National Osteoarthritis Strategy

DRAFT FOR CONSULTATION

Developed by National Osteoarthritis Strategy Project Group
September 2018
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Osteoarthritis (OA) is the most common chronic joint disease in Australia.

1 in 6 Australians with osteoarthritis reported high or very high psychological distress, over 5 times higher compared to those without the condition.

2 in 3 people who have osteoarthritis are female.

1 in 4 people with osteoarthritis self-reported fair or poor health, twice as many as people without the condition.

One in eight Australians are affected by osteoarthritis.

38% rise in the rate of total knee replacements for osteoarthritis from 2005-06 to 2015-16.

Nearly 100,000 Australians had joint replacements to treat osteoarthritis at an estimated cost of more than $2 billion in 2016.

People with osteoarthritis were also over 4 times more likely to report ‘very severe pain’ (5.2%) compared to those without the condition (1.2%).

Osteoarthritis cost the health system $3.75 billion in 2012.

Over 1 in 2 Australians with osteoarthritis report moderate to very severe pain.
Preface

The National Osteoarthritis Strategy (the Strategy), prepared by the National Osteoarthritis Project Group, aims to provide a national response to osteoarthritis and to deliver major benefits to people at risk of, or with, osteoarthritis by making more effective, cost-effective and accessible healthcare solutions available to all Australians.

The Strategy identifies seven priority areas covering the whole person journey from prevention and early management to joint replacement or other surgery and rehabilitation, focusing on reducing the impact of osteoarthritis on individuals, families and the community. It is intended to provide an evidence-informed policy foundation on which practical and feasible implementation plans for osteoarthritis prevention and management are developed and to guide government and other key stakeholders and organisations as to how existing limited health care resources can be better coordinated and targeted to achieve optimal outcomes for people.

Vision

To outline Australia’s national response to osteoarthritis and inform how existing limited health care resources can be better coordinated and targeted to achieve optimal outcomes for people.

Specific objectives are identified against each key priority area in the Strategy. In broad terms the Strategy aims to:

- Guide the development, planning and implementation of osteoarthritis prevention and management through research, healthcare professionals, community education and best practice clinical services using a whole of population approach.
- Support the delivery of consistent, evidence-based strategy, to manage and minimise the impact and extent of osteoarthritis in the Australian community.
- Achieve agreement for a national implementation program to deliver the models of best practice treatment and self-management of osteoarthritis.
- Make best practice osteoarthritis management accessible to all Australians.

The National Osteoarthritis Strategy was initiated by the University of Sydney and Medibank Better Health Foundation. The Strategy has been developed over 2017-2018 by a leadership group, three working groups, an implementation committee, and stakeholders. It has been further refined through public consultation and submissions. The Strategy will be launched at the National Osteoarthritis Summit in Canberra in November 2018, and progressed to a national implementation plan.

The Strategy has been designed to provide governments, non-government organisations, Primary Health Networks, health practitioners, community service providers and professional bodies with a national strategic plan and achievable implementation plans for more effective prevention and management of osteoarthritis. This initiative leads the way in Australia and internationally in osteoarthritis prevention, management and research.
Acknowledgements

The National Osteoarthritis Strategy is endorsed by Arthritis Australia, the Australian Rheumatology Association, the Australian Orthopaedic Association and the Australasian College of Sport and Exercise Physicians, with additional discussions with other organisations ongoing.


This draft Strategy is a result of consultation and meetings with the Leadership and Working Groups and key multi-sectoral stakeholders. It benefits from the expertise of a wide range of experts, expertise and experience in the field. The enormous contribution from the Leadership, Working and Implementation Groups to the design and development of the Strategy, is greatly appreciated. Sincere appreciation is extended to the stakeholders for their input and feedback on this work.

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The National Osteoarthritis Strategy Draft for Consultation

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The National Osteoarthritis Strategy project team also wishes to acknowledge the assistance of all those who helped in the development of the Strategy.
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EXECUTIVE SUMMARY

Osteoarthritis is the most common chronic joint disease in Australia and one of the leading causes of pain and disability. Despite the tremendous burden this disease places on individuals, families, healthcare systems and society, the care that consumers receive is often fragmented and inappropriate.

The National Osteoarthritis Strategy has been developed to align with current Guidelines, Standards and jurisdictional Models of Care. It takes into account new evidence and feedback received from broad consultation both in Australia and internationally. It aims to outline a national response to osteoarthritis and inform how existing limited health care resources can be better coordinated to achieve optimal patient outcomes.

The Strategy takes a whole person journey approach from prevention and early management (including self-management) to joint replacement, other related surgery and rehabilitation. The Strategy sets seven priorities to guide the actions required under three thematic areas as depicted in Figure 1.

![Figure 1 Summary of Priority Areas](image)
Under each of the priority areas, the Strategy sets high-level directions for improvement with a set of objectives, as follows.

**Prevention:**
- Maintain healthy weight amongst the community to prevent osteoarthritis;
- Raise organised, incidental, moderate and vigorous physical activity levels by 15% by 2030 to prevent osteoarthritis;
- Reduce knee injury rates from sporting participation by 25% by 2025 to prevent osteoarthritis;

**Living Well with Osteoarthritis:**
- At least 50% of Australians with osteoarthritis receive a recommendation from a healthcare practitioner to undertake evidence-based lifestyle and other self-management strategies to reduce pain and disability by 2025;
- At least 50% of people with osteoarthritis are undertaking lifestyle and other self-management strategies to reduce pain and disability by 2025;
- Ensure access to, and uptake of, lifestyle and other self-management strategies by people with osteoarthritis is equitable across geographic areas, socioeconomic levels and cultural and linguistically diverse groups;

**Advanced Care:**
- Optimise the decision-making process for joint replacement for both healthcare practitioners and people with severe osteoarthritis;
- Promote the dissemination of information on evidence-based non-surgical management for people with severe osteoarthritis to the public, primary healthcare practitioners and specialist orthopaedic practitioners;
- Enhance access to, and uptake of, effective non-surgical management for people with severe osteoarthritis;
- Promote efficient clinical pathway from diagnosis of severe osteoarthritis (in appropriate patients for total joint replacement) to the execution of surgery;
- Prioritise access to non-surgical management programs by people on the joint replacement waiting list.

Implementation of the Strategy will require collaboration between a wide range of stakeholders across all health system sectors and beyond, including all levels of government, private sector partners, industry, service providers, health professionals, communities, professional bodies, not-for-profit organisations, consumer groups, non-government payers (including general, non-health insurers) and the education system. Engagement with these key stakeholders will continue over the course of the implementation process to ultimately ensure best practice osteoarthritis management is accessible to all Australians.
1 Introduction

1.1 Understanding of the burden of osteoarthritis in Australia

Osteoarthritis is the most common chronic joint disease and one of the leading causes of pain and disability in Australia and worldwide. It is estimated that nearly three million, or one in eight, Australians are affected by osteoarthritis [9]. More than half of Australians with osteoarthritis reported experiencing ‘moderate’ to ‘very severe pain’ during 2014–15 [10]. People with osteoarthritis are 4.3 times more likely to report ‘very severe pain’ and 2.3 times more likely to report poor health, compared to those without the condition [10]. The risk of mobility impairment attributable to knee osteoarthritis alone is greater than that due to any other medical condition in people aged 65 and over, representing a substantial threat to healthy ageing [11, 12].

Osteoarthritis can have a profound impact on an individual’s physical and mental health, quality of life and ability to engage in social, community and occupational activities [13]. Osteoarthritis also has a strong economic impact. It is a leading cause of early retirement: half of those with osteoarthritis aged between 45 and 64 years are currently not in the workforce, twice as many as those without the condition [1]. Osteoarthritis is estimated to have cost the Australian health system $3.75 billion in 2012, with over half of these costs from joint replacements [1]. There has been nearly 40% rise in the rate of total knee replacements for osteoarthritis from 2005–2006 to 2015–2016 and the cost of hip and knee replacements is estimated to have increased by over $80 million annually [1, 10, 14, 15]. The total economic cost of osteoarthritis, including indirect costs such as lost work productivity and loss of wellbeing, is estimated to be over $23 billion each year [16].

The prevalence of osteoarthritis is expected to double to 25% of the population by 2040, due to an ageing and increasingly obese population [17]. To curb the exponential burden of osteoarthritis on individuals and communities, effective prevention and management of osteoarthritis and cost-effective health services are required.

1.2 Management of osteoarthritis

A range of health services is available for people at risk of, or with, osteoarthritis, including general practitioner (GP) services, allied health services, speciality care within the community and in-patient hospital care, community exercise groups, all delivered in conjunction with prescribed medication [18]. Recommended first-line care for osteoarthritis includes individually tailored physical activity, self-management for osteoarthritis such as exercise and weight management, and psychological techniques.

Osteoarthritis conditions in Australia are commonly managed by GPs, who also provide referrals to specialists, allied health services (e.g. physiotherapy, occupational therapy, exercise physiology, dietetics, social work), and imaging services where indicated. Almost one in five GP referrals to an orthopaedic surgeon is for people with osteoarthritis [19]. Osteoarthritis is also the third most common reason for referral for imaging (4.2% of requests [19]). Psychological and behavioural pain management interventions are effective in improving emotional, behavioural wellbeing and reducing pain intensity and disability [20, 21].

Recommended first-line care for osteoarthritis:
- Individually tailored physical activity
- Self-management such as exercise and weight management
- Psychological techniques
In-patient care for people with osteoarthritis is delivered in both the public and private hospital systems. In 2016–2017, there were 341,591 admissions to public hospitals and 191,769 to private hospitals related to arthritis and osteoarthritis [22].

Funding for these healthcare services comes from government, private health insurance and patients out-of-pocket expenses [18]. The Medicare Benefits Schedule (MBS) and Pharmaceutical Benefits Scheme (PBS) provide subsidies for medical care and medications for people with osteoarthritis, respectively. Only those who are under a General Practitioner Management Plan (GPMP) or Team Care Arrangement (TCA) for chronic conditions and with a formal chronic care plan can access up to five Medicare-subsidised allied health services for the treatment of their osteoarthritis [23].

Despite the tremendous burden that osteoarthritis places on individuals, healthcare systems and society, osteoarthritis is poorly managed in Australia. Two-thirds of people with osteoarthritis report that they are faring badly with their condition [24]. In 2009-10, 57% of people with osteoarthritis reportedly did not receive appropriate care for their condition as recommended by current guidelines [25]. Most GPs report dissatisfaction with the care they can provide to people with osteoarthritis due to the limited effectiveness of current treatment options [26]. Management is further compromised by the fact that little is known about the causes of osteoarthritis and there is no confirmed cure or intervention to slow its progression.

2 National Osteoarthritis Strategy

2.1 Why now?

The care that people at risk of, and with osteoarthritis receive in Australia is often fragmented and inappropriate. The fragmentation of care has created perverse incentives to over-treat osteoarthritis with expensive interventions that often represent low-value care. There have been some attempts to improve the alignment of practice with contemporary evidence, but these have been piecemeal and not systematic. Recently a number of key initiatives have been launched, which could have a favourable impact on osteoarthritis management, especially in a fiscally constrained environment. These include the Medicare Benefits Schedule (MBS) review, the introduction of Medical Research Future Fund funding to support translational research and implementation, development of Clinical Care Standards for Osteoarthritis [27], launch of the Victorian Osteoarthritis Model of Care [6], revision of the Royal Australian College of General Practitioners (RACGP) guidelines for osteoarthritis management [7], new NPS MedicineWise osteoarthritis initiatives [28], and launch of the New South Wales Agency for Clinical Innovation and Ministry of Health Leading Better Value Care (LBVC) Initiative [8].

Osteoarthritis treatment should be evidence-based and tailored to the individual. Education and information delivered to people about the appropriate management of osteoarthritis should also be based on evidence. There are also relatively limited opportunities for services in Australia to obtain assistance to implement effective psychological pain management services. Success should be determined by patient outcomes, not volume, and this paradigm shift is key to achieving appropriate rates of investigation and delivery of high-value care. Similarly, osteoarthritis research is siloed, has limited capacity and nationally does not follow a coherent plan that is centred on person and population needs.
With increasing individual and societal burden from osteoarthritis, along with inappropriate clinical practices, it is critical that effective strategies are implemented to improve prevention, care and research for consumers and the population. We urgently need a cohesive, unified, clear direction that is not fragmented or informed by anecdote and personal agendas.

### 2.2 Aims

The vision of the National Osteoarthritis Strategy is to outline Australia’s national response to osteoarthritis and inform how existing limited health care resources can be better coordinated and targeted to achieve optimal outcomes for people.

Reflecting this vision, the Strategy proposed a set of strategies for effective osteoarthritis prevention and management using a whole person approach. It aims to manage and minimise the impact and extent of osteoarthritis in the Australian community, deliver models of best practice treatment and self-management of osteoarthritis and make best osteoarthritis management accessible to all Australians.

### 2.3 Principles

The National Osteoarthritis Strategy has been developed to align with current Guidelines, Standards and Models of Care and a range of Commonwealth, state and local government initiatives, and also to consider new evidence, best practice and feedback from a broad consultation process undertaken across Australia. The following principles have guided the Strategy:

- A bio-psychosocial approach to the prevention and management of osteoarthritis which necessarily goes beyond biomedical factors to include the psychological, environmental and social factors affecting people living with, or at risk of, osteoarthritis.
- A patient/consumer-centred approach, which embraces patient education and supports active and effective self-management.
- Inter-professional collaboration and best-practice, evidence-based clinical care, aimed at achieving optimal outcomes for people.
- A focus on innovation and new technologies and approaches such as big data modelling and personalised medicine.

The Strategy employs a whole person journey method from prevention and early management (including self-management) to joint replacement, other related surgery and rehabilitation, focusing on individual and community impact (Figure 2). This approach has been used successfully to develop the National Pain Strategy [3], the National Diabetes Strategy [29] and the National Plan for Child and Youth Wellbeing [30]. These strategies have been instrumental in raising awareness of the prevalence and socioeconomic burden of these conditions and developing clear and strategic implementation plans.

![Figure 2 the Whole Person Journey Method](image)
2.4 Design and process

The design and development of the Strategy involved 5 stages.

1. **Formation of a Strategy Leadership Group**

The Strategy Leadership Group (Figure 3) provided the strategic framework and work plan for the National Osteoarthritis Strategy, oversaw the preparation of the National Strategy, provided guidance, led the consultation process and reviewed the draft strategy. It will further mobilise support and financial resources for the implementation of the Strategy. The Leadership Group comprised representatives of osteoarthritis disciplines, GP’s and other primary care practitioners, advocacy groups of the Australian healthcare system and consumers.

![Figure 3 Structure of National Osteoarthritis Strategy Project Group](image)

2. **Working Group actions**

Three Working Groups worked in parallel with a specific focus according to the disease course of osteoarthritis and led the identification of priority areas, objectives within priority areas and strategies to meet the objectives. The working groups covering the three key phases of a person’s journey were:

2. *Living Well with Osteoarthritis* Working Group: non-surgical interventions including detection, diagnosis and early care;

3. **Development of the draft National Osteoarthritis Strategy**

The draft Strategy has been developed using contemporary evidence and recommendations by the Working Groups. Key elements of the draft Strategy include prioritised issues, goals, objectives, strategies and implementation plans for the three key phases. In addition, the Strategy will be informed by face-to-face consultations with identified stakeholders and an online public consultation.

4. **2018 National Osteoarthritis Summit**

The draft National Osteoarthritis Strategy is to be presented to wider stakeholder groups at the 2018 Osteoarthritis Summit, to be held in Canberra in November 2018, for consultation and validation to ensure an effective, comprehensive and transparent consultation process. The Summit will also formalise the Strategy and move it to a set of national implementation plans.

5. **Implementation: financial analysis, communication and advocacy**

The National Osteoarthritis Strategy will be used as the core advocacy document to be presented to all levels of government to represent the interests of people with osteoarthritis in Australia. The
recommendations will be assessed from a financial perspective with economic modelling and evaluation, highlighting the high cost of current osteoarthritis management, and resulting consequences of implementing the National Osteoarthritis Strategy. The Strategy will also inform the osteoarthritis-specific recommendations of the National Strategic Action Plan for Arthritis which is currently under development.

3 A Strategic Response

The Strategy takes a whole person journey approach from prevention and early management (including self-management) to joint replacement or other related surgery and rehabilitation and identified seven priorities to guide the actions required under three thematic areas as depicted in Figure 4.

Figure 4 Summary of Priority Areas
The objectives and strategies for each priority area are outlined under the three thematic elements in this section. The implementation suggestions inform what could be undertaken and achieved at various levels of government and at a local community level during the entire person journey in order to improve their experience.

Some of the recommendations for the themes of *Living Well with Osteoarthritis* overlap slightly with those for *Advanced Care*, but this reinforces the importance of non-operative management by both the primary care practitioners and surgeons. The asterisks (*) denote the strategies that are aligned with the National Pain Strategy and the Victorian Model of Care for Osteoarthritis.

### 3.1 Prevention

<table>
<thead>
<tr>
<th>Priority 1</th>
<th>Implement multifaceted programs to prevent obesity and increase physical activity for the prevention of osteoarthritis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective (a)</td>
<td>Maintain healthy weight amongst the community to prevent osteoarthritis</td>
</tr>
<tr>
<td>Measure(s)</td>
<td>1. The proportion of Australians with a body mass index within the healthy range; 2. The difference in the proportion of Australians with a body mass index within the healthy range between the first and fifth quintile of the socio-economic index for areas (SEIFA); 3. The links between osteoarthritis and obesity highlighted in relevant obesity groups’ strategies and policies.</td>
</tr>
<tr>
<td>Strategy 1</td>
<td>Support the development of a national obesity strategy by working closely with national obesity groups to change policy and practice to support obesity and osteoarthritis prevention.</td>
</tr>
<tr>
<td>Implementation plans</td>
<td>1. Work with national obesity groups (e.g. Obesity Policy Coalition, Obesity Australia, and Australian and New Zealand Obesity Society) to drive the implementation of the recommendations of the ‘Tipping the Scales’ report and other obesity prevention policies and programs at all levels of government, community and business; 2. Work with national obesity groups to drive greater access to effective weight loss therapies in community settings; 3. Promote the inclusion of musculoskeletal health and ageiing representatives within national obesity groups to ensure the importance of osteoarthritis prevention is clearly on the agenda; 4. Work with national obesity groups to lobby the Commonwealth government legislation for a mandatory “front of package” interpretive labelling to provide information to support informed consumer choice in purchasing.</td>
</tr>
<tr>
<td>Strategy 2</td>
<td>Improve public awareness of the link between obesity and osteoarthritis</td>
</tr>
<tr>
<td>Implementation plans</td>
<td>1. Develop and deliver community awareness-raising campaigns to highlight the link between obesity and osteoarthritis; 2. Improve community understanding of energy balance and its link to weight management. This is important for the secondary prevention of osteoarthritis.</td>
</tr>
<tr>
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<tr>
<td><strong>Objective (b)</strong></td>
<td>Raise organised, incidental, moderate and vigorous physical activity levels by 15% by 2030 to prevent osteoarthritis</td>
</tr>
<tr>
<td><strong>Measure(s)</strong></td>
<td>Increase in physical activity participation (time) and number of participants (people) undertaking different levels of physical activity</td>
</tr>
<tr>
<td><strong>Strategy 1</strong></td>
<td>Work closely with national physical activity groups to change policy and practice</td>
</tr>
<tr>
<td><strong>Implementation plans</strong></td>
<td>1. Place prevention of osteoarthritis into the agenda of national physical activity promotion groups, such as Exercise and Sports Science Australia and the Heart Foundation; 2. Work with national physical activity groups to drive successful implementation of physical activity guidelines. Specifically, by raising awareness of the importance of physical activity, investing in safe exercise areas in communities and developing easy-to-follow physical activity programs.</td>
</tr>
<tr>
<td><strong>Strategy 2</strong></td>
<td>Promote physical activity in everyday life through community-based settings to prevent osteoarthritis related to physical inactivity</td>
</tr>
<tr>
<td><strong>Implementation plans</strong></td>
<td>1. Conduct awareness-raising campaigns and provide local programs to encourage communities (e.g. families, schools and workplaces) to participate in incidental and unstructured physical activity; 2. Engage state and local governments (councils), schools and workplaces to develop infrastructure that encourages incidental or unstructured physical activity; 3. Targeted engagement with people with signs of, or at risk of developing osteoarthritis to increase physical activities that increase joint movement and muscle strength.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Priority 2</strong></th>
<th>Adhere to joint injury prevention programs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective</strong></td>
<td>Reduce knee injury rates from sporting participation by 25% by 2025 to prevent osteoarthritis</td>
</tr>
<tr>
<td><strong>Measure(s)</strong></td>
<td>Reduction in knee injury rates from sporting participation</td>
</tr>
<tr>
<td><strong>Strategy 1</strong></td>
<td>Work with sporting groups and those groups with an interest in sports injury prevention</td>
</tr>
</tbody>
</table>
| Implementation plans | 1. In partnership with key stakeholders, develop a school-age injury prevention program based on established successful programs, such as the FootyFirst program and the Fédération Internationale de Football Association (FIFA) 11+ program;  
2. Engage with other organisations beyond government (e.g. private sector) to assist with the implementation of joint injury prevention programs;  
3. Identify the best implementation pathways, including the development and use of technologies, for injury prevention programs through formal evaluation. |
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Strategy 2</td>
<td>Work with executive boards of sports bodies and educators to mandate change</td>
</tr>
</tbody>
</table>
| Implementation plans | 1. Collaborating with School Engagement and Partnerships at Australian Sports Commission to increase physical activity at schools;  
2. Implement physical activities and training programs by sporting bodies that target balance and body movement activities to reduce injury;  
3. Develop targeted interventions to educate and change attitudes as well as behaviours of coaches on existing programs;  
4. Develop training programs for coaches and exercise professionals to allow successful implementation of injury prevention programs;  
5. Approach training institutions and professional representative bodies (e.g. The Australian Council for Health, Physical Education and Recreation, Exercise and Sports Science Australia and the Australian Physiotherapy Association) to institute training in implementing injury prevention programs, and to audit current practice around teaching of these programs within the academic curriculum of these professions;  
6. Consider sports specific changes that can prevent injuries. For example, the rule change by the Australian Football League for posterior cruciate ligament injury prevention, and the netball follow-on step rule. |
| Strategy 3 | Audit and provide feedback on existing injury prevention programs |
| Implementation plans | 1. Develop an auditing mechanism for the quality and content of injury prevention programs;  
2. Build in mechanisms to quickly update existing injury prevention programs and ensure the distribution of the update. |
| Strategy 4 | Utilise mass media for better access to knowledge and information |
| Implementation plans | 1. Market a change of narrative of what injury prevention is;  
2. Make the link between injury and osteoarthritis evident;  
3. Promote culture change through education;  
4. Identify and prepare injury prevention program champions and inform local opinion leaders. |
### Priority 1

**Support primary care practitioners to deliver best-practice, evidence-based, appropriate care to people with osteoarthritis, including increased prescription of lifestyle interventions**

<table>
<thead>
<tr>
<th>Objective</th>
<th>At least 50% of Australians with osteoarthritis receive a recommendation from a healthcare practitioner to undertake evidence-based lifestyle and other self-management strategies to reduce pain and disability by 2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure(s)</td>
<td>Percentage of Australians with osteoarthritis that has been recommended to undertake lifestyle and other self-management strategies</td>
</tr>
<tr>
<td>Strategy 1</td>
<td>Improve the knowledge, skills and confidence of healthcare practitioners and students/trainees to provide best-practice, high-value care for people with osteoarthritis (particularly effective delivery of ‘first-line’ evidence-based therapies) and support their effective self-management</td>
</tr>
</tbody>
</table>

**Implementation plans**

1. Identify knowledge and skills gaps of primary care practitioners and trainees regarding high-value care for people with osteoarthritis;

2. Establish and maintain a repository of existing (and emerging) evidence-based osteoarthritis and chronic disease management educational and training resources, including clinical practice tools, available for health practitioners;

3. Develop and promote skills-based core competencies in evidence-based osteoarthritis care across clinical groups, care settings, and all levels of professional practice in collaboration with professional bodies and consumers. These competencies must also consider culturally sensitive care delivery for Aboriginal and Torres Strait Islander peoples and culturally and linguistically diverse populations;

4. Develop evidence-based, trans-disciplinary, flexible educational and training resources for healthcare practitioners and trainees, informed by consumer expertise, where these resources do not currently exist;

5. Improve training of the emerging healthcare workforce and practising clinicians in evidence-based osteoarthritis and chronic disease management by:
   
   i. Supporting Universities to audit the adequacy of their curricula in the evidence-based management of musculoskeletal conditions and persistent pain, based on established competencies;
   
   ii. Embedding effective training resources within the curricula of Australian university courses;

   iii. Developing, and promoting training courses on osteoarthritis and chronic disease management through the Royal Australian College of General Practitioners, Australian College of Rural and Remote Medicine, Primary Health Networks and other professional bodies such
as the Australian Primary Health Care Nurses Association and Pharmaceutical Society of Australia.

6. Work with insurance agencies and regulatory authorities to ensure independent medical examiners meet competency standards for assessment and management of osteoarthritis and are supported to make recommendations on funding high-value care options for injured Australians;

7. Tailor upskilling strategies to support other potential workforce practitioners, such as fitness professionals, aged care workers and lay peer mentors to provide education, exercise and weight loss support in community settings for people with osteoarthritis. The opportunities should also extend to the unpaid workforce, such as volunteers and carers;

8. Provide information and technology infrastructure for decision support and outcomes measurement by healthcare practitioners. This can be achieved by promoting existing evidence-based decision support and information systems and advocating for a national standardised electronic medical report system.

<table>
<thead>
<tr>
<th>Strategy 2</th>
<th>Improve standards in osteoarthritis management by developing national benchmarking of outcomes of osteoarthritis programs and services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation plan</td>
<td>Develop and implement key performance indicators to evaluate osteoarthritis programs and services that align with the Australian Commission on Safety and Quality in Health Care Clinical Care Standards [31] and relevant guidelines such as those from the Royal Australian College of General Practitioners.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Priority 2</th>
<th>Improve the uptake of evidence-based and affordable, tailored, non-surgical care and support for ongoing self-management by all Australians with osteoarthritis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective (a)</td>
<td>At least 50% of people with osteoarthritis are undertaking lifestyle and other self-management strategies to reduce pain and disability by 2025</td>
</tr>
<tr>
<td>Measure(s)</td>
<td>Percentage of Australian with osteoarthritis who are undertaking lifestyle and other self-management strategies</td>
</tr>
<tr>
<td>Strategy 1</td>
<td>Empower consumers with the knowledge and confidence to request high-value care from healthcare practitioners and support self-management*</td>
</tr>
</tbody>
</table>
| Implementation plan                            | 1. Deliver public health messages about effective management of osteoarthritis specifically, disseminated through a mass media campaign, new government policy (e.g. Find your 30) and non-government organisations. It is critical that the role of physical activity in the management of osteoarthritis is made explicit in order to overcome widespread public misconceptions;  
   2. Establish and maintain a resources hub/web platform for consumers where resources are integrated in a central repository including educational resources, a service directory of local resources and services and decision aids; |
3. Develop evidence-based consumer resources available for different settings (e.g. for community centres, gyms, general practices) in multiple languages, different modes and delivered via a range of options such as hard copy information, telephone support, web-based and social media-based where these resources do not currently exist;*

4. Disseminate to consumers minimum standards for osteoarthritis care for use in Australia (e.g. adapt current European standards and current Australian standards as required);

5. Deliver education and support for self-management in primary care, for example, by increasing the use of practice nurses and shared medical appointments and encouraging referral to self-management education classes run by arthritis organisations.

<table>
<thead>
<tr>
<th>Strategy 2</th>
<th>Improve access to evidence-based exercise, weight loss and other pain management strategies</th>
</tr>
</thead>
</table>
| Implementation plan | 1. Engage community-based facilities to deliver evidence-based exercise and weight loss programs suitable for people living with osteoarthritis;  
2. Support private health insurance companies to provide access to evidence-based exercise and weight loss interventions for their members;  
3. Upskill health practitioners in providing evidence-based advice and support and strategies for on-referral concerning exercise and weight loss (refer to Priority Area 1), including those disciplines where these interventions have not typically formed part of their traditional scope of practice;  
4. Innovative funding models to support delivery of group-based exercise and/or weight loss interventions, where clinically appropriate;  
5. Promote psychological and behavioural approaches to assist populations with high vulnerability reduce chronic pain and improve adherence to medical regimes for the management of osteoarthritis;  
6. Encourage the Government to expand access to Medicare items for approved allied health practitioners to provide support for osteoarthritis chronic disease management programs beyond the current maximum of five sessions per year per patient. Treatment duration and the number of sessions funded should align with what is required to achieve measurable symptom reduction effectively. |

| Strategy 3 | Provide access to timely inter-disciplinary coordinated team care (remotely delivered or onsite) both in community and hospital settings for those individuals who require this level of care |
| Implementation plan | 1. Identify and advocate for appropriate funding models to support interdisciplinary care including:*  
   i. Reforms to the Australian MBS Chronic Disease Management and Team Care Arrangement schemes to better support high-value care and improved outcomes. Innovative financing changes may include:  
      a. Provision of a higher number of services for chronic musculoskeletal conditions, based on disability criteria; |
b. Provide block funding linked to appropriate components of care, rather than funding episodes of care that may not include appropriate components of care;

c. Scale funding levels according to clinical profiles (e.g. disability level, comorbidity profiles).

ii. Reform rebate schemes for private health insurance and compensation insurance schemes, such that rebates/payments support components of high-value care (e.g. exercise, weight loss and pain management). This may also include a change from episodic to block funding;*

iii. Reforms to Medicare and insurance schemes to cover care delivery and interdisciplinary care planning using strategies remotely delivered, such as telehealth, especially for physiotherapy.

2. Scope and undertake a formative evaluation of community-based ‘osteoarthritis or musculoskeletal hubs’ that allow for stratified care according to clinical presentation complexity or barriers to care. These hubs should also provide upskilling opportunities for primary care practitioners, provide links to secondary and tertiary care when needed and provide multidisciplinary outreach services for rural areas.

<table>
<thead>
<tr>
<th>Strategy 4</th>
<th>Advocate for musculoskeletal health on the Agenda of Health policy and planning*</th>
</tr>
</thead>
</table>
| Implementation plan | 1. Advocate for expansion of the MBS Chronic Disease Management initiative and broader implementation of the Healthier Medicare trial to include musculoskeletal health conditions;*

2. Update existing or emerging non-communicable disease management and prevention policies, frameworks and funding agreements at State/Territory and Commonwealth levels to explicitly include a focus on musculoskeletal health;*

3. Support development and implementation of models of care for osteoarthritis in Australian States and Territories;

4. Support Primary Health Networks and Local Health Networks to develop care pathways for osteoarthritis, such as Health Pathways;

5. Lever recommendations from the World Health Organization (WHO) Global Strategy and Action Plan on Ageing and Health [32] and Guidelines on Integrated Care for Older People (ICOPE) [33] as an opportunity to develop and implement health policy to support functional ability in older people though optimising mobility and addressing musculoskeletal pain. |

<table>
<thead>
<tr>
<th>Objective (b)</th>
<th>Ensure access to, and uptake of, lifestyle and other self-management strategies by people with osteoarthritis is equitable across geographic areas, socioeconomic levels and cultural and linguistically diverse groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure(s)</td>
<td>Percentage of Australian with osteoarthritis undertaking lifestyle and other self-management strategies, analysed by area and sub-population groups</td>
</tr>
<tr>
<td>Strategy 1</td>
<td>Implement and support remotely-delivered evidence-based osteoarthritis services that take a biopsychosocial approach and support self-management</td>
</tr>
</tbody>
</table>
## Implementation plan

1. Establish new or promote existing models that enable internet and telephone delivery of exercise programs; health coaching for self-management; weight loss and pain management;*

2. Develop and implement a training program for healthcare practitioners to support the use of telehealth and internet-supported service delivery models to provide exercise programs; health coaching for self-management; weight loss and pain management.*

3. Develop an accreditation framework for remotely delivered osteoarthritis care programs.

### Strategy 2

**Implement outreach programs to promote high-value care to people living with osteoarthritis, their care givers and healthcare professionals in regional and rural areas.**

### Implementation plan

1. Work with State/Territory governments and Primary Health Networks to identify geographic areas of high demand for osteoarthritis care and funding options to support outreach services and local workforce capacity building initiatives;

2. Engage Primary Health Networks and regional/rural communities in systematising and promoting pathways of care for people with osteoarthritis;

3. Work with non-government organisations and Aboriginal Medical Services to support outreach services to underserviced areas and build local workforce capacity in underserviced areas to deliver osteoarthritis care through clinical mentoring and establishment of local communities of practice.

### Strategy 3

**Develop education and osteoarthritis management programs that are appropriate for and relevant to culturally and linguistically diverse groups**

### Implementation plan

1. Establish the specific OA needs of culturally and linguistically diverse groups including indigenous Australians and identify gaps to inform future programs;

2. Develop and test information resources in different languages and work with culturally and linguistically diverse groups to ensure programs meet their needs.

## 3.3 Advanced Care

### Priority 1

**Optimise decision-making processes leading to total joint replacement (TJR) surgery and maximise outcomes and satisfaction following TJR surgery for people with severe osteoarthritis**

### Objective

Optimise the decision-making process for joint replacement for both healthcare practitioners and people with severe osteoarthritis
<table>
<thead>
<tr>
<th>Measure(s)</th>
<th>The appropriateness of surgeries performed after using the decision tool.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stage 1 strategy</strong></td>
<td>Have available structured patient decision-aids and education materials available for everyone considering total joint replacement</td>
</tr>
</tbody>
</table>
| **Implementation plans** | 1. Collate the existing patient decision aids and educational materials available for people considering a joint replacement via a mapping exercise and systematic search in Australia;  
2. Develop an optimal decision aid tool via a Delphi exercise or expert task force to ensure it is appropriate, feasible and applicable for the Australian population and healthcare system. |
| **Stage 2 strategy** | Ensure available decision aids are embedded in current practice |
| **Implementation plan** | 1. Ensure decision aids are available through multiple media (e.g., online module, flyer, telehealth, mobile application etc.) to meet the individual preference of health professionals and patient;  
2. Incorporate standardised decision aids and educational materials into the existing healthcare system and incorporate a pathway to link with existing and planned osteoarthritis education and non-surgical care programs (e.g. Osteoarthritis Hip and Knee Service, Osteoarthritis Chronic Care Program [34], Comprehensive Osteoarthritis Pathway TAS);  
3. Make information about the surgical procedure and post-operative expectations and rehabilitation available to patients in all States and Territories. |
| **Stage 3 strategy** | Embed patient information database in decision aids to promote a shared decision-making process between patients and surgeons |
| **Implementation plan** | 1. Support innovative information and communication technology-enabled strategies to make assessments of the needs for joint replacement and data collection simpler and easy for healthcare practitioners;  
2. Adopt a national and state-wide application to capture patients’ decisions and key health outcomes;  
3. Integrate the decision aids with population registries (e.g. Australian Orthopaedic Association National Joint Replacement Registry) to collect patient-centred outcome data and clinical performance of health care (e.g. willingness for surgery) over a specified period of time (e.g. audit and feedback systems);  
4. Provide a directory of existing physical activity, weight-loss, and other specialist services in the decision aid (e.g. National Health Service Directory, e.g. Health Pathways). |
Priority 2 | Optimise non-surgical management as an alternative, where indicated, or as an adjunct to total joint replacement for people with severe osteoarthritis

<table>
<thead>
<tr>
<th>Stage 1 objective</th>
<th>Promote the dissemination of information on evidence-based non-surgical management for people with severe osteoarthritis to the public, primary healthcare practitioners and specialist orthopaedic practitioners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure(s)</td>
<td>Proportion of patients who are appropriately identified as not suitable for joint replacement</td>
</tr>
<tr>
<td>Stage 1 strategy</td>
<td>Increase access to resources and awareness of evidence-based non-surgical management prior to considering surgery</td>
</tr>
<tr>
<td>Implementation plan</td>
<td>1. Provide people considering surgery with information on evidence-based non-surgical management; 2. Promote existing programs tailored for osteoarthritis management for healthcare practitioners (e.g. Osteoarthritis Chronic Care Program [34]; Healthy Weight For Life; Good Life with osteoArthritis in Denmark (GLA:D)); 3. Promote local clinical guidelines, pathways, care standards and model of care; 4. Engage with mass media (e.g. TV, newspaper) and other effective marketing strategies (e.g. advertisement/infographic at clinic waiting room etc.) to increase public awareness of evidence-based non-surgical management for people with severe osteoarthritis; 5. Partner with community and not-for-profit organisations to promote appropriate non-surgical care for people with osteoarthritis as a precursor to surgery; 6. Develop and provide ongoing inter-professional education for healthcare professionals on evidence-based non-surgical management for people with severe osteoarthritis.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 2 objective</th>
<th>Enhance access to, and uptake of, effective non-surgical management for people with severe osteoarthritis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure(s)</td>
<td>Uptake of effective non-surgical management by people with severe osteoarthritis</td>
</tr>
<tr>
<td>Stage 2 strategy</td>
<td>Have funding models (public and private) to support packages of care inclusive of exercise, weight loss, pain management and psychological health interventions, that align with peoples’ needs, preferences and places of residence*</td>
</tr>
<tr>
<td>Implementation plan</td>
<td>1. Ensure non-surgical management is promoted by institutional healthcare providers (e.g. Local Health Districts);</td>
</tr>
</tbody>
</table>
2. List New MBS items (linked to accreditation) for allied health (e.g. longer consultations where needed; reimbursement of nursing and allied health care at a level adequate to achieve agreed outcomes; reimbursement for communication between practitioners; reimbursement of evidence-based complementary interventions by accredited practitioners);
3. Advocate third party insurance of community-based clinics;
4. Expand funding for telehealth services and training to include allied health practitioners in public and private settings (e.g. revision of Medicare item numbers for allied health services to accommodate telehealth consultations).*

<table>
<thead>
<tr>
<th>Stage 3 strategy</th>
<th>Implement non-surgical management of severe osteoarthritis as outpatient service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation plan</td>
<td>1. Increase access to the MBS Team Care Arrangement scheme to reduce the unnecessary referrals to hospital care;*</td>
</tr>
<tr>
<td></td>
<td>2. Accredit osteoarthritis management educators, who are upskilled in both physical and psychological domains (i.e. not a new discipline, but an accredited role that could be performed by any health professional with training, knowledge and skills);</td>
</tr>
<tr>
<td></td>
<td>3. Educate consumers on healthy behavioural changes, motivational strategies</td>
</tr>
</tbody>
</table>

**Priority 3**

**Improve access to, the efficiency and cost effectiveness of services across healthcare systems for managing people with severe osteoarthritis**

**Objective (a)**
Promote efficient clinical pathway from diagnosis of severe osteoarthritis (in appropriate patients for total joint replacement) to the execution of surgery (This will include but not limited to waiting list management, perioperative strategies for optimising co-morbidities, theatre case and resource management, post-operative clinical pathways targeting shortened length of stays)

**Measure(s)**
Reduction in waiting time for Category 2 classification* patients who are appropriately selected suitable for total joint replacement

**Strategy**
Ensure that total joint replacement surgery is provided, to those who need it, within timeframes consistent with current Australian policy on urgency categorisation*

**Implementation plan**
1. Expand tertiary-based osteoarthritis services to community-based settings with appropriate operational modifications to suit the local context. Any expansion of the current services into community settings should be coupled with local stakeholder consultation to ensure the model of service delivery meets the local operational requirements;*
2. Implement a consistent, national and state-wide post-operative pathway of care, with an emphasis on discharge to the home environment where access to appropriate post-operative care services, such as allied health care, is available;*

3. Consult with, and support, Primary Health Networks to develop strategies and pathways for community-based service delivery for people with osteoarthritis. Identifying appropriate patient flow in rural settings as a priority;*

4. Ensure personnel in appointed facility or local musculoskeletal clinic coordination roles (e.g. through Osteoarthritis Hip and Knee Service sites, community musculoskeletal centres) have the opportunity to meet biannually for peer support and service standardisation;*

<table>
<thead>
<tr>
<th>Objective (b)</th>
<th>Prioritise access to non-surgical management programs by people on the joint replacement waiting list</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure(s)</td>
<td>Proportion of people on the joint replacement waiting list who have been given access to non-surgical management programs</td>
</tr>
<tr>
<td>Strategy</td>
<td>Ensure evidence-based non-surgical management has been accessed or completed by people with osteoarthritis before being placed on surgical waiting lists</td>
</tr>
</tbody>
</table>
| Implementation plan | 1. Perform multidisciplinary pre-surgery assessments to identify possible surgical risk factors and inform discharge planning:
   i. group meetings to discuss management and agree on management plan
   ii. facilitate co-location of practitioners where possible

2. Monitor patients’ status while on a surgical wait list using an appropriate, simple tool so that patients who are deteriorating rapidly can be fast-tracked for surgery;*

3. Establish private and public musculoskeletal health centres, incorporating allied health, medical and orthopaedic surgery practitioners, to provide services for people with advanced osteoarthritis or complex presentations, particularly for complex persistent pain. Where feasible, these centres would link with subacute care funding initiatives;*

4. Establish public and private advanced practice physiotherapy roles in community centres, initially for surgical triage and post-replacement review* |

4 Evidence-based Strategic Priorities

In developing strategic responses to optimise outcomes for people at risk of, or with, osteoarthritis, three working groups reviewed the literature to date and identified a number of achievable strategic priorities, based on a set of prioritisation criteria. This section provides the evidence supporting the identified priority areas, which direct the objectives and strategies to address the problem areas and to achieve the objectives outlined in the proceeding section.
4.1 Prevention

Summary of Evidence:
- Lack of implementation of current prevention and management programs to address the multifactorial nature of obesity and physical activity for osteoarthritis prevention;
- Joint injuries are one of the leading causes of the development of osteoarthritis;
- Injuries in sport are a barrier to adopting an active lifestyle;
- Joint injuries in sport can be controlled through exercise-based training programs;
- Exercise-based programs are effective but hard to implement at a broad level.

Osteoarthritis affects the whole joint and is moderated by both biomechanical (joint loading), metabolic (inflammatory) and psychosocial factors [35-37]. Public health strategies that aim to prevent osteoarthritis should target those modifiable risk factors through the development of multifaceted and feasible interventions [38-40].

Evidence related to both primary and secondary osteoarthritis prevention is presented in this section. For primary prevention, we consider strategies that prevent overweight, obesity and joint injury, while secondary prevention strategies aim at preventing the progression of the disease in individuals that are “at risk” (overweight, obese or have a prior joint injury) [39, 40].

4.1.1 Priority 1: Implement multifaceted programs to prevent obesity and increase physical activity for the prevention of osteoarthritis

The link between obesity, overweight, joint injury and osteoarthritis is well established in the literature [40-45]. Despite the substantial interest in the primary prevention of obesity, no country to date has reversed its obesity pandemic [46]. There are clear statements of what is required across government, non-government, community and industry. However, many countries, including Australia, are slow to take action [47, 48].

Prevention of obesity is both challenging and problematic due to a range of factors, including the complexity of the determinants of obesity, along with a lack of resources and/or reluctance of governments to commit to a sustained multi-level approach that also addresses unhelpful commercial interests [49]. The global obesity pandemic is primarily attributed to an energy imbalance commonly characterised by energy-dense, poor quality dietary patterns and reduced levels of physical activity, however, an interplay between multiple factors makes prevention (and management) much more complex [50, 51].

Recent systematic reviews [52-55] highlight the outcomes of obesity prevention programs to date, but the effectiveness of interventions is more pronounced for programs targeted to children [56] and for multi-factorial interventions that seek to improve diet and physical activity [54]. The ‘one size fits all’ approach has been shown to be ineffective, while strategies that combine population-level policy with a specific group or setting-based interventions and programs were typically more successful [55, 57].

An assessment of the cost-effectiveness of a number of obesity prevention approaches conducted in Australia found that policy and regulatory approaches were generally more cost-effective than
health promotion or clinical interventions [58]. Although the wide ranging impact of the obesity problem in Australia is recognised [59-61], current government programs and initiatives specifically designed to tackle the issue are hard to identify. To date, responsibility for obesity prevention has been largely left to individuals and non-government initiatives [62] with various stakeholder groups engaged. Strategies and priority areas to consider the complex and multifactorial nature of obesity across the lifespan from the existing literature include the following [63, 64]:

- Advocating for the recognition of obesity as a chronic disease,
- Developing a clinical toolbox to assist health professionals in preventing obesity,
- Developing equitable prevention strategies across the lifespan,
- Implementing regulatory mechanisms to reduce the consumption of unhealthy foods,
- Developing a national active transport strategy,
- Creating public education campaigns to improve attitudes and behaviours around diet, physical activity and sedentary behaviour,
- Establishing obesity as a national priority with a national taskforce and,
- Developing support for the update and monitoring of national guidelines for diet, physical activity and weight management.

Another issue affecting the translation of evidence-based obesity prevention interventions is the lack of external validity and process evaluation reports regarding the majority of clinical trials related to the prevention of weight gain and maintenance of weight loss [53, 56, 65]. To bridge the ‘gap’ of evidence to practice in the prevention of obesity and the promotion of healthy lifestyles, researchers and service providers need to increase their own knowledge, understanding and skills and also develop partnerships with experts in business, marketing, policy change, and advocacy [66].

In summary, the complexity of the prevention of obesity is illustrated by the multifactorial nature and causes of the problem. To achieve an improvement in such a complex issue requires implementing strategies that address the multiple stakeholders involved, identifying their perceptions and beliefs, learning from their experiences and considering the local context of the systems in which they interact [57, 67, 68]. There is a need to address the lack of a comprehensive, integrated and multi-sectoral approach to obesity prevention and management across Australia.

4.1.2 Priority 2: Adhere to joint injury prevention programs

Joint injuries in sport lead to osteoarthritis

Joint injuries are one of the leading causes of the development of osteoarthritis in young adults [69]. Evidence shows that 12% of the overall prevalence of symptomatic osteoarthritis is related to post-traumatic osteoarthritis of the knee, hip and ankle [70]. Most commonly, the association between injuries to the anterior cruciate ligament (ACL) of the knee and the development of knee osteoarthritis within 5 to 15 years after initial injury regardless of how the injury is managed is well known [71, 72]. Australia has the highest incidence of ACL reconstructions in the world, causing a financial burden on the healthcare system [73].

Injuries in sport are a barrier to adopting an active lifestyle

To identify and address the injury and safety-related barriers that prevent people from leading a more active lifestyle, the Victorian Government established a Sports Injury Prevention Taskforce [74]. In their 2013 report, four focus areas of intervention to drive participation, performance and sports injury prevention were established: (1) Increase awareness of the benefits of sports injury prevention and management for participation and performance; (2) Enhance the safe participation of children and adolescents; (3) Address injury in the high participation (team) sports; and (4) Improve the sports medical emergency response and injury prevention planning and practice. A
A series of strategies was also proposed to enable those interventions, such as building awareness and increasing acceptance of the positive impact of injury prevention on performance and participation. Ideally, this requires a systemic approach to implementing injury prevention utilising drivers (coaches, support of policies, practices and rewards) to influence a positive culture around sports injury prevention.

**Joint injuries in sport can be controlled through exercise-based training programs**

There is a growing body of literature to demonstrate the efficacy of multifactorial injury prevention programs in sports that focus on exercises for stability, balance, weight, plyometric, agility, and sports-specific movements [75-85]. Despite the demonstration of program efficacy in controlled settings, the development and implementation of these types of injury prevention programs in Australia have been limited [1]. This is for several reasons, described in the sections below. However, because of the growing body of evidence internationally supporting the benefits of these programs, Arthritis Australia, Sports Medicine Australia and the Australian Orthopaedic Association have all advocated a proposal developed by the Global Alliance for Musculoskeletal Health of the Bone and Joint Decade to implement a population-level injury prevention program in Australia. The proposal is based on incorporating injury prevention content into existing coach education resources and programs; research into sport-specific content; and intervention at the community sports level through a coach-directed, ‘train the trainer’ approach [1].

**Exercise-based programs for injury prevention in Australia**

The Preventing Australian Football Injuries through eXercise (PAFIX), funded through the National Health and Medical Research Council, was one of the earliest exercise-based programs to be developed and tested. Using a cluster randomised controlled design, the effectiveness of a specially developed program on injury rates was evaluated. Community-level Australian football players who were in the intervention arm of the program had a 22% reduction in lower limb injury rates and a 50% reduction in knee injury rates, compared to the control arm of the program. The reduction in the injury incidence rate was considered to be a clinically important outcome because of the large impact these injuries have on players health and participation, although it was not a statistically significant finding [86]. Since the PAFIX trial, several international programs have been developed and evaluated, the most well-known of these being the FIFA 11+ [87] targeting young football players.

**Exercise-based programs are effective but hard to implement at a broad level**

It is recognised that there is a gap between research and practice in the field of sports injury prevention [88]. Successful outcomes of injury prevention programs depend on effective interventions being implemented to ensure adherence to, and maintenance of, the program as designed, i.e. a player can turn-up and do the training but that does not ensure the correct training is actually performed [89]. There are several reasons why the implementation of these programs is a challenge, including, among others:

- **Reach**: A secondary analysis of the PAFIX trial showed that more than half of the players (55%) attended only one instead of the two weekly sessions intended. [90]. High compliance to an injury prevention program is important as this has been shown to be related to significantly lower risk for all injuries (35%) and gives significant improvements in functional balance in a soccer-based program, the FIFA 11+ [91].
- **Coaches beliefs**: Another Australian football study found that coaches’ beliefs and specific practices were affecting the implementation of evidence-based exercises for lower limb prevention [92].
Few studies report implementation: A systematic review to evaluate the benefits of lower limb injury prevention exercise protocols for the Australian Football League, showed the lack of reporting of implementation issues, such as intervention adherence or behaviour change related to the adoption of the intervention, for the majority of the studies included. The reasons for the lack of adherence and the context in which the interventions were implemented, were also not routinely explored [93].

Proven efficacy does not guarantee success in preventing injuries in the real world, and more focus should be given to the process needed to translate those interventions into effective and sustainable prevention programs [94-96]. An analysis of 12,000 manuscripts in sports injury prevention published in 2010, showed that about only 4% of the papers assessed the effectiveness of sports injury prevention interventions and their implementation [97]. Some of the concepts required for successful implementation have already appeared in the sports injury prevention implementation literature, such as understanding the implementation context; adopting a multilevel or ecological approach to implementation activities; and engaging intervention end-users in the planning and operationalising of implementation activities [98]. Added to that, it is also important to consider the development of implementation and evaluation strategies to address key barriers and facilitators; and to adopt a cross-disciplinary mixed research approach that considers both hard and social science [99].

Given the ever-growing issue with poor knowledge to action in the injury prevention field as described above, it is now important to develop an implementation “plan of action” and practical tools. This can assist in identifying the factors when implementing injury prevention programmes to be more widely used by the community and have an impact at the population level [100-102].

4.2 Living Well with Osteoarthritis

Summary of Evidence:
- Under-utilisation of lifestyle interventions by Australian primary care practitioners
- Over-reliance on medications by people diagnosed with osteoarthritis
- Lack of equitable uptake of evidence-based and affordable, tailored, non-surgical care and support for ongoing self-management

Safe, effective, non-surgical, non-pharmacological interventions for the management of osteoarthritis are available [103]. Several osteoarthritis management guidelines have been produced to summarise the scientific evidence available for osteoarthritis treatments, and to inform the practice of health practitioners [5, 104-107]. There is a relative consensus among these guidelines that the core components of osteoarthritis management should be tailored to suit the individual and include non-surgical, non-drug treatments; i) support for effective osteoarthritis self-management, ii) exercise and iii) weight loss [103, 108]. However, there is evidence that currently, not all Australians have access to this high-value osteoarthritis care [109]. The Strategy aims to empower Australians with osteoarthritis not just to live with their condition, but to live well with their osteoarthritis. This will only be achieved through improving access to high-value care for all Australians with osteoarthritis.
4.2.1 Priority 1: Support primary care practitioners to deliver best-practice, evidence-based, appropriate care to people with osteoarthritis, including increased prescription of lifestyle interventions

There are a number of barriers to the implementation of consistent, evidence-based osteoarthritis care in Australia. To date, the policy and system responses to osteoarthritis have not been commensurate with the burden of disease [25]. However, over the last decade, substantial improvements in policy and system-level capacity have been observed, particularly with the introduction of Models of Care for osteoarthritis in NSW, VIC and WA [110].

The CareTrack study in Australia reported that of 3517 primary care-based health care encounters in 2009-10, only 43% (95% CI 35.8%–50.5%) provided appropriate care for patients with osteoarthritis [25]. This is a reflection of practice internationally; a systematic review and meta-analysis quality care indicators found that only 36.1% (95% CI 27.8–44.7%) of patients with osteoarthritis received adequate quality of non-drug osteoarthritis care; the authors identified that this was particularly concerning given that exercise and physical activity are effective management strategies [111].

Another systematic review and meta-analysis reported similar results: only 38.7% (28.9–49.5) of patients were referred for or received a recommendation to exercise and 35.4% (95% CI 27.8–44.0) were offered education and self-management [112].

There appears to be a disconnection between recommendations from evidence-based osteoarthritis management guidelines for healthcare practitioners and the adoption of these into clinical practice. A survey of Australian GPs reported favourable attitudes towards clinical practice guidelines as aids to support decision-making in practice. However, the familiarity and actual use of the Royal Australian College of General Practitioners Osteoarthritis Guideline by GPs was poor [113]. A recent systematic review synthesised studies that identified the barriers and enablers to the management of osteoarthritis as reported by primary care practitioners. There were no themes identified that were enablers. Emergent themes that were barriers included; “1) Osteoarthritis is not that serious, 2) Healthcare practitioners are, or perceive they are, under-prepared, 3) Personal beliefs at odds with providing recommended practice, and 4) Dissonant patient expectations” [114]. These barriers should be considered when addressing evidence-practice gaps.

Underutilisation of lifestyle interventions

A recent large study found that although the attitudes of UK GPs towards prescribing or recommending exercise for osteoarthritis are generally positive, documented barriers to the initiation of exercise programs include insufficient time during consultations and lack of expertise [115]. This is likely to be the case for Australian GPs. One way to address this is to refer patients with osteoarthritis to practitioners skilled in exercise prescription and behaviour change. However, it is well-documented that the health service use of people living with osteoarthritis in Australia is often limited to consultation with GPs and the subsequent referral rate by GPs to appropriate allied health services is low [116].

A survey of Australian GPs found that non-drug treatments such as exercise continue to be underutilised despite the strong recommendations for use of these modalities in the Royal Australian College of General Practitioners Guideline for the non-surgical management of hip and knee osteoarthritis [109]. Further, the Bettering the Evaluation and Care of Health (BEACH) study found that only 17 of every 100 GP contacts with patients with hip and knee osteoarthritis utilised lifestyle management interventions (e.g. referral to a dietitian or physiotherapist, advice/education/counselling, or physical medicine/rehabilitation) [117]. A subsequent analysis of BEACH data reported similar findings for the management of foot/ankle osteoarthritis by GPs. Most patients with foot/ankle osteoarthritis were managed using medication (64.6 per 100 problems) with a relatively low rate of people managed with non-pharmacological strategies such as counselling, advice or education (17.7 per 100), or referral to allied health practitioners (10.1 per 100) [118].
In Australia, one of the barriers to referring patients for lifestyle interventions is that current funding models do not adequately support delivery of allied health and services. The Medicare Benefits Schedule (MBS) provides funding for face-to-face consultations with GPs and medical specialists. However, the MBS provides only very limited funding support for patients who need allied health support for osteoarthritis. Currently, the Medicare rebate is available for a maximum of five services per patient each calendar year. There are several key requirements to enable patients to access this rebate: i) Patients must have a GP Management Plan and Team Care Arrangements prepared by their GP; ii) referrals to allied health practitioners must be from GPs; and iii) allied health practitioners must report back to the referring GP [119]. This current arrangement can be burdensome to set up for treating GPs and can provide a barrier to access the rebate for patients.

GPs are not the only healthcare practitioners underutilising appropriate lifestyle interventions for osteoarthritis patients. A recent survey in Australia and New Zealand revealed that almost a third of physiotherapists did not always prescribe exercises during their consultation with people presenting with knee osteoarthritis [120]. This is particularly concerning when compared with evidence that 99% of physiotherapists are using exercise for knee osteoarthritis in the UK [121].

Over-reliance on medications

While lifestyle interventions such as weight loss and exercise are underutilised, Australian GPs consistently prescribe pharmacological treatments for their patients with osteoarthritis [109, 122]. There are several concerns with this approach:

- There appears to be an over-reliance of healthcare practitioners on the use of medications in the absence of lifestyle interventions [109, 117].
- It appears that GPs continue to prescribe/recommend medications for osteoarthritis that either demonstrate very little beneficial effects (such as paracetamol [117, 123]) and/or carry unacceptable risks of side effects. Opioids are potentially addictive, and may cause constipation, nausea, vomiting, hyperalgesia, confusion, drowsiness and respiratory depression; and non-steroidal anti-inflammatory drugs (NSAIDs) carry well-known gastrointestinal and cardiovascular risks. [109, 117].

Therefore, people living with osteoarthritis continue to rely on medications for management of their osteoarthritis as a primary treatment modality, but which may not be as helpful to them as lifestyle interventions (such as exercise and weight loss). Further, many people living with osteoarthritis have comorbid conditions such as diabetes and heart disease that would also derive benefits from lifestyle interventions.

4.2.2 Priority 2: Improve the uptake of evidence-based and affordable, tailored, non-surgical care and support for ongoing self-management by all Australians with osteoarthritis

Some Australians living with arthritis report poorer access to GPs, specialists, allied health and rehabilitation, reduced access to quality information about treatment options, and generally feel dissatisfied with the care from their healthcare practitioners [124]. This is particularly relevant for people who live in rural/remote areas [125], where services are often limited or non-existent [126]. This is consistent with a systematic review of evidence from the international literature [127]. The problem is further compounded in regional and remote populations, where there are higher rates of arthritis compared to those in major cities; with more than two in three people being overweight or obese; and almost three in four people not undertaking enough exercise [128]. Evidence confirms that a wide divergence between evidence-based recommended care and practice exists for people living with osteoarthritis [111]. It appears that access to osteoarthritis care is especially poor for Indigenous Australians [129-131]. This is particularly worrying given evidence that self-reported arthritis is more prevalent in Indigenous compared with non-Indigenous Australians [132].
A recent study asked people living with osteoarthritis to recall their experiences accessing osteoarthritis care in Australia. A recurring theme was that people were advised to ‘put up with’ their condition and were offered few options for their treatment. Long waiting times and difficulty obtaining outpatient appointments within the public hospital system were identified as barriers to accessing treatment. Lack of access to health professionals was a larger problem for people living in regional areas of Australia. Financial factors that were barriers to accessing treatment included difficulty taking time off from work to attend appointments and the cost of appointments with little rebate from private health insurance [133].

In addition, the access to care can be limited by geographical isolation and patients’ inability to pay. Data exist showing Australian patients are willing to embrace novel, remote tele-rehabilitation models for their osteoarthritis care [134] but there are barriers to implementing these. Barriers associated with models of service delivery include: lack of access to services, lack of funding for allied health tele-rehabilitation consultations (both MBS and private health insurance), health care practitioner reluctance to change their traditional models of face-to-face care, and the continually changing infrastructure and training to implement these treatment models [135].

Around 60% of Australians demonstrate low health literacy [136]. Low health literacy is strongly associated with poorer health outcomes, and is the main driver behind making adult health literacy a research priority area of the Australian Commission on Safety and Quality in Healthcare. In general, there is also poor quality of information available to people regarding symptom management strategies for their osteoarthritis [26, 124, 133]. When formal group-based osteoarthritis self-management education programs are offered, the uptake of these programs can be poor and effectiveness limited [137]. Barriers to participation in osteoarthritis self-management programs may include physical limitations, difficulty travelling to a venue, work commitments and disinterest (demonstrated by patients and sometimes their health professionals) [138]. This is an important area for future research; osteoarthritis self-management education should be made more accessible by integrating these interventions into different models of healthcare delivery [102, 138].

There is a lack of uptake and adherence (in both the long and short-term) to exercise and weight loss interventions by people living with osteoarthritis in Australia. A survey that asked 591 Australians with hip and knee osteoarthritis about self-management strategies found that only a small proportion of people were engaged in highly recommended self-management strategies. Only 50% of respondents were trying to lose weight, 18% were engaged in a muscle strengthening program, 6% were participating in fitness classes and 7% in hydrotherapy [139].

There is also systematic review evidence that practitioners such as musculoskeletal physiotherapists recognise that psychological interventions are valuable to achieve behaviour change and support patients to self-manage their condition. However, physiotherapists believe that they are inadequately trained to effectively utilise the psychological interventions that may be helpful to patients [140]. This evidence was further supported by a recent Australian study that reported while physiotherapists recognised the importance of person-centred care (which is focussed on the empowerment of patients to self-manage their osteoarthritis), their current knowledge and clinical practice in this area was limited [141].
4.3 Advanced Care

Summary of Evidence:
- Lack of decision-making is leading to increased total joint replacement surgery
- Patient-reported measures are not used systematically by orthopaedic surgeons to track progress (determine appropriateness for surgery)
- Limited tools available for the determination of clinical urgency or the adequacy of joint replacement in people with advanced (severe used above?) osteoarthritis
- Lack of non-operative alternatives for the management of severe osteoarthritis

A cost-effective intervention to treat severe osteoarthritis of the hip or knee is primary joint replacement, or surgery to remove painful, damaged joint surfaces and replace them with artificial weight-bearing surfaces [142]. Greater numbers of people over the age of 60, increased rates of obesity and joint injury, sedentary lifestyles and greater expectations of quality of life are all driving the increasing demand for joint replacement both internationally and nationally [143-145].

In 2016, almost 115,000 Australians underwent hip, knee or shoulder replacement [146], with approximately 37% of all joint replacement surgeries performed in public hospitals [146]. Over recent years, variations in the provision of care and rising health care costs have contributed to the need to ensure that the provision of health care is effective, efficient and safe. Increasing demand for joint replacement or other surgery will require effective and efficient strategies for the application of limited resources to provide equitable and appropriate provision of care as part of the Australian system of universal health care. Selecting the right candidates for total joint replacement surgery is essential, but not well studied (?). Three prioritised reform areas relating to joint replacement care have been identified by the working group.

4.3.1 Priority 1: Optimise decision-making processes leading to total joint replacement (TJR) surgery and maximise outcomes and satisfaction following TJR surgery for people with severe osteoarthritis

Limitations of existing patient selection and prioritisation criteria

Total joint replacement surgery represents major orthopaedic surgery. It should only be undertaken based on valid prognostic factors and when all other appropriate non-operative management strategies have been tried. Currently, up to one-quarter of total joint replacements are performed on inappropriate candidates according to evidence-based criteria [147]. A substantial proportion of patients are unsatisfied or continue to experience persistent pain after total hip replacement (6-27%) and total knee replacement (15-44%) [148], indicating that outcomes are less than expected and/or that expectations were too high [149]. Meeting pre-operative expectations and achieving satisfactory pain relief appear to be the most important factors in predicting the success of total joint replacement and identification of those patients who respond well to surgery (‘responders’) may assist in delivering the most cost-effective management [150]. It would seem reasonable that healthcare practitioners and hospital management adopt criteria for both selecting candidates and for assessing appropriateness for surgery. Yet there are currently very few formal predictive tools available to aid referring health care practitioners determine those likely to be good or poor responders to surgery.
Appropriateness criteria

It seems evident that pain, function, radiological changes and failed conservative therapy should be part of future studies on joint replacement indications. However, pain and function are relatively subjective measures, both when reported by the patient and when judged by the health practitioner. This is illustrated by the fact that although consensus on the indication domains seems to exist, symptom severity greatly varies at the time of surgery across different centres in Europe and Australia [151]. Despite the availability of validated questionnaires to assess pain and disability in osteoarthritis patients [152-154], it does not appear that these patient-reported measures are being used systematically by orthopaedic surgeons [155]. Similarly, patients agreed that pain was currently inadequately evaluated by surgeons [156]. Accordingly, there is a need to focus on instruments that measure pain and function in a way that is meaningful for both surgeons and patients, and delivered in the context of making decisions regarding appropriateness for surgery.

Stronger associations between psychological factors and joint replacement outcomes are reported in knee replacement than in hip replacement [157] and which may, in part, contribute to higher dissatisfaction rates and poorer response to surgery reported in recipients of knee replacement compared to hip replacement [158]. There is a dearth of literature examining the impact of psychological factors on actual response rates in joint replacement surgery. In addition, modifiable risk factors are likely to impede an individual’s capacity to benefit from joint replacement. These factors should also be considered prior to referral and consideration should be given to whether it is feasible to mitigate this risk through intervention, such as body mass index [159], psychological distress [160], co-morbidity profile [161] etc. Willingness to undergo surgery has also been linked to misperceptions about the indications for, and risks and benefits of, joint replacement. Patient preferences and perceptions about treatment options may be addressed using a patient decision aid. This is designed to help patients’ participation in the decision-making process by improving knowledge, creating realistic perceptions of benefits and harms, reducing decisional conflict, and improving the match between the chosen option and informed patients’ values [162].

A few previously developed patient selection criteria for total joint replacement indicated there were still approximately 20-45% of patients’ whose appropriateness for replacement was considered uncertain [163-165]. This makes these decision tools difficult to use in daily practice, as patients rated as ‘uncertain’ may have similar improvements in health outcomes as those rated as ‘appropriate’. In addition, orthopaedic surgeons recognise the need for a decision aid to support their decision making for total joint replacement and to optimise communication with patients [166]. However, the uptake of decision aids among surgeons has been low. Surgeons’ views regarding the development of a decision-support tool to standardise the assessment of patient appropriateness for surgery has raised some challenges. While most agreed that a tool may help guide discussions with patients and standardise the process, some indicated that their clinical experience was enough and that they are unlikely to find a tool useful [167]. Concerns were also expressed about mandatory cut-offs for patient-centred care and the medicolegal implications of using a decision aid [168]. An audit and feedback intervention before and after using a decision aid may be necessary for surgeons to gain confidence in its legitimacy [168].

Prioritisation criteria

To date, no strong evidence has been identified to support a specific tool for the determination of clinical urgency or the adequacy of joint replacement in people with advanced joint disease. The use of broad, non-specific groupings for the allocation of surgery is currently based on a system-wide category of utilisation of service rather than accurately defined health states. A number of international and national groups have attempted to develop acceptable tools for the clinical prioritisation of joint replacement surgery, but the validity and reliability of these tools remain uncertain. A systematic review identified 12 hip replacement and 10 knee replacement indication
sets from 6 guidelines (including European League Against Rheumatism, National Institute Care Excellence, Osteoarthritis Research Society International and British Osteoarthritis Society) and 18 papers [169]. Indication criteria concerning joint replacement consisted of pain (in respectively 11 and 10 sets), function (12 and 7 sets), radiological changes (10 and 9 sets), failed conservative therapy (8 and 4 sets) and other indications (6 and 7 sets) [169]. It was shown that currently available joint replacement indication criteria are largely based on limited and low-quality evidence. Hence, empirical research is needed, especially regarding domain specific cut-off values or ranges at which the best postoperative outcomes are achieved for patients, taking into account the limited lifespan of a prosthesis [169].

A working group established by OMERACT/OARSI (Osteoarthritis Research Society International) attempted to categorise the severity of symptomatic osteoarthritis using identified domains of pain, functional status and structural damage to correspond with referral for joint replacement [170]. They concluded there was wide variability in surgeon’s recommendations for joint replacement, but this was an important factor in who received surgery. While the level of symptoms was higher amongst people the surgeons referred for surgery, there was no cut-off point based on pain or disability to allow for discrimination between those referred for joint replacement and those who were not. A Canadian group developed the joint replacement priority criteria tool (HKPT) as part of the Western Canada Waiting List Project (http://www.wcwl.ca/tools/joint_replacement) [171, 172]. The tool ranks individuals according to the urgency for joint replacement [173]. While high and low categories of urgency were well discriminated, there was an overlap of adjacent urgency categories, suggesting further evaluation is required to assess the clinical validity of this tool. A priority criteria tool for joint replacement was also developed in New Zealand to provide consistency and transparency to the process of prioritising access to surgery [174, 175]. An Australian tool has been developed to determine appropriate access to surgical consultation: the Multi-attribute Prioritisation Tool (MaPT). It was developed by the University of Melbourne with support from the Victorian Department of Human Services (http://www.health.vic.gov.au/surgery/pubs/owlsumrep.pdf), and is designed to help prioritise and manage people considering joint replacement surgery. However, there was no published evidence that investigated the validity and reliability of the MaPT and hence it has not been recommended for use in the Victorian or Western Australian modes of care.

4.3.2 Priority 2: Optimise non-surgical management as an alternative, where indicated, or as an adjunct to total joint replacement for people with severe osteoarthritis

There is a perceived lack of non-operative alternatives for the management of severe osteoarthritis which was highlighted by Australia surgeons [168]. A study among Dutch orthopaedic surgeons similarly documented a lack of confidence in the efficacy of non-surgical treatments associated with a decreased referral rate [176]. Nevertheless, meta-analyses of small studies have shown that pre-operative exercise interventions for patients with knee/hip osteoarthritis awaiting total joint replacement reduced knee pain (SMD: 0.43; 95% CI: 0.13, 0.73) [177] and hip pain (SMD: 0.45; 95% CI: 0.15, 0.75) and improved hip function (SMD: 0.46; 95% CI: 0.20, 0.72).

There is limited research on the effectiveness of short-term non-pharmacological and non-surgical weight loss interventions prior to surgery either on pre- and post-operative outcomes or adverse events. Data from previous studies suggest an increased risk of deep surgical site infection and 90-day hospital readmission with a weight loss of ≥5% over the year prior to total joint replacement [178, 179]. Results from a pilot study of 40 patients with BMI ≥ 30 indicated that a structured, dietician-led weight loss intervention prior to total joint replacement is more effective in achieving weight loss than usual care and resulted in a statistically significant improvement in self-reported physical function at 12 months post surgery [180]. However, there is no conclusive evidence to support the recommendation that obese patients lose weight prior to total joint replacement [181]. There were insufficient studies with distinguishable exercise and weight loss content to compare...
different types of exercise and dietary programs within patients with severe hip and knee osteoarthritis [181]. Hence, without further research, specific recommendations cannot be made regarding the optimal design of an exercise program to target weight loss.

4.3.3 Priority 3: Improve access to, the efficiency and cost effectiveness of services across healthcare systems for managing people with severe osteoarthritis

Direct health expenditure on osteoarthritis in Australia was more than $3.7 billion in 2012 [182], of which 77% was spent on hospital services [18]. Despite the availability of public health care, ensuring timely access to care for osteoarthritis is problematic, as evidenced by the introduction of major government reforms to prioritise and “fast track” patients for total joint replacement and to optimise conservative management [13]. Several challenges have also been reported regarding accessing care for hip or knee osteoarthritis, including medical opinions about delaying surgery for later and the appropriate age for total joint replacement, difficulty obtaining referrals or appointments, long waiting times, work-related issues, attitudes about non-operative care and limited availability of primary and specialist care in some areas [183]. Private health insurance was the most frequently cited enabler and was perceived to support the costs of surgical and conservative treatments, including physiotherapy, while facilitating faster access to surgery. Closer proximity to services and assistance from medical professionals in arranging care were also considered enablers [183].

Providing timely access to total joint replacement for osteoarthritis is a key priority for the Commonwealth government (National Arthritis and Musculoskeletal Conditions Advisory Group 2004, Department of Human Services 2005). In 2016–17, the median waiting time for orthopaedic surgery in public hospitals was more than 195 days for half of the patients admitted for total knee replacement and 110 days for total hip replacement. The median waiting time for total knee replacement was 251 days for Indigenous Australians and 193 days for non-Indigenous Australians [184]. In 2015–16, it was 164 days in major cities, compared to 230 days in inner regional areas, 251 days in outer regional areas and 187 days in remote areas [185].

There is a need for an effective and equitable prioritisation system that supports rational and efficient clinical decision-making, better delivery of health care, improved health service planning and resource allocation and patient choice. The current three-tiered system (urgent, semi-urgent and non-urgent) used by surgeons and their registrars to determine the priority of patients for total joint replacement surgery is relatively unstructured and insensitive to individual patient need. Importantly, high priority patients may not receive timely surgery [186]. Patients with severe osteoarthritis waiting for an appointment to see an orthopaedic specialist and those already waiting for surgery are not routinely reviewed and may experience physical and psychological deterioration while they wait for surgical treatment. Delaying surgery for extended periods can result in the deterioration of both physical function and overall well-being [187].

Surveys conducted in people on orthopaedic waiting lists have shown the uptake of non-operative options, such as physiotherapy and rheumatologic care, was very low or non-existent. Only around 20-28% of patients have tried exercise or weight loss before being placed on the waitlist (Dowsey M. et.al 2018 unpublished data). The reasons for this may include: lack of knowledge about services by gatekeepers (i.e. GPs); lack of uptake of services by patients for financial reasons, difficulty accessing services, competing priorities, such as caring responsibilities; and insufficient capacity to meet demand in community health settings. A more equitable and clinically responsive system would ensure all conservative care options had been undertaken and those with the highest need (based on physical, functional, quality of life, economic and other issues) received prompt care [187]. Service configuration will need to be adapted to recognise local structural issues such as population and workforce geographical distribution, workforce capacity and professional linkages, information and communications technology resources, and access to evidence resources and facilities [143].
The evidence provided in this section served as the basis of the determination of priority areas of the Strategy, the implementation plans to address these priorities and the gaps in the existing research, which are summarised in the next section.

5 Research Capacity Building

In addition to the implementation plans, each working group has identified a number of research agendas to build the research capacity in response to the challenges faced in osteoarthritis prevention and management. The priorities identified are presented below:

5.1 Prevention

Three research areas were identified in the area of osteoarthritis prevention:

- Further research to better inform and refine the development of osteoarthritis prevention programs to understand the multifactorial pathway for translation and adoption of effective training programs
- Further research to develop strategies for the secondary prevention of osteoarthritis. Particularly, for people that present with factors that may cause disease, e.g. post joint injury, encourage physical activities that increase joint movement and muscle strength
- Development of a database/registry/working group of injury prevention research to understand what is already taking place and to guide specific injury prevention research priority setting

5.2 Living Well with Osteoarthritis

Six research priorities in the area of non-surgical intervention were identified:

- Evaluation of the benefits of a mass media education program about effective management of chronic musculoskeletal conditions including osteoarthritis;
- Evaluation of remote models of self-management support and service delivery for osteoarthritis;
- Evaluation of a community ‘osteoarthritis Hub’ model, commencing with what is available now, what has worked, what has not (process evaluation);
- Economic analysis of allied health-delivered models of osteoarthritis management (proof of concept);
- Economic analysis of alternative funding models for osteoarthritis care, for example, block or outcome funded, rather than funded based on occasions of service;
- Research work aiming at new treatments and discovery work for osteoarthritis care.

5.3 Advanced Care

The following three areas are identified as the top research priorities in surgical intervention and advanced care of osteoarthritis:

- Development of a validated patient selection tool that can predict better outcomes for total joint replacement
- Generation of more evidence of effective (pre-operative) non-surgical interventions for people with severe osteoarthritis
Examination and identification of barriers to uptake non-surgical interventions for people with severe osteoarthritis

6 Appendix

An environment scan was conducted to map various systems, supports, and other resources related to osteoarthritis self-management and treatment currently available to people with osteoarthritis as well as the financial environment of the funding streams currently used by health service providers and communities in Australia. Given the multiple sources of data, varying target populations, and types of knowledge, this environmental scan is not meant to provide an overarching framework for the Strategy, but serves to identify the gaps or duplicative efforts from the existing programs. It entailed a combination of a literature review (e.g. systematic, critical, or exploratory), a short survey, a focus group or interview with key stakeholders, and some form of program planning.
7 References

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