, Hagberg L, Zethraeus N, *et al.* Integrative medicine for back and neck pain: exploring cost-effectiveness alongside a randomized clinical pilot trial. *Eur J Integr Med* 2014;6:29–38.
 - 24 Kan L, Zhang J, Yang Y, *et al.* The effects of yoga on pain, mobility, and quality of life in patients with knee osteoarthritis: a systematic review. *Evid Based Complement Alternat Med* 2016;2016:1–10.
 - 25 Shim J-W, Jung J-Y, Kim S-S. Effects of electroacupuncture for knee osteoarthritis: a systematic review and meta-analysis. *Evid Based Complement Alternat Med* 2016;2016:1–18.
 - 26 Manyanga T, Froese M, Zarychanski R, *et al.* Pain management with acupuncture in osteoarthritis: a systematic review and meta-analysis. *BMC Complement Altern Med* 2014;14:1–9.
 - 27 Chang W-D, Chen S, Lee C-L, *et al.* The effects of tai chi Chuan on improving Mind-body health for knee osteoarthritis patients: a systematic review and meta-analysis. *Evid Based Complement Alternat Med* 2016;2016:1–10.
 - 28 Macfarlane GJ, Paudyal P, Doherty M, *et al.* A systematic review of evidence for the effectiveness of practitioner-based complementary and alternative therapies in the management of rheumatic diseases: osteoarthritis. *Rheumatology* 2012;51:2224–33.
 - 29 Kirby ER, Broom AF, Sibbritt DW, *et al.* Health care utilisation and out-of-pocket expenditure associated with back pain: a nationally representative survey of Australian women. *PLoS One* 2013;8:e83559.
 - 30 Sibbritt D, Lauche R, Sundberg T, *et al.* Severity of back pain may influence choice and order of practitioner consultations across conventional, allied and complementary health care: a cross-sectional study of 1851 mid-age Australian women. *BMC Musculoskelet Disord* 2016;17:1–9.
 - 31 March LM, Schwarz JM, Carfrae BH, *et al.* Clinical validation of self-reported osteoarthritis. *Osteoarthritis Cartilage* 1998;6:87–93.