Musculoskeletal conditions and comorbidity in Australia

AIHW

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Summary

Musculoskeletal conditions comprise more than 150 different conditions of the bones, muscles, ligaments and connective tissues, such as forms of arthritis, osteoporosis and back pain and problems. These conditions have a substantial impact on individuals—through illness, pain and disability—and the community, through health system expenditure and other economic costs, and population disease burden. Comorbidity refers to the occurrence of 2 or more diseases in a person at one time.

This report examines the prevalence of comorbid chronic conditions among people with musculoskeletal conditions using data from the National Health Survey 2014–15 and the National Hospital Morbidity Database 2016–17.

Musculoskeletal conditions are common in Australia

In 2014–15, 30% of Australians had at least 1 musculoskeletal condition. The prevalence generally increased with age, from 1.0% among people aged 0–14 to 72% among people aged 75–84.

The most common musculoskeletal conditions were:

- Back pain and problems (16.2% of the population)
- Osteoarthritis (9.0%)
- Other forms of arthritis (5.3%).

Most people with a musculoskeletal condition had at least 1 other chronic condition

Almost 4 in 5 (79%) people with arthritis and 2 in 3 (65%) people with back pain and problems had at least 1 other chronic condition.

Among people with arthritis, the most common comorbid conditions were:

- Cardiovascular disease (48%)
- Back pain and problems (33%)
- Mental health problems (27%).

Among people with back pain and problems, the most common comorbid conditions were:

- Arthritis (31%)
- Cardiovascular disease (31%)
- Mental health problems (30%).

More than half (54%) the hospitalisations for musculoskeletal conditions involved at least 1 other chronic condition

In 2016–17, there were 536,804 hospitalisations with a musculoskeletal condition as the principal diagnosis. Of these hospitalisations, 41% had 1 additional chronic condition, 9.0% had 2 and 3.4% had 3 or more. Common comorbidities included diabetes, colitis and nerve damage in the limbs.

Musculoskeletal hospitalisations involving comorbid chronic conditions were more likely to involve rehabilitation care and be a same day separation than those that did not involve comorbidities. However, this varied depending on the musculoskeletal condition.

1   Introduction

The increasing prevalence of chronic or non-communicable conditions is a major issue worldwide (WHO 2011). Chronic conditions are the leading cause of ill health, disability and death, and have a substantial impact on the Australian health-care system. According to the National Health Survey (NHS) 2014–15, half of the Australian population (more than 11 million Australians) had at least 1 of 8 selected chronic conditions, and 6.9 million Australians had a musculoskeletal condition. One in 4 Australians (about 5.3 million people, 23%) reported having 2 or more coexisting chronic conditions—commonly known as comorbidity or multi-morbidity—and musculoskeletal conditions were present in about 22% of these (ABS 2015).

This report explores the prevalence and impact of chronic condition comorbidity associated with musculoskeletal conditions in Australia.

What are musculoskeletal conditions?

Musculoskeletal conditions comprise more than 150 different conditions of the bones, muscles, ligaments, connective tissues and joints. They are the most common chronic conditions in Australia, and have a substantial impact on people and society through illness, pain and disability, health system expenditure and other economic costs, and population disease burden (AIHW 2016b). Box 1 provides a brief description of the musculoskeletal conditions examined in this report.

Musculoskeletal conditions have a profound impact on quality of life and wellbeing, due to acute and chronic pain, physical limitations, management of comorbidities and mental health problems. This can result in withdrawal from social, community and occupational activities (Briggs et al. 2016). Older people with musculoskeletal conditions are generally less active in comparison with those without musculoskeletal conditions, which greatly increases the risk of functional decline (Cooper et al. 2010). Decreased physical capabilities such as reduced grip strength, standing balance, walking speed, and ability to stand up and down can result in a reduced ability to manage comorbid conditions and increased risk of death (Cooper et al. 2010).

What is comorbidity?

Comorbidity refers to the occurrence of 2 or more diseases in a person at one time. While the existence of these multiple health conditions may be unrelated, in many instances—and particularly in relation to chronic diseases—there is some association between them. Further, a range of chronic diseases share risk factors. Understanding more about comorbidities can provide vital information for prevention, management and treatment of chronic diseases (AIHW 2016a).

In this report, we define comorbidity as any other chronic condition occurring in an individual at the same time as a musculoskeletal condition.

Box 1: Definitions and key terms

Arthritis: An umbrella term for a wide range of inflammatory conditions affecting the joints, causing pain and stiffness. Age, overweight and obesity, injury and genetic factors increase the risk of developing arthritis. Osteoarthritis and rheumatoid arthritis are common forms of arthritis.

Chronic conditions: Conditions that have complex and multiple causes, are long-lasting and persistent in their symptoms or development, and often lead to a gradual deterioration of health and loss of independence.

Comorbid: The presence of more than 1 illness or disease occurring in a person at the same time.

Hospitalisation: Synonymous with **admission** and **separation**; that is, an episode of hospital care that starts with the formal admission process and ends with the formal separation process. An episode of care can be completed by the patient's being discharged, being transferred to another hospital or care facility, or dying, or by a portion of a hospital stay starting or ending in a change of type of care (for example, from acute to rehabilitation) (AIHW 2016a).

Inflammatory arthropathies: A group of diseases that cause inflammation in the joints. In Chapter 3 of this report, these diseases include reactive arthritis, inflammatory polyarthropathies, ankylosing spondylitis and other inflammatory spondylopathies.

Osteoarthritis: A condition characterised by the deterioration of the cartilage that overlies the ends of bones in joints, damage in the underlying bone and low-grade inflammation, mostly affecting the hands, spine, hips, knees, ankles and feet.

Rheumatoid arthritis: A systemic autoimmune disease where the body's immune system attacks its own tissues lining the joints, causing pain, swelling and stiffness. Joint damage is progressive and irreversible, resulting in deformities and severe disability over time.

Back pain and problems: A wide range of conditions associated with the bones, joints, connective tissue, muscles and nerves of the back. Disc disorders, sciatica and curvature of the spine are common back problems, and may be the result of a range of injuries and conditions (such as osteoarthritis). Age, being overweight or obese, occupation and genetic factors are known to increase risk.

Morbidity: Refers to ill health in an individual and to levels of ill health in a population or group.

Osteoporosis: A condition that causes the bones to become thin, weak and fragile, so that even a minimum amount of trauma (such as a bump or a fall) can cause a broken bone, resulting in chronic pain, disability, loss of independence and premature death. Osteoporosis is caused by chronic loss of bone density, where the minerals in the bones (such as calcium) are lost faster than the body is able to replace them. Risk factors associated with osteoporosis are increasing age, being female, family history of the disease, low vitamin D levels, low calcium intake, low body weight, physical inactivity, smoking, excess alcohol consumption, long-term corticosteroid use and reduced oestrogen levels.

'Other musculoskeletal conditions': These include a broad range of specific conditions such as joint, connective and soft tissue disorders, amputations and other unclassified musculoskeletal conditions separate from arthritis, back pain problems and osteoporosis.

Prevalence: The number or proportion (of cases, instances) in a population at a given time.

Risk factor: Any factor that causes or increases the likelihood of a health disorder or other unwanted condition or event.

Background

Prevalence

In 2014–15, almost 1 in 4 Australians (23%) had comorbid chronic conditions, with 9.3% having 3 or more conditions, according to self-reported survey data (ABS 2015).

Older people are more likely to experience a higher number of comorbid chronic conditions. People aged 65 and over were 6.2 times as likely (60%) to have a comorbidity than people aged 0–44 (9.7%). Over a quarter (29%) of people aged 65 and over reported having 3 or more chronic conditions, compared with 2.4% for those aged under 45 (ABS 2015) (Figure 1.1).

Figure 1.1: Comorbidity of selected chronic conditions, by age, 2014–15

Note: The selected chronic conditions are arthritis, asthma, back pain and problems, cancer, cardiovascular disease, chronic obstructive pulmonary disease, diabetes, and mental health conditions.

Sources: ABS 2015; Table 19.1.
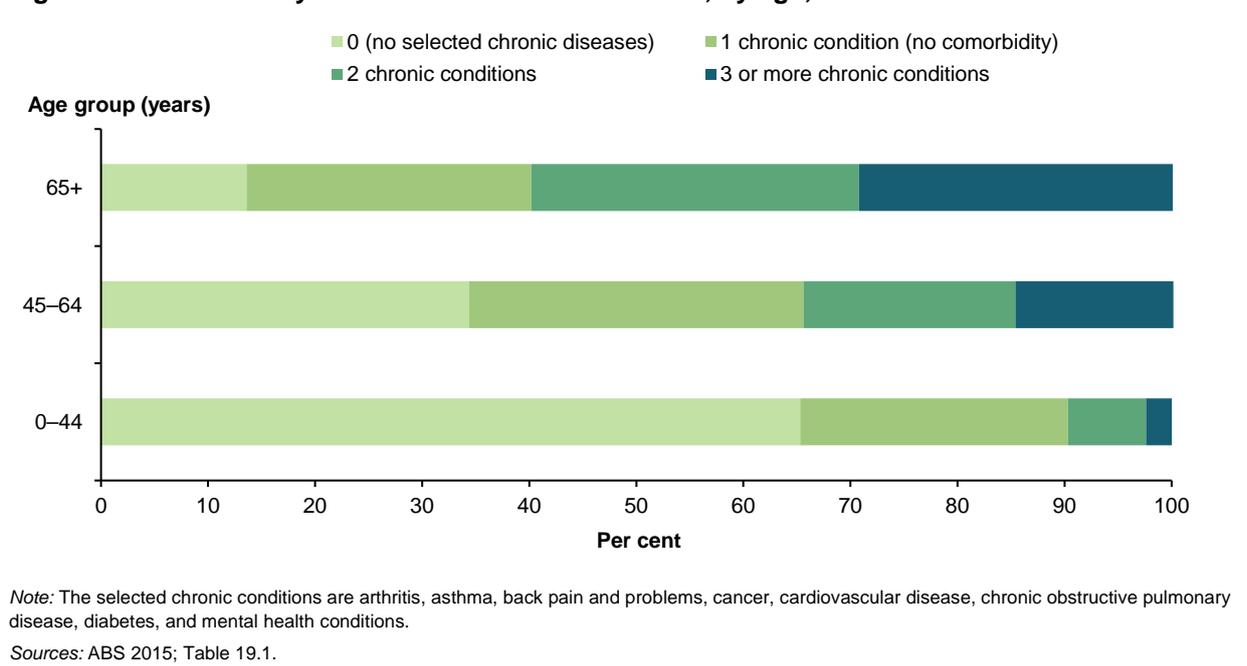
In addition to the older population, in 2014–15 the proportion of people with 2 or more chronic conditions was higher for:

- people living in the most disadvantaged areas (30%) compared with the least disadvantaged areas (19%)
- people living in *Outer Regional* and *Remote* areas (26%) compared with *Major cities* (21%) (ABS 2015).

Lifestyle risk factors for musculoskeletal conditions and comorbidities include physical inactivity, smoking, poor diet, occupation (involving manual labor or joint loading) and history of joint trauma and injuries (Arthritis Australia 2014).

The common and increasing prevalence of two key risk factors (age and excess weight) for many chronic conditions and diseases—including musculoskeletal conditions, cardiovascular disease and Type 2 diabetes mellitus—could indicate a potential increase in chronic disease and chronic disease comorbidity in Australia (AIHW 2016a).

Treatment and health outcomes

Chronic condition comorbidities place a substantial burden on individuals in terms of disease management, outcomes and quality of life. People with comorbidities have a higher risk of hospitalisations, adverse drug events, poorer functional status and increased mortality compared to people without comorbidities (Cooper et al. 2010; Fortin et al. 2004; Gijsen et al. 2001; Kadam & Croft 2007). Comorbidity among people with musculoskeletal conditions has been shown to result in poorer health outcomes. For example, all-cause mortality rates were shown to be higher in people hospitalised with musculoskeletal conditions and comorbid cardiovascular disease (CVD) (Barbour et al. 2015; Zeltzer et al. 2014). Comorbid chronic conditions can complicate treatment and management for individuals, as interventions tend to focus on the treatment and management of individual conditions. For those with more than 1 chronic condition, treatment and management can become more complex and require a broader and integrated approach. Individuals with comorbidities often use multiple services, which can result in duplication of tests, conflicting medical advice and increased stress and burden on the individual (Starfield et al. 2005; Vogeli et al. 2007; Wolff et al. 2002).

Comorbidities can also make it more difficult for people to self-manage their conditions (Leeder & Wells 2012). For example, arthritis and back pain and problems often restrict physical activity—an important factor in successful disease management of cardiovascular disease, mental health problems and weight (DoH 2014).

Disease burden and health-care costs

Musculoskeletal conditions contribute substantially to the disease burden in Australia, accounting for 12% of the total burden in 2011, and ranked as the fourth-leading contributor to the total disease burden after cancer, cardiovascular diseases and mental health conditions. Musculoskeletal conditions were also the leading cause of non-fatal burden in 2011 (23%) (AIHW 2017b).

Musculoskeletal conditions are also highly comorbid, and featured in the most common chronic condition comorbidity combinations among selected chronic diseases in 2014–15:

- arthritis with CVD (7.4% of the population)
- arthritis with back pain and problems (5.1%)
- back pain and problems with cardiovascular disease (5.0%) (ABS 2015).

In 2012–13, musculoskeletal conditions were ranked the fifth-leading cause of hospital admitted patient expenditure, following cardiovascular diseases, injuries, reproductive and maternal conditions and gastrointestinal diseases. Expenditure on chronic musculoskeletal disorders was estimated at $3.5 billion, accounting for 7.7% of total hospital admitted patient expenditure (AIHW 2017b).

Structure of this report

The report is structured in five chapters:

- Chapter 1, the introduction (this chapter), presents an overview of chronic disease comorbidity in Australia, describes the extent and impact of comorbidities more broadly on chronic conditions treatment and management, and introduces the musculoskeletal conditions of interest.
- Chapter 2, Comorbidity in the community, summarises the population prevalence and burden of musculoskeletal conditions, and describes in more detail the comparative

prevalence of chronic comorbid conditions in the population with musculoskeletal conditions.

- Chapter 3, Comorbidity in hospital care, presents baseline information on the volume and impact of chronic comorbid conditions in musculoskeletal hospitalisations in Australia.
- Chapter 4, Data gaps and limitations, highlights key data gaps and limitations that are important to note for future analysis and interpretation of the key findings presented in the report.

2   Comorbidity in the community

Key findings:

- Almost 1 in 3 (30%) Australians have at least 1 musculoskeletal condition.

- Back pain and problems is the most common musculoskeletal condition (16% of the population), followed by osteoarthritis (9.0%) and other forms of arthritis (5.3%).

- Almost 4 in 5 (79%) people with arthritis and 2 in 3 (65%) people with back pain and problems had at least 1 other chronic condition.

- More than 2 in 5 (43%) people with arthritis and more than 1 in 3 (35%) people with back pain and problems had 2 or more comorbid chronic conditions.

- Among those with back pain and problems, arthritis and cardiovascular disease were the most common comorbidities (both 31%), followed by mental health problems (30%).

- Among those with arthritis, cardiovascular disease (48%), back pain and problems (33%) and mental health problems (27%) were the most common comorbidities.

What data are available to report on comorbidity in the community?

This chapter summarises the prevalence of musculoskeletal conditions in the Australian population, and describes the comparative prevalence of chronic condition comorbidity in the population with musculoskeletal conditions. Summary information on the extent and impact of musculoskeletal conditions presented here is derived from the National Health Survey (NHS) 2014–15 and from the Australian Burden of Disease Study (ABDS) 2011. Information on comorbidity is derived from the Australian Bureau of Statistics (ABS) NHS 2014–15 only.

National Health Survey

The NHS 2014–15 collected information on the health of Australians from approximately 19,000 respondents, including long-term health conditions and risk factors. Respondents were asked if they had been diagnosed with a health condition, and if it was current and/or long-term (self-reported).

In this chapter, summary information is presented on the prevalence of 5 broad musculoskeletal condition groups:

- Back pain and problems (dorsopathies)
- Rheumatoid arthritis
- Osteoarthritis
- Osteoporosis
- Other diseases of the musculoskeletal system and connective tissue.

Comorbidity was determined where a respondent reported both the musculoskeletal condition of interest and at least 1 other chronic condition, including other specific musculoskeletal conditions. Published data on chronic condition comorbidity are available for eight selected chronic conditions, including two musculoskeletal conditions only:

- Arthritis (including rheumatoid arthritis, osteoarthritis, other and type unknown)
- Back pain and problems
- Asthma
- Cancer
- Chronic Obstructive Pulmonary Disease
- Diabetes mellitus
- Diseases of the circulatory system (including heart disease, stroke and other cardiovascular diseases)
- Mental and behavioural problems.

For further information, please see the NHS 2014–15 User's Guide on the ABS website www.abs.gov.au.

Australian Burden of Disease Study

The ABDS 2011 provides information on the burden of disease for the Australian population, including Australian-specific estimates for 200 diseases and injuries, grouped into 17 disease groups, for 2003 and 2011. It also provides estimates of how much of the burden can be attributed to 29 different risk factors.

The summary measure of burden of disease analysis is disability-adjusted life years (DALY). One DALY is 1 year of 'healthy life' lost due to illness and/or death. The more DALY associated with a disease or injury, the greater the burden. The DALY measure is produced by combining the non-fatal and fatal burden.

Non-fatal burden is expressed as years lived with disability (YLD). YLD measures the proportion of healthy life lost due to living with a disease in a given year, and is influenced by the number of people with each disease, how long they spend living with it and how severe the effects are.

The ABDS 2011 accounted for comorbidity through an adjustment procedure to simulate the comorbidities within the Australian population and their impact on YLD (AIHW 2016c).

What do the data tell us?

Prevalence of musculoskeletal conditions

In 2014–15, 30% of Australians had at least 1 musculoskeletal condition. Of these, approximately:

- 3.7 million Australians (16% of the population) had back problems
- 2.1 million (9.0%) had osteoarthritis
- 406,000 (1.8%) had rheumatoid arthritis
- 1.2 million (5.3%) had other forms of arthritis
- 801,800 Australians (3.5%) had osteoporosis
- 575,000 (2.5%) had 'other musculoskeletal conditions' (such as gout, and other soft tissue disorders).

There were sex differences in the observed prevalence of some of these conditions. Females were more likely than males to have osteoarthritis (12% compared with 6.4%) and osteoporosis (5.5% compared with 1.4%), while all other conditions showed similar prevalence between males and females (Figure 2.1).

Figure 2.1: Prevalence of musculoskeletal conditions, by sex, 2014–15
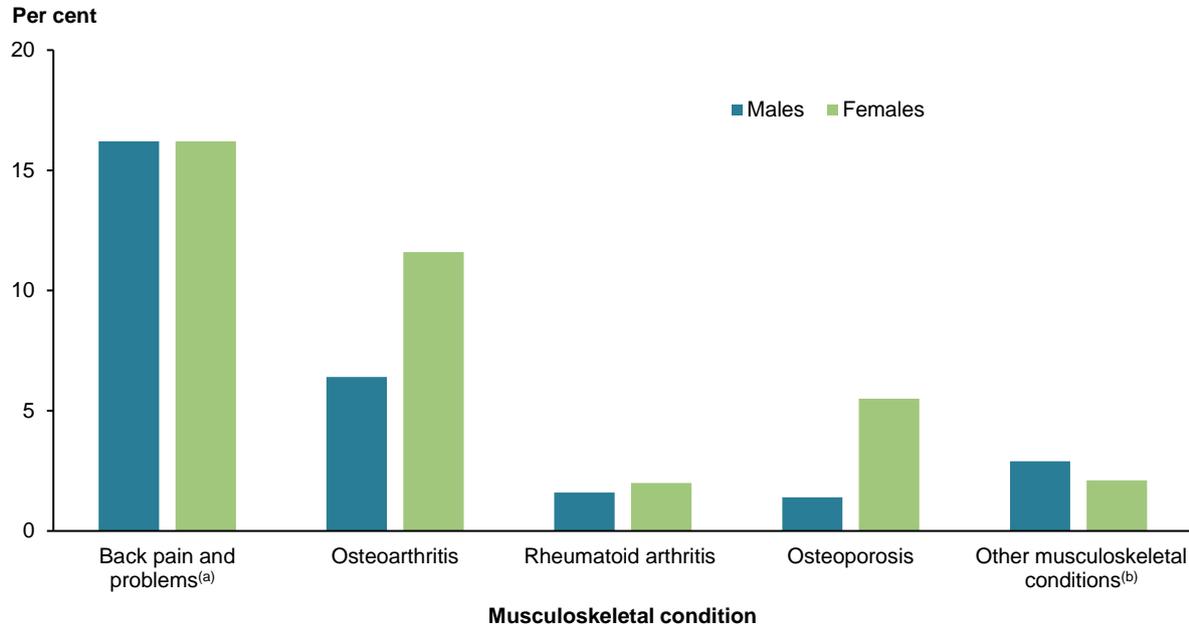
(a) Includes sciatica, disc disorders, back pain/problems not elsewhere classified and curvature of the spine.

(b) Includes gout and other soft tissue disorders.

Source: NHS 2014–15; Tables 3.7, 3.11.

Age and prevalence of musculoskeletal conditions

The prevalence of at least 1 musculoskeletal condition generally increased with increasing age: from 1.0% among people aged 0–14 to 72% among people aged 75–84. The prevalence among people aged 85 and over was slightly lower at 68% (ABS 2015).

The prevalence of specific musculoskeletal conditions varied across age groups, with the majority of conditions peaking in the older age groups. Osteoarthritis (34%) and 'other musculoskeletal conditions' (6%) were most common in the oldest age group (85 and older). Rheumatoid arthritis (7%) and osteoporosis (18%) were most common in the 75–84 age group. Back pain and problems were most common in a slightly younger group, with 27% of the 65–74 age group having the condition (Figure 2.2).

Figure 2.2: Prevalence of musculoskeletal conditions by age, 2014–15
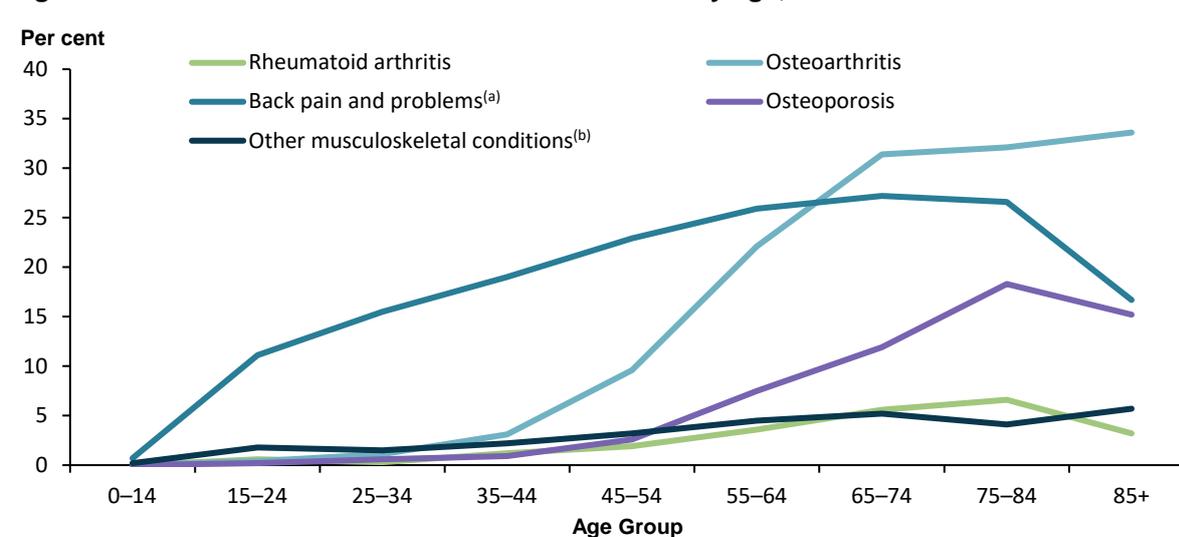
(a) Includes sciatica, disc disorders, back pain/problems not elsewhere classified and curvature of the spine.

(b) Includes gout and other soft tissue disorders.

Source: ABS 2015; Table 3.3.

Burden of disease

In 2011, musculoskeletal conditions accounted for 12%—521,286 disability adjusted life years (DALY)—of the total burden of disease and injury in Australia. Non-fatal burden accounts for almost all of the burden of musculoskeletal conditions (97%). This means 505,673 DALY of the burden of musculoskeletal conditions are years lived with disability (YLD) and 15,613 DALY of the burden are years of life lost (AIHW 2017a).

Of the total burden of all musculoskeletal conditions:

- 'other musculoskeletal conditions' contributed more than 1-third (35%, 183,947 DALY)
- back pain and problems contributed nearly 1-third (31%, 163,788 DALY)
- osteoarthritis contributed 17% (85,806 DALY)
- rheumatoid arthritis contributed 16% (83,489 DALY) (AIHW 2017a).

The Australian Burden of Disease Study 2011 included osteoporosis as a risk factor (low bone mineral density) and not as a disease. That study showed that low bone mineral density accounted for 0.1% of the total burden in Australia (AIHW 2016b).

Number of comorbid conditions

Comorbidity is common in people with chronic musculoskeletal conditions, and varies by specific condition. Chronic condition comorbidity was more common among people with arthritis than people with back pain and problems.

In 2014–15 nearly 4 in 5 (79% of) people with arthritis, and 2 in 3 (65% of) people with back pain and problems had at least 1 other chronic condition. The proportion of comorbidity was similar for males and females for people with arthritis; and slightly lower for males (63%) than females (68%) for people with back pain and problems. More than 2 in 5 (43%) people with arthritis and more than 1 in 3 (35%) people with back pain and problems had 2 or more comorbid chronic conditions (Figure 2.3) (ABS 2015).

Figure 2.3: Number of comorbid chronic conditions among people with arthritis or with back pain and problems, by sex, 2014–15 (%)
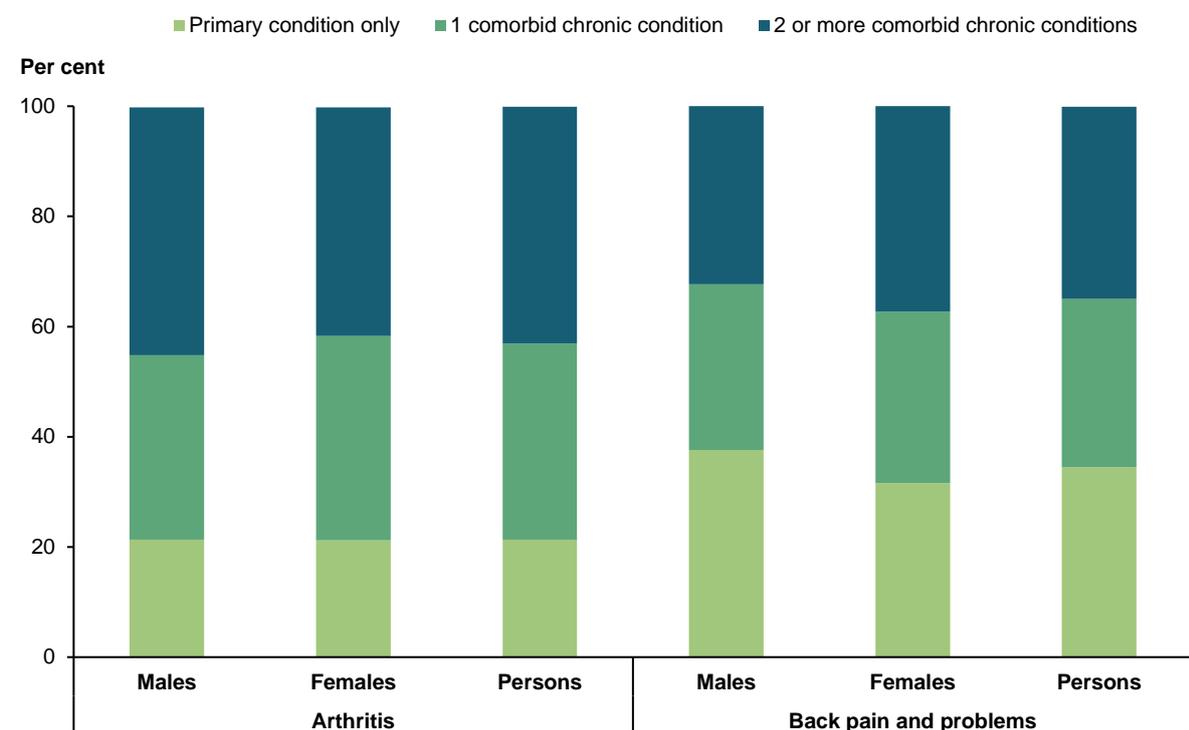
Source: ABS 2015; Table 19.3.

Age and comorbidity

Comorbidity among people with chronic musculoskeletal conditions varied by age, with older people having more comorbid chronic conditions than younger people. This is consistent with the pattern seen in the Australian population, where the number of chronic conditions increased with age. In 2014–15, most people aged 45–64 had at least 1 chronic condition (66%) and most people age 65 and over had 2 or more chronic conditions (60%) (Figure 2.4).

Among people with arthritis in the same year:

- the proportion of people with comorbid chronic conditions increased with age, from 69% among people aged 0–44 to 86% among people aged 65 and over (Figure 2.4)

- the proportion of people with 1 and with 2 or more comorbid conditions increased with increasing age, however this was less pronounced than for people with back pain and problems.

In 2014–15, among people with back pain and problems:

- the proportion with at least 1 other chronic condition increased from 49% among people aged 0–44 to 88% among people aged 65 and over

- nearly 2 in 3 (64% of) people aged over 65 had 2 or more comorbid chronic conditions (Figure 2.4).

Figure 2.4: People with musculoskeletal conditions and comorbidities, by number of comorbidities and age, 2014–15 (%)
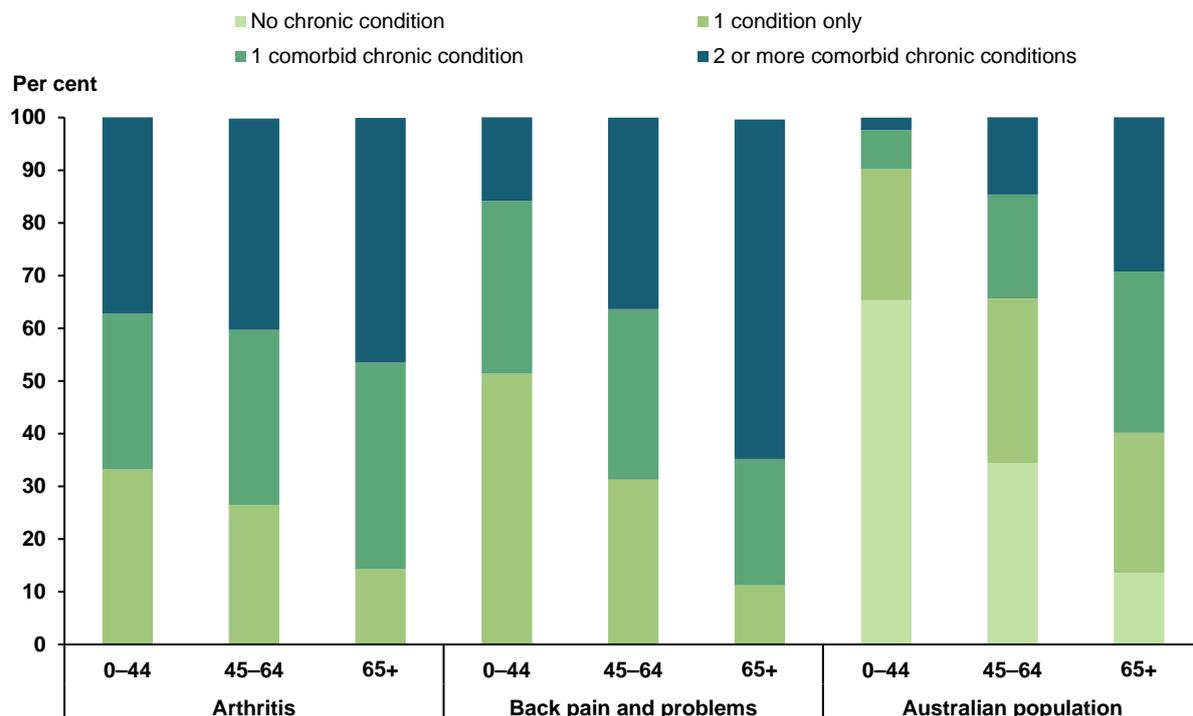
Source: ABS 2015; Table 19.2.

Types of comorbid chronic conditions

In 2014–15, around 1.2 million people had both arthritis and back pain and problems. This represented almost 1 in 5 of the 6.1 million Australians who had one or both of these conditions (ABS 2015).

People with arthritis and people with back pain and problems had similar common comorbid conditions. This is in part due to the overlap between the two groups. Cardiovascular disease was the most common comorbid condition among people with arthritis (48%), followed by back pain and problems (33%) and mental health problems (27%). Among people with back pain and problems, arthritis and cardiovascular disease were the most common comorbid condition (both 31%), followed by mental health problems (30%) (Figure 2.5). Most of these rates were higher than for the Australian population; however, those with musculoskeletal diseases were also likely to be older than the population, on average (Figure 2.5).

Figure 2.5: Type of comorbid chronic conditions by musculoskeletal condition and Australian population, 2014–15 (%)
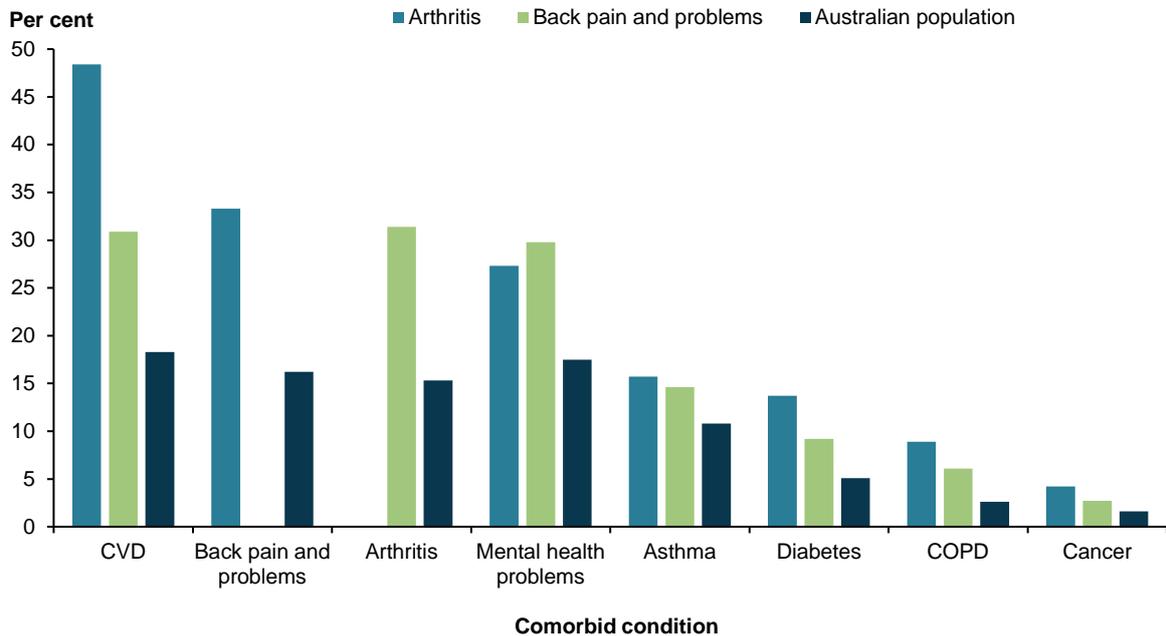
Source: ABS 2015; Table 19.3.

Type of comorbidity and sex

There were some differences by sex (Figure 2.6). Females with back pain and problems had higher rates of comorbid arthritis (36% compared 27%) and asthma (17% compared with 12%) than males with back pain and problems.

Figure 2.6: Prevalence of selected chronic condition comorbidities in people with back pain and problems, by sex, 2014–15
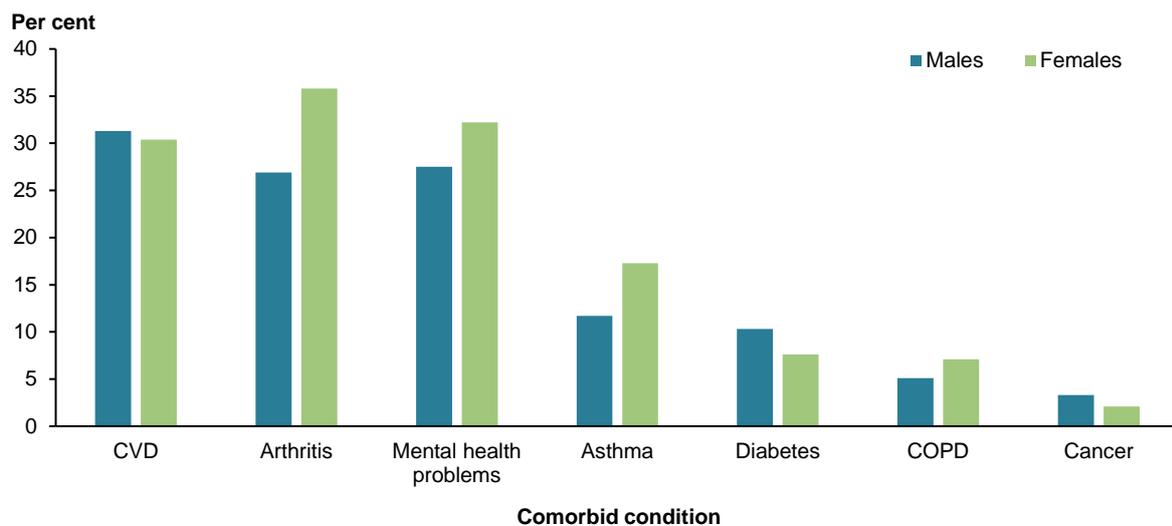
Source: ABS 2015; Table 19.3.

There were no significant differences by sex in common comorbid conditions among people with arthritis (Figure 2.7).

Figure 2.7: Prevalence of other comorbidities in people with arthritis, by sex, 2014–15
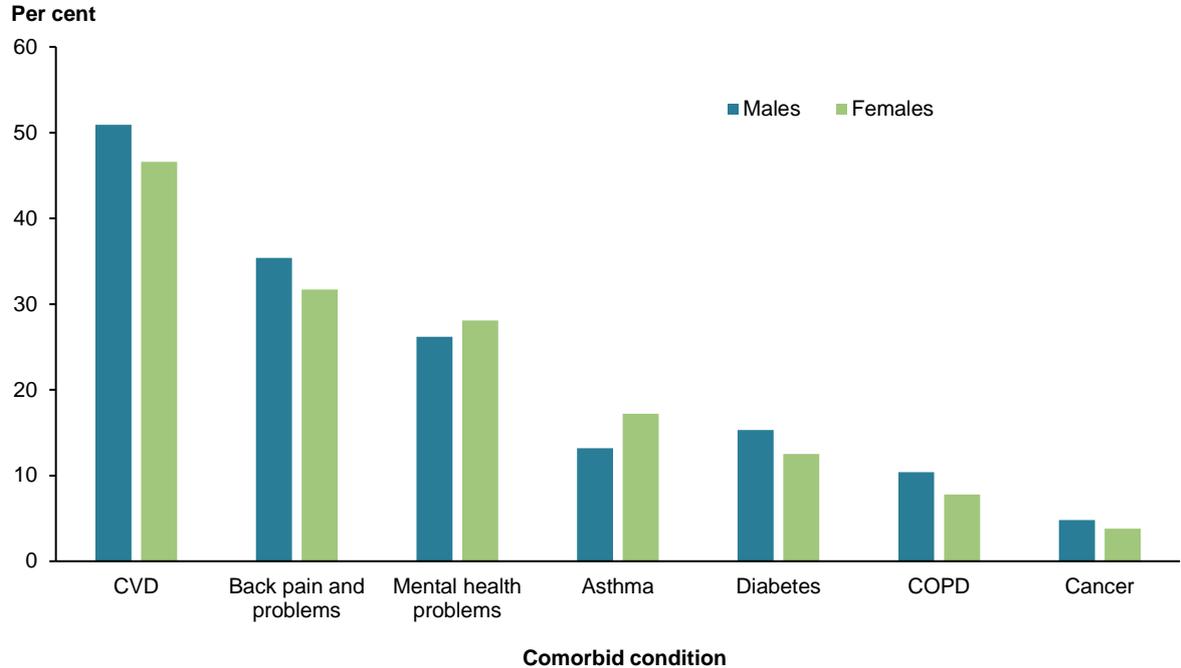
Source: ABS 2015; Table 19.3.

3 Comorbidity in hospital care

Key findings:

- In 2016–17, there were 760,000 hospitalisations with a chronic musculoskeletal condition as a principal and/or additional diagnosis.

- More than half (54%) of hospitalisations with a musculoskeletal condition as their principal diagnosis involved at least 1 other chronic condition.

- Diabetes and peripheral neuropathy were among the most common comorbid conditions.

- Chronic musculoskeletal conditions often co-occurred.

- Hospitalisations for older patients involved a higher number of comorbid chronic conditions, on average.

- Hospitalisations for people with musculoskeletal conditions and at least 1 other chronic condition were more likely to be for rehabilitation care.

What data are available to report comorbidity in admitted patient care?

This chapter presents information on the extent of chronic condition comorbidities in musculoskeletal hospitalisations in Australia using data from the National Hospital Morbidity Database (NHMD) 2016–17.

National Hospital Morbidity Database

The NHMD is a compilation of episode-level records from admitted patient morbidity data collection systems in Australian public and private hospitals. Diagnosis and procedure information is coded according to the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification (ICD-10-AM) 9th edition (ACCD 2014).

This data source provides national coverage of all hospital admissions, as well as detailed information on influencing conditions, interventions and procedures undertaken during the episode of care (hospitalisation).

For more information on the NHMD, see www.aihw.gov.au/about-our-data/our-data-collections/national-hospitals-data-collection.

Chronic condition grouping

This report groups chronic conditions in hospitalisations based on a study by Calderón-Larrañaga and others (2017). The study defines 60 chronic condition groups of relevance to an older population, and includes five musculoskeletal condition groups of interest to the Australian context:

- Back pain and problems (dorsopathies)
- Inflammatory arthropathies
- Osteoarthritis and other degenerative joint diseases

- Osteoporosis
- Other musculoskeletal and joint diseases.

Other chronic condition groups including asthma, blindness and visual impairment, chronic kidney diseases, dementia, diabetes, heart failure, multiple sclerosis, prostate disease and neoplasms (cancer) are examined as 'comorbid conditions' in this chapter. Note that the condition groupings used in this chapter are derived from the method presented by Calderón-Larrañaga and others (2017) for examining chronic condition comorbidity, and results do not match results for musculoskeletal or other chronic condition hospitalisations reported elsewhere by the AIHW. For more information on the musculoskeletal condition grouping used, see Appendix A. For a complete list of ICD codes for all chronic conditions groupings used, see Calderón Larrañaga and others (2017) supplementary tables.

What do the data tell us?

Types of hospitalisations

The **principal diagnosis** is the diagnosis established after study to be chiefly responsible for occasioning the patient's episode of admitted patient care. An **additional diagnosis** is a condition or complaint that either coexists with the principal diagnosis or arises during the episode of care. An additional diagnosis is reported if the condition affects patient management (AIHW 2018a). A chronic musculoskeletal condition can be a principal or additional diagnosis, depending on what condition led to the hospitalisation. In some cases, one musculoskeletal condition could be a principal diagnosis and another could be an additional diagnosis. For example, a patient might be hospitalised for an operation to treat back pain and may also have osteoarthritis that affects their care. Figure 3.1 is a breakdown of the number of hospitalisations in Australia in 2016–17 that involved a chronic musculoskeletal condition as a principal or additional diagnosis.

Figure 3.1: Types of hospitalisations involving at least 1 musculoskeletal diagnosis, 2016–17
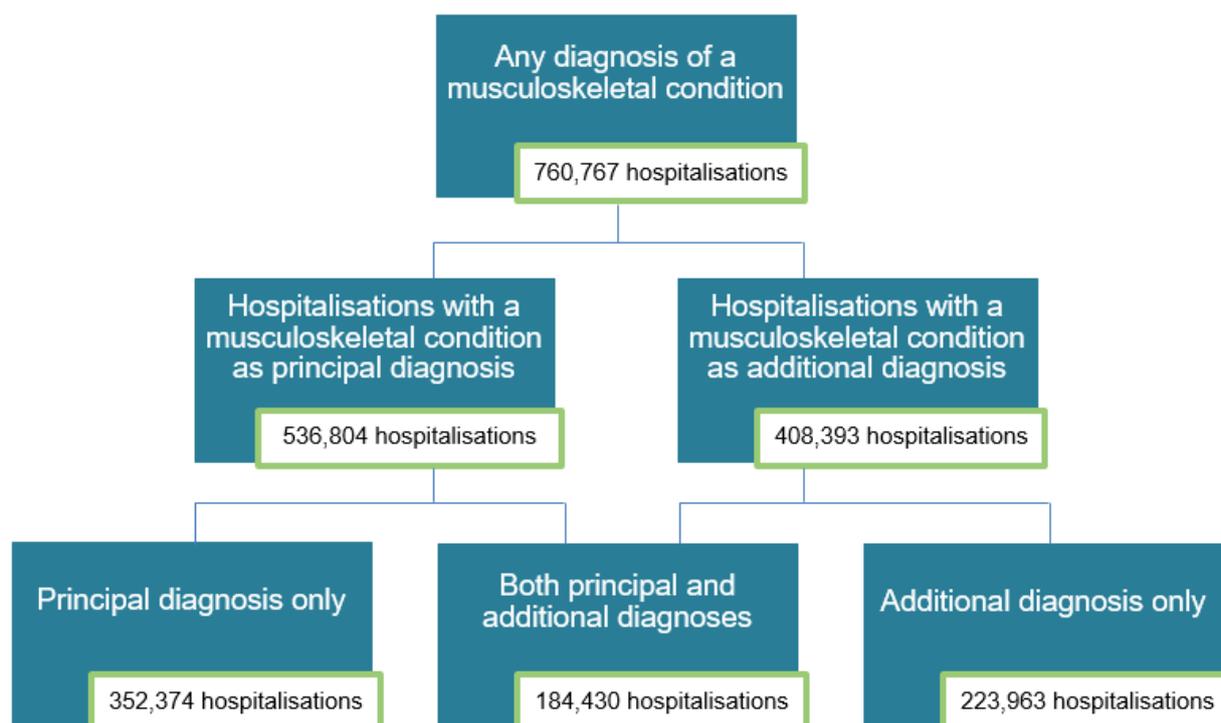
Any diagnosis of a musculoskeletal condition
760,767 hospitalisations

Hospitalisations with a musculoskeletal condition as principal diagnosis
536,804 hospitalisations

Hospitalisations with a musculoskeletal condition as additional diagnosis
408,393 hospitalisations

Principal diagnosis only
352,374 hospitalisations

Both principal and additional diagnoses
184,430 hospitalisations

Additional diagnosis only
223,963 hospitalisations

Note: For the purpose of this report, hospital diagnosis codes are grouped using the method developed by Calderón-Larrañaga et al. 2017 and will not match data published elsewhere by the AIHW.

Source: AIHW analysis of National Hospital Morbidity Database, 2016–17.

In 2016–17, there were 760,767 hospitalisations involving a chronic musculoskeletal condition, representing 6.9% of all hospitalisations in Australia. Of these, 71% (536,804 hospitalisations) had a musculoskeletal condition as the principal diagnosis, meaning that, after investigation, a musculoskeletal condition was the reason the patient was admitted to hospital on that occasion. Just over one-third (34% or 184,430 hospitalisations) of hospitalisations with a chronic musculoskeletal principal diagnosis also included another chronic musculoskeletal condition as an additional diagnosis (Figure 3.1). At least 9 in 10 hospitalisations with a musculoskeletal condition as principal diagnosis involved a procedure (Supplementary table 1). A procedure is 'a clinical intervention that is surgical in nature' and 'carries a procedural risk, carries an anaesthetic risk, requires specialised training, and/or requires special facilities or equipment available only in the acute care setting' (AIHW 2018a).

Number of comorbid chronic conditions

In 2016–17 there were 536,804 hospitalisations where a musculoskeletal condition was the principal diagnosis. More than half (54%) of these hospitalisations had at least 1 additional chronic condition diagnosis. Among all hospitalisations with a musculoskeletal condition as the principal diagnosis, 41% had 1 additional chronic condition, 9% had 2 and 3% had 3 or more (Figure 3.2).

Figure 3.2: Musculoskeletal hospitalisations with comorbid chronic conditions, 2016–17
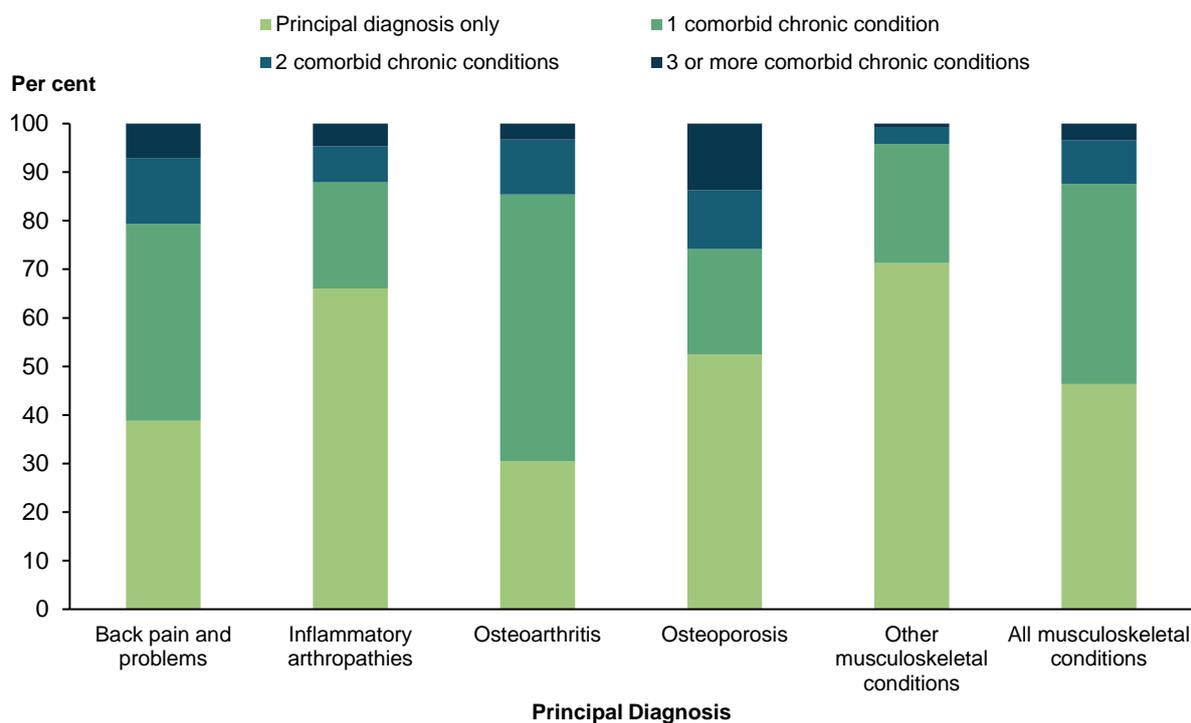
Note: For the purpose of this report, hospital diagnosis codes are grouped using the method developed by Calderón-Larrañaga et al. 2017 and will not match data published elsewhere by the AIHW.

Source: AIHW analysis of National Hospital Morbidity Database, 2016–17.

Types of comorbid chronic conditions

Hospitalisations for osteoarthritis conditions had the highest rates of comorbid chronic conditions, with 70% of hospitalisations with these principal diagnoses involving another chronic condition. The most common comorbid chronic conditions for these hospitalisations were those classified as 'other musculoskeletal conditions', followed by diabetes and colitis (inflammation of the colon) (Figure 3.3).

Diabetes was a common comorbid condition across all musculoskeletal principal diagnosis groups, being the most diagnosed chronic condition in inflammatory arthropathies (14%) and the second most in all other musculoskeletal conditions, including osteoarthritis hospitalisations (13%), back pain and problems (13%), osteoporosis (11%) and other musculoskeletal conditions (7.7%) (Figure 3.3).

Two in 5 (42%) hospitalisations for back pain and problems also involved peripheral neuropathy. Peripheral neuropathy is caused by damaged, inappropriate or distorted signalling between the nerves in the peripheral nervous system, the spine and the brain. Symptoms include numbness, weakness or pain in the hands, feet, arms or legs. These two diagnoses are likely to co-occur because they are both features of sciatica and spinal canal stenosis (Bardin, King and Maher, 2017).

Figure 3.3: 5 most common chronic condition additional diagnoses for each musculoskeletal principal diagnosis (proportion of hospitalisations)

| Principal diagnosis	1st	2nd	3rd	4th	5th
Back pain and problems	Peripheral neuropathy 42%	Diabetes 13%	Colitis 6%	Other musculoskeletal conditions 4%	Hypertension 3%
Inflammatory arthropathies	Diabetes 14%	Other musculoskeletal conditions 8%	Chronic kidney diseases 3%	Colitis 3%	Osteoarthritis 2%
Osteoarthritis	Other musculoskeletal conditions 55%	Diabetes 13%	Colitis 3%	Hypertension 3%	Anaemia 2%
Osteoporosis	Colitis 15%	Diabetes 11%	Back pain and problems 7%	Other metabolic diseases 7%	Hypertension 5%
Other musculoskeletal conditions	Osteoarthritis 17%	Diabetes 8%	Inflammatory arthropathies 1%	Peripheral neuropathy 1%	Hypertension 1%

Note: For the purpose of this report, hospital diagnosis codes are grouped using the method developed by Calderón-Larrañaga et al. 2017 and will not match data published elsewhere by the AIHW. Older patients were more likely to have comorbid conditions.

Source: AIHW analysis of National Hospital Morbidity Database, 2016–17.

Age and comorbidity

The average (mean) number of chronic conditions per hospitalisation increased with the age of the patient, for all musculoskeletal principal diagnoses (Figure 3.4). This finding should be considered when comparing characteristics of hospitalisations for those with and without comorbid conditions, as the two populations have different age structures.

Figure 3.4: Average number of chronic condition additional diagnoses for musculoskeletal hospitalisations by principal diagnosis condition and age (mean years)
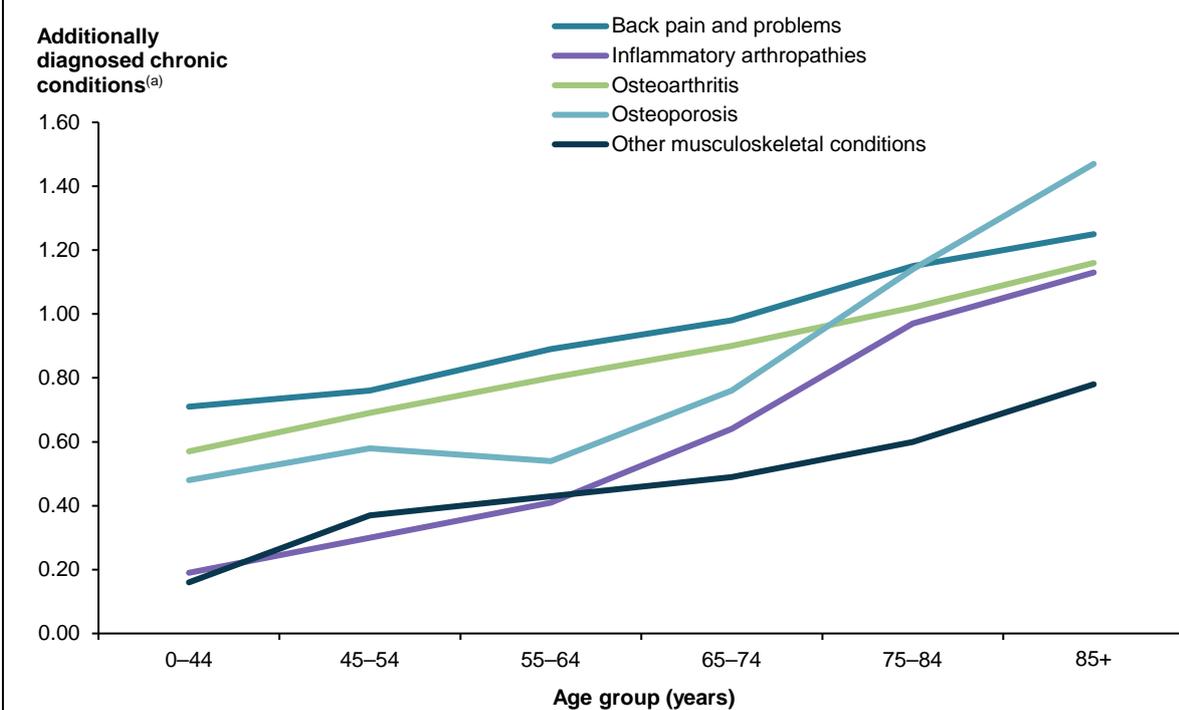
(a) Mean number.

Note: For the purpose of this report, hospital diagnosis codes are grouped using the method developed by Calderón-Larrañaga et al. 2017 and will not match data published elsewhere by the AIHW.

Source: AIHW analysis of National Hospital Morbidity Database, 2016–17.

Treatment type

Hospitalisations can have different care types. An episode of acute care for an admitted patient is one in which the principal clinical intent is to do one or more of the following:

- manage labour (obstetric)
- cure illness or provide definitive treatment of injury
- perform surgery
- relieve symptoms of illness or injury (excluding palliative care)
- reduce severity of illness or injury
- protect against exacerbation and/or complication of an illness and/or injury which could threaten life or normal functions
- perform diagnostic or therapeutic procedures (AIHW 2014).

Rehabilitation care is care in which the primary clinical purpose or treatment goal is improvement in the functioning of a patient with an impairment, activity limitation or participation restriction due to a health condition. The patient will be capable of actively participating.

Rehabilitation care is always:

- delivered under the management of or informed by a clinician with specialised expertise in rehabilitation

- evidenced by an individualised multidisciplinary management plan, which is documented in the patient's medical record, that includes negotiated goals within specified time frames and formal assessment of functional ability.

Rehabilitation care excludes care that meets the definition of mental health care (AIHW 2014).

Musculoskeletal hospitalisations had a higher proportion of rehabilitation care than non-musculoskeletal hospitalisations (Figure 3.5). The proportion of rehabilitation episodes varied by musculoskeletal condition. For hospitalisations for osteoarthritis, rehabilitation was more common than acute care (54% compared with 45%).

Figure 3.5: Hospitalisations for chronic musculoskeletal conditions by care type, 2016–17 (%)
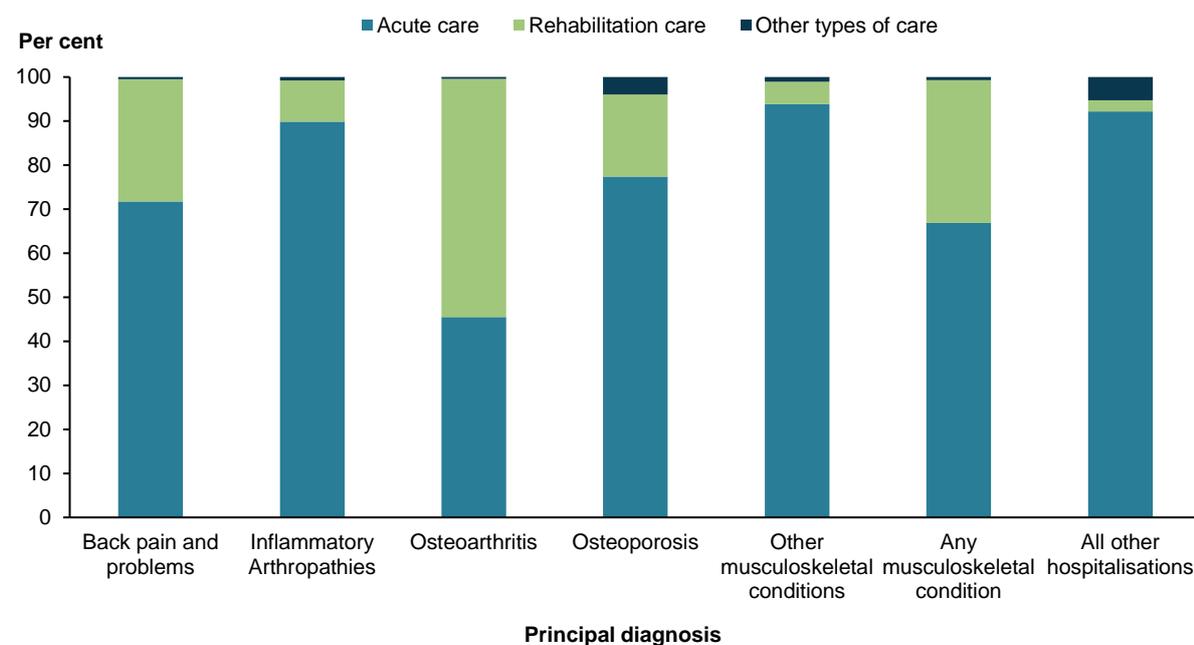

Note: For the purpose of this report, hospital diagnosis codes are grouped using the method developed by Calderón-Larrañaga et al. 2017 and will not match data published elsewhere by the AIHW.

Source: AIHW analysis of National Hospital Morbidity Database, 2016–17.

When comparing care types between musculoskeletal hospitalisations with and without comorbid chronic conditions, hospitalisations with at least 1 comorbid chronic condition have a higher proportion of rehabilitation care (52.4%) than hospitalisations with no comorbid conditions (9.3%). This difference was largest for osteoarthritis hospitalisations, where hospitalisations with at least 1 comorbid chronic condition were more than 7 times as likely to include rehabilitation care than hospitalisations without a comorbid chronic condition (73% compared with 10%). This difference remained after accounting for the older age profile of comorbid hospitalisations. For inflammatory arthropathies hospitalisations, those

with comorbid chronic conditions were 6 times as likely to receive rehabilitation care. However, this decreased to 5 times as likely after accounting for the older age structure of the population. Hospitalisations for back pain and problems and other musculoskeletal conditions did not show large variation in the proportion of rehabilitation care between episodes with and without comorbid conditions (Figure 3.6).

Figure 3.6: Hospitalisations for chronic musculoskeletal conditions with rehabilitation as their care type, 2016–17 (% and rate ratios)
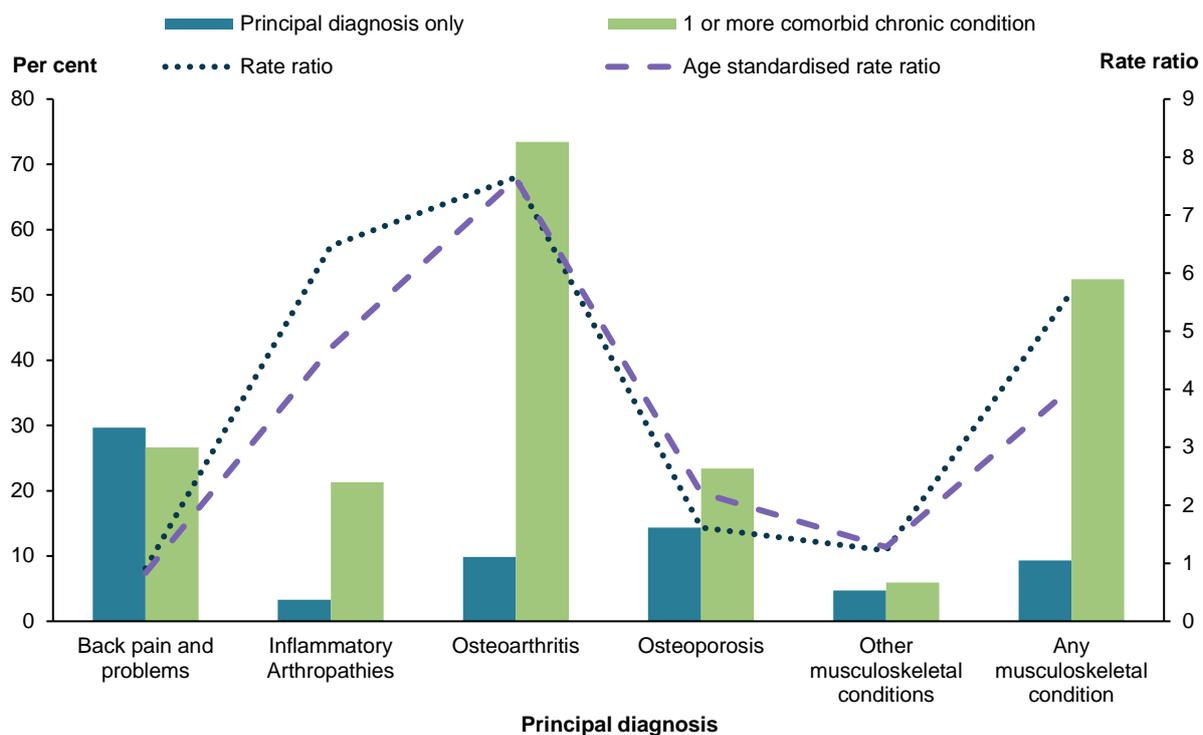
Note: For the purpose of this report, hospital diagnosis codes are grouped using the method developed by Calderón-Larrañaga et al. 2017 and will not match data published elsewhere by the AIHW.

Source: AIHW analysis of National Hospital Morbidity Database, 2016–17.

Length of stay

Among all hospitalisations with a musculoskeletal condition as a principal diagnosis, those with at least 1 comorbid chronic condition were more likely to be same day separations: 45% compared with 57% for hospitalisations without comorbid chronic conditions.

However, this varied by type of musculoskeletal principal diagnosis (Figure 3.6). Hospitalisations for inflammatory arthropathies were more than twice as likely to involve an overnight stay when comorbid chronic conditions were present and those for osteoporosis were almost 3 times as likely. However, the increased length of stay in those diagnosed with osteoporosis may be attributable to the longer stay associated with hip fractures, which are most commonly caused by minimum trauma falls (AIHW 2018b). In contrast, hospitalisations for osteoarthritis were twice as likely to be same day separations if comorbid chronic conditions were present.

Most of these trends remained the same after adjusting for the higher proportion of older patients with chronic comorbid conditions, except for osteoporosis hospitalisations, where

hospitalisations with comorbid chronic conditions increased from almost 4 times as likely to involve an overnight stay to almost 6 times as likely, after age standardisation (Figure 3.7).

Figure 3.7: Overnight hospitalisations for chronic musculoskeletal conditions, 2016–17 (%)
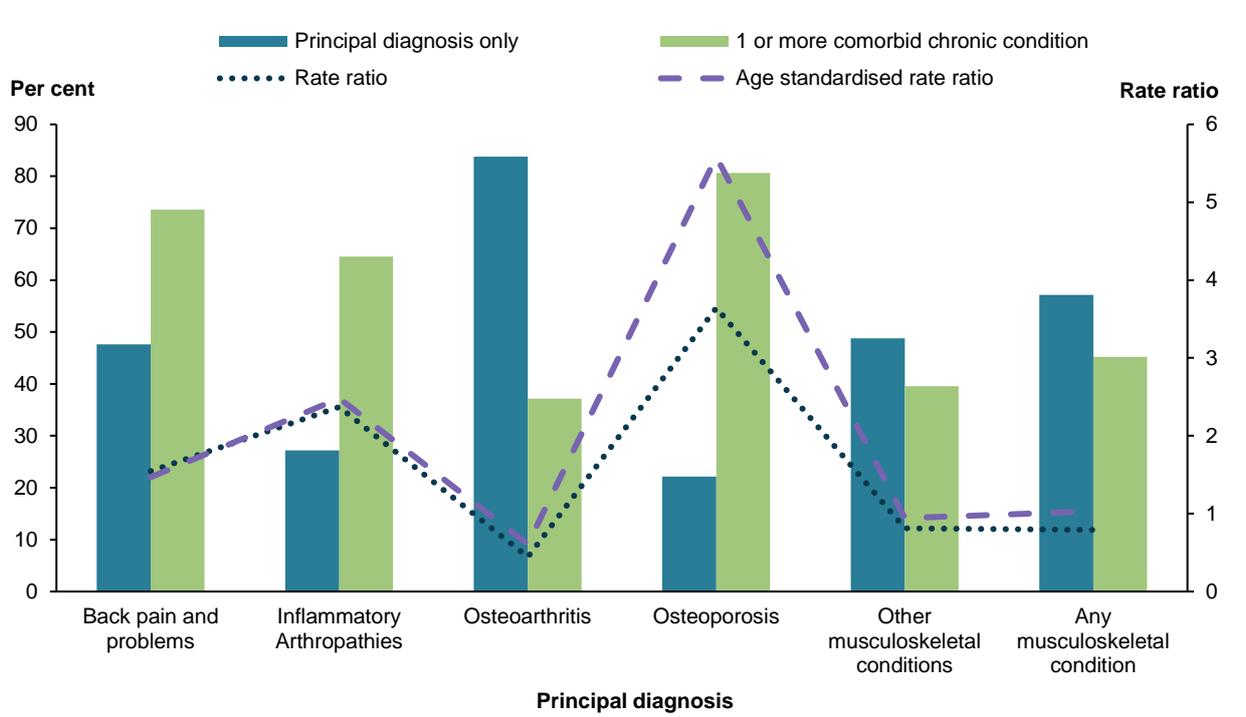
Note: For the purpose of this report, hospital diagnosis codes are grouped using the method developed by Calderón-Larrañaga et al. 2017 and will not match data published elsewhere by the AIHW.

Source: AIHW analysis of National Hospital Morbidity Database, 2016–17.

Hospitalisations with a musculoskeletal condition as an additional diagnosis

Just over a quarter (29% or 224,000 hospitalisations) of musculoskeletal condition hospitalisations involved the musculoskeletal condition as an additional diagnosis only. In these cases, just over one-quarter (27%) had another chronic condition as the principal diagnosis. The most common chronic condition principal diagnoses were peripheral neuropathy (4.3%), diabetes (2.7%), solid neoplasms (tumours) (1.8%) and cerebrovascular disease (stroke) (1.6%) (Supplementary table 2).

4   Data gaps and limitations

It is important to note, for future analysis and interpretation of the key findings presented here, the data limitations and gaps associated with these analyses. These broadly relate to differences in the scope and coverage of individual data sources, including how conditions are defined and reported and gaps in the completeness of available information, particularly relating to treatment and management of musculoskeletal conditions.

Scope and coverage

The scope and coverage of the data sources examined in this report differ, and may result in differences in findings between the data sources, particularly relating to the prevalence of comorbid conditions. Methodological considerations include:

- The National Health Survey 2014–15 is a population survey where condition-specific information is based on self-reported information from a representative sample of the Australian population. People living in non-private dwellings such as hotels and motels, hostels, boarding schools and boarding houses, hospitals, nursing and convalescent homes, prisons, reformatories and single quarters of military establishments and short-stay caravan parks were excluded from the NHS 2014–15.

- The exclusion of those in aged care facilities from the NHS is likely to cause underestimates of the rates of musculoskeletal conditions and comorbidities in the Australian population, especially for older age groups. Of those living in aged care, 53% had arthritis and 20% had osteoporosis. Almost all people living in residential aged care facilities had more than 1 long-term health condition (98%) and 21% had more than 8 conditions (ABS 2016).

- The purpose of the National Minimum Data Set (NMDS) for Admitted patient care is to collect information about care provided to admitted patients in Australian hospitals. The scope of the NMDS is episodes of care for admitted patients in all public and private acute and psychiatric hospitals, free-standing day hospital facilities, and alcohol and drug treatment centres in Australia. Hospitals operated by the Australian Defence Force, corrections authorities and in Australia's off-shore territories are not in scope but some are included. The reference period for this data set is 2016–17. The data set includes records for admitted patient separations between 1 July 2016 and 30 June 2017 (AIHW 2018a).

- Although there are national standards for data on hospital services, there are some variations in how hospital services are defined and counted, between public and private hospitals, among the states and territories and over time.

- Records for newborn hospitalisations that did not have qualified days, records for hospital boarders (for example, when a child accompanies a parent in hospital, but does not require care) and records for posthumous organ procurement have been excluded from this analysis. This report includes hospitalisations where the care type was rehabilitation. The coding of these episodes changed from 1 July 2015 and this (combined with the unique coding groups used in this report), means that the data presented should not be compared with data published for previous years.

The implications of these differences mean that the NHS 2014–15 may identify only the most prevalent conditions in the population, and not necessarily the conditions that require or have the greatest impact on treatment, management or hospital care (ABS 2015). Similarly, conditions recorded in the NHMD are only those that affect the care provided in hospital, and are not necessarily the most prevalent in the population or a complete record of all conditions experienced by people admitted.

Data on Aboriginal and Torres Strait Islander people could not be reported separately in this report due to concerns about confidentiality and reliability.

Classification schemes

The NHS and NHMD data presented in this report use different classification schemes to group conditions and define musculoskeletal conditions. In the NHS 2014–15, respondents were asked if they had been diagnosed with a health condition, and if it was current and/or long-term (self-reported).

For this report, NHMD data were grouped according to a method for examining chronic condition comorbidity in older people presented by Calderón-Larrañaga and others (2017). This method was chosen for this report because it:

- was designed to measure the extent of comorbid chronic conditions in older populations
- broke down musculoskeletal conditions into subcategories
- was tested on public hospital in-patient data and aged care cohort data.

While this method was assessed as suitable for the purposes of this report, it should be noted that the method was developed in 2017 using two Swedish data sources and has not been widely tested or applied in Australia.

Completeness

Hospitalisations for musculoskeletal conditions usually occur only when surgical intervention is required or the condition is severe, and are less frequent than general practitioner visits (AIHW 2017a).

Treatments for musculoskeletal conditions are largely managed in a primary health care setting from a multidisciplinary health professional team. General practitioner visits for musculoskeletal conditions are common, with musculoskeletal conditions making up an estimated 15% of visits and 18% of problems managed at general practices in 2015–16 (Britt et al. 2016).

This may contribute to differences in the common comorbidities between the NHS and NHMD, as conditions may be primarily managed in the primary health care setting. Some of the common comorbidities are also likely to be managed in the primary health care setting rather than in hospitals (NVDPA 2012).

Allied and primary health care data are not currently available for routine population health monitoring and this therefore creates a gap in information relating to the impact of comorbid chronic conditions on the treatment and management of people with musculoskeletal conditions. Likewise, there is no regular, national data available on the treatment outcomes of those with musculoskeletal conditions. Therefore, this report is unable to compare the outcomes for those with and without comorbid chronic conditions.

Future work

This report provides a baseline for future exploration of musculoskeletal conditions and their comorbidities.

While the detailed analyses of comorbidity in Chapter 3 focus on those approximately 537,000 hospitalisations for which the principal diagnosis was for musculoskeletal conditions, there are another 224,000 hospitalisations primarily for other conditions on which musculoskeletal conditions had an impact. Further analysis could be undertaken to explore the effect of these musculoskeletal conditions on other chronic condition hospitalisations. From this, it may be possible to determine if there are particular comorbidity combinations that increase patient risk of poor outcomes.

Noting the differences between the most prevalent musculoskeletal chronic disease comorbidities (NHS 2014–15; Chapter 2) and the most commonly hospitalised (Chapter 3), future work could include, when data are available:

- detailed analysis of available primary health care data to explore musculoskeletal comorbidities managed in primary care
- data linkage of admitted patient and primary health care data to provide a greater understanding of the 'patient journey', as well as the treatment and management of musculoskeletal conditions and comorbidities.

Appendix A: Musculoskeletal condition groups used in NHMD analysis

Table A1: ICD-10-AM codes for musculoskeletal conditions

Condition group	ICD-10-AM codes
Dorsopathies (Back pain and problems)	
M40–M43	Deforming dorsopathies
M47–M49	Spondylopathies, excluding inflammatory spondylopathies
M50–M53	Other dorsopathies, excluding dorsalgia
Q675	Congenital deformity of spine
Q761	Klippel-Feil syndrome
Q764	Other congenital malformations of spine, not associated with scoliosis
Inflammatory arthropathies	
M023	Reiter disease
M05–M14	Inflammatory polyarthropathies
M45	Ankylosing spondylitis
M460, M461, M468, M469	Other inflammatory spondylopathies
Osteoarthritis and other degenerative joint disorders	
M15–M19	Arthrosis
M362–M363	Systemic disorders of connective tissue (haemophilic arthropathy, arthropathy in other blood disorders)
Osteoporosis	
M80–M82	Osteoporosis
Other musculoskeletal conditions	
M21–M25	Other joint disorders, not acquired
M35.7	Hypermobility syndrome
M61	Calcification and ossification of muscle
M65.2, M65.3, M65.4	Synovitis and tenosynovitis, selected
M70.0, M72.0, M72.2, M72.4, M75.0, M75.1, M75.3, M75.4, M79.7	Other soft tissue disorders, selected
M84.1	Nonunion of fracture (pseudarthrosis)
M89	Other disorders of bone
M91, M93, M94	Chondropathies, selected
M96, M99	Other disorders of the musculoskeletal system and connective tissue
Q65, Q66, Q68, Q71, Q72, Q73, Q74, Q77, Q78, Q79.6, Q79.8, Q87	Congenital malformations and deformations of the musculoskeletal system, selected
S38.2, S48, S58, S68, S78, S88, S98, T05, T09.6, T11.6, T13.6, T14.7	Traumatic amputation
T90–T98	Sequelae of injuries, of poisoning and of other consequences of external causes
Z44.0, Z44.1	Fitting and adjustment of (external) prosthetic device (artificial arm, leg)

Condition group	ICD-10-AM codes	
B902	Sequelae of tuberculosis of bones and joints	
Z89	Acquired absence of limb	
Z94.6	Bone transplant status	
Z96.6	Presence of orthopaedic joint implants	
Z97.1	Presence of artificial limb	

Source: Calderón-Larrañaga et al. 2017.

Acknowledgments

Abbreviations

ABS	Australian Bureau of Statistics
ABDS	Australian Burden of Disease Study
AIHW	Australian Institute of Health and Welfare
COPD	Chronic Obstructive Pulmonary Disease
CVD	Cardiovascular disease
DALY	disability-adjusted life years
ICD-10-AM	International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification
NHS	National Health Survey
NHMD	National Hospitals Morbidity Database
NMDS	National Minimum Data Set
WHO	World Health Organization
YLD	years lived with disability

Symbols

—	nil or rounded to zero
. .	not applicable
n.a.	not available
n.p.	not publishable because of small numbers, confidentiality or other concerns about the quality of the data

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Most people with a musculoskeletal condition, such as arthritis or back pain, also have at least one other chronic disease. This report shows that:

- Almost 4 in 5 (79%) people with arthritis and 2 in 3 (65%) people with back pain and problems had at least 1 other chronic condition.

- More than half (54%) the hospitalisations for musculoskeletal conditions involved at least 1 other chronic condition.

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