



ARTHRITIS COMMUNITY RESEARCH & EVALUATION UNIT (ACREU)

ACCESS TO CARE FOR PEOPLE WITH ARTHRITIS

ENHANCING CARE ACROSS THE CONTINUUM USING ADVANCED PRACTITIONERS / EXTENDED ROLE PRACTITIONERS

March 20, 2008

Prepared by:

Aileen M. Davis
Crystal MacKay
Elizabeth M. Badley

Address for correspondence:

Arthritis Community Research &
Evaluation Unit (ACREU)
399 Bathurst Street
MP-10th Floor, Suite 316
Toronto, ON M5T 2S8
Tel: (416) 603-6269
Fax: (416) 603-6288

WORKING REPORT 2008-01

Acknowledgements

Members of the committee who contributed to this report:

Aileen M. Davis, BScPT, MSc, PhD
Senior Scientist, Arthritis Community Research & Evaluation Unit, Division of Health Care and Outcomes Research, Toronto Western Research Institute, University Health Network
Associate Professor, Department of Physical Therapy, University of Toronto
Toronto, Ontario, Canada

Elizabeth M. Badley, PhD
Director, Arthritis Community Research & Evaluation Unit, Head of Division of Health Care and Outcomes Research, Toronto Western Research Institute, University Health Network
Professor, Department of Public Health Sciences, University of Toronto,
Toronto, Ontario, Canada

Crystal MacKay, BScPT, MHSc
Research Manager, Arthritis Community Research & Evaluation Unit
Division of Health Care and Outcomes Research, Toronto Western Research Institute, University Health Network
Toronto, Ontario, Canada

Laura Passalent BScPT, MHSc
Physiotherapist
Musculoskeletal Health and Arthritis Program
Toronto Western Hospital
University Health Network
Toronto, Ontario, Canada

Laurie Hurley, MSc, BScPT, Instructor
Department of Rehabilitation
University of Toronto
Senior Director, Arthritis Programs and Services
The Arthritis Society, ON Division
Toronto, Ontario, Canada

Susan Ross, Regional Director
Arthritis Programs and Services
The Arthritis Society, ON Division
Toronto, Ontario, Canada

John F. Flannery, MD, FRCPC
Medical Director, MSK Rehabilitation Program, and Residency Program Director, University of Toronto
Toronto Rehab - Hillcrest Centre
Toronto, Ontario, Canada

Deanna Baker, BSc, PT
Physiotherapist Practitioner
University Health Network
Toronto, Ontario, Canada

Gillian Hawker, MD, MSc
Professor of Medicine, Women's College Hospital / University of Toronto
Toronto, Ontario, Canada

Jeff A. Bloom, MD, CCFP, FCFP
Interim Family Physician-in-Chief
Toronto Western Hospital
University Health Network
Toronto, Ontario, Canada

Maria Tassone, MSc, BSc PT
Director, Allied Health, Professional Practice
University Health Network
Toronto, Ontario, Canada

Sonia Bibershtein BScPT
Physical Therapist with the Multidisciplinary Osteoporosis Program
Women's College Ambulatory Care Centre
Toronto, Ontario, Canada

Connie Roberts, Physiotherapist with Advanced Training in Rheumatology
The Arthritis Society
Toronto, Ontario, Canada

We would also like to acknowledge the invaluable feedback received on an earlier draft of this report from individuals representing those with arthritis, working in advanced practice roles and physicians treating people with arthritis.

Table of Contents

Executive Summary	1
Introduction.....	2
What is meant by Advanced Practice (AP) or Extended Role Practitioner (ERP)?	2
Why are APs or ERPs critical in addressing arthritis and MSK health?.....	3
What do we know about Models of Care utilizing AP or ERP in arthritis management?.....	4
Types of Models of Care with APs and ERPs.....	5
Recommendations regarding AP and ERP roles across the continuum of care.....	6
Conclusions and Summary: Issues for resolution	8
References.....	9

List of Figures and Exhibits

Figure 1: Health care utilization of people with arthritis and related disorders	3
Figure 2: Current models of arthritis care.....	4
Figure 3: Potential roles for AP/ERP in a comprehensive approach to arthritis management	7
Exhibit 1. Key roles for the AP/ ERP.....	7

Executive Summary

- The burden of arthritis is increasing (the number of people with arthritis is expected to increase by 50% by 2020) and there are problems accessing timely, appropriate care; limited health human resources are exacerbating issues of access.
- Primary care physicians acknowledge limitations in their skill in managing arthritis and musculoskeletal disease; specialists such as orthopaedic surgeons see large numbers of people who require conservative management and who do not go on to have surgery.
- Health professionals, such as physiotherapists, occupational therapists and nurses with advanced skills and training, who work in advanced or extended practice within an interdisciplinary team, have the potential to facilitate timely and appropriate access to the right provider for people with arthritis and musculoskeletal conditions.
- In Ontario and Canada in general, models of care using advanced practitioners (AP) and extended role practitioners (ERP) have been developed and implemented for isolated aspects of care without considering the continuum of care. Future models need: 1) to reflect the continuum of care; 2) to include the patient as an active partner in their care with the health team; and, 3) supportive community and health system policies and resources to facilitate the desired good outcomes for patients (and the system).
- Components of the AP/ERP role include: facilitation of system navigation for the patient; assessment; screening; triage and referral; monitoring including ongoing management and follow-up; education of patients and health professionals; and, program evaluation. AP/ERPs need to function within a truly integrated health care system that allows immediate access to care for patients who are beyond the management domain of the AP/ERP.
- Utilization of AP/ERPs in primary care for patients with musculoskeletal complaints and throughout the continuum of care for people with all types and severity of arthritis has the potential to improve access to care by the right provider and ultimately improve patient and system level outcomes.
- Issues related to the implementation of advanced or extended practice roles will likely differ depending on the point of the continuum of care, context (e.g., community versus hospital setting; urban versus rural or remote etc.) and the stakeholder. Evidence from process and outcome evaluation is critical to understanding and supporting the successful implementation and evolution of practice roles and models of care.

Introduction

Provision of appropriate and timely care for increasing numbers of Canadians with chronic disease is one of the greatest challenges facing the health care system in the face of shrinking health human resources. This is particularly true in the case of arthritis. Arthritis is one of most frequent chronic conditions, affecting 1 in 6 people which, based on 2000/2001 data from the Canadian Community Health Survey, represented over 1.6 million Ontarians over the age of 15 (1), and it is the primary cause of long term disability resulting in large personal and societal costs that are generally unrecognized (2-85). Canadian data indicate that musculoskeletal (MSK) disorders, which includes arthritis, are the second most costly group of diseases (after cardiovascular disease) (86). The number of people with arthritis is projected to increase dramatically with the aging baby boomer generation and increasing rates of obesity (8;17;20;22-24;26;33;37;44;51;54;57;61;68;77;81;84;87-116).

Given the recognized burden of disease, chronic disease management has become a primary focus for Ontario and other Canadian provinces. The vision of the chronic disease management strategy is that Ontarians will be supported by a comprehensive, sufficiently resourced, integrated system, in which the patient is an active partner, that will support disease management and prevention (117). However, the current availability of resources and models of care delivery are insufficient to meet the growing need for services and are inadequate to support this vision of chronic disease management. For instance, there is a shortage of primary care physicians in many areas of Ontario and Canada (118-121). The literature also shows deficiencies in the primary care management of arthritis: primary care physicians report lack of confidence in MSK examination; and, there is sub-optimal referral to specialists (79;122-134). Population studies show under-utilization of total joint replacement (TJR) surgery in those with demonstrated need as well as long wait times for these services (33;135-153). At the same time only a proportion of referrals to surgeons for consideration of TJR are appropriate; that is, the individual is deemed to be a candidate for surgery (ranges from 40 to 80% depending on the study) (33;148;154;155). There are also delays in referral of individuals with early inflammatory arthritis to

rheumatologists (126;155-166). Similarly, non-pharmacologic therapies are under-employed both at the community level and in primary care (125;167-171). Contributing to problems in accessing care are constraints in the availability of arthritis-relevant health human resources (e.g., rheumatologists, orthopaedic surgeons, rehabilitation therapists), both in absolute numbers and in geographic distribution (33;139;140;148-150;153;172-175). There is emerging evidence that lack of availability of arthritis health professionals at the local level contributes to lower rates of treatment (176;177).

Given these challenges, there is a critical need to look at alternative ways of enhancing existing resources and ensuring optimal care for people with various types of arthritis across the stages and spectrum of disease severity. One alternative is the use of health professionals as advanced (AP) or extended role practitioners (ERP) to examine, triage, and manage individuals. Other jurisdictions such as the United Kingdom (UK) refer to health providers in these roles as extended scope practitioners. Advanced practice roles have generally been assumed by nurses and rehabilitation professionals such as physical (PT) or occupational therapists (OT).

What is meant by advanced practice (AP) or extended role practice (ERP)?

There is no agreement on the definition of AP or ERP as the specific skills required vary by discipline and by the context in which practice occurs. However, there is agreement that AP or ERP generally are undertaken by health professionals within the scope of practice of their regulatory body (i.e., the procedures, actions, and processes that are permitted for the licensed individual.) The individual AP/ERP is limited to the scope of practice in which he/she has received education and experience, and has demonstrated competency. The description used by the Canadian Physiotherapy Association states that advanced practice or extended roles are characterized by providers practising to the full scope of their profession which includes activities such as ordering x-rays, blood tests, and limited medications (178). Advanced medical directives or delegation are typically used to perform these latter activities. Individuals practicing in this capacity have additional training and skills; in the case of MSK

disease or arthritis, this could include advanced training around joint examination for nurses or additional skills around reading x-rays for PTs or OTs. AP/ERPs are often the first and could potentially be the only contact with the patient, and in some jurisdictions work independently. For example, in British Columbia and Ontario, direct access by a patient to a PT (i.e., without physician referral) can occur in specified settings. In Ontario, direct access is available when the PT provides service in a setting not governed by the Public Hospitals Act. However, even when an AP/ERP works independently, their provision of care occurs within an interdisciplinary dynamic, such that processes exist to ensure that patients can be referred to other health providers as necessary (179-199).

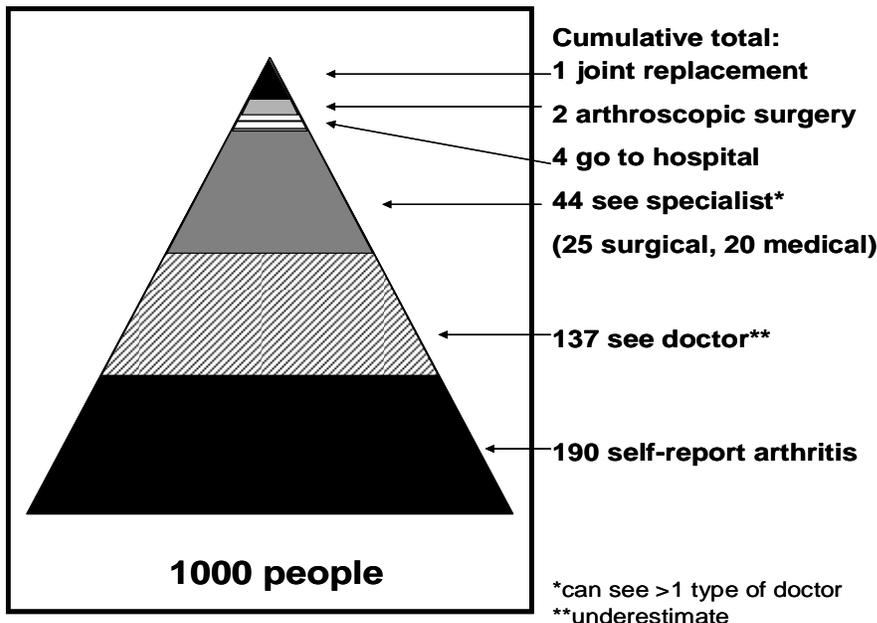
As an alternative approach to managing health human resources shortages, the Ontario Ministry of Health and Long-term Care describes individuals working as physician assistants (PA) as supporting physicians in a range of health care settings. In contrast to nursing, OT or PT, PAs are an unregulated profession. With appropriate physician supervision, a PA has the skills and experience to deal with medical emergencies as well as with everyday health

care needs. Activities of the PA may include conducting patient interviews, histories, and physical examinations; performing selected diagnostic and therapeutic interventions; and counseling on preventive health care. In compliance with relevant legislation and regulations in Ontario, the physician supervising the PA determines the clinical activities of the PA and is accountable for the health care provided (200).

Why are APs or ERPs critical in addressing arthritis and MSK health?

As noted above, the burden of arthritis is increasing and health human resources are decreasing. As shown in figure 1, the majority of people with arthritis do not see a specialist and the majority of those who do see a physician are managed through conservative means (201). Models of care that incorporate AP/ERPs have the potential to increase access to care while also facilitating care by the right provider in a timely manner (e.g., specialists will be seeing those who require their specific skills; those who need education and self-management strategies can similarly access the appropriate service provider).

Figure 1. Health care utilization of people with arthritis and related disorders



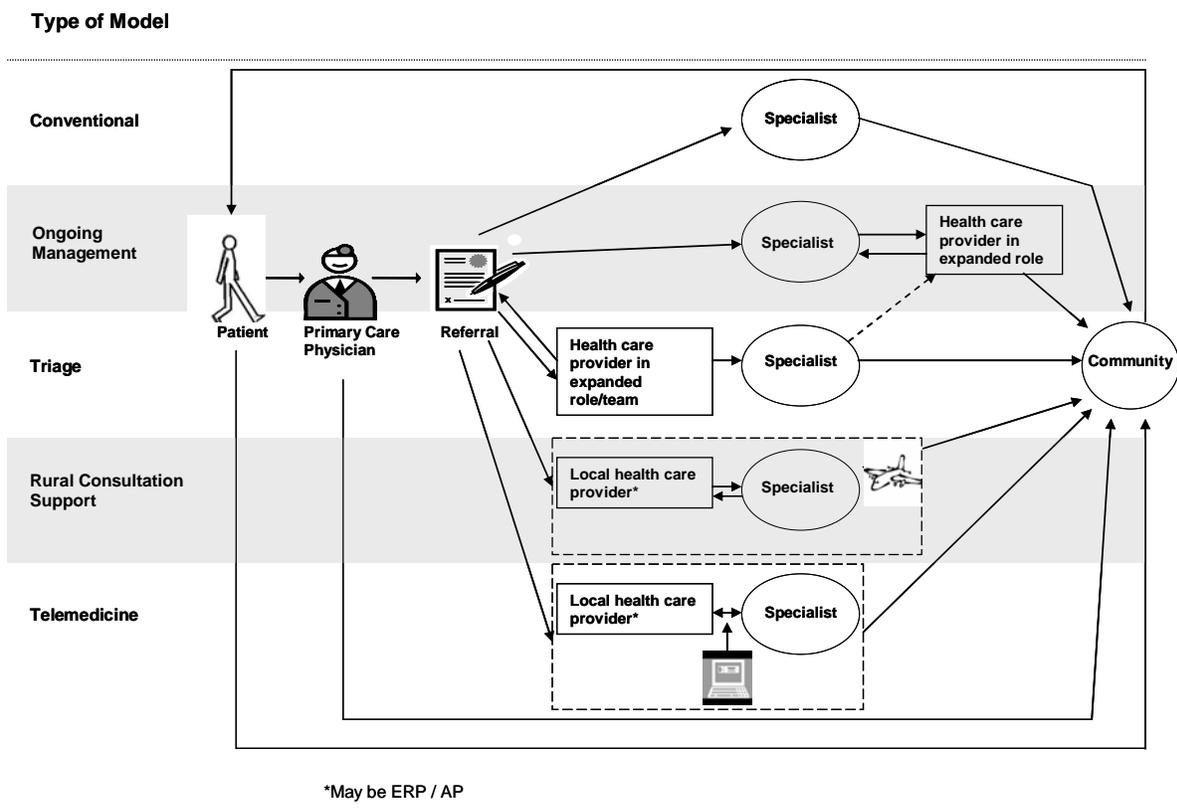
Source: Reproduced from Arthritis and related conditions in Ontario: ICES Research Atlas (201)

What do we know about models of care utilizing APs or ERPs in arthritis management?

A model of arthritis care describes the essential elements necessary to provide optimal care for people living with all types of arthritis and at all stages and severity of disease. For example, the British Columbia and Ontario Chronic Care Models include the informed patient who is active in his/her own care and who interacts with a prepared and proactive health care team. Overarching are community and health system structures and resources (e.g., resources and policies providing self-management support at the community level and that has organizational systems including health system design, decision support and clinical information systems at the health system level) with the goal of achieving improved patient and system outcomes (202;203). The goal of such models is timely, integrated, inter-professional care in which the patient is an active partner.

Internationally, health care professionals such as nurses, PTs, and OTs, increasingly work in extended roles in rheumatology and orthopaedics in part to improve access to care (204). Typically, these providers work in models of care with one of two primary purposes: 1) to provide ongoing management of patients with arthritis while working in collaboration with a specialist; and, 2) to assess patients with MSK conditions and to refer them to appropriate services (triage) (189;190). Research from the Arthritis Community Research & Evaluation Unit (ACREU) identified common models of care for arthritis including those using APs and ERPs by conducting key informant interviews with 74 health care providers working in arthritis care and other arthritis experts. These models are described below followed by a summary of the research that has examined the impact of the use of APs and ERPs. Figure 2 illustrates the current models of care that include specialist

Figure 2. Current Models of Care



services as well as other health care providers, which may be AP/ERPs, in care delivery.

Types of Models of Care with AP and ERPs *Ongoing management using APs/ ERPs*

This model is often used in the outpatient hospital setting for patients with various types of arthritis, most commonly inflammatory arthritis. Patients are referred from primary care physicians to a specialist (often a rheumatologist). Appropriate patients are then referred to an AP or ERP for ongoing monitoring and management over time. The AP/ERPs perform MSK examinations, provide ongoing monitoring, make recommendations regarding changes to medications, and make referrals to other health care providers. The AP/ERP works closely with the specialist as required, but in more stable cases, patients may be managed independently by an AP/ERP with less frequent follow-up by the rheumatologist. Patient education, self-management and support for psychosocial issues are often integrated into the care provided by the AP/ERP.

Triage

Triage models have been developed to streamline and expedite access to orthopaedic care particularly in the UK, and more recently as a response to wait time reduction strategies for total joint replacement in Canada (179;180;183;186-188;192;193;205-207). To a lesser extent, triage models are in development for screening of early inflammatory arthritis in order to identify patients in need of timely referrals to rheumatology. In this model, patients are referred by a primary care physician to a centre with AP/ERPs (usually working in a team) for assessment and management. The composition of the triage team varies with some teams led by advanced practice PTs or OTs and other teams consisting of PTs and primary care physicians with skills in orthopaedics. The APs/ERPs or triage teams assess, advise and request appropriate investigations, and refer to the orthopaedic surgeon if indicated. Although some follow-up may be available, patients typically are seen only 1-2 times by the team and primary health care providers provide ongoing management of the condition. Treatments such as joint injections may be available and performed by APs/ERPs; however, this occurs mainly in the UK. Patient education and self-management strategies may be incorporated into service delivery.

Specific models of care to promote access to specialist care in rural and remote communities have been developed with rural consultation support by physicians and other health care providers and telemedicine. Both of these models may integrate AP/ERPs.

Rural and remote consultation support

This model has been used to address health human resource shortages and promote timely access to care for patients living in rural and remote areas. An initial assessment is usually conducted by a primary care physician or, in some remote communities, a nurse. Referrals are made to the appropriate health care provider, often a specialist, who travels to local communities on a regular basis to provide assessment and management of patients. Specialist visits are relatively infrequent and for a defined and short period of time; therefore, screening patients to determine who is in need of specialist input at a given visit is critical. The ongoing monitoring and liaison with the specialist is then often managed by the local health professional, such as a PT, nurse, or primary care physician. In some cases, these professionals are AP/ERPs.

Telemedicine

Telemedicine is a means of sharing health information and providing health care services using telecommunications. After the patient is referred from the primary care physician to a specialist, telemedicine can often be used to link the patient to the specialist in a remote location. A nurse, PT, and/or primary care physician are present with the patient locally in order to perform the MSK assessment while the specialist views the process. In some cases an AP/ERP conducts the screening, hands on assessment, or follow-up of such patients. Hence, direct contact with the patient, practitioner and specialist is facilitated such that appropriate referrals, treatment and follow-up can be implemented.

Evidence supporting AP/ERP roles

To date, most of the research related to AP/ERPs comes from the UK where studies have focused on PTs working in triage roles in orthopaedic clinics with demonstrated reductions in wait times for orthopaedic surgery, improved conversion rates to surgery, and high patient satisfaction (180;183;186;192;193;206-209). In

other research, specially trained PTs have been shown to accurately diagnose MSK conditions and manage a substantive proportion of orthopaedic caseloads independently (180;183;186-188;191;192;206;207;210-212). In a randomized controlled trial of the effectiveness of specially trained PTs in the UK, it was found that they were as effective as post-fellowship junior orthopaedic surgeons in the initial assessment and management of new referrals to orthopaedic departments. The only outcome of statistical or clinical difference between the groups was in patient satisfaction that favored the PTs. Initial direct costs were lower in the PT group as they were less likely to order radiographs or recommend surgery (183). In Canada, PTs working in advanced practice roles have been shown to make similar clinical recommendations to orthopaedic surgeons regarding the patient's need for orthopaedic consultation and total joint replacement (213).

In rheumatology, the use of nurses in extended roles has been evaluated. Hill et al. found that patients in a rheumatology nurse practitioner clinic had significantly lower levels of pain, increased knowledge, and were more satisfied with their care than physician-led clinics (184;185). Similarly in the Netherlands, patients seen by clinical nurse specialists had similar outcomes to patients seen by a team of professionals (197). In Canada, patient and parental satisfaction with care provided by an advanced practitioner in a paediatric rheumatology setting was generally similar to the care provided by the rheumatologist (182). PT-led clinics were rated higher in the domains of access and communication but were lower for the provision of continuity of care as compared to rheumatologist-led clinics (182).

In summary, various models of care using APs or ERPs exist in Canada and internationally. The limited available evidence suggests that practitioners in these roles can satisfactorily triage and manage people with arthritis and MSK conditions, appropriately referring individuals to specialist care. However, the models that exist, particularly in Canada, tend to address only a specified aspect of the continuum of care (e.g., triage for total joint arthroplasty). An arthritis model of care that maximizes the skills of all health care providers needs to address the continuum of care across various aspects of the health care system and the community for people with all types of

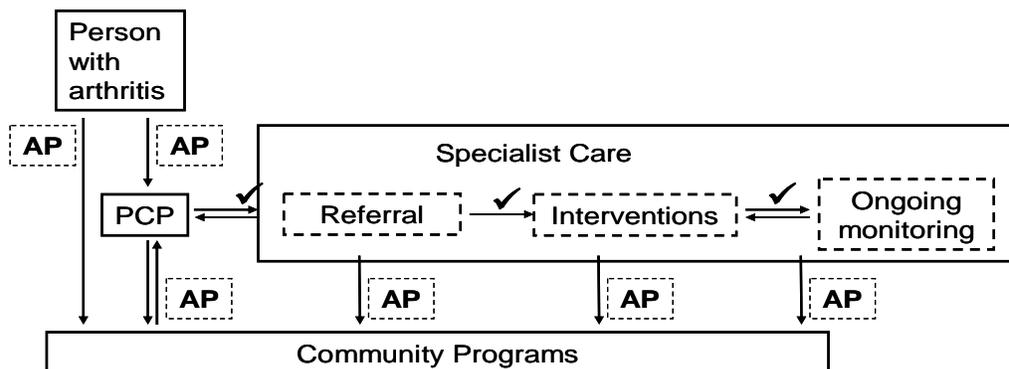
arthritis and at all stages of disease and disease severity. It is by addressing care across the continuum that we will have the opportunity to ensure access to the right care by the right health care provider at the right time and improve health system efficiency, patient care, and reduce costs.

Recommendations regarding AP and ERP roles across the continuum of care

Given their skills and the known roles in which AP/ERPs currently work nationally and internationally, there is great potential for the expanded use of AP/ERPs across the continuum of care. Figure 3 describes the continuum of care for people with arthritis (recognizing that some individuals, depending on the stage and severity of their disease, will require care throughout the continuum while others will require only some aspects of care), and shows the interfaces at which AP/ERPs currently practice, as well as additional possible areas in the continuum where extended practice roles might be introduced or enhanced to improve access to appropriate care.

Given the prevalence of arthritis, the deficiencies in primary care management of arthritis, and that only 16% of people with arthritis see a specialist (Figure 1), there are many people in the community who could benefit from an AP/ERP assessment and evaluation. Early intervention, as indicated by evidence synthesized in best practice guidelines (214), may relieve symptoms and prevent or slow progression of the disease. Community-based access to care also has the potential to facilitate access to appropriate medical and specialist care. The relatively limited deployment of AP/ERPs is most frequently in conjunction with specialist care, as noted above, but there is opportunity for expansion of these roles in more settings. Additionally, community programs, ongoing access, and follow-up by AP/ERPs provide the opportunity for individuals to regain access to the system as their condition changes. AP/ERPs could have a beneficial ongoing relationship with the client base. For example, continuing interaction between the patient and AP/ERP beyond the initial assessment would include follow-up visits to assess adherence to recommendations, need for change in treatment direction, referral onward to other specialists/programs, etc. Key roles for AP/ERPs are highlighted in Exhibit 1. It is unlikely that one individual will fulfill all roles

Figure 3. Potential roles for AP/ERP in a comprehensive approach to arthritis management



✓ = documented role for AP/ERPs
 AP = opportunity for AP/ERPs to facilitate care (see text)
 PCP = primary care practitioner

at a given time as it will depend on the context of the care delivery and the needs of all stakeholders involved.

A key component of the advanced/extended practice role is program development in response to patient need and demand. This may include development of comprehensive self-management and education programs for arthritis and related conditions, population-specific exercise classes etc. where none exist, or partnering with existing community-based programs and resources (e.g., in some regions such programs are offered by The Arthritis Society and Seniors Wellness programs).

Contributions to educational activities are also a key component of the role of the AP/ERPs. These would include educational activities for colleagues; education provision to rehabilitation students and medical residents working in the area of MSK, as well as providing education to the community about chronic MSK conditions with health promotion and disease/injury prevention as imperative. Training volunteers to conduct self-management and exercise programs could also fall within the role of the AP/ERP.

Participation in clinical-, systems-, and population-based research and evaluation will be an important aspect of the AP/ERP role depending on the context. For example, quality, peer-reviewed output should be a key expectation for those working in academic

settings, and should include attendance and presentation at relevant conferences, submission to journals and contribution to the development of research projects within the area of practice.

- Exhibit 1. Key roles for the AP / ERP:**
- System navigation
 - Assessment
 - Triage and referral
 - Ongoing management, monitoring and follow-up
 - Program development and evaluation
 - Patient and health care provider education

Demonstrable leadership in the area of practice (e.g. arthritis, general MSK, etc.) within the profession (e.g., PT/OT, etc.) and at the place of employment is also a key component. Professional investment in the role should include awareness and participation in activities with professional regulatory bodies and professional associations.

While Figure 3 focuses on arthritis management, this model of care could extend to individuals with all MSK, and potentially other chronic conditions such as diabetes, cardiovascular, mental health, cancer, etc. The purview of MSK

disease is within the knowledge base and expertise of rehabilitation therapists. There is an opportunity to realize efficiencies associated with timely access to the right professional for people with this entire group of diseases and conditions. It should be noted that the effective functioning of a collaborative interdisciplinary MSK team is critical to the success of models of care using AP/ERP across the continuum of care. This team would include primary care practitioners, rheumatologists, orthopaedic surgeons, pharmacists, social workers, PTs, OTs, nurses, and dieticians working together with each focusing on their area of expertise. This collaborative approach is crucial to success when the AP/ERP is the first-line practitioner working in a triage role as they may encounter patients with conditions/presentations that are beyond their expertise. Integration of disciplines is critical as AP/ERPs need to know who they can call to obtain immediate assistance/referral or information. In the UK, General Practitioners with a Special Interest in MSK are often part of the team and available to assist with the more challenging cases.

Conclusions and Summary: Issues for resolution

The potential for AP/ERP roles across the continuum of care in improving access and quality of care for individuals with arthritis and MSK diseases is now well recognized. Additionally, there are potential cost savings at the patient level. Patients should receive both better care, and faster, more appropriate care which should lead to increased efficiency and cost savings for the health care system. However, development and implementation of these roles is still a major challenge. The key issues will differ depending on the point of the continuum of care where the role is implemented, the stakeholder and the context. From the perspective of the public/potential patient, education about who provides the care will be required. Health professionals are likely to be concerned about encroachment on practice, liability and funding mechanisms. Some health professionals will not want the responsibility of extended practice, while others will struggle to learn a new way of practicing. Rural and remote areas will face challenges of geography not experienced in urban areas. Academic centres will need to consider alternative ways of ensuring training for health

professionals. Regulatory bodies will need to resolve issues regarding scope of practice to ensure those working in extended or advanced practice roles are working within their scope. Standardization of credentialing for AP/ERPs will be important to ensure that they have the necessary skills to perform their roles. Educators and regulatory bodies will need to work together on this issue to prevent roles remaining institutionally based. For example, in Ontario, AP/ERPs work under advanced directives specific to the institution in which they work, which limits transferability and the scope of the role. Employers too may struggle when trying to redefine job descriptions, determine appropriate compensation (including costs of ongoing education to meet requirements for ongoing credentialing) and resolve issues of liability.

As we have learned from the implementation of these roles within the UK, even recognizing that the National Health System funding model differs from that in Canada, these issues are not insurmountable. Within the Central Toronto Local Health Integrated Network, there is a cadre of advanced practitioners who could begin to work at various points in and throughout the continuum of care that could make this vision a reality. Developing and implementing, viable and effective solutions for all stakeholders requires that there is recognition and inclusion of all the roles of AP/ERPs across the continuum of care. Otherwise, these roles will continue to be developed focusing only on limited aspects of care for a limited number of people with arthritis or MSK conditions resulting in limited transferability across the continuum of care and settings.

In the context of the increased burden of arthritis and MSK disease and the shrinking of health human resources, *timely, integrated, inter-professional care in which the patient is an active partner* is the optimal goal. Utilization of APs or ERPs in primary care settings for patients with MSK complaints and throughout the continuum of care for people with all types, stages and severity of arthritis has the potential to improve access to care by the patient to the right provider which would ultimately improve patient and system level outcomes. Establishing a body of evidence related to process and outcome evaluation around these roles and models of care will be critical to understanding and supporting their evolution.

Reference List

- (1) Perruccio AV, Badley EM, Guan J. Burden of Disease. In: Badley E, Glazier R, editors. Arthritis and Related Conditions in Ontario: ICES Research Atlas. 2nd ed. Toronto: Institute for Clinical Evaluative Sciences; 2004. p. 15-40.
- (2) Arthritis prevalence and activity limitations--United States, 1990. MMWR Morb Mortal Wkly Rep 1994 Jun 24;43(24):433-8.
- (3) Prevalence of disabilities and associated health conditions--United States, 1991-1992. MMWR Morb Mortal Wkly Rep 1994 Oct 14;43(40):730-9.
- (4) Impact of arthritis and other rheumatic conditions on the health-care system--United States, 1997. MMWR Morb Mortal Wkly Rep 1999 May 7;48(17):349-53.
- (5) Prevalence of arthritis--United States, 1997. MMWR Morb Mortal Wkly Rep 2001 May 4;50(17):334-6.
- (6) Prevalence of disabilities and associated health conditions among adults--United States, 1999. MMWR Morb Mortal Wkly Rep 2001 Feb 23;50(7):120-5.
- (7) Public health and aging: projected prevalence of self-reported arthritis or chronic joint symptoms among persons aged >65 years--United States, 2005-2030. MMWR Morb Mortal Wkly Rep 2003 May 30;52(21):489-91.
- (8) The burden of musculoskeletal conditions at the start of the new millennium. World Health Organ Tech Rep Ser 2003;919:i-218, back.
- (9) Adams PF, Hendershot GE, Marano MA. Current estimates from the National Health Interview Survey, 1996. Vital Health Stat 10 1999 Oct;(200):1-203.
- (10) Aggarwal A, Chandran S, Misra R. Physical, psychosocial and economic impact of rheumatoid arthritis: a pilot study of patients seen at a tertiary care referral centre. Natl Med J India 2006 Jul;19(4):187-91.
- (11) Alonso J, Ferrer M, Gandek B, Ware JE, Jr., Aaronson NK, Mosconi P, et al. Health-related quality of life associated with chronic conditions in eight countries: results from the International Quality of Life Assessment (IQOLA) Project. Qual Life Res 2004 Mar;13(2):283-98.
- (12) Arden N, Nevitt MC. Osteoarthritis: epidemiology. Best Pract Res Clin Rheumatol 2006 Feb;20(1):3-25.
- (13) Badley E. The impact of musculoskeletal disorders on the Canadian population. J Rheumatol 1992 Mar;19(3):337-40.
- (14) Badley EM, Rasooly I, Webster GK. Relative importance of musculoskeletal disorders as a cause of chronic health problems, disability, and health care utilization: findings from the 1990 Ontario Health Survey. J Rheumatol 1994 Mar;21(3):505-14.
- (15) Badley EM. The impact of disabling arthritis. Arthritis Care Res 1995 Dec;8(4):221-8.
- (16) Badley EM, Webster GK, Rasooly I. The impact of musculoskeletal disorders in the population: are they just aches and pains? Findings from the 1990 Ontario Health Survey. J Rheumatol 1995 Apr;22(4):733-9.
- (17) Badley EM, Wang PP. Arthritis and the aging population: projections of arthritis prevalence in Canada 1991 to 2031. J Rheumatol 1998 Jan;25(1):138-44.
- (18) Badley EM, Wang PP. The contribution of arthritis and arthritis disability to nonparticipation in the labor force: a Canadian example. J Rheumatol 2001 May;28(5):1077-82.
- (19) Bijlsma JW, Knahr K. Strategies for the prevention and management of osteoarthritis of the hip and knee. Best Pract Res Clin Rheumatol 2007 Feb;21(1):59-76.
- (20) Brooks PM. Impact of osteoarthritis on individuals and society: how much disability? Social consequences and health economic implications. Curr Opin Rheumatol 2002 Sep;14(5):573-7.
- (21) Buckwalter JA, Saltzman C, Brown T. The impact of osteoarthritis: implications for research. Clin Orthop Relat Res 2004 Oct;(427 Suppl):S6-15.

- (22) Busija L, Hollingsworth B, Buchbinder R, Osborne RH. Role of age, sex, and obesity in the higher prevalence of arthritis among lower socioeconomic groups: a population-based survey. *Arthritis Rheum* 2007 May 15;57(4):553-61.
- (23) Desai MM, Zhang P, Hennessy CH. Surveillance for morbidity and mortality among older adults--United States, 1995-1996. *MMWR CDC Surveill Summ* 1999 Dec 17;48(8):7-25.
- (24) Elders MJ. The increasing impact of arthritis on public health. *J Rheumatol Suppl* 2000 Oct;60:6-8.
- (25) Fautrel B, Hilliquin P, Rozenberg S, Allaert FA, Coste P, Leclerc A, et al. Impact of osteoarthritis: results of a nationwide survey of 10,000 patients consulting for OA. *Joint Bone Spine* 2005 May;72(3):235-40.
- (26) Felson DT, Zhang Y. An update on the epidemiology of knee and hip osteoarthritis with a view to prevention. *Arthritis Rheum* 1998 Aug;41(8):1343-55.
- (27) Fex E, Larsson BM, Nived K, Eberhardt K. Effect of rheumatoid arthritis on work status and social and leisure time activities in patients followed 8 years from onset. *J Rheumatol* 1998 Jan;25(1):44-50.
- (28) Fontaine KR, Haaz S, Heo M. Projected prevalence of US adults with self-reported doctor-diagnosed arthritis, 2005 to 2050. *Clin Rheumatol* 2007 May;26(5):772-4.
- (29) Gabriel SE, Crowson CS, O'Fallon WM. Costs of osteoarthritis: estimates from a geographically defined population. *J Rheumatol Suppl* 1995 Feb;43:23-5.
- (30) Glazier R, Fry J, Badley E. Arthritis and rheumatism are neglected health priorities: a bibliometric study. *J Rheumatol* 2001 Apr;28(4):706-11.
- (31) Gupta S, Hawker GA, Laporte A, Croxford R, Coyte PC. The economic burden of disabling hip and knee osteoarthritis (OA) from the perspective of individuals living with this condition. *Rheumatology (Oxford)* 2005 Dec;44(12):1531-7.
- (32) Harkness EF, Macfarlane GJ, Silman AJ, McBeth J. Is musculoskeletal pain more common now than 40 years ago?: Two population-based cross-sectional studies. *Rheumatology (Oxford)* 2005 Jul;44(7):890-5.
- (33) Health C. *Arthritis in Canada: An ongoing challenge*. Ottawa, Ontario: Health Canada; 2003.
- (34) Hill CL, Parsons J, Taylor A, Leach G. Health related quality of life in a population sample with arthritis. *J Rheumatol* 1999 Sep;26(9):2029-35.
- (35) Hopman-Rock M, de Bock GH, Bijlsma JW, Springer MP, Hofman A, Kraaijmaat FW. The pattern of health care utilization of elderly people with arthritic pain in the hip or knee. *Int J Qual Health Care* 1997 Apr;9(2):129-37.
- (36) Hunsche E, Chancellor JV, Bruce N. The burden of arthritis and nonsteroidal anti-inflammatory treatment. A European literature review. *Pharmacoeconomics* 2001;19 Suppl 1:1-15.
- (37) Jarvholm B, Lewold S, Malchau H, Vingard E. Age, bodyweight, smoking habits and the risk of severe osteoarthritis in the hip and knee in men. *Eur J Epidemiol* 2005;20(6):537-42.
- (38) Katz PP. The impact of rheumatoid arthritis on life activities. *Arthritis Care Res* 1995 Dec;8(4):272-8.
- (39) Kavanaugh A. Economic consequences of established rheumatoid arthritis and its treatment. *Best Pract Res Clin Rheumatol* 2007 Oct;21(5):929-42.
- (40) Kelsey JL, Hochberg MC. Epidemiology of chronic musculoskeletal disorders. *Annu Rev Public Health* 1988;9:379-401.
- (41) Kempen GI, Ormel J, Brilman EI, Relyveld J. Adaptive responses among Dutch elderly: the impact of eight chronic medical conditions on health-related quality of life. *Am J Public Health* 1997 Jan;87(1):38-44.
- (42) Kobelt G, Jonsson L, Lindgren P, Young A, Eberhardt K. Modeling the progression of rheumatoid arthritis: a two-country model to

estimate costs and consequences of rheumatoid arthritis. *Arthritis Rheum* 2002 Sep;46(9):2310-9.

(43) Kopec JA, Rahman MM, Berthelot JM, Le Petit C, Aghajanian J, Sayre EC, et al. Descriptive epidemiology of osteoarthritis in British Columbia, Canada. *J Rheumatol* 2007 Feb;34(2):386-93.

(44) Kvien TK. Epidemiology and burden of illness of rheumatoid arthritis. *Pharmacoeconomics* 2004;22(2 Suppl 1):1-12.

(45) Lajas C, Abasolo L, Bellajdel B, Hernandez-Garcia C, Carmona L, Vargas E, et al. Costs and predictors of costs in rheumatoid arthritis: a prevalence-based study. *Arthritis Rheum* 2003 Feb 15;49(1):64-70.

(46) Lane NE. Clinical practice. Osteoarthritis of the hip. *N Engl J Med* 2007 Oct 4;357(14):1413-21.

(47) LaPlante MP. The demographics of disability. *Milbank Q* 1991;69 Suppl 1-2:55-77.

(48) Lawrence RC, Helmick CG, Arnett FC, Deyo RA, Felson DT, Giannini EH, et al. Estimates of the prevalence of arthritis and selected musculoskeletal disorders in the United States. *Arthritis Rheum* 1998 May;41(5):778-99.

(49) Lee P. The economic impact of musculoskeletal disorders. *Qual Life Res* 1994 Dec;3 Suppl 1:S85-S91.

(50) Lethbridge-Cejku M, Helmick CG, Popovic JR. Hospitalizations for arthritis and other rheumatic conditions: data from the 1997 National Hospital Discharge Survey. *Med Care* 2003 Dec;41(12):1367-73.

(51) Leveille SG. Musculoskeletal aging. *Curr Opin Rheumatol* 2004 Mar;16(2):114-8.

(52) Li X, Gignac MA, Anis AH. The indirect costs of arthritis resulting from unemployment, reduced performance, and occupational changes while at work. *Med Care* 2006 Apr;44(4):304-10.

(53) March L, Lapsley H. What are the costs to society and the potential benefits from the effective management of early rheumatoid

arthritis? *Best Pract Res Clin Rheumatol* 2001 Mar;15(1):171-85.

(54) March LM, Bachmeier CJ. Economics of osteoarthritis: a global perspective. *Baillieres Clin Rheumatol* 1997 Nov;11(4):817-34.

(55) McDuffie FC. Morbidity impact of rheumatoid arthritis on society. *Am J Med* 1985 Jan 21;78(1A):1-5.

(56) Merkesdal S, Ruof J, Schoffski O, Bernitt K, Zeidler H, Mau W. Indirect medical costs in early rheumatoid arthritis: composition of and changes in indirect costs within the first three years of disease. *Arthritis Rheum* 2001 Mar;44(3):528-34.

(57) Miles TP, Flegal K, Harris T. Musculoskeletal disorders: time trends, comorbid conditions, self-assessed health status, and associated activity limitations. *Vital Health Stat* 3 1993 Jan;(27):275-88.

(58) Nunez M, Sanchez A, Nunez E, Casals T, Alegre C, Munoz-Gomez J. Patients' perceptions of health related quality of life in rheumatoid arthritis and chronic low back pain. *Qual Life Res* 2006 Feb;15(1):93-102.

(59) Nusselder WJ, van d, V, van Sonsbeek JL, Lenior ME, van den Bos GA. The elimination of selected chronic diseases in a population: the compression and expansion of morbidity. *Am J Public Health* 1996 Feb;86(2):187-94.

(60) Osiri M, Maetzel A, Tugwell P. The economic burden of rheumatoid arthritis in a developing nation: results from a one-year prospective cohort study in Thailand. *J Rheumatol* 2007 Jan;34(1):57-63.

(61) Pearson-Ceol J. Literature review on the effects of obesity on knee osteoarthritis. *Orthop Nurs* 2007 Sep;26(5):289-92.

(62) Picavet HS, van den Bos GA. The contribution of six chronic conditions to the total burden of mobility disability in the Dutch population. *Am J Public Health* 1997 Oct;87(10):1680-2.

(63) Picavet HS, Hazes JM. Prevalence of self reported musculoskeletal diseases is high. *Ann Rheum Dis* 2003 Jul;62(7):644-50.

- (64) Pincus T, Callahan LF, Burkhauser RV. Most chronic diseases are reported more frequently by individuals with fewer than 12 years of formal education in the age 18-64 United States population. *J Chronic Dis* 1987;40(9):865-74.
- (65) Rabenda V, Manette C, Lemmens R, Mariani AM, Struvay N, Reginster JY. Prevalence and impact of osteoarthritis and osteoporosis on health-related quality of life among active subjects. *Aging Clin Exp Res* 2007 Feb;19(1):55-60.
- (66) Raina P, Dukeshire S, Lindsay J, Chambers LW. Chronic conditions and disabilities among seniors: an analysis of population-based health and activity limitation surveys. *Ann Epidemiol* 1998 Aug;8(6):402-9.
- (67) Rat AC, Boissier MC. Rheumatoid arthritis: direct and indirect costs. *Joint Bone Spine* 2004 Nov;71(6):518-24.
- (68) Reginster JY. The prevalence and burden of arthritis. *Rheumatology (Oxford)* 2002 Apr;41 Supp 1:3-6.
- (69) Reynolds DL, Torrance GW, Badley EM, Bennett KJ, Chambers LW, Goldsmith CH, et al. Modelling the population health impact of musculoskeletal diseases: arthritis. *J Rheumatol* 1993 Jun;20(6):1037-47.
- (70) Rkain H, Allali F, Jroundi I, Hajjaj-Hassouni N. Socioeconomic impact of rheumatoid arthritis in Morocco. *Joint Bone Spine* 2006 May;73(3):278-83.
- (71) Ruof J, Hulsemann JL, Mittendorf T, Handelmann S, der Schulenburg JM, Zeidler H, et al. Costs of rheumatoid arthritis in Germany: a micro-costing approach based on healthcare payer's data sources. *Ann Rheum Dis* 2003 Jun;62(6):544-9.
- (72) Saarni SI, Harkanen T, Sintonen H, Suvisaari J, Koskinen S, Aromaa A, et al. The impact of 29 chronic conditions on health-related quality of life: a general population survey in Finland using 15D and EQ-5D. *Qual Life Res* 2006 Oct;15(8):1403-14.
- (73) Salaffi F, De Angelis R, Stancati A, Grassi W. Health-related quality of life in multiple musculoskeletal conditions: a cross-sectional population based epidemiological study. II. The MAPPING study. *Clin Exp Rheumatol* 2005 Nov;23(6):829-39.
- (74) Sangha O. Epidemiology of rheumatic diseases. *Rheumatology (Oxford)* 2000 Dec;39 Suppl 2:3-12.
- (75) Schultz SE, Kopec JA. Impact of chronic conditions. *Health Rep* 2003 Aug;14(4):41-53.
- (76) Sprangers MA, de Regt EB, Andries F, van Agt HM, Bijl RV, de Boer JB, et al. Which chronic conditions are associated with better or poorer quality of life? *J Clin Epidemiol* 2000 Sep;53(9):895-907.
- (77) Sun BH, Wu CW, Kalunian KC. New developments in osteoarthritis. *Rheum Dis Clin North Am* 2007 Feb;33(1):135-48.
- (78) Verbrugge LM, Lepkowski JM, Konkol LL. Levels of disability among U.S. adults with arthritis. *J Gerontol* 1991 Mar;46(2):S71-S83.
- (79) Verbrugge LM, Patrick DL. Seven chronic conditions: their impact on US adults' activity levels and use of medical services. *Am J Public Health* 1995 Feb;85(2):173-82.
- (80) Wong JB, Ramey DR, Singh G. Long-term morbidity, mortality, and economics of rheumatoid arthritis. *Arthritis Rheum* 2001 Dec;44(12):2746-9.
- (81) Woo J, Lau E, Lau CS, Lee P, Zhang J, Kwok T, et al. Socioeconomic impact of osteoarthritis in Hong Kong: utilization of health and social services, and direct and indirect costs. *Arthritis Rheum* 2003 Aug 15;49(4):526-34.
- (82) Woolf AD, Pflieger B. Burden of major musculoskeletal conditions. *Bull World Health Organ* 2003;81(9):646-56.
- (83) Yelin E. Arthritis. The cumulative impact of a common chronic condition. *Arthritis Rheum* 1992 May;35(5):489-97.
- (84) Yelin E, Callahan LF. The economic cost and social and psychological impact of musculoskeletal conditions. *National Arthritis*

Data Work Groups. *Arthritis Rheum* 1995 Oct;38(10):1351-62.

(85) Yelin E, Wanke LA. An assessment of the annual and long-term direct costs of rheumatoid arthritis: the impact of poor function and functional decline. *Arthritis Rheum* 1999 Jun;42(6):1209-18.

(86) Health Canada. *Economic Burden of Illness in Canada, 1998. 2002.*

(87) Anderson JJ, Felson DT. Factors associated with osteoarthritis of the knee in the first national Health and Nutrition Examination Survey (HANES I). Evidence for an association with overweight, race, and physical demands of work. *Am J Epidemiol* 1988 Jul;128(1):179-89.

(88) Bierma-Zeinstra SM, Koes BW. Risk factors and prognostic factors of hip and knee osteoarthritis. *Nat Clin Pract Rheumatol* 2007 Feb;3(2):78-85.

(89) Cicuttini FM, Baker JR, Spector TD. The association of obesity with osteoarthritis of the hand and knee in women: a twin study. *J Rheumatol* 1996 Jul;23(7):1221-6.

(90) Cooper C, Snow S, McAlindon TE, Kellingray S, Stuart B, Coggon D, et al. Risk factors for the incidence and progression of radiographic knee osteoarthritis. *Arthritis Rheum* 2000 May;43(5):995-1000.

(91) Davis MA, Ettinger WH, Neuhaus JM, Cho SA, Hauck WW. The association of knee injury and obesity with unilateral and bilateral osteoarthritis of the knee. *Am J Epidemiol* 1989 Aug;130(2):278-88.

(92) Dawson J, Juszczak E, Thorogood M, Marks SA, Dodd C, Fitzpatrick R. An investigation of risk factors for symptomatic osteoarthritis of the knee in women using a life course approach. *J Epidemiol Community Health* 2003 Oct;57(10):823-30.

(93) Felson DT, Anderson JJ, Naimark A, Walker AM, Meenan RF. Obesity and knee osteoarthritis. The Framingham Study. *Ann Intern Med* 1988 Jul 1;109(1):18-24.

(94) Felson DT. Does excess weight cause osteoarthritis and, if so, why? *Ann Rheum Dis* 1996 Sep;55(9):668-70.

(95) Felson DT. Weight and osteoarthritis. *Am J Clin Nutr* 1996 Mar;63(3 Suppl):430S-2S.

(96) Felson DT, Zhang Y, Hannan MT, Naimark A, Weissman B, Aliabadi P, et al. Risk factors for incident radiographic knee osteoarthritis in the elderly: the Framingham Study. *Arthritis Rheum* 1997 Apr;40(4):728-33.

(97) Felson DT, Lawrence RC, Dieppe PA, Hirsch R, Helmick CG, Jordan JM, et al. Osteoarthritis: new insights. Part 1: the disease and its risk factors. *Ann Intern Med* 2000 Oct 17;133(8):635-46.

(98) Felson DT, Goggins J, Niu J, Zhang Y, Hunter DJ. The effect of body weight on progression of knee osteoarthritis is dependent on alignment. *Arthritis Rheum* 2004 Dec;50(12):3904-9.

(99) Hart DJ, Spector TD. The relationship of obesity, fat distribution and osteoarthritis in women in the general population: the Chingford Study. *J Rheumatol* 1993 Feb;20(2):331-5.

(100) Hart DJ, Doyle DV, Spector TD. Incidence and risk factors for radiographic knee osteoarthritis in middle-aged women: the Chingford Study. *Arthritis Rheum* 1999 Jan;42(1):17-24.

(101) Hartz AJ, Fischer ME, Brill G, Kelber S, Rupley D, Jr., Oken B, et al. The association of obesity with joint pain and osteoarthritis in the HANES data. *J Chronic Dis* 1986;39(4):311-9.

(102) Heliovaara M, Makela M, Impivaara O, Knekt P, Aromaa A, Sievers K. Association of overweight, trauma and workload with coxarthrosis. A health survey of 7,217 persons. *Acta Orthop Scand* 1993 Oct;64(5):513-8.

(103) Helmick CG, Lawrence RC, Pollard RA, Lloyd E, Heyse SP. Arthritis and other rheumatic conditions: who is affected now, who will be affected later? National Arthritis Data Workgroup. *Arthritis Care Res* 1995 Dec;8(4):203-11.

- (104) Hochberg MC, Lethbridge-Cejku M, Scott WW, Jr., Reichle R, Plato CC, Tobin JD. The association of body weight, body fatness and body fat distribution with osteoarthritis of the knee: data from the Baltimore Longitudinal Study of Aging. *J Rheumatol* 1995 Mar;22(3):488-93.
- (105) Hootman JM, Helmick CG. Projections of US prevalence of arthritis and associated activity limitations. *Arthritis Rheum* 2006 Jan;54(1):226-9.
- (106) Issa SN, Sharma L. Epidemiology of osteoarthritis: an update. *Curr Rheumatol Rep* 2006 Feb;8(1):7-15.
- (107) Jiang Y, Chen Y, Manuel D, Morrison H, Mao Y, Working Group. Quantifying the impact of obesity category on major chronic diseases in Canada. *ScientificWorldJournal* 2007;7:1211-21.
- (108) Maetzel A, Li LC, Pencharz J, Tomlinson G, Bombardier C. The economic burden associated with osteoarthritis, rheumatoid arthritis, and hypertension: a comparative study. *Ann Rheum Dis* 2004 Apr;63(4):395-401.
- (109) Manek NJ, Hart D, Spector TD, MacGregor AJ. The association of body mass index and osteoarthritis of the knee joint: an examination of genetic and environmental influences. *Arthritis Rheum* 2003 Apr;48(4):1024-9.
- (110) Manninen P, Riihimaki H, Heliovaara M, Makela P. Overweight, gender and knee osteoarthritis. *Int J Obes Relat Metab Disord* 1996 Jun;20(6):595-7.
- (111) O'Reilly S, Doherty M. Lifestyle changes in the management of osteoarthritis. *Best Pract Res Clin Rheumatol* 2001 Oct;15(4):559-68.
- (112) Oliveria SA, Felson DT, Cirillo PA, Reed JI, Walker AM. Body weight, body mass index, and incident symptomatic osteoarthritis of the hand, hip, and knee. *Epidemiology* 1999 Mar;10(2):161-6.
- (113) Reynolds DL, Chambers LW, Badley EM, Bennett KJ, Goldsmith CH, Jamieson E, et al. Physical disability among Canadians reporting musculoskeletal diseases. *J Rheumatol* 1992 Jul;19(7):1020-30.
- (114) Teichtahl AJ, Wang Y, Cicuttini FM. Obesity and rural health--a neglected risk factor for knee osteoarthritis. *Rural Remote Health* 2007 Jan;7(1):698.
- (115) Yoshimura N, Nishioka S, Kinoshita H, Horii N, Nishioka T, Ryujin M, et al. Risk factors for knee osteoarthritis in Japanese women: heavy weight, previous joint injuries, and occupational activities. *J Rheumatol* 2004 Jan;31(1):157-62.
- (116) Zeidler H. Epidemiology of musculoskeletal conditions in the geriatric population. *Eur J Rheumatol Inflamm* 1994;14(1):3-6.
- (117) Ministry of Health and Long Term Care. Preventing and managing chronic disease: Ontario's framework. 2007.
- (118) Gagnon L. Stats Can: 14% of Canadians have no family doctor. *CMAJ* 2004 Jul 20;171(2):124.
- (119) Ryten E, Thurber AD, Buske L. The Class of 1989 and physician supply in Canada. *CMAJ* 1998 Mar 24;158(6):723-8.
- (120) The College of Family Physicians of Canada. A Prescription for Renewal. 2000.
- (121) McKendry R. Report of the Fact Finder on Physician Resources in Ontario. Physicians for Ontario: Too Many? Too Few? For 2000 and Beyond. 1999. Ref Type: Generic
- (122) Bolumar F, Ruiz MT, Hernandez I, Pascual E. Reliability of the diagnosis of rheumatic conditions at the primary health care level. *J Rheumatol* 1994 Dec;21(12):2344-8.
- (123) Coyte PC, Hawker G, Croxford R, Attard C, Wright JG. Variation in rheumatologists' and family physicians' perceptions of the indications for and outcomes of knee replacement surgery. *J Rheumatol* 1996 Apr;23(4):730-8.
- (124) Gamez-Nava JI, Gonzalez-Lopez L, Davis P, Suarez-Almazor ME. Referral and diagnosis of common rheumatic diseases by primary care physicians. *Br J Rheumatol* 1998 Nov;37(11):1215-9.

- (125) Glazier R. The role of primary care physicians in treating arthritis: overview. In: Badley EM, Williams JI, editors. *Patterns of Health Care in Ontario: Arthritis and Related Conditions. An ICES Practice Atlas*. Toronto: Institute for Clinical Evaluative Sciences; 1998. p. 63-4.
- (126) Glazier RH, Dalby DM, Badley EM, Hawker GA, Bell MJ, Buchbinder R, et al. Management of the early and late presentations of rheumatoid arthritis: a survey of Ontario primary care physicians. *CMAJ* 1996 Sep 15;155(6):679-87.
- (127) Glazier RH, Dalby DM, Badley EM, Hawker GA, Bell MJ, Buchbinder R. Determinants of physician confidence in the primary care management of musculoskeletal disorders. *J Rheumatol* 1996 Feb;23(2):351-6.
- (128) Glazier RH, Dalby DM, Badley EM, Hawker GA, Bell MJ, Buchbinder R, et al. Management of common musculoskeletal problems: a survey of Ontario primary care physicians. *CMAJ* 1998 Apr 21;158(8):1037-40.
- (129) Lillcrap MS, Byrne E, Speed CA. Musculoskeletal assessment of general medical in-patients--joints still crying out for attention. *Rheumatology (Oxford)* 2003 Aug;42(8):951-4.
- (130) Matheny JM, Brinker MR, Elliott MN, Blake R, Rowane MP. Confidence of graduating family practice residents in their management of musculoskeletal conditions. *Am J Orthop* 2000 Dec;29(12):945-52.
- (131) Power JD, Perruccio AV, Desmeules M, Lagace C, Badley EM. Ambulatory physician care for musculoskeletal disorders in Canada. *J Rheumatol* 2006 Jan;33(1):133-9.
- (132) Roland MO, Porter RW, Matthews JG, Redden JF, Simonds GW, Bewley B. Improving care: a study of orthopaedic outpatient referrals. *BMJ* 1991 May 11;302(6785):1124-8.
- (133) Speed CA, Crisp AJ. Referrals to hospital-based rheumatology and orthopaedic services: seeking direction. *Rheumatology (Oxford)* 2005 Apr;44(4):469-71.
- (134) Wright JG, Coyte P, Hawker G, Bombardier C, Cooke D, Heck D, et al. Variation in orthopedic surgeons' perceptions of the indications for and outcomes of knee replacement. *CMAJ* 1995 Mar 1;152(5):687-97.
- (135) Ackerman IN, Graves SE, Wicks IP, Bennell KL, Osborne RH. Severely compromised quality of life in women and those of lower socioeconomic status waiting for joint replacement surgery. *Arthritis Rheum* 2005 Oct 15;53(5):653-8.
- (136) Bourne RB, Sibbald WJ, Doig G, Lee L, Adolph S, Robertson D, et al. The Southwestern Ontario Joint Replacement Pilot Project: electronic point-of-care data collection. Southwestern Ontario Study Group. *Can J Surg* 2001 Jun;44(3):199-202.
- (137) Coyte P, Wang PP, Hawker G, Wright JG. The relationship between variations in knee replacement utilization rates and the reported prevalence of arthritis in Ontario, Canada. *J Rheumatol* 1997 Dec;24(12):2403-12.
- (138) Coyte PC, Hawker G, Wright JG. Variations in knee replacement utilization rates and the supply of health professionals in Ontario, Canada. *J Rheumatol* 1996 Jul;23(7):1214-20.
- (139) Dixon T, Shaw M, Ebrahim S, Dieppe P. Trends in hip and knee joint replacement: socioeconomic inequalities and projections of need. *Ann Rheum Dis* 2004 Jul;63(7):825-30.
- (140) Dixon T, Shaw ME, Dieppe PA. Analysis of regional variation in hip and knee joint replacement rates in England using Hospital Episodes Statistics. *Public Health* 2006 Jan;120(1):83-90.
- (141) Gaudet MC, Ehrmann FD, Rossignol M, Zukor D, Tanzer M, Gravel C, et al. The wait for total hip replacement in patients with osteoarthritis. *Can J Surg* 2007 Apr;50(2):101-9.
- (142) Hawker GA, Wright JG, Coyte PC, Williams JI, Harvey B, Glazier R, et al. Differences between men and women in the rate of use of hip and knee arthroplasty. *N Engl J Med* 2000 Apr 6;342(14):1016-22.
- (143) Hawker GA, Wright JG, Coyte PC, Williams JI, Harvey B, Glazier R, et al. Determining the need for hip and knee

arthroplasty: the role of clinical severity and patients' preferences. *Med Care* 2001 Mar;39(3):206-16.

(144) Kili S, Wright I, Jones RS. Change in Harris hip score in patients on the waiting list for total hip replacement. *Ann R Coll Surg Engl* 2003 Jul;85(4):269-71.

(145) Merx H, Dreinhofer K, Schrader P, Sturmer T, Puhl W, Gunther KP, et al. International variation in hip replacement rates. *Ann Rheum Dis* 2003 Mar;62(3):222-6.

(146) Pedersen AB, Johnsen SP, Overgaard S, Soballe K, Sorensen HT, Lucht U. Total hip arthroplasty in Denmark: incidence of primary operations and revisions during 1996-2002 and estimated future demands. *Acta Orthop* 2005 Apr;76(2):182-9.

(147) Shipton D, Badley EM, Bookman AA, Hawker GA. Barriers to providing adequate rheumatology care: implications from a survey of rheumatologists in Ontario, Canada. *J Rheumatol* 2002 Nov;29(11):2420-5.

(148) Shipton D, Badley EM, Mahomed NN. Critical shortage of orthopaedic services in Ontario, Canada. *J Bone Joint Surg Am* 2003 Sep;85-A(9):1710-5.

(149) Shipton D, Badley EM. Availability of Services. In: Badley EM, Glazier RH, editors. *Arthritis and Related Conditions in Ontario: ICES Research Atlas*. Toronto: Institute for Clinical Evaluative Sciences; 2004. p. 41-66.

(150) Steel N, Melzer D, Gardener E, McWilliams B. Need for and receipt of hip and knee replacement--a national population survey. *Rheumatology (Oxford)* 2006 Nov;45(11):1437-41.

(151) Williams JI, Llewellyn TH, Arshinoff R, Young N, Naylor CD. The burden of waiting for hip and knee replacements in Ontario. Ontario Hip and Knee Replacement Project Team. *J Eval Clin Pract* 1997 Feb;3(1):59-68.

(152) Wright JG, Hawker GA, Bombardier C, Croxford R, Dittus RS, Freund DA, et al. Physician enthusiasm as an explanation for area variation in the utilization of knee replacement surgery. *Med Care* 1999 Sep;37(9):946-56.

(153) Yong PF, Milner PC, Payne JN, Lewis PA, Jennison C. Inequalities in access to knee joint replacements for people in need. *Ann Rheum Dis* 2004 Nov;63(11):1483-9.

(154) The Chartered Society of Physiotherapy. *Chartered physiotherapists working as extended scope practitioners (ESP)*. London, England; 2002.

(155) Power JD, Glazier RH, Boyle E, Badley EM. Primary and Specialist Care. In: Badley EM, Glazier RH, editors. *Arthritis and Related Conditions in Ontario: ICES Research Atlas*. 2nd ed. Toronto: Institute for Clinical Evaluative Sciences; 2004. p. 67-86.

(156) Aletaha D, Eberl G, Nell VP, Machold KP, Smolen JS. Practical progress in realisation of early diagnosis and treatment of patients with suspected rheumatoid arthritis: results from two matched questionnaires within three years. *Ann Rheum Dis* 2002 Jul;61(7):630-4.

(157) Chan KW, Felson DT, Yood RA, Walker AM. The lag time between onset of symptoms and diagnosis of rheumatoid arthritis. *Arthritis Rheum* 1994 Jun;37(6):814-20.

(158) Emery P, Breedveld FC, Dougados M, Kalden JR, Schiff MH, Smolen JS. Early referral recommendation for newly diagnosed rheumatoid arthritis: evidence based development of a clinical guide. *Ann Rheum Dis* 2002 Apr;61(4):290-7.

(159) Geletka R, St Clair EW. Treatment of early rheumatoid arthritis. *Best Pract Res Clin Rheumatol* 2003 Oct;17(5):791-809.

(160) Hernandez-Garcia C, Vargas E, Abasolo L, Lajas C, Bellajdell B, Morado IC, et al. Lag time between onset of symptoms and access to rheumatology care and DMARD therapy in a cohort of patients with rheumatoid arthritis. *J Rheumatol* 2000 Oct;27(10):2323-8.

(161) Irvine S, Munro R, Porter D. Early referral, diagnosis, and treatment of rheumatoid arthritis: evidence for changing medical practice. *Ann Rheum Dis* 1999 Aug;58(8):510-3.

(162) Moreland LW, Bridges SL, Jr. Early rheumatoid arthritis: a medical emergency? *Am J Med* 2001 Oct 15;111(6):498-500.

- (163) Scott DL, Shipley M, Dawson A, Edwards S, Symmons DP, Woolf AD. The clinical management of rheumatoid arthritis and osteoarthritis: strategies for improving clinical effectiveness. *Br J Rheumatol* 1998 May;37(5):546-54.
- (164) Smolen JS, Aletaha D, Machold KP. Therapeutic strategies in early rheumatoid arthritis. *Best Pract Res Clin Rheumatol* 2005 Feb;19(1):163-77.
- (165) Palm O, Purinszky E. Women with early rheumatoid arthritis are referred later than men. *Ann Rheum Dis* 2005 Aug;64(8):1227-8.
- (166) van der Horst-Bruinsma IE, Speyer I, Visser H, Breedveld FC, Hazes JM. Diagnosis and course of early-onset arthritis: results of a special early arthritis clinic compared to routine patient care. *Br J Rheumatol* 1998 Oct;37(10):1084-8.
- (167) Beatty PW, Hagglund KJ, Neri MT, Dhont KR, Clark MJ, Hilton SA. Access to health care services among people with chronic or disabling conditions: patterns and predictors. *Arch Phys Med Rehabil* 2003 Oct;84(10):1417-25.
- (168) Berkanovic E, Hurwicz ML, Batchlor E. Rheumatoid arthritis and the use of medical services. *Arthritis Care and Research* 1991;4(1):12-21.
- (169) Campbell ML, Sheets D, Strong PS. Secondary health conditions among middle-aged individuals with chronic physical disabilities: implications for unmet needs for services. *Assist Technol* 1999;11(2):105-22.
- (170) Jacobi CE, Rupp I, Boshuizen HC, Triemstra M, Dinant HJ, van den Bos GA. Unmet demands for health care among patients with rheumatoid arthritis: indications for underuse? *Arthritis Rheum* 2004 Jun 15;51(3):440-6.
- (171) Zink A, Listing J, Niewerth M, Zeidler H. The National database of the German Collaborative Arthritis Centers:II. Treatment of patients with rheumatoid arthritis. *Annals of the Rheumatic Diseases* 2001;60:207-13.
- (172) Availability of Specialist Care for Arthritis and Related Conditions in Ontario, Year 2000 Survey. Part 1: Rheumatologist Services. Arthritis Community Research & Evaluation Unit (ACREU); 2001.
- (173) Fitzpatrick R, Norquist JM, Reeves BC, Morris RW, Murray DW, Gregg PJ. Equity and need when waiting for total hip replacement surgery. *J Eval Clin Pract* 2004 Feb;10(1):3-9.
- (174) Kurtz S, Ong K, Lau E, Mowat F, Halpern M. Projections of primary and revision hip and knee arthroplasty in the United States from 2005 to 2030. *J Bone Joint Surg Am* 2007 Apr;89(4):780-5.
- (175) Deal CL, Hooker R, Harrington T, Birnbaum N, Hogan P, Bouchery E, et al. The United States rheumatology workforce: supply and demand, 2005-2025. *Arthritis Rheum* 2007 Mar;56(3):722-9.
- (176) Badley EM, Canizares M, Mahomed NN. Orthopaedic surgery for arthritis and related conditions in Ontario. 2005. Ref Type: Generic
- (177) Canizares M, Badley EM, Davis A, MacKay C, Mahomed N. Orthopaedic surgery in Ontario in the era of the wait time strategy. Arthritis Community Research & Evaluation Unit (ACREU); 2007.
- (178) Canadian Physiotherapy Association. Canadian Physiotherapy Association 2006 [cited 2008 Jan 29];Available from: URL: <http://www.physiotherapy.ca/>
- (179) Aiken AB, Atkinson M, Harrison MM, Hope J. Reducing hip and knee replacement wait times: an expanded role for physiotherapists in orthopedic surgical clinics. *Healthc Q* 2007;10(2):88-91, 6.
- (180) Byles SE, Ling RS. Orthopaedic Out-patients - A Fresh Approach. *Physiotherapy* 1989;75(7):435-7.
- (181) Campos AA, Graveline C, Ferguson J, Landon K, Schneider R, Laxer RM. The physical therapy practitioner: An expanded role for physical therapy in pediatric rheumatology. *Physiother Can* 2001;282-97.
- (182) Campos AA, Graveline C, Ferguson J, Landon K, Schneider R, Laxer RM. The physical

therapy practitioner (PTP) in pediatric rheumatology: High level of patient and parent satisfaction with services. *Physiother Can* 2002;Winter:32-6.

(183) Daker-White G, Carr AJ, Harvey I, Woolhead G, Bannister G, Nelson I, et al. A randomised controlled trial. Shifting boundaries of doctors and physiotherapists in orthopaedic outpatient departments. *J Epidemiol Community Health* 1999 Oct;53(10):643-50.

(184) Hill J, Bird HA, Harmer R, Wright V, Lawton C. An evaluation of the effectiveness, safety and acceptability of a nurse practitioner in a rheumatology outpatient clinic. *Br J Rheumatol* 1994 Mar;33(3):283-8.

(185) Hill J, Thorpe R, Bird H. Outcomes for patients with RA - A rheumatology nurse practitioner clinic compared to standard outpatient care. *Musculoskeletal Care* 2003;1(1):5-20.

(186) Hockin J, Bannister G. The Extended Role of a Physiotherapist in an Out-patient Orthopaedic Clinic. *Physiotherapy* 1994;80:281-4.

(187) Hourigan PG, Weatherley CR. Initial assessment and follow-up by a physiotherapist of patients with back pain referred to a spinal clinic. *J R Soc Med* 1994 Apr;87(4):213-4.

(188) Hourigan PG, Weatherley CR. The physiotherapist as an orthopaedic assistant in a back pain clinic. *Physiother* 1995;81(9):546-8.

(189) MacKay C, Devitt R, Soever L, Badley EM. An exploration of comprehensive interdisciplinary models for arthritis. *Arthritis Community Research & Evaluation Unit (ACREU)*; 2005.

(190) MacKay C, Veinot P, Badley EM. An overview of developments in comprehensive interdisciplinary models of care for arthritis: provider and patient perspectives. *Arthritis Community Research & Evaluation Unit (ACREU)*.; 2006.

(191) Oldmeadow LB, Bedi HS, Burch HT, Smith JS, Leahy ES, Goldwasser M. Experienced physiotherapists as gatekeepers to hospital

orthopaedic outpatient care. *Med J Aust* 2007 Jun 18;186(12):625-8.

(192) Pearse EO, Maclean A, Ricketts DM. The extended scope physiotherapist in orthopaedic out-patients - an audit. *Ann R Coll Surg Engl* 2006 Nov;88(7):653-5.

(193) Rymaszewski LA, Sharma S, McGill PE, Murdoch A, Freeman S, Loh T. A team approach to musculo-skeletal disorders. *Ann R Coll Surg Engl* 2005 May;87(3):174-80.

(194) Stevenson K. Meeting the challenges of arthritis: think tank on extended roles for rehabilitation professionals. 2007. Presentation ACREU Workshop.
Ref Type: Generic

(195) Temmink D, Hutten JB, Francke AL, bu-Saad HH, van der ZJ. Quality and continuity of care in Dutch nurse clinics for people with rheumatic diseases. *Int J Qual Health Care* 2000 Apr;12(2):89-95.

(196) Temmink D, Hutten JB, Francke AL, Rasker JJ, bu-Saad HH, van der ZJ. Rheumatology outpatient nurse clinics: a valuable addition? *Arthritis Rheum* 2001 Jun;45(3):280-6.

(197) Tijhuis GJ, Zwinderman AH, Hazes JM, van den Hout WB, Breedveld FC, Vliet Vlieland TP. A randomized comparison of care provided by a clinical nurse specialist, an inpatient team, and a day patient team in rheumatoid arthritis. *Arthritis Rheum* 2002 Oct 15;47(5):525-31.

(198) van den Hout WB, Tijhuis GJ, Hazes JM, Breedveld FC, Vliet Vlieland TP. Cost effectiveness and cost utility analysis of multidisciplinary care in patients with rheumatoid arthritis: a randomised comparison of clinical nurse specialist care, inpatient team care, and day patient team care. *Ann Rheum Dis* 2003 Apr;62(4):308-15.

(199) Woodhouse L. Advanced practice physiotherapy in Ontario. *Ontario Physiotherapy Association* 2006 [cited 2008 Jan 29]; Available from: URL: http://www.opa.on.ca/pdfs/in_the_news_app_in_ontario.pdf

(200) Health Force Ontario. Physician assistants. Government of Ontario 2008 [cited 2008 Jan 29]; Available from: URL: <http://www.healthforceontario.ca/WhatIsHFO/FAQs/PhysicianAssistants.aspx#catagory01>

(201) Badley EM. Emerging Issues. In: Badley EM, Williams J, editors. Arthritis and related conditions in Ontario: ICES Research Atlas. Toronto: Institute for Clinical Evaluative Sciences; 2004.

(202) Wagner EH. Chronic disease management: what will it take to improve care for chronic illness? *Eff Clin Pract* 1998 Aug;1(1):2-4.

(203) Wagner EH, Austin BT, Davis C, Hindmarsh M, Schaefer J, Bonomi A. Improving chronic illness care: translating evidence into action. *Health Aff (Millwood)* 2001 Nov;20(6):64-78.

(204) Arthritis RC. Defining the Extended Clinical role for Allied Health Professionals in Rheumatology. UK 2001.

(205) Stevenson K. A new dawn: A consultant physiotherapist in musculoskeletal disease. *Musculoskeletal Care* 2003;1(1):65-70.

(206) Weale AE, Bannister GC. Who should see orthopaedic outpatients--physiotherapists or surgeons? *Ann R Coll Surg Engl* 1995 Mar;77(2 Suppl):71-3.

(207) Weatherley CR, Hourigan PG. Triage of back pain by physiotherapists in orthopaedic clinics. *J R Soc Med* 1998 Jul;91(7):377-9.

(208) The Chartered Society of Physiotherapy. Making physiotherapy count: A range of quality assured services. UK: The Chartered Society of Physiotherapy; 2004.

(209) Maddison P, Jones J, Breslin A, Barton C, Fleur J, Lewis R, et al. Improved access and targeting of musculoskeletal services in northwest Wales: targeted early access to musculoskeletal services (TEAMS) programme. *BMJ* 2004 Dec 4;329(7478):1325-7.

(210) Gardiner J, Turner P. Accuracy of Clinical Diagnosis of Internal Derangement of the Knee by Extended Scope Physiotherapists and

Orthopaedic Doctors. *Physiotherapy* 2002 Mar;88(3):153-7.

(211) Moore JH, Goss DL, Baxter RE, DeBerardino TM, Mansfield LT, Fellows DW, et al. Clinical diagnostic accuracy and magnetic resonance imaging of patients referred by physical therapists, orthopaedic surgeons, and nonorthopaedic providers. *J Orthop Sports Phys Ther* 2005 Feb;35(2):67-71.

(212) Dickens V, Ali F, Gent H, Rees A. Assessment and Diagnosis of Knee Injuries The Value of an experienced physiotherapist. *Physiother* 2003;89(7):417-22.

(213) MacKay C., Davis A.M., Mahomed N., Badley E.M. Expanding role in orthopaedic care: a comparison of physiotherapist and orthopaedic surgeon recommendations for triage. *Journal of Evaluation in Clinical Practice*. In press 2008.

(214) Glazier RH, Badley EM, Lineker SC, Wilkins AL, Bell MJ. Getting a Grip on Arthritis: an educational intervention for the diagnosis and treatment of arthritis in primary care. *J Rheumatol* 2005 Jan;32(1):137-42.