



**Arthritis Community Research &
Evaluation Unit (ACREU)
University Health Network**

**CARE FOR PEOPLE
WITH ARTHRITIS:
EVIDENCE AND BEST
PRACTICES**

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Executive Summary

Introduction

Arthritis is a leading cause of pain, physical disability and health care utilization in Canada, affecting nearly 4 million Canadians aged 15 years and older. With the aging of the population, the number of people in Canada living with arthritis is projected to increase to 6.4 million Canadians by 2025. As a result of the significant personal, societal and economic impacts of arthritis, prevention and management of this disease is critical to public health. This report reviews best practice and evidence-based care for people with arthritis, and looks at both evidence for efficacy (what works) and evidence related to the optimum delivery of interventions (how to apply). Most of the research presented in this report pertains to the most common forms of arthritis, osteoarthritis (OA) and rheumatoid arthritis (RA), respectively.

Methods

A literature review on best practices related to primary prevention, pharmacologic interventions, and non-pharmacologic interventions including rehabilitation interventions and self-management strategies was conducted. A systematic process to critically appraise the literature was undertaken using a standardized tool. Evidence was categorized into three levels based on the following criteria:

- a) **Conclusive evidence:** Systematic review(s) and/or guideline(s) and/or one RCT that are graded “Good” or “Excellent” according to our criteria for appraisal.
- b) **Indicative evidence:** Consistent findings among multiple high quality studies other than RCTs (e.g. cohorts, case control studies, qualitative studies) and/or high quality (“Good” or “Excellent”) review(s) that are not systematic.
- c) **Emerging/Limited evidence:** One - two studies other than RCTs that are graded as “Average” or above according to our criteria for appraisal or one RCT that is graded “Average” according to our criteria for appraisal

Key Findings

In total, 291 studies were retrieved and reviewed. A description of key findings from the literature review of best practices and evidence-based care for arthritis follows.

Primary Prevention

- Prevention strategies can address only identified and modifiable risk factors.
- Prevention strategies must be feasible and accessible.
- Recommended prevention strategies include:
 - Weight control
 - Physical activity
 - Injury prevention

Pharmacologic Treatments for Osteoarthritis and Rheumatoid Arthritis

- Pharmacologic interventions for people with osteoarthritis (OA) and rheumatoid arthritis (RA) must be prescribed in conjunction with non-pharmacologic interventions including patient education, exercise, rehabilitation modalities, and referral to specialty services if necessary.

Osteoarthritis:

- Best practice for pharmacologic interventions for OA includes starting with simple analgesics, only then followed by non-steroidal anti-inflammatory drugs (NSAIDs).
- If NSAIDs are prescribed, gastrointestinal (GI) risk factors should be reviewed and gastroprotective agents should be considered.
- Opioid analgesics may be used in patients with moderate to severe pain who cannot tolerate NSAIDs.
- Intra-articular injection with Hyaluron may be considered before systemic treatment for a symptomatic dry knee joint, and cortisone injection may be considered before systemic treatment for a symptomatic inflamed knee joint.
- There is conclusive evidence that topical agents such as capsaicin and topical NSAIDs can provide short-term pain relief.
- Glucosamine, an over-the-counter agent not currently regulated, has also demonstrated efficacy for pain control.

Rheumatoid Arthritis:

- Early aggressive pharmacologic treatment can halt RA disease progression and yield better patient outcomes.
- There is conclusive evidence that all patients with RA should be offered disease modifying antirheumatic drugs (DMARDs).
- Biologic response modifiers are targeted to the basic biological mechanisms of the disease process and have shown efficacy in randomized control trials (RCT), although their long-term efficacy has yet to be determined.
- NSAIDs continue to be recommended to manage pain and inflammation (with GI protection as required).
- Some patients may require vitamin or mineral supplements.
- Low dose corticosteroids may provide short-term relief for uncontrolled disease and are often used successfully over the long-term with little risk of side effects.

Non-Pharmacologic and Rehabilitation Best Practices in the Management of Arthritis

- There is conclusive evidence in systematic reviews and/or in practice guidelines for the following non-pharmacologic rehabilitation interventions for persons with RA and OA: client education, exercise (aerobic and strengthening), joint protection instruction, assistive devices, and for RA only, orthoses (hand/wrist splint and foot orthosis).

- There is limited or emerging evidence for vocational/work rehabilitation and physiotherapy modalities.
- Persons with arthritis should receive these rehabilitation interventions early in the disease process; however, all interventions should be optimally timed based on client receptivity and need.
- An educational-behavioural approach appears to be an effective manner in which to deliver rehabilitation interventions for persons with arthritis.

Arthritis Self-Management Strategies

- There is conclusive evidence for the use of self-management programs as a best practice for arthritis management due to the short-term benefits shown in recent studies.
- Benefits are particularly positive for education delivered in a group format and are over and above what is already achieved by medications.
- Research supports psychoeducational programs with a skills-building focus as opposed to solely information-based programs.
- A focus on self-efficacy has been associated with changes in health status. Self-efficacy is also an important predictor of adherence.
- Education should be tailored to the individual needs of the patient.

Rehabilitation Best Practices in the Management of Total Joint Replacement

- There is conclusive evidence to support pre-operative education interventions to decrease patient anxiety. Pre-operative rehabilitation tailored according to anxiety or targeted to those with more complex needs (e.g. those who are more disabled or have limited social support) is beneficial in reducing length of stay for individuals undergoing THR or TKR.
- Inpatient rehabilitation following total joint replacement (TJR) is successful in improving patient functional outcomes.
- Patient characteristics that have been consistently associated with discharge to inpatient rehabilitation are older age, comorbidity, and living alone.
- There is a need to identify a standardized approach to determining optimal discharge destinations, given the evidence that is emerging that functional outcomes following TJR for individuals discharged home with home care are similar to those for individuals who receive inpatient rehabilitation.

Access to Orthopaedic Services for Arthritis

- TJR is a widely recognised effective procedure for the treatment of severe OA in terms of improvement of pain, function, and patient satisfaction.
- There is no evidence regarding a uniform definition of appropriateness of TJR. However, the emerging evidence suggests that indications are made primarily based on pain and disability.

- There is a significant population in need of TJR even after accounting for willingness to undergo the surgery.
- Long waiting times for TJR and unmet need suggest that the current level of access does not match demand in Canada.
- There is no published standard protocol for physicians to use in the management and maintenance of waiting lists in Canada. However, protocols are under investigation to standardize this practice.
- Potential positive outcomes of offering arthroscopy include high levels of satisfaction with services among patients and professionals, and improved patient-related outcomes such as quality of life. However, evidence is conflicting with regard to the effectiveness of arthroscopy for OA of the knee necessitating further research.

Summary

Arthritis creates a large burden of morbidity and disability in the population and represents a high direct and indirect cost to society. This report describes the efficacy of interventions for arthritis (what works) and the evidence related to the optimum delivery of interventions (how to apply). It provides an evidence-based foundation for the development of comprehensive interdisciplinary models of care for arthritis which are essential to ensuring people with arthritis get the right care by the right person at the right time.

Chapter 1. Introduction

1.1 Overview

This report reviews best practice and evidence-based care for people with arthritis, and looks at both evidence for efficacy (what works) and evidence related to the optimum delivery of interventions (how to apply). This report was originally developed as background information for review of the literature on models of care for arthritis and key informant interviews concerning implementation of novel models of care in Ontario (An Exploration of Comprehensive Interdisciplinary Models for Arthritis, ACREU Working Report 2005-03).

Arthritis and related conditions exact a significant impact on the population of Canada. Arthritis is a leading cause of pain, physical disability and health care utilization (1-6). The symptoms of arthritis and related conditions include pain, swelling, or stiffness in or around the joints. If arthritis is not treated appropriately, the disease can affect the structure and function of joints. In turn, this leads to increased pain, disability and difficulty performing activities of daily living (7;8). The adverse consequences of arthritis have a significant impact on leisure, and social and labour force participation at all ages (4;9).

People living with arthritis, their families and society as a whole are affected by the outcomes of the disease. In 2000, arthritis and related conditions affected nearly 4 million Canadians aged 15 years and older, representing 16% of the Canadian population (10). In Ontario alone, 1.6 million people have arthritis. The prevalence of arthritis in the population increases with age (6). However, despite being seen as a disease of the aging, nearly 3 in 5 people who have arthritis are younger than 65 years of age (10). With the aging of the baby boomers, it is projected that the prevalence of arthritis will increase to 6.4 million Canadians within 25 years (10). The increased burden of this disease will have a significant impact on health care resources in Canada in the future.

Arthritis is also costly from an economic standpoint. The costs of arthritis have been estimated by Coyte as 6.2 billion Canadian and in a 2003 Health Canada Report as \$4.4 billion CDN (1998 dollars) (11-13). Approximately two-thirds of the costs of arthritis are indirect costs due to disability, a measure of lost productivity (11).

Arthritis and related conditions comprise a large group of conditions affecting the joints, ligaments, tendons, bones and other components of the musculoskeletal system (14). The three main categories of arthritis are: a) degenerative arthritis, primarily osteoarthritis (OA), b) inflammatory arthritis such as rheumatoid arthritis (RA), and c) connective tissue and other systemic diseases. OA, a degenerative arthritis, is the most common form of arthritis, characterized by loss of cartilage with concomitant bony changes, including sclerosis and osteophytes (15). RA is the most common form of inflammatory arthritis. It is a chronic inflammatory polyarthritis, which if untreated or inadequately treated, results in the destruction of the joints and severe functional disability (16). It may also be accompanied by extracurricular manifestations affecting other organs such as

the eyes, heart, and lungs (17). Connective tissue and other systemic diseases, such as systemic lupus erthematosus, are relatively rare conditions (refer to Appendix A for definitions of the major types of arthritis).

For the purposes of this report, the evidence is reviewed for degenerative arthritis and selected forms of inflammatory arthritis. Most of the research pertains to the most common forms of these diseases, OA and RA, respectively.

Health care services for individuals with inflammatory arthritis and connective tissue/systemic disease are generally provided by specialists. As such, the issues of access to the health care system are similar for these types of arthritis. Early consultation with an arthritis specialist is recommended to confirm diagnosis and treatment of RA (18). OA can often be managed in a primary care setting with access to specialist care by orthopaedic surgeons when interventions such as total joint replacement (TJR) are considered. Joint replacement is used in those for whom other treatment modalities have failed and who generally have more severe disease (19). Although the medical management of degenerative arthritis and inflammatory arthritis differ, both share common elements with regard to the management of pain and disability, including non-pharmacologic interventions such as rehabilitation.

1.2 Objectives

The overall objective of this report is to:

- a) summarize the evidence for best practice approaches to arthritis management across the continuum of care, including both pharmacologic and non-pharmacologic interventions (i.e. what works).
- b) summarize the evidence on when, where and by whom the best practices should optimally be applied.

1.3 Structure of the Report

This report presents findings from a literature review on best practices related to primary prevention, pharmacologic interventions, and non-pharmacologic interventions including rehabilitation interventions and self-management strategies. It also explores recent findings related to TJR and arthroscopic surgery.

1.4 Methods

Included in this review are studies using a variety of study designs, including randomized controlled trials (RCTs), non-randomized control trials and other studies such as cohort studies, clinical practice guidelines, and qualitative studies. It is considered important to include a variety of types of studies to address the management of arthritis because information that is needed for making clinical decisions in the day-to-day management of chronic diseases like arthritis; such as psychosocial factors and personal preferences of the client, warrant the use of methodologies other than RCTs. This is supported by the

work of other researchers who recognize that RCTs in the area of chronic disease management are rare as conducting these studies in complex chronic disease management is often unfeasible (20).

1.4.1 Literature Search Strategy

The literature search was divided into five major subject areas: primary prevention, pharmacology, rehabilitation and non-pharmacologic interventions, self-management and surgery. Nine databases were searched using the same general strategy: disease keywords and subject area keywords, limited by year, language, article type and age of subjects. The complexity, keywords used, and limits employed for each strategy were specific to the subject area and database being searched (see Appendix B for details).

The literature scan was executed between July and August 2004 and updated as recently as March 2005 in order to include any references that had been published in subsequent months.

1.4.2 Study Selection and Methods of Review

Abstracts were initially screened by one of two research associates to determine eligibility for review. Studies examining effectiveness of interventions, delivery of interventions, as well as the system factors that influence the delivery of such interventions were eligible. These studies needed to meet the following inclusion criteria:

- Subjects who had a clinical diagnosis of arthritis (OA, RA, spondyloarthropathy, systemic lupus erythematosus, and scleroderma)
- Subjects who were adults aged 18 years and over
- Interventions based in a hospital or community setting
- Interventions that focused on the following: non-pharmacologic interventions and rehabilitation (e.g. exercise), primary prevention, pharmacology, self-management, arthroscopy and TJR.

For the purposes of the review, studies were not limited to specific outcome measures. In the examination of interventions, systematic reviews were selected for inclusion. However, where evidence was lacking from these reviews, primary studies were also included. Studies meeting these criteria were retrieved, and a systematic process to critically appraise the literature was undertaken. Standardized critical appraisal forms based on the work of Law et al. (21) were developed to guide the appraisal process. All articles were graded according to Excellent, Good, Average, Poor and Very Poor. The literature was reviewed by one of ten reviewers. A small selection of articles were reviewed and compared by two reviewers to ensure consistency in the appraisal process.

Levels of evidence were determined for each subject area. For intervention studies, or studies that examine the outcomes/effectiveness of specific interventions/strategies, levels of evidence were based on the following definitions:

- a) **Conclusive evidence:** Systematic review(s) and/or guideline(s) and/or one RCT that are graded “Good” or “Excellent” according to our criteria for appraisal.
- b) **Indicative evidence:** Consistent findings among multiple high quality studies other than RCTs (e.g. cohorts, case control studies, qualitative studies) and/or high quality (“Good” or “Excellent”) review(s) that are not systematic.
- c) **Emerging/Limited evidence:** One - two studies other than RCTs that are graded as “Average” or above according to our criteria for appraisal or one RCT that is graded “Average” according to our criteria for appraisal

For the purpose of this report, a best practice is a process or method that, through experience and research, has proven to reliably lead to a desired result. Best practices involve integrating information from clients and/or family members and individual clinical experience/expertise with the best available external clinical evidence from systematic research in making decisions about the care of individual clients (22-24).

1.5 Results of the Literature Review

In total, 291 studies were retrieved and reviewed. The majority of the studies were rated as excellent (54%) or good (21%) in the appraisal process. Studies rated as poor were not included in the literature review. Refer to Table 1.1 for a summary of the characteristics of the studies reviewed for this report. A summary of the best available evidence is presented in the following chapters.

Table 1.1. Literature review summary

LITERATURE CHARACTERISTICS		AREA					
		Prevention	Pharmacology	Non-pharmacologic and Rehabilitation	Self-Management	Rehabilitation and TJR	Surgery
Total number of studies		36	58	49	53	42	53
Condition	Osteoarthritis	31	26	18	8	35	42
	Rheumatoid arthritis	2	27	24	7	12	8
	Arthritis non-specified	3	5	8	38	6	13
Type of Research	Quantitative	8	0	13	18	34	41
	Qualitative	0	0	0	1	2	4
	Systematic Review	5	41	20	10	3	2
	Narrative	23	13	17	22	3	5
	Grey Literature	0	0	0	0	0	0
	Mixed methods	0	0	0	2	0	1
	International Guidelines	0	4	0	0	0	0
Quality of Evidence	Excellent	15	58	41	17	18	16
	Good	10	0	5	15	14	22
	Average	9	0	4	10	8	15

Chapter 2: Primary Prevention

Key Messages

- ✓ Prevention strategies can address only identified and modifiable risk factors.
- ✓ Prevention strategies must be feasible and accessible.
- ✓ Recommended prevention strategies for osteoarthritis include:
 - Weight control
 - Physical activity
 - Injury prevention
 - Infectious disease control

- ✓ Currently there are no primary prevention strategies for rheumatoid arthritis.

2.1 Introduction

Arthritis and related conditions evolve to a pathology that may become fixed and irreversible. Prevention is an essential component of management practice for arthritis and related conditions.

The goal of primary prevention is to inhibit the development of disease before it occurs. The objective of this chapter is to review current evidence in the primary prevention of arthritis. Literature regarding primary prevention interventions is scarce. There are, however, several studies that have examined the risk factors that are key to understanding the potential for primary prevention strategies for arthritis. Available studies are examined in this chapter.

2.2 Results: Osteoarthritis

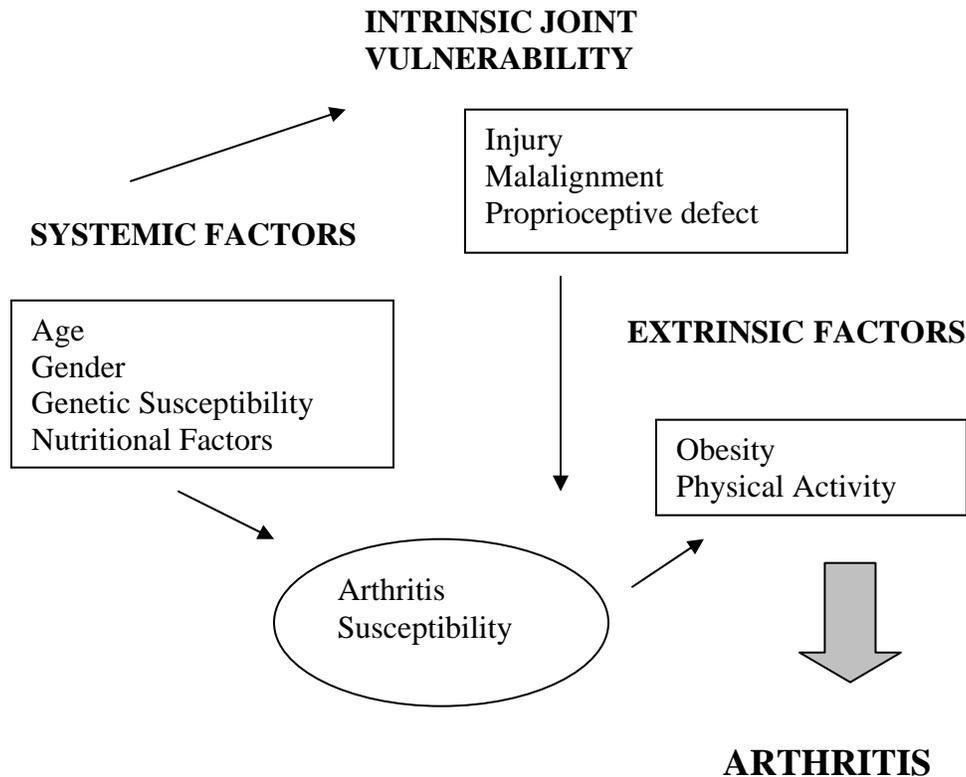
2.2.1 *Model of Risk Factors Associated with Osteoarthritis*

Osteoarthritis (OA) is a multifactorial disorder. No single risk factor is necessary and sufficient to precipitate the condition. Therefore one must carefully examine the array of potential risk factors or determinants that culminate in arthritis. Only risk factors which are modifiable may then be considered as candidates for primary prevention strategies.

A proposed model of risk factors is presented in Figure 2.1 (adapted from Felson (25)).

The model includes three categories of risk factors: 1) Systemic factors which affect joint vulnerability; 2) Intrinsic factors which impact upon joint vulnerability; and, 3) Extrinsic risk factors which act upon the joints.

Figure 2.1. Risk Factors Associated with Arthritis



2.2.2 Systemic Factors

1. Age and Gender

Risk of arthritis increases with age, however nearly three of five people with arthritis are younger than 65 years of age (5;26). Before age 50 men have a higher incidence of OA than women; after age 50 women have a higher incidence, and the sex difference increases with age. Women account for approximately two-thirds of those with arthritis (5;26-29).

The increased incidence of OA with age is likely the consequence of biologic changes which occur with aging including: 1) decreased responsiveness of chondrocytes to growth factors that stimulate repair; 2) decreased joint stability due to increased laxity of ligaments around the joints; and, 3) failure of shock absorbers with age (30).

2. Hormonal factors

A postmenopausal hormone deficiency is proposed as a risk for 'menopausal arthritis' based on a rapidly progressive hand OA that is seen at the time of menopause (30).

3. Genetic susceptibility

Individuals whose parents had OA, particularly polyarthritic disease, or, if disease onset was middle age or earlier have an increased risk of developing OA. There have been extended families with early onset severe arthritis that have been linked to an autosomal dominant mutation in type II procollagen. Greater than fifty percent of hand OA may be associated with genetic susceptibility (30).

4. Geographic Variation

Black populations in Jamaica, South Africa, Nigeria and Liberia have lower prevalence of hip OA compared to all Europeans residing in Europe (30). A recent study in North Carolina did not confirm this racial difference in prevalence (30). Additional studies identify a lower prevalence of hip OA among Asians, and among Blackfeet and Pima Native Americans as compared with white Americans (30).

5. Bone Density

It has been suggested that there is an inverse relationship related to bone density between OA and osteoporosis. Individuals with higher bone density are at an increased risk of OA. This may suggest the presence of circulating bone growth factor in those with osteophytes, as well as other candidates such as insulin-like growth factor type 1 (IGF-1), platelet-derived growth factor, fibroblast growth factor, transforming growth factor beta, and colony-stimulating factor type 1 (30;31).

6. Nutrition

Although there has been a great deal of discussion about antioxidants in the diet or from alternate sources, particularly Vitamins C and E, confirmatory evidence of antioxidants as a protective factor has not been identified (30). Vitamin D plays an active role in bone remodeling; however, a protective effect of Vitamin D on incident OA has not been confirmed (30;32).

2.2.3 Intrinsic Joint Vulnerability

1. Injury

Two types of major knee injury, anterior cruciate ligament damage and meniscal tears, have been strongly associated with subsequent knee OA. Such injuries are often sustained through sudden major trauma or injury to the joint such as that which may be encountered in an automobile accident or a fall (30).

2. Mal-alignment

Three developmental abnormalities, although uncommon, often lead to OA in later life. They are: congenital dislocation of the hip, Legg-Calve-Perthes disease, and slipped femoral capital epiphysis (30;33;34).

3. Proprioceptive Defect

Neurological events such as cerebral vascular accident (CVA) or brain injury (BI) may result in specialized nerve endings in muscles, tendons and joints, which are sensitive to changes in tension of muscle or tendon, being affected and subsequently leading to a

defect in proprioception. A disturbance in proprioception - the ability to sense position, location, orientation and movement of the body and its parts - may result in injury and/or mal-alignment of joints on a repetitive basis which may increase the risk of OA.

2.2.4 Extrinsic Factors

1. Obesity

Overweight and/or obese individuals develop knee OA more often than individuals who are not overweight (25;28;31;35;36). Longitudinal studies have established that increased weight precedes the occurrence of knee OA (37-39). Increased weight may act through two mechanisms: the amount of force across a weight bearing joint which could break down cartilage; and, through metabolic intermediaries, possibly excess adipose tissue produces abnormal levels of certain hormones or growth factors that affect cartilage or underlying bone (25;29;30;35;40).

2. Smoking

Heavy smoking has been associated with increased knee OA (41), while ever having smoked has been associated with an increased risk of Heberden's nodes in the Chingford study (42).

3. Physical Activity

Physical activity is considered in two contexts: avocational and vocational (28). There has been a great deal of discussion about the impact of repetitive joint use or repeated impulsive loading in avocational activities. A number of studies have examined running in particular. It has been consistently reported that the uninjured knee in a recreational athlete is not at increased risk for developing OA (25). However, the elite athlete has been found to be at increased risk of developing OA in sports such as running, soccer and hockey. It is the injury sustained by the elite athlete through impact, and/or loading, and repetitive movement that places him/her at risk of OA (43).

Vocational activity, specifically occupational injury as a consequence of stereotyped repetitive joint movement, increases the risk of OA (25;34). Vocations requiring kneeling, squatting, bending, crouching and crawling are at particular risk (44). In addition, with joint loading associated with lifting, moving and carrying heavy objects over uneven ground and in cramped spaces, further joint injury may ensue. A consequent increase in OA risk is observed (33;35). Specific occupational groups have been found at increased risk of developing OA (43). Heberden's nodes have been observed among British cotton mill workers, (30) and significantly more distal interphalangeal (DIP) joint OA was observed among long-term female employees of a Virginia textile mill (30). A number of studies consistently demonstrate a higher incidence of hip OA among farmers (30;31), and miners have a reported increased risk of both knee and hip OA (30).

2.3 Results: Rheumatoid Arthritis

2.3.1 Systemic Factors

1. Age and Gender

Rheumatoid arthritis (RA) is two to three times more likely to affect women than men (14) and the incidence increases with age (29).

2. Hormonal factors

The development of RA is rare prior to menarche. An adverse pregnancy outcome (spontaneous miscarriage, termination or stillbirth) may be a risk factor for future RA. The onset of RA during pregnancy is rare, however, in the few weeks following delivery there is an increased risk of RA, potentially related to breast feeding and the pro-inflammatory effect of prolactin (29).

3. Genetic susceptibility

The genetic contribution to RA has been estimated at approximately sixty percent (29). It has been difficult to differentiate the genetic component responsible for susceptibility from disease persistence or severity. There have been a number of advances including the identification of the link between HLA-DR4, HLA-DRB1 alleles and the shared epitope that are considered markers for increased risk of developing RA (29).

4. Geographic variation

There is conflicting evidence regarding the influence of racial background. The occurrence of RA among the world's population is not consistent. Prior to 1800 there were no definite descriptions of RA in Europe (29). RA has been identified in North American skeletons dating back several thousand years, with the highest frequency of RA found among Native American peoples (29).

2.3.2 Extrinsic Factors

1. Injury

Published evidence to support the theory of trauma, either physical or psychological, as risk factors for RA has not been substantive (29).

2. Obesity

Symmons (2002) reports two population based case-control studies in which adult obesity (BMI > 30 kg/m²) was associated with the development of RA (29).

3. Smoking

Several studies have shown that the risk of developing RA is higher among smokers (29).

2.4 Prevention Approaches

2.4.1 Osteoarthritis

Prevention strategies may take two approaches. Given that the precise etiology of arthritis is unknown, the first option would be to take a public health approach to affect change through health promotion strategies. Secondly, high risk individuals could be identified and specific strategies or programs could be targeted with individuals or small groups. Prevention efforts would ideally be directed to individuals with one or more of the following risk factors to reduce the risk of knee and hip OA: age over 50, female sex, a first-order family relative with OA, a previous history of hip or knee injury or surgery, obesity, or a job requiring bending and carrying (30).

Modifiable risk factors should be addressed in prevention strategies. The goals of prevention must be feasible and achievable, and prevention strategies and/or programs must be accessible to the individual.

1. Weight Control

Nutritional strategies should focus on eating a well balanced diet, including adjusting one's calories required to reduce weight, or to achieve and maintain an appropriate weight (normal BMI). Diet should incorporate a balance of vitamins and minerals, including antioxidants (ACE) and Vitamin D (26;27;30;32;40;45;46).

2. Physical Activity

Physical activity must be employed to complement caloric intake (46). Physical activities are required that emphasize flexibility to ensure continued flexibility of muscles, tendons and joint structures. Physical activity must also include activities that will build and maintain strength to ensure joint stability (47). Physical activities should be chosen which are accessible and enjoyable (48). Finally, arthritis prevention is important throughout the life course; therefore, age inclusive physical activities should be emphasized.

3. Injury Prevention

Sport injury prevention programs should be incorporated throughout the lifespan. Strategies such as warm-ups, strengthening exercises and using protective equipment assists in avoiding joint injuries which can increase the risk of OA (27). Public health messages need to emphasize the use of protective equipment in sports activities, and encourage consultation with a trained professional to establish safe sport training, scheduling and participation.

Vocational and avocational activities should avoid repetitive impact and torsional loading. Also, incorporating activities for participation across the lifespan is an integral component of a healthy lifestyle. Avoidance of occupational injury should be addressed through workplace safety programs and targeted activity analysis to minimize repetitive movements, decrease weight loads, and optimize equipment position and postural

alignment during occupational activities. Supportive legislation and policy, and taking precautions to avoid repetitive joint use and resulting joint injury in the workplace may also help to prevent arthritis. Ergonomic modification of the workplace should be utilized whenever possible (26).

2.4.2 Rheumatoid Arthritis

Currently there are no modifiable risk factors that have been identified to allow consideration of primary prevention strategies for RA.

2.4.3 Other Forms of Arthritis

Although not primarily the focus of this report, it should be acknowledged that there are potential strategies for primary prevention of some more rare types of arthritis. These include arthritis associated with Lyme disease, rubella arthritis and gout. These are beyond the scope of this report.

Chapter 3. Pharmacologic Treatments for Osteoarthritis and Rheumatoid Arthritis

Key Messages

- ✓ Pharmacologic interventions for people with osteoarthritis (OA) and rheumatoid arthritis (RA) must be prescribed in conjunction with non-pharmacologic interventions including patient education, exercise, rehabilitation modalities, and referral to specialty services if necessary.

Osteoarthritis:

- ✓ Best practice for pharmacologic interventions for OA includes starting with simple analgesics, only then followed by non-steroidal anti-inflammatory drugs (NSAIDs).
- ✓ If NSAIDs are prescribed, gastrointestinal (GI) risk factors should be reviewed and gastroprotective agents should be considered.
- ✓ Opioid analgesics may be used in patients with moderate to severe pain who cannot tolerate NSAIDs.
- ✓ Intra-articular injection with Hyaluron may be considered before systemic treatment for a symptomatic dry knee joint, and cortisone injection may be considered before systemic treatment for a symptomatic inflamed knee joint.
- ✓ There is conclusive evidence that topical agents such as capsaicin and topical NSAIDs can provide short-term pain relief.
- ✓ Glucosamine, an over-the-counter agent which is not currently regulated, has also demonstrated efficacy for pain control.

Rheumatoid Arthritis:

- ✓ Early aggressive pharmacologic treatment can halt RA disease progression and yield better patient outcomes.
- ✓ There is conclusive evidence that all patients with RA should be offered disease modifying anti-rheumatic drugs (DMARDs).
- ✓ Biologic response modifiers are targeted to the basic biological mechanisms of the disease process and have shown efficacy in RCTs although their long-term efficacy has yet to be determined.
- ✓ NSAIDs continue to be recommended to manage pain and inflammation (with GI protection as required).
- ✓ Some patients may require vitamin or mineral supplements.
- ✓ Low dose corticosteroids may provide short-term relief for uncontrolled disease and are often used successfully over the long-term with little risk of side effects.

3.1 Introduction

Pharmacologic interventions represent agents that are ingested or otherwise taken into the body with the intention of providing a therapeutic change.

Pharmacologic agents are the cornerstone to the management of all patients with rheumatoid arthritis (RA) and are an important treatment option for moderate to severe osteoarthritis (OA). The goals of pharmacologic treatment include pain control, reduction of inflammation and, increasingly, disease modification. While both diseases fall under the classification or diagnosis of arthritis and rheumatism, they are very different; each has its own distinct characteristics as well as very different disease and treatment trajectories.

There are several classes of drugs that are used alone or in combination to meet the treatment goals of both OA and RA. Most of these agents are prescription medications and must be prescribed by a licensed health care provider. While the efficacy of most indicated pharmacologic agents is unquestionable, there is some confusion about the role of various agents in the management of these two very different types of disease. The relevance of pharmacologic interventions in the discussion of models of care for persons with arthritis cannot be considered without discussion of appropriate diagnosis, prescription of the most efficacious and safe treatments, adequate monitoring for adverse events and effectiveness, and specialty referrals, if available.

In addition to prescription drugs this review also includes drugs that are available over-the-counter and selected complementary and alternative medications.

3.2 Results

There is an extensive published literature on the pharmacologic management of OA and RA. For this review, pharmacologic agents were divided into classifications that are common in the arthritis literature. These classifications are: topical analgesics, complementary and alternative medicines, nonopioid analgesics, opioid analgesics, corticosteroids (systemic), cortisone injection, other intra-articular injections, NSAIDs (including topicals), gastroprotective agents, DMARDs, and biologic response modifiers (Refer to Appendix C for the definitions of these efficacious pharmacologic agents). For the most part, individual agents and their specific dosing are not relevant to this discussion and, therefore, are not addressed in this report. Reviews of the class of drugs called cyclo-oxygenase-2 inhibitors (COX-2 inhibitors) were reviewed but embargoed since one agent has been withdrawn from the market and the continued use of the others drugs in this category is currently being investigated (49;50).

The key message contained in all the literature reviewed, for both OA and RA, was that the pharmacologic interventions must be prescribed in conjunction with non-pharmacologic interventions including patient education, exercise, rehabilitation modalities, and referral to specialty services if necessary.

3.2.1 The Benefits of Pharmacologic Agents in the Treatment of OA (Appendix D, Table 3.1):

Drug treatment for arthritis has been extensively studied in the academic literature. The main indication for pharmacologic therapy in OA is pain (51). While there is early

evidence that disease progression (joint damage) may be halted with certain agents (e.g. glucosamine), these data are inconclusive. Pharmacologic therapy should be added to a program of nonpharmacologic modalities (19;52;53). The use of non-pharmacologic modalities such as joint protection and weight loss may reduce joint damage. To date there are no pharmacologic interventions that can claim the same effect. Key considerations in the use of pharmacologic therapies for OA include efficacy, toxicity and cost. The emphasis is on using the safest efficacious therapies. At present there are a number of agents available which effectively provide OA pain relief; these include selected topical agents, complementary and alternative medicines, injections, analgesics and NSAIDs (19;52-55).

3.2.1.1 Complementary and Alternative Medicine (CAM):

Topical agents that have demonstrated efficacy in clinical trials include methylsalicylate and capsaicin (19;52;56). They can be used at the discretion of the patient.

Of all the CAMs, glucosamine treatment seems most promising (19;53;56-60). Glucosamine has been shown to provide symptomatic relief of OA and may also slow cartilage degeneration (although these data are not conclusive). Glucosamine can be used at the discretion of the patient.

3.2.1.2 Analgesics

Guidelines recommend that symptomatic management of OA be based around simple analgesic agents (19;52;53;61-64). Acetaminophen is the oral analgesic to try first, and if successful, this is the preferred long-term oral analgesic. Most analgesics found to be efficacious in OA are available over-the-counter. While there is limited evidence for OA for randomized control trials (RCTs), international guidelines recommend opioid analgesics with or without acetaminophen in patients with moderate to severe pain who cannot tolerate NSAIDs (19;52;53;65;66).

3.2.1.3 Corticosteroids

Joint aspiration accompanied by intra-articular injection of cortisone may be considered in patients with knee or hip OA, with moderate to severe pain, and in whom signs of joint inflammation are present (19;52;53;67-69). Joint aspiration and injection must be done by a trained and regulated health professional. Systemic corticosteroids are generally not appropriate for patients with OA (19;51;52).

3.2.1.4 Hyaluronan Acid

Hyaluronan injection (also called viscosupplementation) may be considered for patients with knee OA, with mild to moderate pain and no signs of joint inflammation, who do not respond to analgesics (19;52;69-72). Joint injection should be done by a trained and regulated health professional.

3.2.1.5 Non-Steroidal Anti-Inflammatory Drugs

NSAIDs may be considered in patients unresponsive to acetaminophen (19;52;53;61-63;69;73-77). Some patients prefer NSAIDs to acetaminophen, although some continue to take acetaminophen with NSAIDs. NSAIDs should be prescribed by a health care professional particularly so that the patient can be monitored closely for side effects. Because NSAIDs can cause significant adverse events, the most common being gastrointestinal toxicity, patients need to be screened for risk of GI adverse events, and gastroprotective agents may need to be prescribed (19;52;53;78;79).

3.2.1.6 Disease Modifying Anti-Rheumatic Drugs

Some DMARDs and biologics are being investigated for their ability to prevent or reverse OA damage. At present these agents are not recommended for patients with OA (19;51;52).

3.2.2 The Benefits of Pharmacologic Agents in the Treatment of RA

(Appendix D, Table 3.2):

3.2.2.1 Disease Modifying Anti-Rheumatic Drugs

The goals of pharmacologic therapy for RA are to control symptoms (e.g., stiffness and pain) and delay disease progression to irreversible joint damage. This means that the use of DMARDs should be considered for all patients with RA (80-90).

For many years the traditional pyramidal approach to the treatment of RA was to provide symptomatic relief with aspirin or NSAIDs. DMARDs were often referred to as second-line drugs because their use was held off until later stages of the illness. In most recent years, emerging data point to the impact of early education and nonpharmacologic interventions coupled with very aggressive early treatment with DMARD therapy for patients who are newly diagnosed. The 2002 American College of Rheumatology (ACR) guidelines now recommend commencing DMARD therapy within three months of diagnosis (80;91-94).

DMARDs are used to slow progression of joint damage in RA. DMARD use results in improved functional outcomes but is associated with significant toxicities. The onset of action of most traditional DMARDs is slow, ranging from three to six months; however, sulfasalazine, methotrexate (MTX), leflunomide, and cyclosporine produce results as early as one to two months. The agent of choice is determined primarily by physician and patient preference, taking into consideration convenience of administration monitoring requirements, medication and monitoring costs, time to therapeutic onset, and frequency and severity of adverse reactions. Few comparative trials are available to provide objective comparisons among these agents. MTX is heavily favoured by most rheumatologists for initial treatment, particularly for severe RA, because of a relatively rapid response, high response rate, and the longest sustained efficacy of all DMARDs.

There is also conclusive evidence for the efficacy of combination therapy as compared to monotherapy (80;92;93;95).

Since DMARDs control rather than cure RA, the management of RA is an iterative process, and patients should be periodically reassessed for evidence of disease activity or progression and for any toxic effects of the treatment regimen (80). Repetitive flares, unacceptable disease activity, or progressive joint damage require consideration of significant changes in DMARD regimen. Average length of therapy with any DMARD is less than five years, demonstrating the need for ongoing monitoring in these patients as they live with the disease for decades.

3.2.2.2 Biologic Response Modifiers

Biologic response modifiers are used to provide symptomatic control and functional improvement in patients for whom treatment with one or more DMARDs has failed (80;95-98). Biologics rapidly mediate significant improvement in measures of disease activity and are well tolerated, but their long-term safety is unknown. Biologics are also significantly more expensive than traditional DMARDs and are not available on formulary. Therefore, access to this medication has been limited for many patients.

3.2.2.3 Non-Steroidal Anti-Inflammatory Drugs

NSAIDs provide symptom control such as reducing joint pain, joint tenderness and morning stiffness but they do not alter the course of RA (74;80;99;100). In addition, NSAIDs can result in significant gastrointestinal toxicity and therefore gastroprotective agents must be considered (79).

3.2.2.4 Corticosteroids

Corticosteroids, given orally or intra-articularly, are useful as short-term adjunctive agents for patients who are not adequately controlled with NSAIDs and DMARDs (80;101;102). Low dose oral corticosteroids (prednisone, methylpredisolone) are also useful in bridge therapy during the introduction of DMARDs. Corticosteroids are widely used long-term, in low doses in RA with little risk of infection.

3.2.2.5 Analgesics

Nonopioid and opioid analgesics have not been addressed in ACR RA guidelines or most reviews. Nonopioid analgesics (e.g. acetaminophen) may be less efficacious than NSAIDs because of the inflammatory nature of RA pain (103). Grissinger (66) has reviewed the RCT evidence for the use of opioid analgesics in arthritis and musculoskeletal conditions and suggests that opioids are a treatment option for the management of uncontrolled pain in RA.

3.2.2.6 Vitamin and Mineral Supplements

It is important to note that individual prescribed therapies may require vitamin or mineral supplements, and these have been well documented in the scientific literature (80;104). In particular, there is now clear evidence of the relationship between RA and osteoporosis regardless of steroid use (105). As a result, it is highly recommended that patients with RA be prescribed calcium, vitamin D and bisphosphinates if required (106;107).

3.2.2.7 Complementary and Alternative Medicine (CAM)

Although there is very limited evidence, some CAMs and topical analgesics have demonstrated improvements in RA symptoms (56;59).

3.2.3 Delivery of Care for the Pharmacologic Management of Osteoarthritis and Rheumatoid Arthritis

The current consensus is that patients with OA can and should be managed in primary care (with referral to orthopedic surgeon if and when required). For patients with RA, the focus is now on early and aggressive diagnosis and treatment; therefore, the referral to and monitoring by a rheumatology specialist is preferred (108;109). An Ontario study (110) found that RA patients treated by specialists were more likely to be prescribed DMARDs than those managed only by a family physician.

3.2.3.1 Barriers to Adequate Pharmacologic Care

ACREU investigators have addressed barriers to care in a number of publications, including barriers to adequate pharmacologic care. These barriers include patient preferences, drug cost and access to health professionals who can prescribe appropriate agents (5;111). To provide appropriate pharmacologic care to patients better strategy is needed to address the following questions: who will diagnose, who will prescribe, who will monitor, is monitoring appropriate, and for RA, is there an ability to refer patients to rheumatology specialists?

3.2.3.2 Evaluation of Models of Care for Pharmacology

For a review of the research on models of care to ensure optimum management of arthritis see *An Exploration of Comprehensive Interdisciplinary Models for Arthritis* Working Report 2005-03.

3.3 Discussion

The key message contained in all the literature reviewed, for both OA and RA, was that the pharmacologic interventions must be prescribed in conjunction with non-pharmacologic interventions including patient education, exercise, rehabilitation modalities, and referral to specialty services if necessary. The recent withdrawal of

rofecoxib from the market has demonstrated that the long term safety and effectiveness of new drugs has yet to be determined and ongoing, vigilant surveillance is required, especially when prescribing newer agents. In addition, many of the most recently developed agents, such as COX-2 inhibitors and biologics are 20 to 30 times more expensive than existing agents, and their true cost-benefit has not yet been determined.

3.3.1 Pharmacologic Management of OA

The optimal management of OA is characterized by nonpharmacologic interventions in conjunction with pharmacologic interventions as required to manage pain. The goal of pharmacologic treatment in OA is to identify the safest, most effective treatments. This means starting with simple analgesics, only then followed by NSAIDs. If NSAIDs are prescribed, GI risk factors should be reviewed and gastroprotective agents should be considered. Opioid analgesics may be used in patients with moderate to severe pain who cannot tolerate NSAIDs. Key considerations for all pharmacologic therapies in OA include risk, safety, efficacy and monitoring. In keeping with this conservative philosophy, intra-articular injection with Hyaluron may be considered before systemic treatment for a symptomatic dry knee joint, and cortisone injection may be considered before systemic treatment for a symptomatic inflamed knee joint. There is conclusive evidence that topical agents such as capsaicin and topical NSAIDs can provide short-term pain relief. Glucosamine, an over-the-counter agent which is not currently regulated, has also demonstrated efficacy for pain control.

3.3.2 Pharmacologic Management of RA

There is now conclusive evidence that early aggressive pharmacologic treatment can halt RA disease progression and yield better patient outcomes. This leads to the need for early nonpharmacologic interventions, including education, to help the patient understand their disease and the consequences of early versus delayed treatment. All patients with RA should be offered DMARDs. Combination DMARD therapy is considered state of the art (although there is variation in prescription patterns even amongst Canadian rheumatologists) (112). Biologic response modifiers are targeted to the basic biological mechanisms of the disease process and have shown efficacy in RCTs. Biologics may be added to baseline therapy, but they do have significant potential for adverse effects, they are extremely costly, and their long-term outcomes are unknown. NSAIDs continue to be recommended to manage pain and inflammation (with GI protection as required). Low dose corticosteroids may provide short-term relief for uncontrolled disease and are often used successfully over the long-term with little risk of side effects. Some patients may require vitamin or mineral supplements.

Chapter 4. Non-Pharmacologic and Rehabilitation Best Practices in the Management of Arthritis

Key Messages

- ✓ There is conclusive evidence in systematic reviews and/or in practice guidelines for the following rehabilitation interventions for persons with rheumatoid arthritis (RA) and osteoarthritis (OA): client education; exercise (aerobic and strengthening); joint protection instruction; assistive devices; and for RA only, orthoses (hand/wrist splint and foot orthosis).
- ✓ There is limited or emerging evidence for vocational/work rehabilitation and physiotherapy modalities.
- ✓ Persons with arthritis should receive these rehabilitation interventions early in the disease process; however, all interventions should be optimally timed based on client receptivity and need.
- ✓ An educational-behavioural approach appears to be an effective manner in which to deliver rehabilitation interventions for persons with arthritis.

4.1 Introduction

Non-pharmacologic treatments are the mainstay of management of mild osteoarthritis (OA) and are an important component of care for moderate and severe OA and Rheumatoid arthritis (RA). Rehabilitation services are a key component to non-pharmacologic treatment either directly or indirectly via education and support for exercise and self-management.

Rehabilitation services (i.e. physiotherapy and occupational therapy) are based on a philosophy that interdisciplinary teamwork and a holistic, client-centred approach are key to successful outcomes in disabling conditions (113). Rehabilitation professionals offer non-pharmacological interventions that have both a preventive and therapeutic role in the management of arthritis. The following section summarizes the evidence on best practices in the management of arthritis in seven areas, highlighting where appropriate the role of rehabilitation. The seven areas are education, exercise, rehabilitation modalities, joint protection, assistive devices, orthoses, and work/employment.

4.2 Results

A summary of the characteristics of the literature on best practices for occupational therapy, physical therapy and exercise is presented in Appendix E.

4.2.1 Education

4.2.1.1 Effectiveness of Education

Client education is an important component of effective arthritis rehabilitation and has varying benefits on both physical and psychosocial outcomes. The aim of client education is to enable persons with arthritis to develop the skills and strategies that are required to manage and live with a chronic condition. Evidence exists in practice guidelines for client education in the non-pharmacologic management of OA and RA (18;19;52;80;114). Educational approaches may include the provision (19;115) and communication (52;95) of information about the disease and its therapies; counselling (115;116) or instruction (117) on how to adapt to living with a chronic disease; and cognitive-behavioural approaches (115) that enhance self-efficacy in coping with the symptoms and the functional limitations associated with the disease. Learning self-management techniques (18;118-120) is also important for the client in coordinating their own care and managing their disease. Benefits of different educational techniques/therapies have been observed in both OA and RA. The benefits of these interventions included decreased pain and enhanced coping (19;117;121;122) as well as reduced psychological disability (52;114;120). A study involving community-based physiotherapy intervention (education and exercise) emphasizing self-management strategies found improved self-efficacy, disease management knowledge, and morning stiffness in people with established RA (119). Currently, a Cochrane protocol exists that will examine the effects of patient education interventions on health status in OA (123).

4.2.1.2 Delivery of Educational Interventions

Discussion of educational interventions is subsumed in Chapter 5 on arthritis self-management strategies.

4.2.2 Exercise

4.2.2.1 Physical, Functional, Physiological, and Behavioral Effects

Strong evidence exists supporting the benefits of exercise in the nonpharmacologic treatment of arthritis for both OA (18;19;52;69;114) and RA (18;80;116;124-126). Exercise has various physiological benefits in reducing the risk of chronic diseases (127), and also has positive effects on physical, functional, physiological and behavioural outcomes in arthritis. These benefits are especially important when the interplay of factors such as a sedentary lifestyle, a deconditioned state, and an increase risk of comorbidity (e.g. arthritis and cardiovascular disease) are considered. For example, functional benefits observed with exercise (e.g. improved postural and gait stability) have implications for falls prevention in the at-risk population. Similarly, muscle weakness is a risk factor for the progression of disability (80;114;128-131). Moreover, some evidence exists to support weight loss for clients who are overweight or obese (18;52;114;131) in both OA of the knee (19;130) and hip (19;52). However, the Arthritis, Diet, and Activity Promotion Trial (ADAPT) (132) and other researchers

(114;133;134) emphasize the importance of combining weight loss and exercise, rather than weight loss alone, as an intervention for clients with OA of the knee.

Participation in exercise has demonstrated beneficial effects on pain, muscle strength, and functional status for clients having low-to-moderate disease activity for OA (18;19;69;80;114;125;126;135;136) and RA (124;137). Most studies have also shown beneficial effects of exercise for individuals with active (137) or chronic RA (138), as well as those having minor limitations (124) or fragile bones (137). For example, detrimental effects were observed on disease activity or joint symptoms in clients with OA and RA (114;124;128;129;131;133;138). However, some negative effects of physical activity compared to bedrest were identified for RA (139). More research is needed to examine the long-term effects of exercise therapy on radiological progression, bone mineral density, and functional capacity in RA (124;138;140).

4.2.2.2 Exercise and Specific Joints

The knee has been the focus of exercise research in OA. Evidence for the effect of exercise in the peripheral joints including the hip is scarce for the OA population. For RA, evidence to recommend knee strengthening exercises is available; however, evidence is lacking for shoulder and hand strengthening exercises.

4.2.2.3 Parameters of Exercise

The literature examined various types and forms of exercises. An operational definition of exercise was lacking in most studies. Only two reviews defined exercise therapy as a range of activities intended to improve strength, range of motion, endurance, balance, coordination, posture, motor function, or motor development that is performed actively, passively, or against resistance (116;126). Studies often involved mixed training methods and lacked consistency in exercise prescription (i.e. intensity, frequency, duration).

There is no optimal exercise regime beneficial for all people with OA (114;116;118;125;126;128;131) or RA (118;137;139;140) reported in literature and guidelines examined in this review. However, several papers provided general recommendations for exercise for OA and RA (116;131;135;137;138;140). Exercise guidelines that were cited in literature included the U.S. Surgeon General's recommendation for physical activity (133;134;141) and the American College of Sports Medicine Position Stand (142) for the quantity and quality of exercise for developing and maintaining fitness in healthy adults (118;120;137). Canada's physical activity guide (127) promotes a variety of choices within three main activity categories: endurance, flexibility, and strength (with balance activities for older adults) to obtain the most health benefits. These guidelines are for healthy adults and should be modified for individuals based on their arthritis condition.

Consensus practice recommendations for exercise prescription for older adults with OA are available (131). A combination of types and forms of exercises are recommended for

OA because different types (e.g. isotonic strength training that is progressive in nature, low-to-moderate intensity aerobic exercise, specific and whole-body functional strength training exercises) and forms (e.g. cycling, running, walking, swimming, aerobic dance) of exercise have varying benefits in terms of specific joint mechanisms and general health (128;130;135;136). In addition, preliminary data supports the use of low-intensity aerobic exercise when examining long-term effects of exercise for OA since higher intensity programs often have higher attrition rates (135).

For adults with RA, the Ottawa Panel has conducted a comprehensive systematic review for the development of evidence-based clinical practice guidelines for therapeutic exercises in the management of this condition (139). For an inflammatory disease such as RA, the Ottawa Panel recommends a low-intensity exercise program for reducing pain and improving functional status as compared with a high-intensity exercise program (139). Fransen recommends a regular graded therapeutic exercise program that avoids exacerbating symptoms and general fatigue while increasing muscle strength, joint range of motion, and general aerobic fitness (118).

4.2.2.4 Delivery of Exercise Therapy Programs

Programs reviewed included endurance, flexibility, strength, and balance activities and were often delivered in a variety of settings (i.e. clinic-, community-, and home-based). These exercise programs also occurred with supervision or were self-directed, on land or in water. However, Fransen indicates that the provision of non-clinical community-based exercise classes targeting older persons with specific chronic musculoskeletal disease such as RA and OA are limited (118).

The treatment approach or exercise therapy program for individuals often depends on the interplay of factors (118;125;133;143) that may affect acceptance and response to the intervention. Some individual factors include age; comorbidity; degree of disease severity affecting response to exercise; and misalignment. Some societal factors include availability and accessibility of programs within the community; cultural perceptions towards exercise; and socio-economic status (SES). Other factors to consider for exercise adoption also include self-efficacy for performing exercise; previous experience or preferences with exercise (118); social support (128;130); as well as practicality and cost issues (118;144). Fransen identified four client characteristics as plausible potential predictors of treatment responsiveness, which included age; body mass index; symptom duration; and radiographical disease severity (118).

It is important for clients to understand their disease and to have the skills to modify their exercise routines for accommodating their individual pattern of disease (i.e. daily fluctuations of symptoms). The physiotherapist, the physician and the client should work as a team to re-evaluate the physical components of the therapy and its demands on the body as the disease evolves or flares up. Assisting the client in perceiving the greater benefits of exercise and minimizing barriers to exercise are important. A client-centred approach in creating an individualized exercise program (e.g. determining the

individual's stage of readiness to exercise, individual goal setting, and mutual planning) is an important consideration.

When preparing an individual for successful participation in a community-based or self-directed exercise program, referral to a physiotherapist and/or occupational therapist may be necessary to evaluate and reduce pain and impairments (120) that may affect response to exercise. Physical therapy should be initiated in the early stages of arthritis (80;114) and may include early screening and preventive exercise therapy for the management of the disease (143). Early OA of the knee is defined by the extent of joint space width loss and not by symptom duration (118).

4.2.2.5 Individualized Versus Class-Based Exercise Programs

Supervised exercise classes appeared to be as effective as treatment provided on a one-to-one basis (125). A home-based exercise regime (126) or the addition of a home exercise element to a program (119;128) showed favourable results. Exercise in a group setting (130) is also advantageous because a social context with peers having similar disease-related symptoms may improve attendance (118). On the other hand, learning to exercise in the home could improve self-efficacy for participating in self-directed physical activity and exercise adoption for a longer time period. Monitoring (118;125;128) or periodic re-training (143) by a physiotherapist, exercise trainer or kinesiologist may promote adherence. The provision of support and counselling (116) as clients adopt exercise behaviour and become more physically active are also important considerations. Adherence to and adoption of exercise therapy as part of a healthy lifestyle are critical for achieving short-term and maintaining long-term health benefits. Long-term goals of physiotherapy (e.g. encouraging participation in lifestyle physical activity and ongoing fitness) would increase the probability of attaining or maintaining a healthy body weight, therefore reducing the risk of various comorbidities associated with obesity and a sedentary lifestyle (118).

Currently, Cochrane protocols exist that will examine the effectiveness of aquatic therapy for treating RA compared to land exercises or no intervention (145); the effectiveness of exercise therapy for RA of the hand (146); as well as the effectiveness of comprehensive PT interventions in improving outcomes based on the International Classification of Functioning, Disability, and Health (ICF) (147).

4.2.3 Rehabilitation Modalities

Physiotherapists have a variety of modalities available that could be used as adjunct interventions to other nonpharmacologic and pharmacologic treatments. For individuals with arthritis, disease symptoms such as pain and joint stiffness may limit motion and prevent participation in exercise. Modalities that can be administered by the physiotherapist include electrophysical agents (i.e. diathermy, ultrasound, transelectrical nerve stimulation, low level laser therapy, faradic baths); thermotherapy (i.e. heat packs, paraffin wax); and cryotherapy (i.e. ice packs, massage with ice) for OA (118;148-152)and/or RA.

4.2.3.1 Evidence of Effectiveness

Many guidelines examined in this review do not support the use of these modalities in the management of OA or RA (19;69;120;153). Scientific evidence for these modalities in both OA and RA is sparse or inconsistent due to poor methodological quality of the studies, inadequate reporting and analysis, heterogeneous outcome measures, as well as varying characteristics of the therapeutic application, study population, and disease state. However, despite the lack of evidence, some of these modalities (e.g. balneotherapy, acupuncture, thermotherapy, cryotherapy) have been used for centuries in the medical practice of specific cultures (149;154-156). Some simple modalities (e.g. transcutaneous electrical nerve stimulation) have the added advantage in that the client can use them in a self-directed mode (118).

The Ottawa Panel concludes that there is insufficient evidence to recommend or not recommend the use of several modalities and physical agents in certain clinical circumstances (157). Despite lack of evidence, the Ottawa Panel supports the use of low-level laser therapy alone; ultrasound alone (i.e. continuous); thermotherapy as an adjunct (i.e. wax combined with exercise); and transcutaneous electrical nerve stimulation (i.e. acupuncture-like TENS) for the management of RA symptoms (e.g. pain, stiffness) in the foot, knee, wrists and/or hand. Conversely, there is insufficient evidence on the efficacy of electrical stimulation or cryotherapy as an intervention for RA (157).

Currently, a Cochrane protocol exists that will examine the efficacy of acupuncture compared to standard medical treatment and sham acupuncture, as well as acupuncture plus standard medical treatment compared to standard medical care alone for OA of the knee (158). However, recent randomized control trials have shown that acupuncture may have an important role as a complementary therapy (159) or as an adjunctive therapy as part of a multidisciplinary integrative approach (160) to reduce pain and improve physical function in patients with knee OA.

4.2.4 Joint Protection

4.2.4.1 Evidence of Benefit

Joint protection and energy conservation are self-management approaches that aim to maintain functional ability in persons with arthritis through altering patterns of joint movements, practising proper joint and body mechanics, planning and pacing activities, regular rest and the use of assistive devices (115;161). There is conclusive evidence supporting the effectiveness of joint protection instruction for persons with RA (52;120;162;163) and OA (52;120).

4.2.4.2 Delivery of Joint Protection

Because joint protection strategies are a fundamental way to provide preventive joint care, persons with arthritis should receive instruction on joint protection early in the disease process; however, instruction should be optimally timed based on client

receptivity and need (161). With regard to the most effective method to provide instruction on joint protection, an educational-behavioural approach has been found to be more effective than a standard information-oriented approach in facilitating behaviour change in persons with RA (i.e. information, demonstration, and short supervised practice). An educational-behavioural approach includes strategies such as skills practice, problem solving, self-efficacy and adherence enhancing strategies, and structured teaching methods to enhance recall with the setting of weekly goals to practise methods at home.

4.2.5 Assistive Devices

Assistive devices (e.g. jar openers, walkers, raised toilet seats) and environmental modifications (e.g. stair rails, wall bars in bathroom) are prescribed by rehabilitation professionals to improve function, enhance safety, and protect joints in persons with arthritis (115;161;164). Assistive device provision is typically combined with joint protection and exercise training strategies to maximize function and independence in the performance of daily activities. Conclusive evidence exists for the use of assistive devices in the treatment of OA and RA (52;114).

A systematic and comprehensive approach to assistive device service delivery is required, including proper evaluation of the need for assistive devices, appropriate training in the use of assistive devices, and adequate follow-up post prescription (114;164). Information on assistive devices should be provided early in the disease process to protect joints even before a person has difficulty with daily activities because of pain or decreased range of motion (164;165).

4.2.6 Orthoses

An orthosis is an apparatus used to support, align, prevent, or correct deformities or to improve the function of movable parts of the body. Hand splints and foot orthoses such as shoe inserts are common types of orthoses. These interventions are designed to relieve pressure, reduce shock and shear, accommodate, correct and support deformities, and control or limit painful motion of joints. There is indicative evidence for the effectiveness of resting splints in RA (163;166) and for the use of foot orthoses (52;167) (i.e. extra-depth shoes with or without semi-rigid insoles to relieve pain on weight-bearing). Research in the area of OA and splinting is scarce. However, preliminary evidence suggests that conservative treatment consisting of splinting the first carpometacarpal joint may delay or prevent the need for surgery (168).

4.2.7 Vocational Rehabilitation

Because work loss occurs early in the course of RA, it is important that persons with arthritis receive rehabilitation services aimed at retaining employment or enabling return to employment. According to Backman (2004), many of the factors associated with work disability or work retention are modifiable with rehabilitation interventions (169). However, studies reporting on the effectiveness of vocational rehabilitation programs for

persons with arthritis are limited. Nevertheless, several authors argue that family physicians and rheumatologists require further knowledge of the benefit and availability of vocational rehabilitation services for persons with arthritis (115;169). A conceptual framework, suggested by Backman, considers the following factors may be useful for health care professionals to plan and evaluate programs to help people with RA retain employment or return to work: characteristics of the person (age, functional status, motivation), demands of the work (physical and psychological requirements), and barriers or supports (physical work space, policies related to sick leave and work accomodation, and interpersonal relationships).

Chapter 5. Arthritis Self-Management Strategies

Key Messages

- ✓ There is conclusive evidence for the use of self-management programs as a best practice for arthritis management due to the short-term benefits shown in recent studies.
- ✓ Benefits are particularly positive for education delivered in a group format and are over and above what is already achieved by medications.
- ✓ Research supports psychoeducational programs with a skills-building focus as opposed to solely information-based programs.
- ✓ A focus on self-efficacy has been associated with changes in health status. Self-efficacy is also an important predictor of adherence.
- ✓ Education should be tailored to the individual needs of the patient.

5.1 Introduction

Patients with chronic disease are inevitably responsible to self-manage their condition. The goal of self-management is to manage symptoms and improve function, including decreasing pain, minimizing disability, improving psychological well-being, enhancing quality of life and decreasing utilization of health care services. Self-management refers to those strategies an individual undertakes to promote personal health and to cope with and become more active in managing arthritis. A few key concepts in the self-management research include self-management, self-care, self-efficacy, patient education and self-management education.

Self-care evolved in the 1970s as a move toward greater self-determination and a potential solution to rising health care costs (170). Self-management and self-care are often used interchangeably and are broadly defined as the activities people engage in to promote health and/or manage chronic conditions. These activities are usually self-initiated and often undertaken with little supervision from health professionals (171).

Patient education has been defined as a set of planned educational activities designed to improve patients' health behaviours and/or health status or retard deterioration from disease (172). It uses a combination of methods, including teaching, counseling and behaviour modification techniques to influence a patient's knowledge, self-efficacy and health behaviour (173;174). Self-efficacy is an important concept in self-management and is defined as the belief in one's ability to carry out a particular behaviour to reach a desired goal. A major goal of many arthritis self-management programs has been to improve self-efficacy to improve clinical outcomes.

While some use patient education and self-management education synonymously, Bodenheimer and colleagues (175) distinguish self-management education from patient education. Traditional patient education focuses on information and technical skills for

managing disease. Self-management education complements traditional patient education by teaching problem-solving skills. Patients are instructed on how to approach situations and make adjustments that are appropriate for their own situation. In addition, traditional patient education has tended to be led by health professionals as opposed to self-management education, which is frequently facilitated by lay leaders (175).

5.2 Results

5.2.1 *Self-Management Content*

Arthritis self-management programs are primarily intended to provide people who have arthritis with the knowledge, skills and confidence to manage their arthritis. Some programs also focus on exercise or physical activity (176;177). Refer to Appendix F for more information on self-management activities and skills.

In general, there is more evidence supporting self-management education programs than exercise-alone programs (176). The *Arthritis Self-Management Program* (ASMP) by Lorig and colleagues has the most supporting evidence (176). The original ASMP was revised to emphasize efficacy-enhancing strategies, as baseline self-efficacy was found to predict future health status and changes in self-efficacy were associated with changes in health status (178). Decreases in feelings of helplessness, rather than changes in self-care behaviour, are associated with improvements in clinical outcomes such as pain (172). In addition, self-efficacy and perceived helplessness are important predictors of adherence to educational or psychoeducational programs (122).

Arthritis Self-management Program (ASMP)

The ASMP is a six-week series of classes, 2-2½ hours in length, taught by lay leaders. The ASMP is a community-taught, peer-led intervention wherein patients gain knowledge, skills and self-efficacy to manage the consequences of their disease. Content of the ASMP includes: an overview of types of arthritis, range of motion and isometric exercises, relaxation techniques, medication use, nutrition, problem solving, joint protection, evaluation of non-traditional therapies and techniques of patient/physician communication (178).

Original controlled trials and follow-up studies of the ASMP showed a significant and clinically meaningful benefit in pain reduction, mediated by an improvement in self-efficacy. There was no significant change in function (179). Studies have also shown reductions in depression and in use of health services (180). Most participants of these ASMP studies had osteoarthritis (OA). Decreases in feelings of helplessness, rather than changes in self-care behaviour, are associated with improvements in clinical outcomes such as pain (172).

While people with arthritis do require information to manage their disease, behavioural-based interventions are more effective than instructional/informational programs alone in achieving such outcomes as decreased pain (174;181). An essential component of self-

management education is skills-building, both learning and applying new skills as related to medical, social and emotional domains (175). Additionally, theoretically-based patient education programs are more successful than programs not theoretically-based (182).

Other programs are: the *Systemic Lupus Erythematosus Self-Help Course* (SLESH), based on a self-help model, which teaches enabling skills, *Bone-Up on Arthritis* (BUOA), a home-study self-care education program originally designed for rural populations with low literacy skills, and *Self-Management Arthritis Relief Therapy* (SMART), a mail-delivered program with books, audiotapes and computer-tailored self-management plan. Only the ASMP has a well-established body of research supporting its efficacy and cost-effectiveness, although this research is focused primarily on Caucasian middle-aged to elderly women with high school education or more (176).

5.2.2 Evidence of Effectiveness

5.2.2.1 Patient Outcomes

Education improves outcomes for people living with arthritis (45;183-185). Patient education has also been shown to improve quality of life among patients with arthritis (186). Evidence from randomized control trials (RCTs) suggests that self-management approaches are effective in the short-term in increasing participants' knowledge, symptom management, use of self-management behaviours, self-efficacy, and aspects of health status (e.g. depression). However, not all approaches target all of these outcomes, nor do multicomponent programs show improvements on all outcomes. Many studies assess self-efficacy, confidence, and attitudes but many measures have not been subjected to psychometric testing (187).

Significant positive outcomes reported in the literature for self-management education include:

- **Increased knowledge** (122;187-189)
- **Increased self-efficacy** (122;187;190;191)
- **Increased use of self-management behaviours** (187-189) including compliance with medical and therapeutic suggestions (122), coping (19;122), exercise (178;190), relaxation (178;190), communication with physicians (190), and dietary habits (190)
- **Effects on psychological status** (122;192) including **decreased depression** (122;192;193)
- **Decreased disability** (144;192;194;195)
- **Effects on joint counts for rheumatoid arthritis (RA)** (192;194)
- **Effects on patient global assessment for RA** (192)
- **Decreased pain** (19;122;144;178;179;189;194;195)
- **Reduced health system utilization** (180;191)

Appendix G summarizes the results of systematic reviews indicating support for self-management education.

A systematic review by Neidermann et al. (122) indicated positive short-term effects of patient education for RA patients, such as improved knowledge and compliance (with medical and therapeutic suggestions) in the educational programs or coping behaviour in the psychoeducational programs.

The EULAR recommendations report there is good evidence to demonstrate the benefits of education in reducing pain and increasing coping skills with knee OA but have little impact on function (19). Failure to affect functional ability may be due to the short duration of many programs and because reducing functional decline may not be a reasonable outcome measure in individuals with established disease. Perkins and Doherty (144) noted that interventions involving exercise and lifestyle changes provide modest benefits for patients with large joint OA.

Results for pain, functional status and depression are generally positive and stronger in OA than in RA patients (174). A Cochrane review of 31 studies by Riemsma and colleagues (192) of patient education for adults with RA (including information only interventions, counseling, and behavioural treatment) found small short-term significant effects on disability, joint counts, patient global assessment, psychological status and depression. The dimensions of anxiety and disease activity showed no significant effects. Behavioural treatment was the most beneficial.

Indirect evidence from RCTs indicates that non-pharmacological treatment offers additional benefit over and above analgesics or nonsteroidal anti-inflammatory drug (NSAID) usage. Superio-Cabuslay (194) compared the effects of education interventions and NSAID treatment on pain and functional disability in patients with OA, and on pain, functional disability, and tender joint counts in patients with RA. This meta-analysis demonstrated that education offers additional benefit when used with an analgesic or NSAID regimen. Because most patients in the education trials were being treated with medications, the authors conclude that the effect sizes of these trials represent the additional, or marginal, effects of patient education interventions beyond those achieved by medication

In sum, patient education for self-management for OA and RA is a non-pharmacologic intervention supported by conclusive evidence. Participating in arthritis self-management programs can decrease pain, decrease frequency of physician visits and provide an overall improvement in quality of life for patients (18).

5.2.2.2 Long-Term Benefits

There is limited evidence regarding the effectiveness of self-management education programs in the long-term. Taal and colleagues (189) reported that few studies found long-term benefits, other than knowledge gain. Effects of group education on health status are almost never maintained over long intervals. Similarly, other studies have also reported limited evidence of long-term benefits of patient education in adults with RA (122;192). The characteristics of RA, disease duration, and the progressive nature of RA

may play a role in long-term results. Methodologically better-designed studies had more difficulties in demonstrating positive outcome results.

In contrast, other researchers finding evidence of long term benefit include Barlow et al. (190), Lorig, Mazonson and Holman (196) and Lorig and Holman (197). Barlow and colleagues (190) found outcomes were maintained at 12 months follow-up, and in addition, they found significant improvement in pain, and visits to general practitioners had decreased. More research is needed to develop strategies for maintaining and enhancing early gains from group education.

5.2.2.3 Cost Savings

A benefit of patient education may be cost-savings (180;198). However, further information is needed (27;176;187;199). Health education in chronic arthritis may add significant and sustained benefits to conventional therapy while reducing costs by decreasing visits to physicians and decreasing hospitalizations (178;196;197;200;201). A study by Lorig, Mozanson and Holman (1993) (196) showed a 40% decrease in physician visits and an estimated four-year saving of US\$648.00 per RA patient and US\$189.00 per OA patient.

In a longitudinal study of outcomes of a Chronic Disease Self-management Program, Lorig and colleagues (191) demonstrated that the program reduced health care costs in populations with diverse chronic diseases, including decreased emergency room and outpatient visits. There was also no increase in hospitalizations or hospital days. Similarly, Dally and colleagues (202) reported that a mailed health education program would offer significant cost savings due to reduced visits to the managed care organization. Although self-management education may not result in changes in general practitioner visits in the short term, they do in the long-term (190).

5.2.3 Delivery of Self-Management Programs

None of the literature reviewed addressed the issue of when in the disease trajectory self-management education would be most beneficial. It may be logical that self-management should be part of disease management regardless of stage. However, the content of this education would expectedly vary depending on the stage of the disease process. It would be beneficial to plan programs that address patients reported learning needs (203), which may vary depending on time from diagnosis, age and culture.

Self-management programs are delivered in a variety of settings with clinical settings (e.g. hospital) and the home environment being the most popular (187). The ASMP primarily takes place in community settings such as church halls, shopping malls, and libraries (204). However, there is a lack of information on the effectiveness of settings other than community (195). One study by Solomon and colleagues (205), who conducted what was reported as a randomized controlled trial of the ASMP course in a large primary care physician network, found no significant clinical benefits at four months in patients recruited from primary care practices. The authors suggest that the

ASMP may not be transferable to such a model of care. These contrasting results may be due to differences in study population. This group was more actively recruited than traditional ASMP courses and therefore may have been less motivated to adhere to suggestions made in the ASMP course. This study has been criticized for not being a true randomized controlled trial, for using an active control group, possibly having flawed design and data collection, and having a high dropout rate (179). More research is needed on the transferability of self-management programs to various practice settings.

Programs vary by format – group (e.g. ASMP and SLESH) versus individual (e.g. BUOA and SMART) or a combination of both (176;187). The EULAR guidelines indicate that effective education techniques include individualized education packages, regular telephone calls, group education, patient coping skills, and spouse assisted coping skills training (19;187). However, there is disagreement in the research on what is most effective. For example, Riemsma, Taal and Rasker (187;192) completed a randomized controlled trial of RA patients and found that the participation of a significant other in psychoeducational programs did not have beneficial effects. They reported that including a partner may sometimes have negative effects; in their program it led to a decrease in self-efficacy and an increase in fatigue. This same study also looked at reinforcement sessions and found that booster sessions were not very effective in enhancing the effects of patient education.

Consistent with findings by Riemsma et al., a 2004 study by van Lankveld and colleagues (187;206), found no evidence for *additional* beneficial effects of spouse participation in a cognitive-behavioural oriented self-management program. The researchers did, however, find improved communication in the experimental group. Partner participation is an area requiring further research.

Warsi and colleagues (187;207) completed a meta-analysis and found that interventions that incorporated face-to-face education were more effective than those that did not have face-to-face interaction (e.g. written materials, video programming).

A randomized controlled trial of a coordinated individual education program with an “arthritis passport” for patients with RA found no effects on self-efficacy expectations, knowledge, health status or behaviours. With an arthritis passport various health care providers record their activities (e.g. medications, therapies, lab results and surgeries) and conclusions regarding the patient to whom the passport is issued. Patients keep the passports and have the responsibility to ensure that it is updated as required by the health care providers they see (187;208).

Dally and colleagues (202) completed a randomized controlled trial to determine whether a mailed health promotion program reduced outpatient visits while improving health status in patients with high visits rates in a managed care organization. Although not effective for patients with hypertension and diabetes, the intervention was found to be effective for arthritis patients in improving self-efficacy and health status while reducing demand for outpatient medical services.

A recent trend in self-management education is the introduction of “chronic disease self-management programs”. Using a combination or series of disease-specific and generic interventions may be one-way of optimizing an individual’s ability to effectively self-manage across the duration of their disease (187).

5.2.3.1 Role of Health Care Provider/ Patient Collaboration in Delivery of Programs

Collaborative care is an important part of self-management education (175;209). In a qualitative study comparing physicians’ and patients’ views of arthritis care, Lambert and colleagues (186) found that collaboration and negotiation were considered constructive responses to conflicts between physicians and patients. This is important in teaching patients self-care strategies to minimize the impact of arthritis on their daily lives.

Self-management stresses the value of the health care provider’s relationship with the patient. Self-management recognizes the need to acknowledge patients as partners in care. Physicians’ communication skills and information-giving behaviours significantly affect patient outcomes, including knowledge, satisfaction, compliance, function and health, although not specifically for arthritis (174). There is a need to educate health professionals on how to help foster and maintain patients’ self-management abilities in clinical settings (187).

Self-management tutors/facilitators are usually health professionals except the ASMP developed by Lorig et al. in the USA, which uses lay tutors with chronic conditions (187). A study by Lorig and colleagues (210) compared lay-taught and professional-taught arthritis self-management courses. Courses taught by lay leaders demonstrated significant increases in knowledge, practice of exercise and relaxation, and decreases in disability, compared to baseline. Participants of the professional-led courses increased their knowledge and practise of exercise. Professional-taught groups demonstrated greater knowledge gain while lay-taught groups had greater changes in relaxation and a tendency toward less disability. There was a higher than average attendance by participants of the lay-led group. This study had a small sample size.

Barlow, Cullen and Rowe (193) reported that patients preferred education about the disease and its treatment to be delivered on a one-to-one basis by health professionals. Similarly, emotional issues were believed to be best dealt with one-to-one, although this could be with a similar other (i.e. a patient). Group interventions were the preferred format for self-management, exercise and relationship issues, whereas videos were thought to be useful for demonstrating use of aids and how other families cope. None of the participants would welcome computer-based interventions. Leaflets were too general to meet specific patient needs but were thought to be useful as memory aids and in educating patients’ social network in understanding RA. The authors concluded that findings support the need for increasing the provision of psych-educational interventions for patients with RA attending outpatient clinics.

Riemsma et al (208) found that health care providers are not ideal trainers for self-management education if the training is given individually during routine consultations. Group education is likely a better way to improve self-management, as discussed earlier.

5.2.3.2 Target Population and Access

Most studies of arthritis education programs typically include patients with a mix of arthritis diagnoses. Educational interventions for only RA patients are generally less effective than in mixed populations (189).

Self-management programs typically target adults (193). Despite their apparent efficacy, self-management education programs reach only a small percentage of their intended audience. For example, less than 1% of people with arthritis participated in Arthritis Foundation-sponsored self-management education or exercise programs in 2001 (176).

In addition, participants of self-management education programs are primarily Caucasian, educated, middle-aged to older adult females. Benefits in populations with a lower education, a different race, male gender or a younger age are less clear, as these groups have participated in such programs to a lesser extent (202).

Many studies of self-management education programs are of patients who voluntarily participate. Engaging people who do not come forward to enroll in self-management programs is a dilemma. As such studies in which participants self-select may show better results due to self-selection bias. For example, community members who respond to PSAs may be more mobile and experience fewer barriers than those recruited through a clinical setting. However, it could also be argued that it may be better to have patients who volunteer to participate in enhancing their self-management activities as they may be more likely to achieve positive outcomes than “non-voluntary” clients.

Barriers to self-management education dissemination include: a lack of trained personnel so that self-management education is unavailable in many primary care settings; socialization of patients with chronic disease and professionals in a medical model that does not promote a collaborative practice model, hindering recruitment to programs; and lack of reimbursement for self-management programs by most health insurance (175).

Not all people will be able to participate in a group-based education program and some patients do not want to. Felson et al. (181) reported that telephone-based programs can be an effective adjunct to care for patients with OA. Most patients have telephones, and telephone-based strategies can help overcome literacy and language barriers, and can help reach home-bound patients. Fries, Lorig and Holman (179) suggest potential solutions to program accessibility barriers may include systematically integrating self-management programs within the health care system; a mail based program called Self-Management Arthritis Relief Therapy (SMART), which has a similar approach to enhancing self-efficacy and behaviour change as the ASMP, and a web based self-management program. Further research is needed on effective delivery strategies and outreach to underserved and minority populations (176).

Self-management programs may also be more effective in specific patient subgroups (207). A systematic review by Taal et al. (189) found that educational interventions in only RA patients were less effective. Ramos-Remus and colleagues (209) suggest that patient education too early in the disease process may be counterproductive and may lead to depression. Patient education is appropriate once patients have gone beyond the denial stage and have accepted the disease (209). There is limited information on when self-management education would be most effective in the disease process. How stage of disease influences the effectiveness and appropriateness of self-management education needs to be explored further (173). Many reviews/studies do not assess the appropriateness of different interventions at different stages of patients' adjustment to their disease.

Future research should be disease-specific, and should seek to identify patient characteristics that are relevant to beneficial outcomes from educational intervention. A review of educational benefits in other specific forms of arthritis, particularly OA, would be worthwhile (192). The benefits for RA patients may be different than for OA patients. Although RA patients are less likely to participate in patient education interventions they may be more likely to benefit with respect to pain and functional disability than OA patients (194).

Rural residents are another population sub-group to consider. One exploratory study conducted in the UK examined the similarities of outcomes on rural and urban participants in an educational intervention designed to improve self-management ability. The researchers found that effectiveness of the educational intervention was independent of location with urban and rural participants experiencing similar benefits (211).

5.3 Discussion

It is difficult to make comparisons of the various studies done on self-management education due to their diversity with respect to program duration, content and outcomes measured. However, several high-quality reviews of studies of OA and RA combined and RA alone note modest positive results from education on symptoms, physical functioning and psychological health status in the short term (212). There is conclusive evidence for the use of self-management programs as a best practice for arthritis management due to the short-term benefits shown in recent studies. However, long-term effectiveness is less conclusive.

When developing self-management education strategies it is important to consider the following:

- Benefits are particularly positive for education delivered in a group format and are over and above what is already achieved by medications.
- Research supports psychoeducational programs with a skills-building focus as opposed to solely information-based programs.

- A focus on self-efficacy has been associated with changes in health status. Self-efficacy is also an important predictor of adherence.
- Education should be tailored to the individual needs of the patient.

The evidence is less clear regarding the following points, warranting further research:

- The benefits of spousal involvement.
- Optimal points in the disease trajectory to initiate self-management education.
- Ideal program duration.
- The role of booster sessions.
- Requirement of group homogeneity with respect to diagnosis (i.e. OA or RA-specific vs. arthritis-specific vs. chronic disease in general).
- Who best to facilitate such activities (health professionals vs. trained lay leaders).

Arthritis self-management programs are strongly endorsed by consumers. Such programs are being used as a vehicle for health care reform and have the potential to substantially improve public health (213). Education should be an integral part of the management of arthritis. Activating patients to become participants in their own care is key to self-management, and there is a professional obligation to do this.

Chapter 6. Rehabilitation Best Practices in the Management of Total Joint Replacement

Key Messages

- ✓ There is conclusive evidence to support preoperative education interventions to decrease patient anxiety. Pre-operative rehabilitation tailored according to anxiety or targeted to those with more complex needs (e.g. those who are more disabled or have limited social support) is beneficial in reducing length of stay for individuals undergoing hip or knee arthroplasty.
- ✓ Inpatient rehabilitation following total joint replacement is successful in improving patient functional outcomes.
- ✓ Characteristics have been consistently associated with discharge to inpatient rehabilitation: older age, comorbidity, and living alone.
- ✓ There is a need to identify a standardized approach to determining optimal discharge destinations. Given the emerging evidence that functional outcomes following total joint replacement for individuals discharged home with home care are similar to those for individuals who receive inpatient rehabilitation, a standardized approach to determine the optimal discharge destination for clients is imperative.

6.1 Introduction

Total joint replacements (TJR) are widely accepted, efficacious forms of treatment for patients with advanced arthritis of the hip and knee (214-219). Rehabilitation is an important component of care for patients with TJR. Rehabilitation professionals, such as physiotherapists and occupational therapists, are often involved in the care of clients undergoing TJR at various stages of the continuum including: pre-operative rehabilitation, post-operative rehabilitation within the acute care hospital, post-operative rehabilitation at home or in a rehabilitation setting, and rehabilitation to meet ongoing long-term needs in the community.

The primary objective of this chapter is to review the literature regarding best practices related to rehabilitation for patients with total hip replacement (THR) and total knee replacement (TKR).

6.2 Results: Pre-Operative Rehabilitation

Typically, both an education component and an exercise component are included in pre-operative rehabilitation programs.

6.2.1 Effectiveness of Pre-Operative Education

McDonald and colleagues (220) conducted a systematic review of nine randomized trials of pre-operative education (verbal, written or audiovisual) delivered by a health care

professional within six weeks of surgery for patients undergoing THR or TKR. Although there was evidence that pre-operative education has a modest beneficial effect on pre-operative anxiety, findings do not support the use of pre-operative education over and above standard care to improve post-operative outcomes, especially with respect to pain, mobility and length of hospital stay (220).

Individual studies have found that preadmission interventions can reduce post-operative length of stay and help decrease the cost for hospital stay and increase hospital income (221;222). Weaver and colleagues (223) conducted a randomized trial of two home care protocols for patients undergoing THR or TKR surgery. One protocol included pre-operative visits by a nurse and physical therapist and 9-12 post-operative visits while the other protocol was post-operative care only (11-47 visits). While there were no differences in functional status, health-related quality of life, or lower extremity functioning at six-month follow-up, the protocol including pre-operative care was found to be more cost-effective.

Several studies have focused on the outcomes of patient anxiety, satisfaction, and pain. Results have shown that those patients that received pre-operative education have lower anxiety levels (224-227). Higher pre-operative anxiety was associated with greater post-operative anxiety, pain, use of pain medications, poorer mental status, and longer stay in hospital (228). Patients reported they would have liked to receive information about post-operative complications and felt that this information would have decreased their anxiety (229).

The results of qualitative studies suggest that pre-operative education gives patients an understanding of what to expect from TJR and allows familiarization of experiences through demonstration and educational content (225;229;230). It is suggested that familiar experiences, familiar personnel, familiar environment, having knowledge, and having an understanding of expectations enabled patients to feel less anxious. Patients have expressed that provision of information and equipment pre-operatively was useful for preparing for surgery and facilitating recovery, but less so in terms of helping them cope with any problems experienced post-operatively (231).

6.2.2 Delivery of Pre-Operative Education

Only one study that was reviewed addressed location of pre-operative education in this patient population (232). In a non-randomized trial, Rivard and colleagues (232) compared home to hospital-based (i.e. pre-admission clinic) pre-operative education for patients undergoing THR surgery. Location had no effect on length of stay or discharge destination.

6.2.3 Evidence of Effectiveness of Pre-Operative Exercise

The effectiveness of individually tailored pre-operative rehabilitation versus usual pre-operative care for patients with complex needs (with co-morbid conditions or limited social support) who were undergoing THR or TKR was examined in a randomized

control trial (233). Pre-operative rehabilitation resulted in earlier achievement of discharge criteria (5.4 versus 8.0 days) and actual length of hospital stay (6.5 versus 10.5 days).

In a randomized control trial to determine the effect of pre-operative exercise on functional recovery, Gilbey et al (234) studied an eight week pre-operative customized exercise program for patients scheduled for THR, followed by post-surgery exercise (234). This was compared to a control group who received only the routine inpatient physical therapy. The intervention group participated in treatment at the clinic as well independently at home. The exercise programs were well tolerated by patients with end-stage hip arthritis and were effective in improving early recovery of physical function in patients with THR (234).

Conversely, other studies were examined that concluded that implementation of pre-operative rehabilitation programs didn't have an impact on patient outcomes (235;236). A systematic review concluded that pre-operative physiotherapy does not improve outcomes in TKR and there is insufficient evidence to determine the impact of pre-operative physiotherapy on THR (237). In a randomized control trial, the effect of pre-operative physical therapy (235), including stretching exercises, strengthening exercises, and education, was compared to no pre-operative physiotherapy. There were no significant differences with regard to Harris Hip scores, hip range of motion (ROM), and pain (235). However, this study was limited to a small sample size (235;236).

It is clear that results vary with respect to the impact of pre-operative rehabilitation for patients with THR and TKR, suggesting future research is needed to determine the effectiveness of this intervention.

6.3 Results: Post-Operative Rehabilitation

Rehabilitation is an important component of care following TJR. In this phase, rehabilitation programs aim to restore mobility, strength, and flexibility; reduce pain; prevent deep vein thrombosis and other complications; teach adherence to ROM and weight bearing precautions; order equipment; provide education to patients and families; and organize home resources (238-243). Typically, the role of the physical therapist includes increasing the mobility of the patient, and educating patients regarding exercises and precautions (239;244).

6.3.1 Evidence of Effectiveness of Exercise

6.3.1.1 Exercise Following Total Knee Replacement

The goals of exercise following TKR are to obtain recovery of knee ROM, to improve hip and knee muscle strength, and to improve functional independence (238). No prospective randomized trials were found that suggest the most efficacious exercise protocol for patients with TKR.

A non-randomized comparison trial compared the muscle force of the quadriceps femoris in patients who had TKR with a healthy control group (245). The results suggest that early intervention aimed at improving quadriceps femoris muscle activation may improve efforts to restore muscle force in patients with TKRs (245). Typically, treatment protocols include active-assisted ROM on post-operative day one, progressing to isometric hip and knee strengthening exercises by post-operative day four (238).

6.3.1.2 Exercise Following Total Hip Replacement

There has been much debate regarding the types of exercises that are optimal following THR (240;246). It is key to prescribe exercises that maximize strength and flexibility while limiting abnormal forces across the joint (238). The inclusion of straight leg raises in treatment programs following THR is debated due to the high forces placed on the hip joint (246).

One study has concluded that bed exercises are not beneficial for THR patients in the acute care period (247). In this RCT, the additional benefit of bed exercises in terms of hip pain, ROM and function were compared to a control group who received only the program of mobilization (247). There were no differences in terms of ROM, pain, and function between the groups. A limitation to the study was the lack of longer-term follow-up beyond acute care.

Hip abductor strengthening has been identified as an important component of exercise programs for THRs. A home program of ROM exercise, low resistance isometric exercises, and eccentric exercises of the hip abductors, was shown to be effective in long-term post-THR recovery as indicated by improvements in gait speed, cadence, and isometric torque (248).

Exercise administered in home programs or in groups led by physiotherapists has been shown to improve outcomes following TJR. No differences have been found between home exercise programs or group programs in terms of patients' gait, pain, quality of life, or activities of daily living (249).

6.3.2 Evidence of Effectiveness of Continuous Passive Motion

Milne and colleagues (250) performed a meta-analysis of 14 trials and found that compared to physical therapy alone, continuous passive motion in combination with physical therapy significantly increased active knee flexion at two weeks (4.3 degrees) and decreased length of acute hospital stay (0.7 days). Two randomized clinical trials, not included in Milne and colleagues' (250) systematic review, utilized a longer follow-up period and reported no beneficial effect of continuous passive motion on outcome (251;252). Worland and colleagues (252) utilized a six-month follow-up and compared continuous passive motion at home to physical therapy on knee range of motion. Based on their results, Worland and colleagues (252) suggest that continuous passive motion after hospital discharge of patients having TKR is an adequate rehabilitation alternative to physical therapy with lower costs. However, it should be noted that none of the articles

addressed functional outcome or selection criteria of patients for whom continuous passive motion is appropriate.

6.3.3 Delivery of Post-Operative Rehabilitation

6.3.3.1 Timing of Therapy

The gold standard for achieving functional mobility is early mobilization (249). Experts in the United States used a modified Delphi technique to ascertain consensus on a standardized treatment program for TKR and THR for patients with primary OA. It was recommended that bed exercises and transfer training for patients within their room commence on post-operative day one or day two (239). Munin and colleagues (253) conducted a randomized control trial of inpatient rehabilitation starting day four versus day seven post surgery for high-risk patients (individuals 70 years of age and older living alone or with at least two comorbidities and individuals of any age who had at least three comorbidities) undergoing elective THR or TKR. Patients who initiated inpatient rehabilitation on post-operative day three demonstrated faster attainment of short-term functional milestones, shorter hospital length of stay (11.7+2.3 versus 14.5+1.9 days, $p < 0.001$) and equivalent functional outcome at less total cost (\$25,891+3648 versus \$27,762+3626 US, $P < 0.001$) at four-month follow-up. These results suggest that even high-risk patients can tolerate early rehabilitation.

6.3.3.2 Intensity of Therapy

Two low quality studies evaluated optimal intensity of in-patient physical therapy after THR or TKR and reported conflicting findings (254;255). In 1993, Hughes and colleagues found that physical therapy provision during the weekend following surgery resulted in reduced length of stay. Several years later, Lang (255) demonstrated no difference between six versus seven day physical therapy treatment on length of hospital stay or discharge destination.

An American study by Freburger (244) utilized secondary databases and a cross-sectional design to examine the relationship between use of physical therapy services and outcomes in the acute care of patients following THR. Although specific parameters of intensity of care were not evaluated, analysis of these data showed that increased utilization of physical therapy was associated with greater probability of discharge home and total cost of care less than expected.

6.3.3.3 Post-Operative Rehabilitation Settings

In Ontario, between 1995/96 and 2001/02, the percentage of people who underwent TJR and who participated in inpatient rehabilitation increased from 30-40% (256). However, there was significant variation in utilization of inpatient rehabilitation services across the province. In 13 district health council (DHC) regions in Ontario, the percentage of patients who received inpatient rehabilitation increased, while in seven DHCs 88% of patients with TKR and 75% of patients with THR were not transferred to inpatient

rehabilitation. This indicates that referral patterns to inpatient rehabilitation may not be consistent across the province of Ontario (256). Similar findings were found in other countries, where researchers have found variability from institution to institution in the types of discharge destinations following TKR. One hospital sent 97% of patients home following surgery compared to two other hospitals that discharged 40% and 57% of patients directly home (253).

Typically, following TJR, patients are discharged from the acute care setting directly home or to inpatient rehabilitation. Those discharged home may receive different options for rehabilitation, including homecare services, outpatient rehabilitation, or perform an independent home exercise program.

1. Inpatient Rehabilitation and Home Care

Inpatient rehabilitation has been shown to be effective in improving outcomes in patients following TJR. Findings from studies that have examined the functional recovery of patients who have participated in inpatient rehabilitation following TJR suggest that inpatient rehabilitation is successful in improving patient functional outcomes (240;241;257;258).

It is important to measure outcomes comparing different discharge destinations of patients following TJR in order to inform decision-making of care providers and the development of a standardized approach to care for patients with TJR. Few studies have compared patient outcomes using various discharge destinations. In a randomized trial with three months follow-up, patients with THR were randomized to home-based care or inpatient rehabilitation. Patients in the home-based group reported significantly greater improvements in quality of life and reported that they received their preferred treatment (249). Outcomes of patients with TKR were similar in the home-based group and inpatient rehabilitation group and more patients in the inpatient rehabilitation group felt they had received their preferred method of care. It is possible that this may be attributed to more demanding rehabilitation following TKR as compared to THR (249).

In a retrospective cohort of patients with TJR, patient characteristics and outcomes of patients who received inpatient rehabilitation were compared to those who received home care after discharge from acute hospital care (259). No significant differences in outcomes, including function, general health or patient satisfaction, were found between the two groups. Patients that received home care were more likely to be men, to have social support, to be more knowledgeable about TJR and to have a preference to receive care at home. In contrast to findings from other studies, there were no significant differences between the groups in terms of levels of comorbidity or social support.

Kelly and Ackerman (260) conducted a descriptive comparative study to examine functional outcomes of individuals undergoing THR or TKR discharged to subacute rehabilitation programs compared with those individuals discharged directly home with home physical therapy follow-up. While no significant differences were found in terms of functional outcome, mean total cost was lower for those patients discharged home

(\$16,918 versus \$24,144 US). However, it is important to note that these two groups differed demographically with patients discharged to rehabilitation facilities tending to be older (greater than 72 years of age), to live alone, and to have more comorbidities.

In the United Kingdom, Jester and Hicks (261) compared the effectiveness of hospital-at-home and inpatient-care for patients receiving THR or TKR. Initiated on post-op day four, hospital-at-home was found to be more effective in terms of patient satisfaction and reduced joint stiffness with similar outcomes for joint pain, disability, and incidence of post-operative complications. As part of the comparison, Jester and Hicks (262) also conducted an economic analysis. Hospital-at-home was found to be more cost-effective.

2. Outpatient Rehabilitation

Few studies have compared outpatient physiotherapy to other forms of post-acute rehabilitation. In a randomized control trial comparing outpatient physiotherapy to inpatient physiotherapy and a home program, researchers found that the outpatient group performed better with respect to improvements in knee ROM. However, these differences were not statistically significant (263).

In a study that compared home-based physical therapy monitored by a physical therapist by telephone to traditional outpatient physical therapy, no significant differences in patient performance were found between the groups (264).

6.3.3.4 Determinants of Inpatient Rehabilitation

Several studies have investigated patient outcomes at discharge from acute care after hip or knee replacement and have suggested that criteria for risk screening are needed to assist clinical decision-making with regard to discharge (260;265;266). In the literature, the following characteristics have been consistently associated with discharge to inpatient rehabilitation: older age, comorbidity, and living alone (256;267). Other factors that have been associated with discharge to inpatient rehabilitation include being female and housebound prior to admission (266). In a retrospective chart review, duration of disease, level of pre-operative complications, lack of support at home, and previous TKR were identified as risk factors for inpatient rehabilitation for patients following TKR (241).

In a comparison of post-operative rehabilitation management in 12 orthopaedic centres in the United States, United Kingdom, and Australia, differences were found in the use of extended care facilities and outpatient physical therapy services (268). The variation was associated with financial resource availability (268).

The literature reveals wide variations in practice with respect to postoperative rehabilitation discharge destinations. It is important to determine best practices in rehabilitation following TJR and the most effective methods of delivering rehabilitation services to meet the needs of patients.

6.4 Summary

Rehabilitation is an essential component of care for clients undergoing TJR. Research evaluating the processes of care in rehabilitation prior to and following TJR is relatively scarce. The review of the literature yielded the following conclusions regarding various rehabilitation processes and interventions:

- There is conclusive evidence to support pre-operative patient education to decrease patient anxiety. Pre-operative rehabilitation tailored according to anxiety or targeted to those with more complex needs (e.g. those who are more disabled or have limited social support) is beneficial in reducing length of stay for individuals undergoing THR or TKR.
- There is indicative evidence that inpatient rehabilitation following TJR is successful in improving patient functional outcomes (240;241;257;258). The evidence is also indicative that the following characteristics have been consistently associated with discharge to inpatient rehabilitation: older age, comorbidity, and living alone (256;267).
- Evidence is emerging indicating a need for validated prognostic factors to assist with clinical-decision making with regard to post-operative rehabilitation discharge destinations following THRs and TKRs; however, there is no evidence supporting a specific standardized approach to determining optimal discharge destinations. Given the emerging evidence that outcomes following TJR for individuals discharged home with home care are similar to those for individuals who receive inpatient rehabilitation, a standardized approach to determine the optimal discharge destination for clients is imperative.
- There is conflicting evidence that continuous passive motion, for patients with TKR, is effective. Further information is required on functional outcomes (reported outcomes to-date have been impairment-focused), cost effectiveness, and appropriate patient selection for this intervention.

Chapter 7. Access To Orthopaedic Services for Arthritis

Key Messages

- ✓ Total joint replacement (TJR) is a widely recognised effective procedure for the treatment of severe osteoarthritis (OA) in terms of improvement of pain, function, and patient satisfaction.
- ✓ There is no evidence regarding a uniform definition of appropriateness of TJR. However, the evidence suggests that indications are made primarily based on pain and disability.
- ✓ There is a significant population in need of total joint replacement even after accounting for willingness to undergo the surgery.
- ✓ Long waiting times for total joint replacement and unmet need suggest that the current level of access does not match demand in Canada.
- ✓ There is no published standard protocol for physicians to use in the management and maintenance of waiting lists in Canada. However, protocols are under investigation to standardize this practice.
- ✓ Potential positive outcomes of offering arthroscopy include high levels of satisfaction with services among patients and professionals and improved patient-related outcomes such as quality of life. However, evidence is conflicting with regard to the effectiveness of arthroscopy for OA of the knee necessitating further research.

7.1 Introduction

Orthopaedic surgery is the most common type of surgical intervention for arthritis. Orthopaedic surgery is a viable intervention when attempts at non-surgical management of arthritis have failed to prevent joint pain or damage and loss of function. Generally, orthopaedic surgery is utilized in individuals who have more severe disease. There are two main types of surgery for arthritis and other rheumatic diseases, including total joint replacement (TJR) and arthroscopy (181).

Given the large volumes of literature supporting favourable outcomes for TJR, this report will not focus on outcomes after TJR. The primary objective of this chapter is to review recent literature regarding access to TJR, including wait times, and prioritization for surgery. A secondary objective is to explore the effectiveness and utilization of arthroscopic surgery for arthritis.

7.2 Results

7.2.1 Access to Orthopaedic Services

Arthroscopic surgery of the knee and TJR of hips and knees are the most commonly performed orthopaedic procedures in Canada. Demand already exceeds the public health-

system's capacity to deliver these services. Given Canada's rapidly aging population, the need for orthopaedic surgery will surely increase (5;111). A study conducted in Ontario concluded that the current level of orthopaedic services in Ontario are half of those for the United States (US), suggesting that orthopaedic needs are under-serviced. When comparing with requirement estimates of orthopaedic services the study indicates that Canada is considerably under serviced. This state of being under-serviced is more dramatic if the substantial number of surgeons that are close to retirement and leaving active practice in Ontario is considered (269). The 2004 National Workforce & Services report published by the National Standard Committee of the Canadian Orthopaedic Association (270) concluded that the population under-servicing is primarily due to resource restrictions suggesting that if the current workforce is used more efficiently and more resources are available, patient access to orthopaedic services could improve. They also reported that an increasing number of surgeons are working at well below a full-time equivalent level.

- Since 1994, the rate of selected orthopaedic procedures for arthritis and related conditions has remained under 500 per 100,000 adult population in Canada
- In 2000, the most frequent arthritis-relevant procedures in Canada were knee arthroscopy, followed by knee and hip replacements

Arthritis in Canada, 2003 (5)

7.2.2 Access to Total Joint Replacement

Outcome after both primary and revision total hip replacement (THR) and total knee replacement (TKR) is reported in the academic literature as being very favourable (214-219). Several guidelines for arthritis recommend that surgical referral be discussed with appropriate patients who continue to experience significant pain and functional disability despite optimal medical therapy (19;52;271).

7.2.2.1 Utilization Rates

Access to TJR is a concern because arthritis is a leading cause of disability resulting in an extensive health care utilization. A study conducted in the US found that Caucasians were more likely to be considered for TKR than Blacks (272). The same authors also reported that rates of TKR are generally higher in the US than in most other countries, while Canada and the United Kingdom (UK) have similar utilization rates. In addition, the rates for knee and hip replacement vary widely in Organisation for Economic Co-operation and Development (OECD) countries; Canada, Australia and the US have higher rates for TKRs versus hip replacements. This is the opposite of the situation in Norway, Sweden and New Zealand where the rates for hip replacements are considerably higher than the rates for knee replacement (273;274). In Canada, the demand for THR and TKR exceeds available resources, resulting in rationing of services and long waiting lists (275).

Table 7.1. International comparison of crude rates (per 100,000 population) of primary TKR and THR

	US	Australia	Canada	New Zealand	Sweden	Norway
Total Knee Replacement	92	81	80	75	63	35
Total Hip Replacement	52	74	64	119	100	124

Source. Canadian Joint Replacement Registry 2004 Report: Total hip and total knee replacements in Canada (274)

There is a high variation in TJR utilization rates among provinces in Canada even after adjusting for age and gender. Such variations in surgery rates raise questions about underuse and overuse of procedures. Badley and colleagues (2003) showed that the rate of THR in Canada has increased by 10% from 1994 to 2000 (from 43 to 47 per 100,000 population) while the rate of TKR has increased by 36% from 1994 to 2000 (from 47 to 65 per 100,000 population). The authors concluded that despite this increase, the demand of the services surpass supply (5).

In addition to regional variations there are also different rates associated with socio-economic status (SES), gender, and race or ethnicity. An Ontario population study found that persons with lower SES (low education and/or low income) have a greater need for TJR suggesting that SES disparities in the rates of performed TJRs cannot be explained by a lower need in those with low SES (276). The same study also found that rates of THRs and TKRs are higher in older individuals in general and in older women in particular, reflecting the prevalence of osteoarthritis (OA) in the population (277). Another Ontario study found that surgeon’s positive opinions regarding TJR was one of the major determinants of area variation in the utilization of knee replacements (278).

One important matter associated with need for TJR is patient preference regarding TJR. Hawker et al. (276), in Ontario, found that among those with severe arthritis, only 15% were definitely willing to undergo surgery. This resistance to TJR was particularly noted among women. In addition, willingness to undergo surgery did not differ by SES and therefore did not explain differences in rate use.

A qualitative study (279) conducted in Ontario aimed to explore the process by which elderly persons make decisions about whether to undergo TJR. One of the main findings of this study was that patients tended to view OA as a normal aging process, not a disease. Participants of this study also believed that their pain and disability had to be significantly greater to consider undergoing surgery and they assumed that their physicians would advise them to have surgery if they could benefit from it.

Patients believed that they need to be in constant pain and virtually unable to move before they would consider themselves as a TJR candidate (279).

7.2.2.2 Management of Waiting Lists

Currently, wait times for TJR vary substantially from doctor to doctor and hospital to hospital. In principle, patients with more urgent conditions should receive services ahead of those with less urgent conditions, and patients with approximately the same degree of urgency should wait about the same length of time regardless of where they live.

At present, patients are usually added to waiting lists chronologically and receive their service in the order in which they joined the queue. This basic approach is modified by the clinician who maintains the list to accommodate his/her clinical judgment of urgency. There is no documentation to suggest that evidence-based protocols routinely inform the prioritization by clinicians (275;280).

7.2.2.3 Measurement of Wait Times

One way of monitoring waiting lists is by calculating wait times. Sanmartin and colleagues (281) reported that there is great variability in perceptions about waiting lists and wait times in Canada. One source of variability is the lack of standards governing whether and when a patient is placed on a waiting list. Wait times for TKRs and THRs are more likely to be calculated starting at the point of facility notification, as opposed to when the surgeon adds the patient to his list. The Ontario Joint Replacement Registry (OJRR) defined 3 types of wait times that best reflect what occurs for patients on the road to the surgery. These are: from the referral to the first consult, from the first consult to the decision is made and from the decision to when the surgery is conducted (273). Another source of variability is the measurement method. For example, the British Columbia Surgical Waiting List Registry provides cross-sectional and retrospective wait times, while the Fraser Institute estimations are based on questionnaires sent to physicians who offer opinions about the amount of time a patient can expect to wait for surgery (281;282).

Studies conducted in Canada and the UK have explored patient characteristics that relate to length of time patients waited for surgery to be performed (273;283;284). Shortt et al (283) did not find any relationship between socio-economic status and the length of waiting times for TJR in Ontario. However, a study in the UK found significant differences in waiting times according to social, geographical, and health care system factors (284). The OJRR report shows that during 2000 and 2004 5% of people needing THR and 7% of people needing TKR waited more than 12 months for surgery in Ontario. They also found that wait times were shorter for THRs versus TKRs. A higher proportion of people having revision surgery waited three months or less compared to those who were having primary surgery (273).

7.2.2.4 Prioritization for TJR

One important issue related to wait times that appears in the literature is the process of prioritization. Three recent publications have presented data from different consensus-

style approaches to the problem (285-287). A Delphi (288) consensus technique using different numbers of scenarios was employed in order to try and gain agreement on priorities for THR and TKR surgeries. Each of these studies is based on consensus from healthcare professionals, particularly orthopaedic surgeons and does not incorporate patients' perspectives on what factors should be used to prioritize.

Studies in various specialties and jurisdictions consistently find a significant number of patients for whom the service is no longer required due to factors such as death, deterioration in health status, relocation to another community, receipt of the service elsewhere, resolution of symptoms, or inappropriate initial placement on the wait list. The literature suggests that by ensuring periodic reassessment of patients, last minute cancellations can be avoided and lists shortened by removing patients who are no longer eligible for surgery (280).

An empirical study conducted by Glozier et al (289) found that of patients' characteristics assessed only pain differentiated between those prioritized and those considered routine. They also found that allocation on the urgent list appears to be based on age, better physical health, and viewing treatment as being effective. Studies in Canada have found that lists are managed in a socially equitable way (280;283;290). However, the same studies found that lists are managed unfairly in terms of clinical equity; that is clinical severity was not the main indication for prioritization. None of these studies were able to identify the prioritization criteria.

The OJJR report also analyzed data on factors related to the process used by surgeons prioritizing their patients. Surgeon prioritization of primary hip and knee replacements looked at baseline severity as measured by patient pain and function ratings from the WOMAC disability questionnaire. Patients with most severe baseline pain or function received their surgery in the shorter waiting times quartiles (273).

7.2.2.5 Patients' Perspectives of Waiting Lists

Two studies examined patients' perspectives of waiting lists. A qualitative study found that in general, patients agreed that waiting lists have to exist but they felt that sometimes waiting lists are managed unfairly. For example, participants reported that they believed that obesity and age are key factors on which doctors based their decisions to prioritize. Participants also agreed that pain and disability should be key criteria on which to prioritize for TJR (291). A study conducted in Ontario concluded that queue management systems in the future should include information from clinical judgement, health status, and patients' views of their overall symptoms burdens and abilities to tolerate delayed relief (292).

7.2.2.6 Effect of Wait Times on Outcomes

The literature on the effect of longer wait times on outcomes is not conclusive. Using data from 43 general and orthopaedic hospitals in the U.K., Hajat and colleagues (293) found that waiting for surgery was associated with worse outcomes 12 months later,

measured as the Oxford Hip Score. However, a study conducted in Sweden by Nilsson et al (294) did not report differences in WOMAC and SF-36 scores between patients who had to wait more than three months for surgery compared to those who waited less than three months.

7.2.3 Arthroscopic Surgery for OA of the Knee

Knee OA can be very painful and debilitating, and medication does not always relieve symptoms. People with refractory symptoms sometimes undergo arthroscopic lavage with or without debridement in an attempt to relieve pain. Arthroscopic lavage involves washing out the joints with several litres of saline solution. Debridement involves lavage plus removal of debris by trimming or shaving of rough surfaces that may interfere with smooth movement of the joint (295). Although there exists conflicting evidence regarding the effectiveness of arthroscopic surgery for arthritis, this section summarizes the evidence regarding the effectiveness, indications, and utilization of arthroscopic procedures for the treatment of knee OA.

7.2.3.1 Effectiveness of Arthroscopic Procedures

Although the long-term benefits of debridement and other arthroscopic procedures of the knee are not clear, many surgeons view arthroscopic knee procedures as providing the short-term benefits necessary to delay the need for TKR surgery.

Debridement of the knee, including meniscectomy, has been shown to be very effective in treating damage caused by injury. The long-term benefits of debridement for individuals with degenerative damage of the knee remain unclear (296), with improvement demonstrated by some studies (297) but not others (298). In the study conducted by McGinley et al (297), patients were evaluated 10 years after having arthroscopic debridement. The authors concluded that the procedure is effective in terms of physical function. These conclusions were based on findings that indicated that only 67% of the patients required TJR after 10 years. They also found that patients were highly satisfied (average 8.6 out of 10). A population-based effectiveness study demonstrated that arthroscopic debridement of the knee for the treatment of OA is a safe procedure with low complication rates, although the rate of complications increases with age (299).

However, Moseley et al (298) found negative results in a placebo-controlled randomized trial. The study consisted of three groups: placebo, debridement, lavage. Neither of the groups receiving arthroscopic intervention reported less pain or better function than the placebo group. This study provides strong evidence that arthroscopic lavage with or without debridement is not better than a placebo procedure for improving knee pain or self-reported function. One of the weaknesses of the study is that nearly all of the participants were men (because it was conducted at a Veteran Affairs Medical Centre), while the majority of knee OA patients are women. Another weakness is that as many as 44% of patients approached for participation in this study declined, which may have introduced bias (295).

In addition, the patient’s clinical features appear to be an important determinant of the effectiveness of arthroscopic surgery in restoring function or relieving pain. Arthroscopic surgery has been less successful in patients with joint malalignment, joint instability, long duration of symptoms, and extensive knee arthritis (300).

7.2.3.2 Indications for Arthroscopic Procedures

Overall, there is no evidence in the literature indicating which patients with arthritis are appropriate for arthroscopic surgery. However, arthroscopic procedures are typically recommended for patients with early OA. Solomon et al (301) examined the factors that a primary care physician could assess and the orthopaedic surgeon’s likelihood of recommending surgical procedures other than TJR. A history of sports-related trauma, poor functional status, limited flexion or extension of the knee, medial or lateral joint line tenderness, pain or click on the McMurray test, and evidence of ACL laxity were highly associated with the surgeon’s judgment of benefit from knee surgery other than TJR.

Table 7.2. Indications for Surgery

PATIENT CHARACTERISTICS		SCORING
Anterior cruciate ligament laxity	→	Surgery is recommended
Sports related trauma	→	Add 2 points
Disability Score <2.4	→	Add 4 points
Limited flexion or extension	→	Add 2 points
Joint line tenderness	→	Add 2 points
Pain or Click on McMurray test	→	Add 2 points
-Solomon et al. (301)		

The finding that some patients have clear improvement should encourage clinicians to modify the intervention and improve patient selection so the proportion of patients with better outcomes is increased. However, studies have suggested that clinical recommendations for the procedure should be refined, as a significant proportion of patients do not attain successful outcomes (297).

7.2.3.3 Utilization Rates for Arthroscopy

In Ontario during 2000, the rate of arthroscopic knee procedures varied with age, peaking in the 55-64 year age group among women and in the 45-54 year age group among men. The increased use of these procedures in the younger age groups can be explained in that arthroscopic procedures are generally indicated for early OA and may be associated with repair of injury. Unlike TJRs, the rates for arthroscopic knee procedures were greater for men with arthritis and related conditions than for women, especially in the younger age groups. The difference in the use of these procedures by the sexes may reflect the greater exposure of males to injury from physically demanding jobs or sports, which is a risk factor for the development of OA (111).

Another study conducted in Ontario found that higher population rates of arthroscopic knee debridement were associated with higher rates of early TKR in patients sixty years of age or older (18.4% of patients had had a TKR within three years after arthroscopic debridement) (299). These findings leave questions regarding the effectiveness or appropriateness of the earlier arthroscopic procedure.

7.3 Summary

TJR is a widely recognised, effective procedure for the treatment of severe OA in terms of improvement of pain, function and patient satisfaction. There is conclusive evidence to support the use of this intervention as an arthritis best practice. There is no evidence regarding a uniform definition of appropriateness of TJR. However, the evidence suggests that indications are made primarily based on pain and disability.

Long waiting times for arthroplasty and unmet need suggest that the current level of access does not match demand in Canada. Canadian studies suggest that there is a great population in need of arthroplasty even after accounting for willingness to undergo the surgery. There is no published standard protocol for physicians to use in the management and maintenance of waiting lists in Canada. However, protocols are under investigation to standardize this practice.

Recent evidence reviewed for this chapter suggests that patients who receive arthroscopic procedures are mainly in the early stages of OA, although there is no evidence of uniform indications of the surgery. Potential positive outcomes of offering arthroscopic debridement or lavage include high levels of satisfaction with services among patients and professionals and improved patient-related outcomes such as quality of life. On the other hand, there is conflicting evidence of the effectiveness of arthroscopy for OA of the knee. Further research is warranted to explore the effectiveness of arthroscopy of the knee in delaying the need for TJR.

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Appendix A. Major Types of Arthritis

	OSTEOARTHRITIS (OA)	RHEUMATOID ARTHRITIS (RA)	SYSTEMIC LUPUS ERYTHEMATOSUS (SLE)	ANKYLOSING SPONDYLITIS (AS)	GOUT
Background	OA results from the deterioration of the cartilage in one or more joints. Leads to joint damage, pain, and stiffness. Typically affects the hands, feet, knees, spine and hips.	RA is caused by the body's immune system attacking the body's joints (primarily hands and feet). This leads to pain, inflammation and joint damage. RA may also have involvement of other organ systems such as eyes, heart, and lungs.	SLE is a connective tissue disorder causing skin rashes and joint and muscle swelling and pain. There may also be organ involvement. This disease, as with RA, fluctuates over time, with flare-ups and periods of remission.	AS is inflammatory arthritis of the spine. Causes pain and stiffness in the back and bent posture. In most cases the disease is characterized by acute painful episodes and remissions. Disease severity varies widely among individuals.	Gout is a type of arthritis caused by too much uric acid in the body which is normally flushed out by the kidneys. Most often affects the big toe but can also affect the ankle, knee, foot, hand, wrist or elbow.
Prevalence	The most common type of arthritis, affecting an estimated <i>10% of Canadian adults</i> .	RA affects approximately <i>1% of Canadian adults</i> , and at least twice as many women as men.	SLE affects <i>0.05% of Canadian adults</i> . Women develop lupus up to 10 times more often than men.	AS affects as many as <i>1% of Canadian adults</i> . Men develop AS 3 times more often than women.	Gout affects up to <i>3% of Canadian adults</i> . Men are 4 times more likely than women to develop gout.
Possible Risk Factors	Old age, heredity, obesity, previous joint injury.	Sex hormones, heredity, race (high disease prevalence is seen among Aboriginal Peoples)	Heredity, hormones and a variety of environmental factors	Heredity and, possibly, gastro-intestinal or genitourinary infections	Heredity, certain medications (e.g. diuretics), alcohol and certain foods
Disease Management	<i>There is no cure for OA.</i> Treatments exist to decrease pain and improve joint mobility include medication (e.g. analgesics, anti-inflammatory drugs), exercise, physiotherapy and weight loss. In severe cases, the entire joint – particularly the hip or knee – may be replaced through surgery.	<i>There is no cure for RA.</i> Early, aggressive treatment by a rheumatologist can prevent joint damage. Drugs used for treatment include non-steroidal anti-inflammatory drugs, corticosteroids, disease-modifying anti-rheumatic drugs, and biologic response modifiers.	<i>There is no cure for SLE.</i> The aim of treatment is to control symptoms, reduce the number of flare-ups and prevent damage. Commonly used medications include analgesics, anti-inflammatory drugs, cortisone and disease-modifying anti-rheumatic drugs. Diet and exercise are also important in the management of lupus.	<i>There is no cure for AS.</i> Medications similar to those used for other types of arthritis are often prescribed to treat AS. Exercise is the cornerstone of AS management. If damage is severe, surgery may be considered.	<i>There is no cure for gout.</i> Non-steroidal anti-inflammatory drugs are often used to help reduce the pain and swelling of joints and decrease stiffness. Cortisone may also be used for this purpose. Drugs such as Allopurinol can be used on a long-term basis to reduce uric acid levels and prevent future attacks. Other methods for controlling gout include dietary changes, weight loss and exercise.

Data source: www.arthritis.ca [Arthritis in Canada (4)]

Appendix B. Search Strategy

The following outlines the details of the literature searches, including the databases accessed, disease terms used, limits applied, and the keywords for each subject area.

Databases

Relevant literature was identified using the OVID and CSA search portals to access both medical and psychosocial databases. These databases include: MEDLINE, Cumulative Index to Nursing and Allied Health (CINAHL), EMBASE, PsychINFO, the Cochrane Library of Systematic Reviews, AgeLine, Social Services Abstracts, Sociological Abstracts, and ERIC. Other relevant databases included for the rehabilitation searches include: PEDro, and OTDbase.

Disease Terms

The disease mesh terms and keywords included: arthritis or arthr*; osteoarthr*; rheumatoid arthr*; systemic lupus erythematosus, lupus; spondyloarthropathy, ankylosing; spondylitis, spondy*; reiter*; and scleroderma, sclerod*. These terms were all separated by the 'OR' bullion operator.

Limits

The basic limits applied to all searches were: 1990-2004; Human; English; Reviews or Systematic Reviews; 19and + years old. Two of the subject areas used variations of these limits. For the searches related to models of care, the year limits were extended to include all articles published between 1980 to 2004, with no review or systematic review limits.

Specific limits were applied to the pharmacology searches due to the large numbers of studies conducted and rapid development of this field. Only reviews which specifically address pharmacologic treatment for OA and/or RA were considered. Only reviews which included randomized control trials or controlled clinical trials were considered. The following date restrictions were imposed on the searches: a) International association guidelines published since 2000, b) Systematic reviews, meta-analyses and other reviews published since 2002 and c) Cochrane reviews published since 1994. It is important to note that some Cochrane reviews have not been updated since the late 1990s.

Keywords by Subject Area

Models of Care

Rheumatic diseases and rheumat* were included with the disease keywords. A combination of the following keywords were employed in the various databases: metrologist, metrol*; telemedicine, telehealth, telemed*; health care delivery, health care deliv*; health services accessibility, health services access*; health services need and demand; approach; pathways to care, path* to care; access to care, access; patient care team, multidisciplinary care team, interdisciplinary, teamwork, interprofessional relations, interprofessional, collaboration; outcome*, outcomes (health care); referral,

referral and consultation, self referral; nurse practitioner, nurse pract*; specialist, specialties, nursing, clinical nurse specialists, special*; model* of care, models, and models, theoretical.

Primary Prevention

The keywords primary prevention, prevent*, risk factors and risk fact* were used in all of the databases, with the addition of the MeSH terms 'preventative healthcare' in CINAHL, and 'at risk population' and 'early intervention' in PsycInfo.

Pharmacology

Due to the extensive literature on drug therapy for arthritis, the search was limited by the keywords evaluation, evalu* or compar* AND drug therapy keywords, including drug ther*, anti-rheumatic drugs, dmards, anti-inflammatory agents- non-steroidal, anti-inflam*, nsaids, and inflammation mediators.

Non-Pharmacologic and Rehabilitation Interventions

Rehabilitation, exercise, occupational therapy, occupational therapist, physiotherapy, physiotherapists, physical therapy techniques (such as balneology, cryotherapy, electric stimulation therapy), exercise therapy, hydrotherapy (which induced hyperthermia), orthopedic manipulation, massage, phototherapy and other common terminology for these interventions were applied. The combination of these key words with the 'or' conjunction varied for particular databases. Several truncated keyword were used (i.e. rehab* or (occupational therap*) or (physical therap*) when possible.

Care* (capturing both home and primary care) and community* were applied to several database searches. These truncated keywords (care* or community*) combined with the disease and intervention keywords were used in the CSA database searches to obtain literature relating to the individual/service level.

Preventive health care, community health services, home health care, health care delivery, health resource utilization, health services accessibility, direct access, gatekeeping, emergency service, patient admission and readmission, patient discharge, health care outcomes, referral and consultation, multidisciplinary care team, disease management, continuity of patient care, and other common terminology for these system-related key words were used. The combination of these key words with the 'or' conjunction varied for particular databases. Several truncations to these keywords occurred (i.e. community* or care or wait* or refer* or readmission* or admission* or emerg* or discharge* or navigat* or manage* or utiliz* or access* or consult* or multidisciplin* or communicat* or continuity or continuum) when possible. These key words were combined with the disease and intervention to obtain literature relating to the system/service level.

Rehabilitation for Total Joint Replacement

For this search, the keywords rehabi*, physiother*, occupational ther*, were used in conjunction (i.e. using the AND operator) with the keywords hospitalization, hospit*, access*, access to care, health services accessibility, model*, utiliz*, waiting list*, length of stay, discharge destination and cost*.

Self-Management

Self management keywords included: self manage*, self care, education, edu*, adapation-psychological, coping, cop* and health education.

Surgery

The keywords arthroscopy, surgery, arthroplasty, and joint replacement were connected to the following keywords by the AND operator: barrier* to care, health care access*, path* to care, waiting list*, coordination, coordin*, health care deliv*, deliv* of healthcare, health care ration*, health care distrib*, resource allocat*, managed care program*, prior*, and strateg*.

Grey Literature

The websites of all the major North American and British arthritis and rheumatology research groups, as well as the government websites of Canada, Great Britain, Australia, Sweden, and the United States were searched for content related to arthritis. Internal ACREU databases were searched for relevant articles. ACREU working reports and reports that were recommended by key informants were also included in the literature.

Appendix C. Pharmacologic Agents

Topical Analgesics

Topical analgesics are short-acting medications that can be rubbed into the skin. Counter-irritants help to mask pain. They contain such ingredients as menthol, camphor, and eucalyptus oil, which stimulate, or irritate, nerve endings by producing a warm or cool sensation. Topical salicylates work like counter-irritants; they also block prostaglandins, which make arthritis pain and inflammation worse. Salicylates are found in many oral analgesics. Topical capsaicin cream depletes the pain neuro-transmitter, substance P, and apart from occasional stinging and burning is usually well tolerated. Most topical analgesics are available over the counter.

Complementary and Alternative Medicines

The term complementary and alternative medicine (CAM) is applied to a broad range of therapies that are not commonly taught in medical schools or utilized by the medical profession. The manufacturing and production of CAM are not strictly regulated in contrast to prescription and other over-the-counter medications. As such, it is difficult for health care providers to assess the likelihood of side effects, toxic effects, or drug-drug interactions. One of the most successful CAMs for arthritis is Glucosamine. Glucosamine, a naturally occurring amino glycoside, is a precursor of the glycosaminoglycans, and important constituent of articular cartilage that has demonstrated symptom relief in humans. In vitro studies support its role in cartilage repair by stimulating synthesis of glycosaminoglycans, although these data are still inconclusive. As yet there is no standardization of over-the-counter preparations. Most CAMs can be purchased over-the-counter.

Nonopioid Analgesics

Acetaminophen and Paracetamol are simple analgesics that have both analgesic and antipyretic actions. Acetaminophen is not generally considered to have potent anti-inflammatory effects and therefore will not impact on inflammatory symptoms. Acetaminophen can be prescribed or purchased over the counter.

Opioid Analgesics

Opioid analgesics are the most effective class of drugs available for the management of pain. Morphine remains the gold standard against which every new opioid analgesic is compared. While there is little clinical trial evidence of the use of opioid analgesics in arthritis, most guidelines recommend their use for patients who are unable to obtain pain relief or who cannot tolerate other medications. Opioid analgesics are generally safe medications when prescribed with appropriate monitoring. Opioid analgesics are available by prescription only.

Corticosteroids, Systemic

Corticosteroids are medications similar to natural hormone substances produced by the body that help to reduce inflammation. They are effective in reducing disease activity and

joint inflammation caused by some types of arthritis. One way corticosteroids reduce inflammation is by decreasing the action of the body's immune response. While this effect can help relieve pain and swelling, it may make the patient more susceptible to infection. During the late 20th century, systemic corticosteroid use fell out of favor because of the side effects attributed to using high doses. In recent years clinical trials have demonstrated the efficacy of low-dose corticosteroids. Corticosteroids are available by prescription only.

Cortisone Injection

Injectible cortisone is synthetically produced and has many different trade names, but is a close derivative of natural hormone substances. The most significant difference is that synthetic cortisone is not injected into the blood stream, but into a particular area of inflammation, most often an inflamed knee joint. When pain is decreased from cortisone it is because the inflammation is diminished. The synthetic cortisone is designed to act more potently and for a longer period of time (days instead of minutes). Cortisone injections are available by injection only and should be administered by a trained health care professional.

Other Intra-Articular Injections

Hyaluronic acid, or HA, is a natural part of cartilage and joint fluid. HA provides lubricating and viscous-elastic properties and is required for proper joint function. Hyaluronic acid, sometimes known as Hyaluron, is injected directly into the joint area. Hyaluron is marketed as a medical device and not a drug. This agent is not available on provincial formularies and therefore in most provinces patients are required to pay for each injection.

Nonsteroidal Anti-Inflammatory Drugs (NSAIDs) including Topical NSAIDs

Traditional NSAIDs work by blocking the enzyme called cyclooxygenase (COX-1) that is responsible for the conversion of arachidonic acid to prostaglandins. Prostaglandins liberated from arachidonic acid by cyclooxygenase are short-lived substances that act as local hormones (autocoids) important in normal physiology and pathologic conditions. Prostaglandins E₂ (PGE₂) is the principal eicosanoid in inflammatory conditions. Along with their benefits, several side effect involving the gastrointestinal, renal, and hemopoietic systems have emerged that have limited the usefulness of traditional NSAIDs. Recently, a second cyclooxygenase enzyme system that appears to be only upregulated in inflammation has been described. Inhibition of this second enzyme (COX-2) appears to confer anti-inflammatory effects without inhibiting the prostaglandins that are important for normal physiologic function of the gastrointestinal, renal, and hemopoietic systems. Originally it was thought that this new class of NSAIDs would significantly reduce side effects. However, their safety is now being reviewed, and one agent has already been voluntarily removed from the market. Some NSAIDs can be bought over the counter, while most are prescribed. COX-2 inhibitors are available through prescription only and are significantly more expensive than traditional, nonselective NSAIDs.

Gastroprotective Agents

NSAIDs can cause significant adverse events including gastrointestinal toxicity, hepatotoxicity, renal complications, cardiovascular complications, coagulation effects and drug interactions (302). Particular attention has been paid to patients with gastrointestinal risk factors because of the prevalence and cost of complications in this group. Risk factors for the development of NSAID-associated gastroduodenal ulcers include advanced age, history of ulcer, concomitant use of corticosteroids or anticoagulants, higher dosage of NSAID, use of multiple NSAIDs or serious underlying disease. In patients with an increased gastrointestinal risk, effective gastroprotective agents should be used. The selective COX-2 inhibitor rofecoxib (Vioxx), designed to be gastroprotective NSAID, has been deemed unsafe and voluntarily removed from the market. The safety of other COX-2 inhibitors is now under review. Traditional gastroprotective agents which have been deemed effective and safe are prostaglandin analogues, H₂-receptor antagonists, or proton pump inhibitors. These have been used in combination with non-selective NSAIDs with clear success. Gastroprotective agents are available by prescription only.

Disease Modifying Anti-Rheumatic Drugs (DMARDs)

DMARDs are drugs that have been demonstrated to alter disease progression as demonstrated by X-ray progression, in addition to reducing the pain which results from inflammation and improving physical function. The category of DMARDs includes a wide range of agents that target different aspects of the complex inflammatory cascade. On the whole, DMARDs have serious adverse event profiles which is why DMARDs are most often prescribed and monitored by arthritis specialists.

Biological Response Modifiers (Biologics)

Unlike DMARDs, most of which have been developed for other diseases like cancer and malaria, biologic response modifiers (biologics) have been developed to target the basic biological mechanisms of the inflammatory arthritis disease process. The cytokines TNF α and interleukin-1 (IL-1) play pivotal roles in the inflammation and joint damage of RA. Three drugs that block the activity of TNF have been approved for use in Canada. Infliximab and adalimumab are antibodies against TNF, and etanercept is a fusion protein of the TNF receptor II. Anakinra is a competitive antagonist of IL-1 that blocks the actions of IL-1. Published results seem to indicate that the effects of anakinra might be more modest than those seen with the other agents; however, head-to-head-trials of different biological compounds have not yet been performed. Biologics are available by prescription only and are ten to twenty times more expensive than traditional DMARDs. Biologics are almost exclusively prescribed by arthritis specialists.

Appendix D. Evidence for Pharmacology

Table 3.1: Osteoarthritis: Conclusive Evidence by Type, First Author and Publication Year

Drug Type	Notes	International Association Guidelines	Cochrane Review	Other Reviews of RCTs
Topical Analgesics	methysalicylate or capsaicin	ACR 2000 Jordan 2003	Little 2000	
Complementary and Alternative Medicines	Various /few trials	Jordan 2003 Zhang 2004	Little 2000	Soeken 2004
	Glucosamine	Jordan 2003 Zhang 2004	Towheed 2000	Matheson 2003 Richy 2003
	Chondroitin	Jordan 2003 Zhang 2004		
Nonopioid Analgesics	Acetaminophen	ACR 2000 Jordan 2003 Zhang 2004	Towheed 2003	Wegman 2004 Lee 2004 Zhang 2004
Steroid Injection	Knee	ACR 2000 Jordan 2003	protocol only	Arroll 2004 Goodwin 2004 Scott 2004
	Hip	Zhang 2004		
Other Intra-articular Injection	hyaluronan-knee	ACR 2000 Jordan 2003	protocol only	Lo 2003 Scott 2004 Wang 2004 Espallargues 2003
NSAIDs (inc. topical)	NSAIDs-knee	ACR 2000 Jordan 2003	Watson 1997	Wegman 2004 Bjordal 2004
	NSAIDs-hip	ACR 2000 Zhang 2004		Wegman 2004
	Analgesics & NSAIDs		Towheed 1997	Lee 2004 Gotzsche 2003
	Topicals	ACR 2000 EULAR 2003		Lin 2004 Scott 2004
Gastroprotective Agents		ACR 2000 Jordan 2003 Zhang 2004	Rostom 2002	
Opioid Analgesics		ACR 2000 Jordan 2003 Zhang 2004	protocol only	Griessinger 2003
	Tramadol			Bijlsma 2002
NSAIDs-Cox 2	Under review for safety	ACR 2000 Jordan 2003 Zhang 2004	Garner 2005	Deeks 2002
Corticosteroids, Systemic	Not Indicated			
DMARDs	Not indicated		protocol only	
Biologic Agents	Not indicated			

Table 3.2: Rheumatoid Arthritis: Conclusive Evidence by Type and Publication Year

Drug Type:	Notes	International Association Guidelines	Cochrane Review	Other Reviews of RCTs
DMARDs	Leflunomide Penicillamine Cyclphosphamide Azathioprine Auranofin Antimalarials Methotrexate Sulfasalazine Injectable gold Cyclosporin		Osiri 2002 Suarez-Almazor 2000 Suarez-Almazor 2000 Suarez-Almazor 2000 Suarez-Almazor 2000 Suarez-Almazor 2000 Suarez-Almazor 1998 Suarez-Almazor 1998 Clark 1997 Wells 1998	
DMARDs	various	ACR 2002		
	Early DMARD therapy	ACR 2002		Emery 2002 Emery 2003 Quinn 2003 Verstappen 2005
	Combination therapy	ACR 2002		Simon 2004 Emery 2003 Quinn 2003
Biologic Agents		ACR 2002	Blumenauer 2003 Blumenauer 2002	Simon 2004 Schwartzman 2004
Corticosteroids, Systemic	low dose	ACR 2002	Criswell 1998	
	low dose vs NSAIDs		Gotzsche 2005	
Steroids, Injection		ACR 2002		
Vitamins & Minerals as Supplement to Prescription Pharmacotherapy		ACR 2002	Ortiz 1999	
NSAIDs (inc. topicals)		ACR 2002		
Gastroprotective Agents		ACR 2002	Rostom 2002	
Topical Analgesics	capsaicin, one trial		Little 2000	
Complementary and Alternative Medicines	Various/few trials		Little 2000	Soeken 2004
Nonopioid Analgesics	acetaminophen inferior to NSAIDS		Wienecke 2004	
NSAIDs-Cox 2	Under review for safety	ACR 2002	Garner 2005 Garner 2002	Deeks 2002
Opioid Analgesics	no RA RCTs		protocol only	Griessinger 2003
Other IA Injection	no RA RCTs			

Appendix E. Results of Rehabilitation Literature Search

Practice guidelines such as the Ontario Program for Optimal Therapeutics (OPOT), European League Against Rheumatism (EULAR), American College of Rheumatology (ACR), and BMJ Clinical Evidence were used in this report; however, they were not included in Table 4.1 because these guidelines included a wide range of interventions. Only guidelines developed by the Ottawa Panel and the American Geriatrics Society Panel have been included in both the table and the report because they are specific for exercise and/or physiotherapy modalities for OA and/or RA. For acupuncture, two recent randomized controlled trials (RCT) have been described in the report (but are not documented in the table) in order to show that evidence in this area is emerging. Moreover, both reviews and guidelines for client education in arthritis were examined; however, most documents were not specific to rehabilitation and thus were not included in the table.

Table 4.1. Literature summary for individual-intervention level studies

LITERATURE CHARACTERISTICS		AREA		
		Occupational Therapy Interventions	Physiotherapy Modalities	Exercise Therapy
Total number of studies		16	13	21* *7 include PT
Condition	Osteoarthritis	2	5	11
	Rheumatoid arthritis	10	8	6
	Arthritis non-specified (or OA/RA combined)	4	0	4
Type of Research	Quantitative	10	0	3
	Qualitative	0	0	0
	Systematic Review	2	12	6
	Narrative	4	1	12
	Grey Literature	0	0	0
Quality of Evidence	Excellent	11	13	17
	Good	3	0	2
	Average	2	0	2

Appendix F. Self-Management Activities and Skills

Types of self-management activities (self-care) people use include (171):

- topical treatments, such as heat, lotion
- activity related strategies, such as exercise, rest, activity modification, assistive devices
- dietary approaches, including supplements, special diets, alcohol
- stress and mind-body activities such as prayer, relaxation, social support
- alternative and complementary care, such as massage, homeopathy
- home remedies like bracelets, household motor oils.

Skills important in the self-management of arthritis include (180):

- using medications properly
- changing behaviour to improve symptoms or slow the progression of the disease
- adjusting to new social and economic circumstances
- coping with the emotional consequences of arthritis
- using community resources
- developing a partnership with physician and other health professionals.

Appendix G. Self-Management Literature Summary

*Disease type refers to *RA* only; *OA* only; *combined OA, RA, and/or other types of arthritis*; or, *chronic disease focus that includes arthritis [CD]*

Reference	Study Type	Disease type*	Results/Outcomes	Quality of Evidence
Riemsma RP, Kirwan JR, Taal E & Rasker JJ <i>Patient education for adults with rheumatoid arthritis</i> 2003 (192)	Cochrane Review	RA	<p>Reviewed 31 studies of patient education for adults with RA (including information only interventions, counseling, and behavioural treatment) found small short-term significant effects on disability, joint counts, patient global assessment, psychological status and depression. The dimensions of anxiety and disease activity showed no significant effects. A trend favouring patient education (behavioural treatment) was found for scores on pain in the short-term.</p> <p>There was no evidence of long-term benefits in adults with RA, although there was a trend favouring patient education for scores on disability. Behavioural treatment was the only type of intervention that showed small significant effects for scores on disability, patient global assessment and depression. No significant effects or trends were found for scores on joint counts, psychological status, anxiety, and disease activity. At final follow-up there were no significant effects for behavioural treatment.</p> <p>Physician global assessment was not assessed in any of the included studies.</p> <p><u>Conclusion:</u> Patient education as provided in the studies reviewed had small short-term effects on disability, joint counts, patient global assessment, psychological status and depression. There was no evidence of long-term benefits in adults with RA.</p>	Excellent
Barlow J, Wright C, Sheasby J, Turner A & Hainsworth J <i>Self-management approaches for people with chronic conditions: a review</i> 2002 (187)	Systematic Review	CD	<p>145 papers were read and summarized by the authors. Self-management interventions have a beneficial effect on the well-being of participants in the short-term. Self-management approaches are effective in increasing participants' knowledge, symptom management, use of self-management behaviours, self-efficacy and aspects of health status (e.g. depression). Two caveats are that not all approaches target all of these outcomes and equally multi-component programs do not show improvements on all outcomes.</p>	Excellent
Bodenheimer T, Lorig K, Holman H, & Grumbach K	Systematic Review	CD	<p>27 studies were assessed. The results were: Patient education programs teaching self-management skills are more effective than information-only patient education in improving clinical outcomes.</p>	Excellent

Reference	Study Type	Disease type*	Results/Outcomes	Quality of Evidence
<i>Patient self-management of chronic disease in primary care 2002 (175)</i>			In certain circumstances self-management education is effective in improving outcomes (e.g. reducing pain, improving coping), and possibly reducing costs , for arthritis and probably for adult asthma. In initial studies, a self-management program bringing together patients with a variety of chronic conditions together may improve outcomes and reduce health care utilization (i.e. reduce physician visits) and health care costs for groups of patients with a variety of chronic conditions.	
Goepfinger J & Lorig K. <i>Interventions to reduce the impact of chronic disease: community based arthritis patient education 1997 (172)</i>	Systematic Review	Combined	The importance of interventions directed towards problems identified by patients, established as effective, and then further developed within theoretical frameworks has been established over the past 20 years. Effectiveness of population-focused, community-based interventions has been documented through a wide variety of groups, although not with low-income and minority populations. Systematic and detailed process evaluations of program implementation needs to occur to identify the intervention components responsible for observed improvements so as to duplicate effective programs.	Average
Keysor JJ, DeVellis BM, DeFriese GH, DeVellis RF, Jordan JM, Konrad TR, Mutran EJ & Callahan LF <i>Critical review of arthritis self-management strategy use 2003 (171)</i>	Systematic Review	Combined	19 studies met inclusion criteria. No two studies examined arthritis self-management strategy use in the same manner. Much of the literature reviewed focused on use of topical treatments, diet, alternative care strategies, exercise, and rest. Use of activity modification practices and joint protection strategies was not examined often, despite the potential benefit and long-term importance of these strategies on health outcomes of people with chronic joint problems. Furthermore, people do not seem to be using these strategies to a great degree. The range of self-initiated strategies used to manage arthritis symptoms and consequences varied and included conventional and unconventional activities . No conclusive evidence relating to socio-demographic and disease-related factors to self-management strategy use was found.	Average
Niedermann K Fransen J, Knols R & Uebelhart D <i>Gap between short- and long-term effects of</i>	Systematic Review	RA	11 studies were included in this review. Validity scores of studies ranged from 3 to 9 (of 11). The seven educational programs (aimed at increasing knowledge and improving performance) mainly improved knowledge and compliance in the short and long term, but there was no improvement in health status. All four psychoeducational programs (combining teaching intervention activities with behavioural intervention activities to improve coping and change	Excellent

Reference	Study Type	Disease type*	Results/Outcomes	Quality of Evidence
<i>patient education in rheumatoid arthritis patients: a systematic review</i> 2004 (122)			<p>behaviour) improved coping behavior in the short term, two of them showing a positive long-term effect on physical or psychological health variables.</p> <p>Conclusion: Methodologically better-designed studies had more difficulties demonstrating positive outcome results. Short-term effects in program targets are generally observed, whereas long-term changes in health status are not convincingly demonstrated. There is a need to find better strategies to enhance the transfer of short-term effects into gains in health status.</p>	
Superio-Cabuslay E, Ward MM & Lorig, KR <i>Patient education interventions in osteoarthritis and rheumatoid arthritis: a meta-analytic comparison with nonsteroidal antiinflammatory drug treatment</i> 1996 (194)	Systematic Review	Combined	<p>19 patient education trials comprised of 32 treatment arms and 28 NSAID trials comprised of 46 treatment arms were included.</p> <p><i>Effect sizes for Patient Education:</i> Pain – 0.17; Functional disability – 0.03; Tender joint counts – 0.34 <i>Effect sizes for NSAID trials:</i> Pain – 0.67; Functional disability – 0.34; Tender joint counts – 0.43</p> <p>Effects of education were much larger in RA studies than in OA studies. In RA studies, the average effect size for the tender joint count was 0.34 in the education trials and 0.43 in the NSAID trials. Because most patients in the education trials were being treated with medications, the effect sizes of these trials represent the additional, or marginal, effects of patient education interventions beyond those achieved by medication.</p> <p>Based on this meta-analysis, patient education interventions provide additional benefits that are 20-30% as great as the effects of NSAID treatment for pain relief in OA and RA, 40% as great as NSAID treatment for improvement in functional ability in RA, and 60-80% as great as NSAID treatment in reduction in tender joint counts in RA.</p>	Good
Taal E, Rasker JJ, Wiegman O <i>Group education for rheumatoid arthritis patients</i> 1997 (189)	Systematic Review	RA Combined	<p>31 studies were reviewed – in 12 studies patients with various rheumatic disease, including RA, were included, and in 19, only RA patients were studied.</p> <p>Group education increased the knowledge of the participants, which was maintained over long intervals. Beneficial behavioral effects were found in mixed populations but less often found in RA patients. Group education often improved physical health status both in mixed and in RA populations, but seldom led to improved psychosocial health status. In general, the beneficial effects of group education were found more often in mixed populations than in strictly RA patients. Further investigations must examine which mechanisms make educational interventions effective and determine the types of interventions or combinations of interventions that are effective. Effects of group education on health status are almost never maintained</p>	Excellent

Reference	Study Type	Disease type*	Results/Outcomes	Quality of Evidence
			over long intervals. More research is needed to develop strategies for maintaining and enhancing early gains from group education.	
Warsi A, LaValley, MP, Wang PS, Avorn J & Solomon DH <i>Arthritis self-management education programs: a meta-analysis of the effect on pain and disability</i> 2003 (195)	Systematic Review	Combined	The analysis included 17 trials of both OA and RA patients. Results: The summary effect size was 0.12 for pain (95% confidence interval [95% CI] 0.00, 0.24) and 0.07 for disability (95% CI 0.00, 0.15). Funnel plots indicated no significant evidence of bias toward the publication of studies with findings that showed reductions in pain or disability. Conclusion: The summary effect sizes suggest that arthritis self-management education programs result in small reductions in pain and disability.	Good
Warsi, A., Wang, P. S., LaValley, M. P., Avorn, J., and Solomon, D. H. <i>Self-management Education Programs in Chronic Disease: A Systematic Review and Methodological Critique of the Literature</i> 2004 (207)	Systematic Review	CD	Results: Included 71 trials of self-management education. Trial methods varied substantially and were suboptimal. Diabetic patients involved with self-management education programs demonstrated reductions in glycosylated hemoglobin levels (summary effect size, 0.45; 95% confidence interval [CI], 0.17-0.74); diabetic patients had improvement in systolic blood pressure (summary effect size, 0.20; 95% CI, 0.01-0.39); and asthmatic patients experienced fewer attacks (log rate ratio, 0.59; 95% CI, 0.35-0.83). Although authors found a trend toward a small benefit , arthritis self-management education programs were not associated with statistically significant effects . Evidence of publication bias existed. Conclusion: Self-management education programs resulted in small to moderate effects for selected chronic diseases. In light of evidence of publication bias, further trials that adhere to a standard methodology would help clarify whether self-management education is worthwhile.	Good
Brady TJ, Kruger J, Helmick CG, Callahan LF & Boutaugh ML <i>Intervention programs for arthritis and other rheumatic diseases</i>	Narrative		Disability reduction or prevention programs for people with arthritis and other rheumatic conditions reduce long-term pain and disability but only reach a fraction of their target audience. Few public health professionals are aware of these programs or their benefits. Nine intervention programs – Five self-management education programs and four exercise/physical activity programs, met study criteria. Of the nine interventions reviewed, the Arthritis Self-Help Course has a well-established body of research supporting its efficacy (to help people with arthritis maximize their abilities and reduce pain, functional limitations and other arthritis-related problems) and cost-effectiveness , although this research has focused primarily on Caucasian	Excellent

Reference	<i>Study Type</i>	Disease type*	Results/Outcomes	Quality of Evidence
2003 (176)			middle-aged to elderly women with high school education or more. Further research is needed on effective delivery strategies, outreach to underserved and minority populations, and other modes of program delivery. The PACE and Arthritis Foundation Aquatics Program interventions have less extensive support but appear to be promising interventions as well. Further research is needed on effectiveness, cost-effectiveness and dissemination. Other packaged programs show promise in reducing pain, disability and depression and in increasing self-care behaviours, but they need to be evaluated more extensively.	