



# MODELS OF CARE DELIVERY FOR PEOPLE WITH ARTHRITIS

Prepared by the Models of Care Working  
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# Executive Summary

A number of different models of care have been developed in an attempt to facilitate a seamless system of settings, services, service providers and service levels that meets the needs of clients or defined populations to manage the current and growing burden of arthritis. This report reviews existing models of arthritis care in the context of the continuum of care for people with arthritis.

## Key Messages

- There are a multitude of potential models. Key models identified include: the traditional primary care physician to specialist referral loop, more recently with many primary care physicians working within team-based practice; specialized arthritis, multi-disciplinary team-based care; models to access care in rural and remote areas through telemedicine and visiting provider mechanisms; triage models of using health care providers working in expanded roles; and, community-based models
- The objective and structure of the models are different:
  - in the traditional primary care-specialist referral model, the primary care physicians assume overall responsibility for care whereas the specialist, usually a rheumatologist or orthopaedic surgeon, provide their specialized services with ongoing care managed in primary care; or in a shared-care model where the specialist sees the patient in limited review with ongoing primary care management
  - specialized arthritis, multi-disciplinary team-based models provide care to people across the continuum of care and spectrum of disease severity
  - remote and rural models rely on local providers to coordinate and provide ongoing management with input from a specialist via technology or infrequent in-person consultation
  - triage models use health providers often working in expanded roles to facilitate priority access to a specialist e.g., people with inflammatory arthritis to a rheumatologist or people with osteoarthritis (OA) who need joint replacement to an orthopaedic surgeon
  - community-based programs provide services that are limited or not available in the formal health care system with the goal of promoting wellness, self-management and risk reduction
- Few of these models address the continuum of care or spectrum of disease severity given their objectives, leaving potential gaps in access and management for some groups
- There is limited evaluation data for any of the models, particularly in a Canadian context
- These models have varying vulnerabilities related to sustainability due to issues such as need for administrative support, concern about professional boundaries and their funding mechanisms

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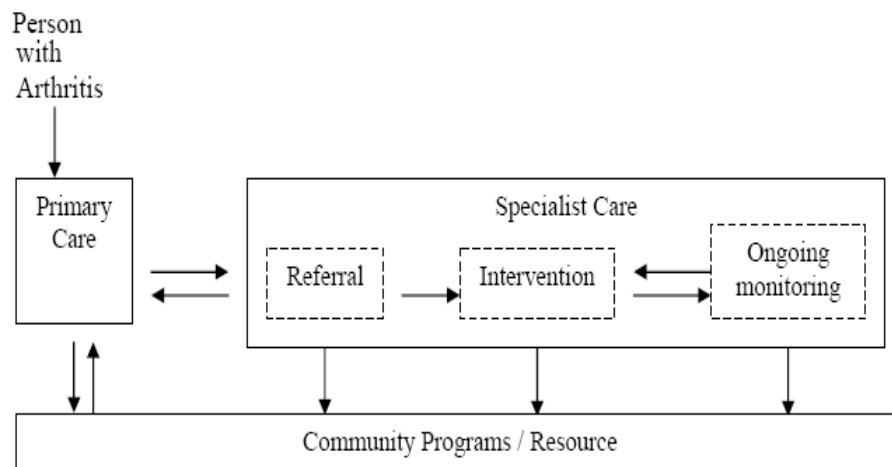
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# 1.0 Introduction

Arthritis is one of most frequent chronic conditions, affecting 1 in 6 people<sup>1</sup> and it is the primary cause of long term disability resulting in large personal and societal costs<sup>2-33 34-67 68-85</sup>. However, the current availability of resources and models of care delivery are insufficient to meet the growing need for services that have been shown to be effective. Current models of service delivery are inadequate to support the vision of chronic disease management. For instance, there is a shortage of primary care physicians in many areas of Canada<sup>86-89</sup>; population studies show underutilization of total joint replacement (TJR) surgery in those with demonstrated need as well as long wait times for these services<sup>33 90-108</sup>. There also are delays in referral of individuals with early inflammatory arthritis to rheumatologists/ internists<sup>109-113</sup>.

A model of care defines the way in which health care is delivered, with an ultimate goal to address the needs of people across the course of their illness, through services provided by a variety of health professionals (e.g., primary care physicians, rheumatologists, orthopaedic surgeons, physiotherapists (PTs), occupational therapists (OTs), nurses, chiropractors, pharmacists, etc.) and community-based programs and resources related to chronic disease management and wellness promotion (Figure 1). Health services can be provided in different settings, including the community, acute care hospitals, inpatient rehabilitation facilities and the home, through face-to-face contacts or the use of communication technology (e.g., telemedicine). A seamless system of settings, services, service providers and service levels that meets the needs of clients or defined populations is critical to managing the current and growing burden of arthritis. This report reviews existing models of arthritis care in the context of the continuum of care for people with arthritis. It builds on and updates prior work by the Arthritis Community Research & Evaluation Unit (ACREU)<sup>114,115</sup>.

**Figure 1: Continuum of Care for People with Arthritis**



## 2.0 Purpose and Objectives

The overall purpose of this report is to identify and describe existing models of care for arthritis management. Specifically, we will describe:

- 1) structural components and context of the models in relation to the continuum of care;
- 2) processes and enablers of care delivery; and,
- 3) evaluation of the models.

## 3.0 Methods

A literature search was conducted using Medline, EMBASE and CINAHL for 1999 through 2009 (restricted to English language and adults over 18 years) and Grey Matters related to arthritis and models of care. Articles were included if they related to arthritis (e.g., OA, rheumatoid arthritis (RA), spondyloarthropathy, systemic lupus erythematosus and scleroderma), musculoskeletal (MSK) conditions, or chronic diseases in general (where the findings and recommendations were applicable to arthritis/MSK). Additionally, articles were included if they focused on models of care, defined as overarching designs for the provision of health care services across the continuum of care and the manner in which these health care services are delivered. Articles were excluded if they were intervention only or focused on specific programs (e.g., self-management, vocational rehabilitation).

Appendix 1 provides details of the search strategy.

## 4.0 Results of the Review

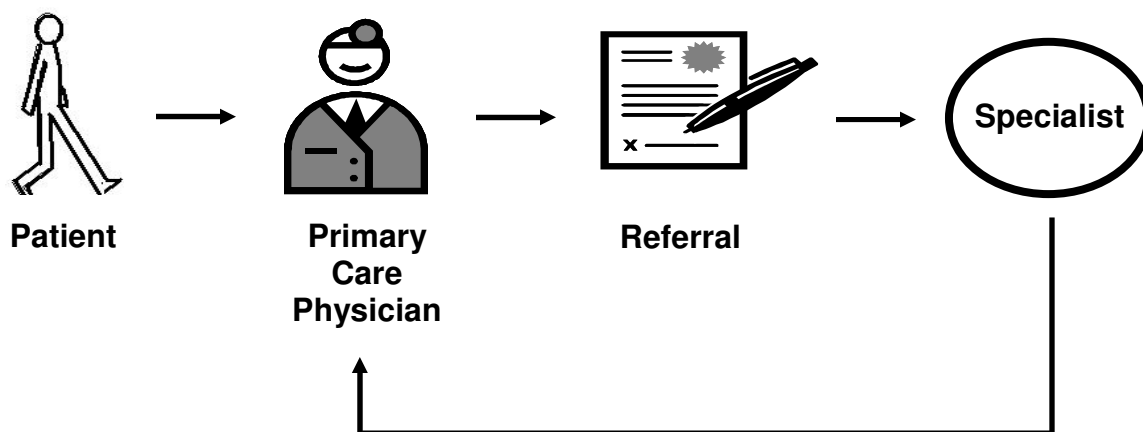
Prior work by MacKay et al<sup>112,114,115</sup> identified four common models of care delivery (i.e., delivery of programs and services) for people with arthritis, including specialized arthritis programs, models using health care providers in expanded clinical roles, models promoting access in remote and rural communities, and community-based care. Programs and services often overlap. For example, health care providers with expanded roles may or may not work in a specialized arthritis program; community programs may incorporate specialized arthritis services. Often what is labeled a ‘model’ reflects the mechanism by which care is delivered (e.g., telemedicine, use of health care providers in expanded roles). While building on MacKay’s initial work, this report will attempt to separate models of care delivery and how they are delivered.

### 4.1 The Traditional Primary Care, Referral to Specialist Care Loop

Primary care is the first access point to the formal health care system. This most frequently occurs via a primary care physician, although legislation permits the general population to access some health professionals such as PTs, pharmacists and nursing directly. Traditionally, care is managed in the primary care setting with referral to the specialist for services outside the scope of practice for the primary care provider. For people with arthritis, the majority of management occurs via their primary care physician.

Referral to a specialist for arthritis-based care is generally to a rheumatologist or internist for diagnosis/ confirmation of diagnosis and enhanced medical management (particularly in the case of suspected inflammatory arthritis or autoimmune diseases) or to an orthopaedic surgeon for a surgical procedure, most frequently joint replacement, to relieve joint symptoms and concomitant disability. Referrals to a specialist by other health professionals vary by province. For example, nurses and PTs in Ontario must have a patient return to their primary care physician <sup>116</sup>. In Alberta, specialists are able to accept referrals from PTs <sup>117</sup>. Whether the specialist continues to follow the patient long-term, return management to the primary care practitioner, or work in a shared-care model depends on the individual practice and patient needs. Figure 2 shows the pathway.

**Figure 2: The Traditional Primary Care, Referral to Specialist Care Loop**



Team-based care has become more prominent in physician-based primary care practice. Family Health Teams (FHT) exist in Ontario under various names and slightly different rules of engagement based on their agreements with the provincial Ministry of Health and Long-Term Care. British Columbia (BC) has Integrated Health Networks and also Divisions of Family Practice which are new in the last few months. Alberta similarly has networks of family care practitioners.

In addition to the primary care physician, the team members include those health professionals who are deemed necessary to meet the needs of the patients rostered to the team. These team members most commonly include nurses and dietitians. Rehabilitation professionals are rarely part of the team, although there are some isolated examples. In Ontario, legislation has recently been adopted to allow OTs to be funded within the FHT structure. St. Michael's Hospital, Toronto, within its inner city health programme has included a PT with advanced training as part of their primary care component.

Within the family health team structure or network, a primary care physician may opt to become the 'expert' in a particular clinical area. For example, some networks in Alberta have a primary care physician who focuses on MSK conditions. Similarly, there is anecdotal information that a rheumatologist in BC is working with a primary care physician to enhance that physician's MSK skills. This enhanced training of primary care physicians occurs as it is well recognized that there is minimal MSK training in undergraduate medical training programmes and primary care physicians report lack of confidence in MSK skills <sup>118-123</sup>.

Key features of the services include:

- diagnosis and provision of care to people with arthritis
- services and interventions available depend on the primary care practitioner (e.g., physicians would most frequently provide pharmacotherapy; PTs would provide physical modalities and activities to promote flexibility, strength and overall activity)
- referral channels to specialist care

There has been little to no evaluation of this model of care. Primary care teams continue to evolve and evaluation data related to how management of care for people with MSK diseases and, in particular arthritis, will be required.

## **4.2 Specialized Arthritis Services: Multi-Disciplinary Team Care within a Unified Setting**

Specialized arthritis programs have largely been developed with the intent of providing the necessary multi-disciplinary team care within a unified setting. They have their history in and most commonly provide care to people with inflammatory arthritis (e.g., RA, ankylosing spondylitis, psoriatic arthritis). However, there are now some programs for other types of arthritis, specifically OA. Examples include the OsteoArthritis Service Integration System (OASIS) Program in BC <sup>124</sup> and the Multidisciplinary Osteoarthritis Program in Ontario <sup>125</sup>, both of which provide services for people with hip and knee OA. Alberta has set up similar team-based care, with a case-management approach, for people with hip and knee OA who require hip or knee replacement surgery. The case manager works with the patient to help them navigate the system and their care such that the model is moving to a shared-care model <sup>126</sup>.

Key features of specialized arthritis services include:

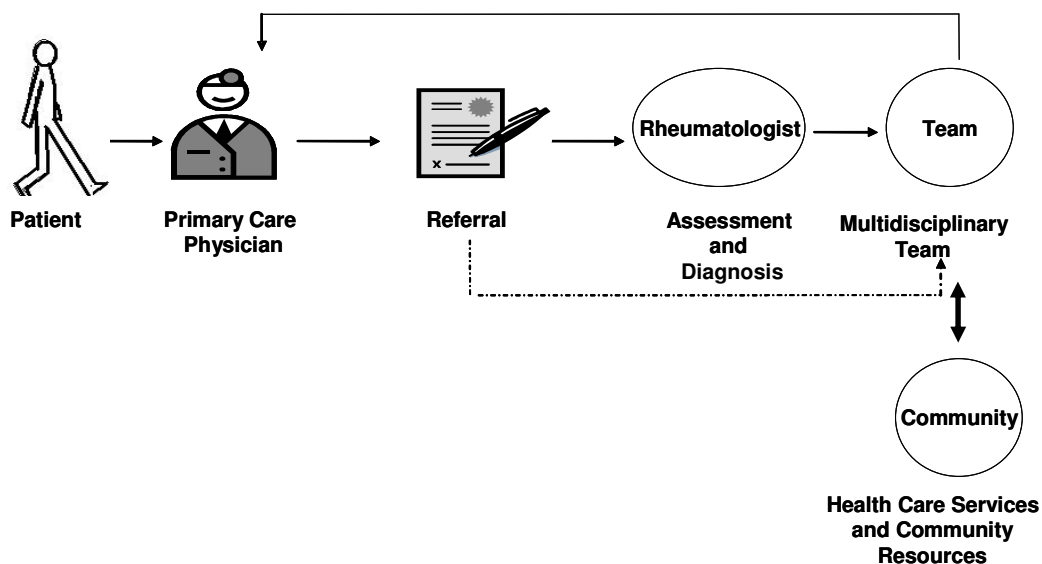
- provision of care only for people with a diagnosis of arthritis
- services and interventions available that are very broad; therefore, a multi-disciplinary team provides care
- a team comprised of health professionals with the skill mix to provide the necessary care
- clear definition of team roles to avoid overlap of evaluation and management in a ‘one stop’
- client-centred service provision
- education is a key component of care
- a team that is usually hospital-based, with most services provided on an outpatient basis
- interaction and communication among team members that is facilitated through regular team meetings and goal setting

The focus of the service determines the necessary skill set for the team members. Frequently, for inflammatory arthritis, the team includes a rheumatologist, nurse, PTs, OTs and social worker. Dietitians, pharmacists, psychologists and orthopaedic surgeons most often are virtual members of the team when the focus is inflammatory arthritis. However, linkages to facilitate access to service have usually been established. The orthopaedic surgeon is a team member, either on site or virtually, when the focus is hip or knee OA. Additionally, specialized arthritis programs are linked with community resources such as programs offered by The Arthritis Society, community centres, etc.



Access to services in specialized arthritis programs is through referral to a specialist physician (usually a rheumatologist, internist, or orthopaedic surgeon). This referral most often stems from the primary care physician but in some provinces, such as Alberta, specialists may accept referrals from other health professionals such as PTs. Figure 3 depicts the pathway for services for the person with arthritis. The multi-disciplinary services include any or all of medical (and surgical if necessary) management of the disease, nursing, physiotherapy, occupational therapy, social work for mental health and financial issues. There is a strong emphasis on patient education and self-management strategies. Services are available in both group and individual format.

**Figure 3: Access and Pathway in Specialized Arthritis Service Programs**



*Note:* In some jurisdictions health professionals other than a primary care physician can refer to specialists <sup>114</sup>

Specialized arthritis programs through their linkages can function across the continuum of care as shown in Figure 3. They also have the potential to function across the spectrum of disease severity. However, for inflammatory arthritis this requires early recognition and referral to a rheumatologist. Within these specialized arthritis services, there are often early inflammatory disease clinics <sup>53,113,127-154</sup>.

OA traditionally is managed by primary care physicians <sup>35,46,132,134,135,137</sup> with referral to a specialist (in Canada, usually an orthopaedic surgeon as the majority of rheumatologists and internists focus on inflammatory arthritis). As such, specialized multi-disciplinary teams for OA rarely see people in the earlier stages of disease. Rather, they are referred to a specialist when the results of medical management are sub-optimal <sup>132,134,135</sup>.

There has been limited evaluation of models of specialized arthritis services. Generally, patients' report high levels of satisfaction and improved pain and function and disease activity <sup>155-159</sup>. In a randomized trial of team vs. non-team outpatient care, Ahlmen et al found that while both groups improved in pain, function and disease activity, people in the team group had greater improvements in mental health and general perceptions of overall health <sup>155</sup>. We were unable to find any specific cost-effectiveness data related to multi-disciplinary teams in arthritis.

Specialized arthritis services also face challenges <sup>114</sup>. By virtue of being multi-disciplinary team-based, locations are limited such that there are geographic challenges in providing services to remote and even some rural areas given the distances and costs of travel for people with arthritis. There is a lack of health human resources with training in arthritis to populate teams and deliver services. Coordination demands are high for multi-disciplinary

services and there is a perception that costs are high due to concentration of health human resources. Within the model, processes need to be structured to allow patients to re-enter the system and ensure that care remains client-centered by providing services at the right time for the patient (e.g., related education and self-management program).

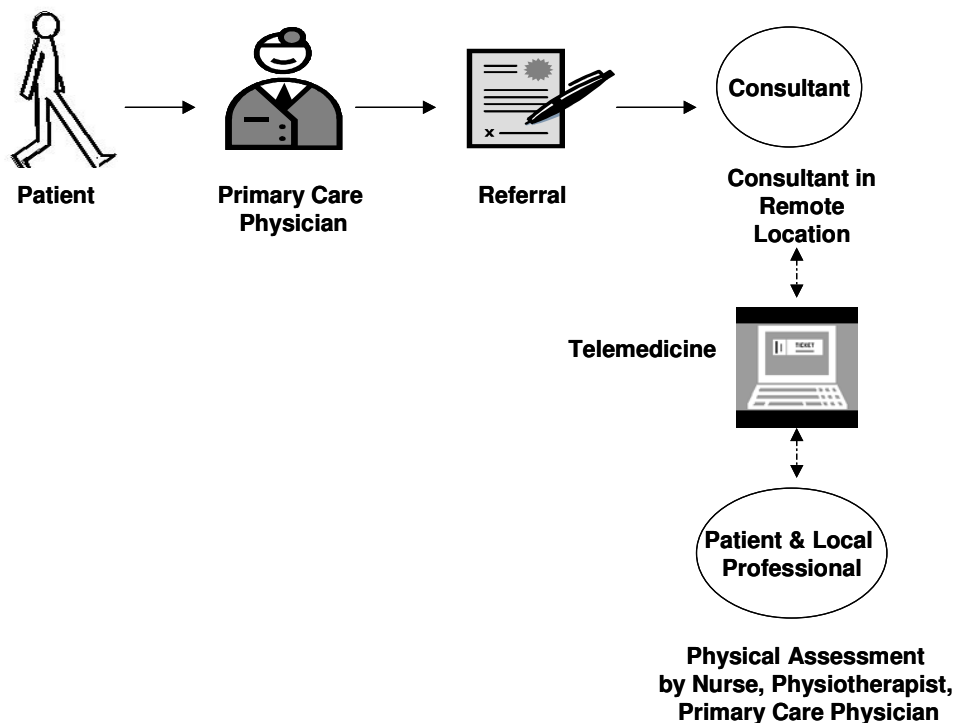
### 4.3 Models to Promote Access in Rural and Remote Communities

To overcome geographic barriers to access, some rural and remote communities have established working relationships with specialist health care providers from distant locations to provide care for people with arthritis<sup>114,115</sup>. In these models, a primary care provider, usually a physician refers the person with arthritis to a specialist. Working in concert with the primary care physician and often a nurse or PT local to the community, the specialist will provide consultation to allow management in the local community. Consultation is conducted either via telemedicine or a visiting health care provider who provides care to the person with arthritis. The primary care physician, nurse and/or PT provides ongoing management. This model has been used for management of all types of arthritis, but most commonly inflammatory arthritis.

#### 4.3.1 Service Delivery by Telemedicine

Telemedicine allows health information to be shared by telecommunications<sup>160</sup>. After referral of a patient to a specialist by a primary care physician, telemedicine is used to link the patient and local health provider and the specialist. The primary care physician, nurse or PT is usually present with the patient at a local site and the specialist observes the assessment and examination. Recommendations for any additional tests and treatment planning are made at the consultation. Telemedicine is most frequently used for follow-up of stable patients with inflammatory disease rather than for initial consultation<sup>114</sup>. Figure 4 shows the pathway to service provision via telemedicine.

**Figure 4: Access and Pathway in Arthritis Service Provision via Telemedicine**



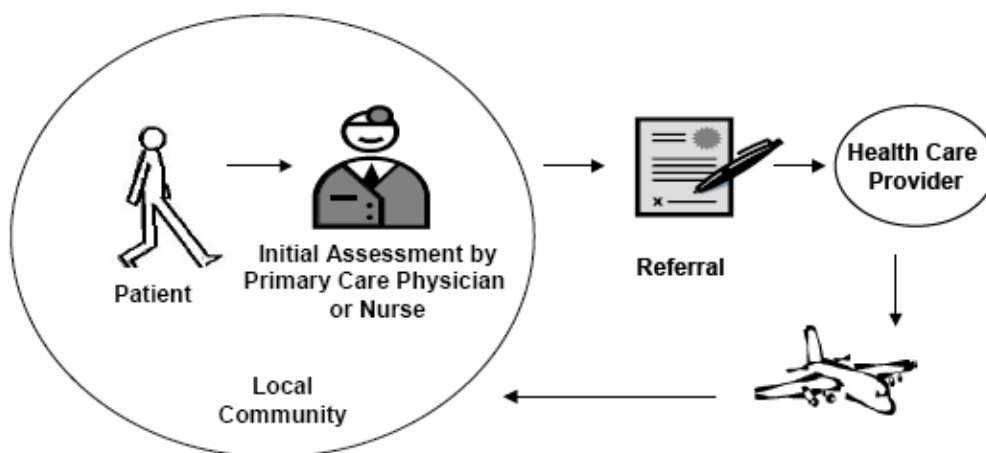
*Note:* In some jurisdictions health professionals other than a primary care physician can refer to specialists<sup>114</sup>

This method of care delivery has been shown to be accurate regarding assessment findings and acceptable to patients, primary care physicians and specialists<sup>161</sup>. Additionally, where services are limited, telemedicine has been shown to be not only feasible and acceptable but cost- and time-effective<sup>160</sup>.

### 4.3.2 Visiting Consultant Health Care Providers

In this method of care delivery, a health care provider travels to a community on a regular basis<sup>114,115</sup>. The length of the visit and frequency is based on the population need. The local health care provider provides ongoing management of people with arthritis. A central tenant of this approach is central coordination of referrals by a health care provider in the community. Often the local health care provider works in an expanded role (as described below) conducting initial assessments prior to the specialist's visit, managing the patient in between specialist visits and informing the specialist of concerning changes in the patient's condition. This model is frequently used in rural and remote communities, particularly for inflammatory arthritis, although people with all types of arthritis can receive these services. As such, a rheumatologist most frequently travels to rural and remote sites. Figure 5 shows the path of the patient.

**Figure 5: Visiting Health Care Provider and the Patients Pathway to Service**



*Note:* In some jurisdictions health professionals other than a primary care physician can refer to specialists<sup>114</sup>

More infrequently, there are orthopaedic surgeons who travel to provide care for people with arthritis. As an example, there are a handful of orthopaedic surgeons in Edmonton who travel to rural regions i.e., they operate in more than one health region. Similarly, there are regions in Ontario where a surgeon travels. This has often been done to provide service where there is operating room capacity in one hospital but not another. Hence, the travel is not necessarily to provide service in a remote or rural community as much as to maximize resources to enhance access to service. It does, however, also limit travel for patients. There has not been evaluation of visiting health care provider services.

Models of care using telemedicine and visiting health care professionals provide local access to care for rural and remote communities. They potentially provide care across the continuum but are dependent on the skills and disciplines of the available health care providers both for recognition and management of arthritis. The breadth and depth of services available to the person with arthritis may be limited. Depending on community resources there may be limited access to community-based, self-management and wellness programs.

By nature of their functioning, central, coordinated care and collaboration across health care providers is promoted. Linkages and partnerships within communities are also promoted. However, the sustainability of these models is dependent on specialists who are willing to perform these roles and local health human resources who are aware of arthritis and who can coordinate care and provide ongoing management.

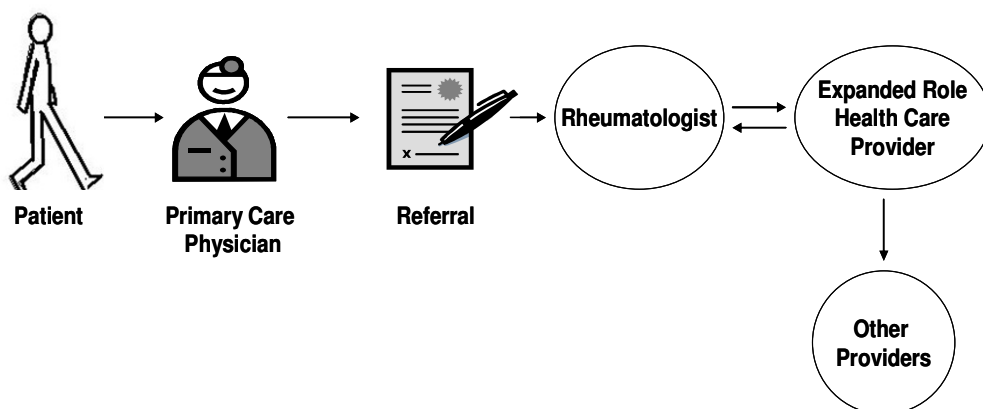
## 4.4 Models to Maximize Specialist Services

Models of care have been developed that use processes such as a health care provider working in an expanded role (although these expanded roles can also exist in other models of care) to facilitate people having access to specialists in a timely way; and, to ensure that specialists are maximizing their skills by seeing those who need their skills. Additionally, models have been established whereby the specialist triages the patient in terms of need to see and urgency based on the required standardized information on the referral or based on the use of telemedicine technology as described above. These models have been established mainly for people with inflammatory arthritis with stable disease who need routine follow-up and for people with OA who are referred to an orthopaedic surgeon for consideration of primary hip or knee replacement to triage those who need surgery<sup>114,115</sup>. However, in Calgary, Alberta, rheumatologists also have established a triage system for individuals with all types of arthritis. For those with inflammatory arthritis, follow-up includes routine monitoring of disease activity and management with re-consultation with the rheumatologist based on evaluation findings. For those with hip and knee OA, the goal is to support both referral management by triaging those who are surgical candidates and post-operative care by providing routine follow-up care to reduce surgeon workload and better streamline services<sup>162</sup>. In these models, there is referral to a specialist (rheumatologist or orthopaedic surgeon) by a primary care provider.

For people with inflammatory arthritis, the initial evaluation is usually with the rheumatologist for diagnosis and initiation of medical management. Additional services such as rehabilitation, social services, etc will be initiated based on patient needs. The goal is to minimize disease activity and maximize the patient's function. Ongoing monitoring in stable patients is often conducted by a health professional other than the rheumatologist working in an expanded role. These individuals are often nurses, PTs or OTs. Through advanced training, they acquire advanced skills in the assessment, diagnosis, triage and independent management of selected MSK and arthritic disorders<sup>163</sup>. This training may be through a formal program or an institution-based program. For example, in Ontario, The Arthritis Society has 8 therapists (6 PTs and 2 OTs) who have received advanced rheumatology training through a formal training program and many work in these roles. Institution-based training programs also exist. However, institution-based programs may limit transportability for the health professional.

For example, working in their expanded role, the health care provider performs the joint examination, reviews laboratory and radiology results (in many cases are able to order additional tests) and coordinates care with other providers. The rheumatologist is available for consultation if a change in the patient's status requires additional review and consideration of change in management. Figure 6 shows the pathway of care.

**Figure 6: Pathway to Care in a Rheumatology Model with an Expanded Role Provider**

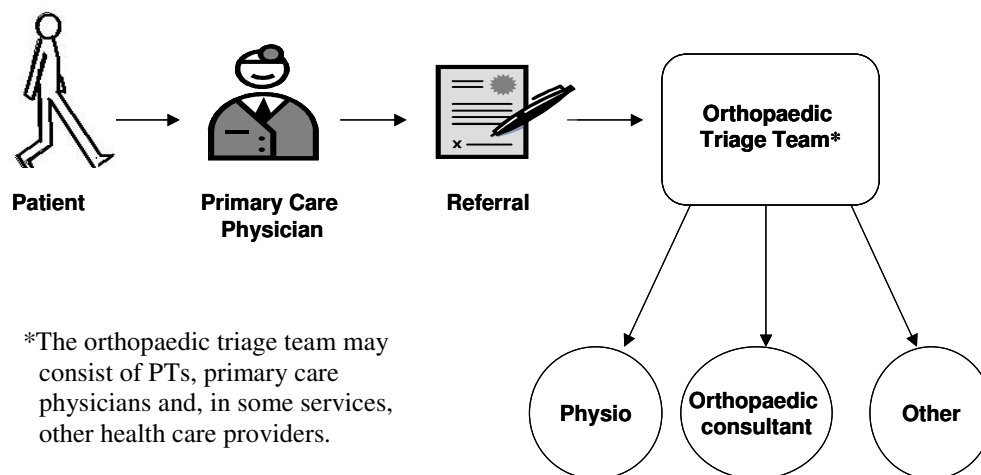


*Note:* In some jurisdictions health professionals other than a primary care physician can refer to specialists<sup>114</sup>

For people with hip and knee OA, so called triage models have been developed. A person is referred to an orthopaedic surgeon for consideration of hip or knee replacement. In this model the individual is first evaluated by a health professional working in an expanded role (usually a PT or OT). For those considered a potential candidate for surgery, they go on to see the surgeon, preferably on the same day, although there are some two visit models that require the patient to return for a separate visit with the surgeon. For those who are not considered to be appropriate for surgery at the current time, they are provided with education and recommendations for exercise, physical therapy and community programs may also be provided. Depending on the structure of the model, these people may have a brief consultation with the surgeon where the assessment findings are reviewed. However, in many cases these people will not see the surgeon in conjunction with the assessment. Communication regarding the findings and the plan for the patient is communicated back to the referring care provider (usually a primary care physician).

As noted above, some of these triage models to facilitate access to specialist care may be a component of a specialized arthritis model of multi-disciplinary team care. Where they are a model of care in their own right, communication and community linkages to support patient management are critical. It should be noted that some of these ‘triage’ models, while initially focused on appropriate triage to the surgeon for joint replacement, have expanded to include aspects of conservative management as noted above and for self-management for people with OA. Figure 7 show the pathways for this triage models.

**Figure 7: Pathway to Care in an Orthopaedic Triage Model**



**Note:** In some jurisdictions health professionals other than a primary care physician can refer to specialists <sup>114</sup>  
 A similar model could also exist where there is triage to a rheumatologist

Models to facilitate access to orthopaedic surgeons and joint replacement surgery exist in BC, Alberta and Ontario. The processes are slightly different but there are central tenants to the models. These include: methods to facilitate access to the system such as a central intake system; standardized assessment and investigations; patient-centered, evidence-based care recommendations regarding conservative management or surgery; and, communication with the referring care provider/physician. For those going on to surgery, education and management of patient expectations; standardized processes for peri-operative and post-operative care; standardized rehabilitation based on best practices; and, follow-up care are also part of the model. For those receiving ongoing conservative management, education, exercise and referral to appropriate community resources as well as re-entry into the system for consideration of joint replacement are part of the model. Quality assurance mechanisms and evaluation are integral for monitoring and management of wait-times and adherence to best

practice care pathways. Recently, a national initiative has developed a toolkit for hip and knee replacement surgery to support best practices in developing and implementing a model of care <sup>164</sup>.

Often, triage models related to hip and knee OA are situated in a hospital setting. Triage models for rheumatology are less common but there are also nurses, PTs and OTs working in the community who have established linkages with a rheumatologist to see patients with a high suspicion of inflammatory arthritis. From a rheumatology perspective, the goal is to identify people with likely inflammatory arthritis. These people are prioritized to be seen by the rheumatologist so that necessary medical management can be initiated and other appropriate resources can be made available to the patient. For example, Edmonton, Alberta has established a triage clinic and a multidisciplinary team with OT, PT and nurse working with a rheumatologist at the clinic.

In Ontario, The Arthritis Society provides additional services that support people with all types of arthritis. Funded by the Ministry of Health and Long-term Care, The Arthritis Society, Ontario Division employs 55 health professionals who work in the community. These include 28 full-time therapists (16 PTs, 11 OTs, 1 social worker) and 27 part time therapists (17 PTs, 1 PT assistant, 4 OTs, 1 OT assistant, 4 social workers). The therapists are able to cover 90% of the province and deliver education and care in the home and in 111 clinics, and through a variety of groups, over the telephone, or through telemedicine. All PTs and OTs receive advanced training in arthritis care through participation in the Assessment of Inflammatory Polyarthritis Training Program <sup>163,165</sup>. Therapists practice in a primary therapist model <sup>166,167</sup> where the first available PT or OT sees the client to initiate education and treatment and brings in the other discipline in a consultative role if needed. There have been multiple studies demonstrating the positive outcomes for people with arthritis receiving care delivered by these therapists <sup>168-172</sup>.

A number of studies have evaluated these triage models of care and particularly the expanded practitioner role. Much of the early work occurred in the UK, Australia and within the context of the military where these roles have a longer history than in Canada. These models have demonstrated reduced wait times and patient satisfaction with process and care <sup>173</sup>. Additionally, health professionals working in these settings have been shown to make decisions related to diagnosis and management as specialists <sup>174-176</sup> and to be able to manage a high proportion of patients <sup>177</sup>. Some studies have also shown that these practitioners appropriately order diagnostic tests such as magnetic resonance imaging scans <sup>178,179</sup>. One study, while finding that wait times were significantly less for therapist-led clinics, found that therapists spent a longer time consulting with their patients <sup>180</sup>.

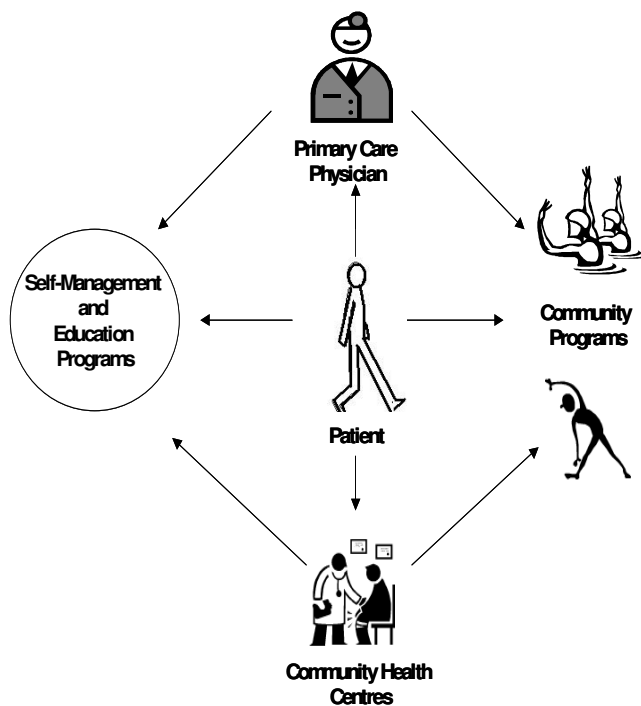
While these models have addressed some of the issues related to access to care and facilitated access to the right health care provider, there are some limitations in the model. For inflammatory arthritis, there remains a dependency for recognizing the condition such that referral is initiated. For hip and knee replacement, the continuum of care is accessed only when disease consideration of surgery requires referral to a specialist. Hence, only a small proportion of the people with OA are managed through this model. Working in expanded roles pushes the traditional boundaries for professions and there continues to be some concerns about training and competency related to health professionals performing restricted acts and working in these roles for some professionals. However, the emphasis by the Federal and Provincial governments on inter-professional care and maximizing scope of practice will continue to push these traditional boundaries. This way of working also is challenged by the Canadian system where physician billing is largely based on fee for service; the support of the model needs to consider the impact on compensation and also ensure protection of liability for physicians. Administrative support and funding for these models and salary support for people working in expanded roles is critical to the success of the models. In Ontario, while the model continues in many centres, there are others where the model has been abandoned. (The success and failure of these models is beyond the scope of this report and will be addressed through further phased work of the Models of Care in Arthritis (MOCA) project.) Funding and sustainability of the models is critical in maintaining access to care for people with arthritis.



## 4.5 Community-Based Model of Care

As indicated by the title, community-based models of care are situated outside of the health care facility in the community and are designed to focus on addressing services that are not available or are very limited in the formal health care system<sup>114,115</sup>. The model is built around and serviced by community resources such that care and services may be provided by a health care provider, trained volunteers, or other providers such as exercise trainers. These programs can be accessed via self-referral or through a health care provider. The services provided vary by community, but include a range of interventions for people with arthritis such as patient and public education; pool programs; exercise programs; and, health promotion and wellness programs including self-management programs (general chronic disease or arthritis-specific). Additionally, health services such as those provided by a primary care physician, PT, OT, dietitian, social worker may be available through a community health model. Community-based models tend to focus on chronic disease management and risk factor reduction as opposed to being specific to arthritis<sup>114,115</sup>. Figure 8 shows this model<sup>114</sup>.

**Figure 8: Pathway to Care in the Community-Based Model**



Given the emphasis on self-management in the context of management of chronic diseases such as arthritis, further discussion of these programs is warranted. The Arthritis Society implemented the Arthritis Self-management Program (ASMP) in 1992 and is the licensed provider of the Stanford University evidence-based ASMP across Canada. ASMP is a health promotion program designed to help people with all types of arthritis better understand their arthritis, learn ways to cope with chronic pain and take a more active role in managing their disease. The program is taught over a six-week period in weekly two-hour sessions. Each program usually has from eight to 14 people and is led by trained volunteer leaders. Most of the leaders have arthritis themselves or are health professionals. They are all interested in helping people with arthritis, and have successfully completed a 15 to 18 hour ASMP Leader Training Workshop. The leaders usually work in pairs and follow a standardized course outline to ensure continued quality of the program. Participants of ASMP have reported less pain, improved ability to move around, increased understanding of arthritis, and have learned new ways to cope with arthritis and become more active in managing their disease<sup>181-187</sup>.

Generic self-management programs are provided mainly by community-based partners such as Young Men's and Women's Clubs of Canada, etc. Only one study has been done to compare the effects of the ASMP to a generic self-management program for people with arthritis and the results suggested that both programs provided benefits, but the disease specific program may have resulted in better outcomes particularly in the short-term (4 months)<sup>188</sup>.

Evaluation of community-based programs has generally looked at evaluating components of services. For example, the ASMP program has been evaluated and shown to be effective for people with arthritis as described above. The general Chronic Disease Self-Management Program also has been shown to benefit people with arthritis<sup>188</sup>. Exercise programs, either one-on-one or in a group setting also have been shown to be beneficial; group programs impart additional benefits from social interactions<sup>189-191</sup>. Adherence to the program be it land-based or a pool program is critical to ensure benefit<sup>192</sup>.

The strength of this model lies in the strong community linkages and networks to support members of the community. However, it is vulnerable as it relies on community volunteers for many of the programs. Training programs to deal with turnover are critical to maintaining programs. This also means that the model is challenged and likely not viable in low density population areas. Additionally, given that programs focus on the community, specific processes and linkages must be made beyond the model to access specialist care for those who need it. Funding is not stable as many of these programs rely on receiving government grants to run their programs.

Given government emphasis on chronic disease management, community-based programs are targeted to provide much of the self-management support. The demand on their services is continuing to grow as the formal health care system and hospital services focuses on acute care management. It will be critical to ensure that community-based models of care are sufficiently resourced to meet growing demands.

## 4.6 Primary Health Care Reform and Team-Based Primary Care

Although not specific to arthritis models of care, primary care serves, as noted above, as the 'gate keeper' to the formal health care system for many people with arthritis. For inflammatory arthritis, recognition and referral to a specialist for early treatment is critical. For OA, the majority of medical management occurs in primary care and referral to a specialist is generally for consideration of surgical intervention. However, there is recognition that health care providers other than physicians may be more appropriate for delivering many of the interventions appropriate for chronic disease management (CDM). A recent position paper by the Ontario Medical Association makes several recommendations around the implementation of and management within the context of a CDM model recognizing the need for multi-disciplinary care<sup>193</sup>. Primary health care reform continues in Canada and there is increasing recognition that access to family and community care through multi-disciplinary teams is a priority at both the federal and provincial levels. Each province has slightly nuanced versions of primary health care teams and/or networks that continue to evolve. The consideration of the team make-up, the approach to care and their impact on management of people with MSK conditions and arthritis is yet to be determined.

## 5.0 Discussion

A number of different models of care have been developed for people with arthritis. These include traditional primary care to specialist models; specialized team-based care; models for access in rural and remote areas; triage models; and community-based models. In reviewing the models, it is clear that the objectives and structures of the models differ and, as such, with the exception of multi-disciplinary team-based, these models do not or in a very limited way address the continuum of care and the spectrum of disease severity (especially for OA). Often, they were established to meet local or regional priorities and/or needs. In some cases, particularly related to hip and knee replacement, provincial and national models are starting to grow<sup>194-196</sup>.



Overall, the literature is sparse in its description of the existing models of care for people with arthritis and most often it is a description of what is done. If the objective of the model is articulated, there is little to no data related to the inputs that determined the type or features of the model and it is often difficult to separate the model of care versus the mechanism by which care is delivered (e.g., a triage model that uses an advanced practitioner versus an advanced practitioner model). Robarts et al. describes some of the drivers of the Ontario model that was established for hip and knee replacement in Ontario<sup>162</sup>. There is little evaluation data for any models and none is related to cost-effectiveness. There is some evidence that other health professionals can provide quality care in areas that were previously performed only by physicians<sup>162,163,173-180</sup> and that patients are satisfied with this care. However, overall the paucity of evidence does threaten the sustainability of the various models.

The threats to sustainability likely come from many sources ranging from macro to micro level issues. These include the lack of National and Provincial strategies related to arthritis management. Despite the prevalence of arthritis and that it has the highest economic burden in Canada<sup>197</sup>, arthritis is not acknowledged in the CDM strategy for BC, Alberta or Ontario. With few exceptions, models of care are at a local, sometimes regional level, and do not have designated sustained funding. As such, they, year-by-year, look to find support dollars in their base budget. Physicians are generally paid through fee-for-service or an alternative funding plan. Where health professionals are assuming roles traditionally provided by physicians, issues related to physician compensation and medico-legal responsibility need to be addressed to remove barriers and threats to care provision. Additionally, the health professionals, such as PTs and OTs, who most commonly provide care to people with arthritis are generally not funded by provincial health plans nor are they funded as part of primary care multi-disciplinary teams in many provinces.

In summary, the learnings from existing models of care need to be utilized and the models need to be evaluated; we need to be bold in determining those that are most effective in a given context based on population need and available resources. This is the impetus that will provide the foundation for provincial and national models of care that will support the care for people with arthritis.

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## Appendix 1: Search Strategy and Total Numbers

### Medline Search Strategy (03-Jun-09)

Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations and Ovid MEDLINE(R) 1950 to Present

#	Searches	Results	Search Type
1	arthritis/ or athritis, psoriatic/ or arthritis, rheumatoid/ or gout/ or osteoarthritis/ or spondylarthritis/	110167	Advanced
2	arthr*.mp.	214895	Advanced
3	osteoarthr*.mp.	41213	Advanced
4	systemic lupus erythematosus.mp. or Lupus Erythematosus, Systemic/	42637	Advanced
5	lupus.mp.	53803	Advanced
6	Spondylarthropathies/ or Spondylitis, Ankylosing/ or spondyloarthropathy.mp. or Spondylitis/	12601	Advanced
7	ankyl*.mp.	15646	Advanced
8	spondy*.mp.	25035	Advanced
9	reiter*.mp.	5014	Advanced
10	scleroderma.mp. or Scleroderma, Systemic/	16992	Advanced
11	sclerod*.mp.	17424	Advanced
12	Rheumatic Diseases/ or rheumatic disease*.mp.	20297	Advanced
13	rheuma*.mp.	137681	Advanced
14	gout*.mp.	10522	Advanced
15	polyarthr*.mp.	8438	Advanced
16	oligoarthr*.mp.	614	Advanced
17	Sjogren's Syndrome/ or sjogren*.mp.	10998	Advanced
18	sjogren*.mp.	63	Advanced
19	Still's Disease, Adult-Onset/ or still*disease*.mp.	637	Advanced
20	bechterew*.mp.	546	Advanced
21	Joint Diseases/ or joint disease*.mp.	22244	Advanced
22	coxarthr*.mp.	1388	Advanced
23	Spinal Osteophytosis/	3158	Advanced
24	spinal osteophyt*.mp.	3165	Advanced
25	Arthritis, Gouty/	594	Advanced
26	Osteoarthritis, Hip/ or Osteoarthritis, Spine/ or Osteoarthritis, Knee/	8197	Advanced
27	musculoskeletal diseases/ or bone diseases/ or cartilage diseases/ or fasciitis/ or foot deformities/ or foot diseases/ or hand deformities/ or joint diseases/ or	84453	Advanced

muscular diseases/ or musculoskeletal abnormalities/ or rheumatic diseases/  
or tennis elbow/

28	(musculoskeletal adj6 disease*).mp.	6652	Advanced
29	MSK.mp.	221	Advanced
30	(musculoskeletal adj6 injur*).mp.	1469	Advanced
31	(musculoskeletal adj6 condition*).mp.	989	Advanced
32	(musculoskeletal adj6 disorder*).mp.	2990	Advanced
33	Chronic disease/	183821	Advanced
34	(chronic adj6 injur*).mp.	8867	Advanced
35	(chronic adj6 condition*).mp.	15164	Advanced
36	(chronic adj6 disorder*).mp.	17153	Advanced
37	(chronic adj6 illness*).mp.	10414	Advanced
38	or/1-37	641699	Advanced
39	metrologist*.mp.	14	Advanced
40	metrol*.mp.	1055	Advanced
41	telemedicine/ or teleradiology/	7803	Advanced
42	telehealth.mp.	813	Advanced
43	telemmed*.mp.	8289	Advanced
44	Rural Health Services/	6051	Advanced
45	(rural adj12 service*).mp.	11032	Advanced
46	Community Health Services/	22819	Advanced
47	(community adj12 service*).mp.	53509	Advanced
48	community service*.mp.	2161	Advanced
49	"Delivery of Health Care"/	49857	Advanced
50	"Delivery of Health Care, Integrated"/	5737	Advanced
51	(health* adj12 delivery).mp.	69277	Advanced
52	(delivery adj2 service*).mp.	5771	Advanced
53	care delivery.mp.	8070	Advanced
54	service delivery.mp.	4571	Advanced
55	access*.mp.	215544	Advanced
56	approach*.mp.	632556	Advanced
57	"Continuity of Patient Care"/	10256	Advanced
58	continuum.mp.	14196	Advanced
59	continuity.mp.	25636	Advanced
60	Critical Pathways/	3158	Advanced
61	"Referral and Consultation"/	41193	Advanced



62	referral*.mp.	75399	Advanced
63	consultation*.mp.	69337	Advanced
64	self-referral*.mp.	1192	Advanced
65	self referral*.mp.	1192	Advanced
66	(path* adj20 care).mp.	10725	Advanced
67	(path* adj15 healthcare).mp.	530	Advanced
68	(path* adj2 service*).mp.	699	Advanced
69	Primary Health Care/	39562	Advanced
70	primary care.mp.	46823	Advanced
71	primary healthcare.mp.	1067	Advanced
72	primary health care.mp.	44502	Advanced
73	Health Services/	15984	Advanced
74	health care service*.mp.	6975	Advanced
75	healthcare service*.mp.	1781	Advanced
76	Patient Care Team/	41361	Advanced
77	Nursing, Team/	1791	Advanced
78	Patient-Centered Care/	5636	Advanced
79	patient centered care.mp.	5872	Advanced
80	patient-centered care.mp.	5872	Advanced
81	patient-focused care.mp.	279	Advanced
82	patient focused care.mp.	279	Advanced
83	Multidisciplinary care team*.mp.	44	Advanced
84	multidisciplin*.mp.	26270	Advanced
85	team*.mp.	91469	Advanced
86	team care.mp.	308	Advanced
87	interdisciplin*.mp.	16974	Advanced
88	interdisciplinary communication/	4076	Advanced
89	cross-disciplin*.mp.	381	Advanced
90	cross disciplin*.mp.	381	Advanced
91	interprofession*.mp.	36603	Advanced
92	collaborat*.mp.	51204	Advanced
93	"outcome and process assessment (health care)"/ or "outcome assessment (health care)"/	49699	Advanced
94	"Quality of Health Care"/	42942	Advanced
95	Quality Assurance, Health Care/	38786	Advanced
96	quality of care.mp.	13651	Advanced



97	quality of healthcare.mp.	294	Advanced
98	quality of health care.mp.	43904	Advanced
99	Nurse Practitioners/	12632	Advanced
100	Nurse's Role/	23828	Advanced
101	(expand* adj10 role*).mp.	4368	Advanced
102	(extend* adj10 role*).mp.	2837	Advanced
103	expanded scope*.mp.	80	Advanced
104	extended scope*.mp.	20	Advanced
105	advanced practice*.mp.	2203	Advanced
106	(advanced adj10 practitioner*).mp.	569	Advanced
107	nurse pract*.mp.	14605	Advanced
108	specialist*.mp.	40899	Advanced
109	specialt*.mp.	45854	Advanced
110	clinical nurse specialist*.mp.	1528	Advanced
111	Nurse Clinicians/	6635	Advanced
112	models, nursing/	9217	Advanced
113	Specialties, Nursing/	6766	Advanced
114	(model* adj20 care).mp.	40058	Advanced
115	care model*.mp.	1767	Advanced
116	shared care.mp.	598	Advanced
117	shared healthcare.mp.	2	Advanced
118	shared health care.mp.	6	Advanced
119	care management.mp.	4418	Advanced
120	coordinat*.mp.	102361	Advanced
121	cooperat*.mp.	116636	Advanced
122	Public-Private Sector Partnerships/	49	Advanced
123	partnership*.mp.	13396	Advanced
124	integrat*.mp.	182067	Advanced
125	"costs and cost analysis"/ or "cost allocation"/ or cost-benefit analysis/ or "cost control"/ or "cost of illness"/ or "cost sharing"/ or health care costs/ or health expenditures/	127316	Advanced
126	cost*.mp.	304008	Advanced
127	or/39-126	1928364	Advanced
128	38 and 127	66827	Advanced
129	outcome*.mp.	861495	Advanced
130	127 and 129	223386	Advanced
131	38 and 130	15639	Advanced

132	128 or 131	66827	Advanced
133	limit 132 to (english language and humans and yr="1999 - 2009" and ("all adult (19 plus years)" or "young adult (19 to 24 years)" or "adult (19 to 44 years)" or "young adult and adult (19-24 and 19-44)" or "middle age (45 to 64 years)" or "middle aged (45 plus years)" or "all aged (65 and over)"))	16330	Advanced

### Cinahl Search Strategy (09 Aug 2009)

#	Query	Limiters/Expanders	Results
S188	S184 NOT S185	Limiters - Publication Year from: 1999-2009; English Language; Age Groups: Adult, 19-44 years, Middle Age, 45-64 years, Aged, 65+ years Search modes - Boolean/Phrase	7015
S187	S184 NOT S185	Limiters - Age Groups: Adult, 19-44 years, Middle Age, 45-64 years, Aged, 65+ years Search modes - Boolean/Phrase	8276
S186	S184 NOT S185	Search modes - Boolean/Phrase	23946
S185	(MH "Animals+")	Search modes - Boolean/Phrase	16930
S184	S181 or S183	Search modes - Boolean/Phrase	24053
S183	S61 and S182	Search modes - Boolean/Phrase	3081
S182	S179 and S180	Search modes - Boolean/Phrase	76724
S181	S61 and S179	Search modes - Boolean/Phrase	24053
<b>Combined Results</b>			
S180	TX outcome*	Search modes - Boolean/Phrase	185118
S179	S173 or S174 or S175 or S176 or S177 or S178	Search modes - Boolean/Phrase	515970
S178	S151 or S152 or S153 or S154 or S155 or S156 or S157 or S158 or S159 or S160 or S161 or S162 or S163 or S164 or S165 or S166 or S167 or S168 or S169 or S170 or S171 or S172	Search modes - Boolean/Phrase	154169
S177	S131 or S132 or S133 or S134 or S135 or S136 or S137 or S138 or S139 or S140 or S141 or S142 or S143 or S144 or S145 or S146 or S147 or S148 or S149 or S150	Search modes - Boolean/Phrase	118942
S176	S116 or S117 or S118 or S119 or S120 or S121 or S122 or S123 or S124 or S125 or S126 or S127 or S128 or S129 or S130	Search modes - Boolean/Phrase	106336
S175	S96 or S97 or S98 or S99 or S100 or S101 or S102 or S103 or S104 or S105 or S106 or S107 or S108 or S109 or S110 or S111 or S112 or S113 or S114 or S115	Search modes - Boolean/Phrase	109954
S174	S80 or S81 or S82 or S83 or S84 or S85 or S86 or S87 or	Search modes - Boolean/Phrase	41342

**Note:** search re-ran on 19-Aug-2009 -> results = **7775**

	S88 or S89 or S90 or S91 or S92 or S93 or S94 or S95		
S173	S62 or S63 or S64 or S65 or S66 or S67 or S68 or S69 or S70 or S71 or S72 or S73 or S74 or S75 or S76 or S77 or S78 or S79	Search modes - Boolean/Phrase	188611
S172	TX cost or TX costs or TX costed or TX costing or TX costly	Search modes - Boolean/Phrase	66300
S171	(MH "Health Facility Costs")	Search modes - Boolean/Phrase	1516
S170	(MH "Economic Aspects of Illness")	Search modes - Boolean/Phrase	2241
S169	(MH "Cost Control")	Search modes - Boolean/Phrase	3156
S168	(MH "Health Care Costs")	Search modes - Boolean/Phrase	11912
S167	(MH "Cost Benefit Analysis")	Search modes - Boolean/Phrase	8580
S166	(MH "Costs and Cost Analysis")	Search modes - Boolean/Phrase	5776
S165	TX integrat*	Search modes - Boolean/Phrase	33649
S164	TX partnership*	Search modes - Boolean/Phrase	10512
S163	TX public N3 partnership or public N3 partnerships	Search modes - Boolean/Phrase	440
S162	(MH "Public Sector")	Search modes - Boolean/Phrase	1979
S161	(MH "Private Sector")	Search modes - Boolean/Phrase	2879
S160	TX co-ordinat*	Search modes - Boolean/Phrase	1927
S159	TX co-operat*	Search modes - Boolean/Phrase	967
S158	TX cooperat*	Search modes - Boolean/Phrase	11185
S157	TX coordinat*	Search modes - Boolean/Phrase	19829
S156	TX care management	Search modes - Boolean/Phrase	8402
S155	TX shared health care	Search modes - Boolean/Phrase	1
S154	TX shared care	Search modes - Boolean/Phrase	247
S153	(MH "Shared Services, Health Care")	Search modes - Boolean/Phrase	318
S152	TX care model*	Search modes - Boolean/Phrase	2228
S151	TX model* N20 care	Search modes - Boolean/Phrase	14534
S150	(MH "Specialties, Nursing")	Search modes - Boolean/Phrase	2170
S149	(MH "Nursing Models, Theoretical")	Search modes - Boolean/Phrase	3296
S148	(MH "Occupational Health Nursing")	Search modes - Boolean/Phrase	3155
S147	(MH "Rehabilitation Nursing")	Search modes - Boolean/Phrase	1788
S146	(MH "Clinical Nurse Specialists")	Search modes - Boolean/Phrase	3916
S145	TX nurse* N2 clinician*	Search modes - Boolean/Phrase	913
S144	TX model* N2 nurs*	Search modes - Boolean/Phrase	6687

S143	TX specialt*	Search modes - Boolean/Phrase	13448
S142	TX specialist*	Search modes - Boolean/Phrase	29186
S141	TX family practi?e	Search modes - Boolean/Phrase	11203
S140	(MH "Family Practice")	Search modes - Boolean/Phrase	6772
S139	TX advanced N10 practitioner*	Search modes - Boolean/Phrase	1363
S138	TX advanced practice*	Search modes - Boolean/Phrase	8567
S137	TX extended scope*	Search modes - Boolean/Phrase	46
S136	TX expanded scope*	Search modes - Boolean/Phrase	72
S135	TX extend* N10 role*	Search modes - Boolean/Phrase	623
S134	TX expand* N10 role*	Search modes - Boolean/Phrase	1862
S133	TX nurse pract*	Search modes - Boolean/Phrase	32953
S132	(MH "Nurse Practitioners")	Search modes - Boolean/Phrase	8672
S131	(MH "Nursing Role")	Search modes - Boolean/Phrase	25677
S130	TX qualit* N2 health care	Search modes - Boolean/Phrase	25393
S129	TX qualit* N2 healthcare	Search modes - Boolean/Phrase	6873
S128	TX qualit* N2 care	Search modes - Boolean/Phrase	41129
S127	(MH "Quality Assurance")	Search modes - Boolean/Phrase	8442
S126	(MH "Quality of Health Care")	Search modes - Boolean/Phrase	21768
S125	(MH "Process Assessment (Health Care)")	Search modes - Boolean/Phrase	2192
S124	(MH "Outcomes (Health Care)")	Search modes - Boolean/Phrase	13532
S123	TX collaborat*	Search modes - Boolean/Phrase	35557
S122	TX interprofession*	Search modes - Boolean/Phrase	9221
S121	TX multi-profession*	Search modes - Boolean/Phrase	300
S120	TX multiprofession*	Search modes - Boolean/Phrase	424
S119	TX inter-profession*	Search modes - Boolean/Phrase	238
S118	TX cross-disciplin*	Search modes - Boolean/Phrase	149
S117	TX (communication N2 resources) or TX (communications N2 resources)	Search modes - Boolean/Phrase	131
S116	(MH "Communication with Community Resources (Omaha)")	Search modes - Boolean/Phrase	1
S115	TX team*	Search modes - Boolean/Phrase	43849
S114	TX intra-disciplin*	Search modes - Boolean/Phrase	8
S113	TX intradisciplin*	Search modes - Boolean/Phrase	67
S112	TX inter-disciplin*	Search modes - Boolean/Phrase	106
S111	TX interdisciplin*	Search modes - Boolean/Phrase	10616
S110	TX multi-disciplin*	Search modes - Boolean/Phrase	898
S109	TX multidisciplin*	Search modes - Boolean/Phrase	21351
S108	TX Multidisciplinary care team*	Search modes - Boolean/Phrase	14115

S107	TX patient focus#ed care	Search modes - Boolean/Phrase	601
S106	TX patient cent#red care	Search modes - Boolean/Phrase	5860
S105	(MH "Team Nursing")	Search modes - Boolean/Phrase	300
S104	TX (patient* N4 team) or TX (patient* N4 teams)	Search modes - Boolean/Phrase	2320
S103	(MH "Multidisciplinary Care Team")	Search modes - Boolean/Phrase	14094
S102	TX health care service*	Search modes - Boolean/Phrase	4233
S101	TX healthcare service*	Search modes - Boolean/Phrase	1130
S100	(MH "Health Services")	Search modes - Boolean/Phrase	3585
S99	TX primary health care	Search modes - Boolean/Phrase	26668
S98	TX primary healthcare	Search modes - Boolean/Phrase	775
S97	TX primary care	Search modes - Boolean/Phrase	28229
S96	(MH "Primary Health Care")	Search modes - Boolean/Phrase	18593
S95	TX consultation*	Search modes - Boolean/Phrase	19022
S94	TX referral*	Search modes - Boolean/Phrase	19227
S93	(MH "Referral and Consultation")	Search modes - Boolean/Phrase	10485
S92	TX (pathway N20 care) or TX (pathways N20 care)	Search modes - Boolean/Phrase	1773
S91	TX (pathway N20 healthcare) or TX (pathways N20 healthcare)	Search modes - Boolean/Phrase	89
S90	TX (pathway N20 service*) or TX (pathways N20 service*)	Search modes - Boolean/Phrase	384
S89	TX (path N20 service*) or TX (paths N20 service*)	Search modes - Boolean/Phrase	137
S88	TX (path N20 healthcare) or TX (paths N20 healthcare)	Search modes - Boolean/Phrase	51
S87	TX (path N20 care) or TX (paths N20 care)	Search modes - Boolean/Phrase	599
S86	TX (critical* N2 path) or TX (critical* N2 paths)	Search modes - Boolean/Phrase	3005
S85	TX (clinic* N2 pathway) or TX (clinic* N2 pathways)	Search modes - Boolean/Phrase	925
S84	(MH "Critical Path")	Search modes - Boolean/Phrase	2330
S83	(MH "Critical Path")	Search modes - Boolean/Phrase	2330
S82	TX continuit*	Search modes - Boolean/Phrase	7587
S81	TX continuum	Search modes - Boolean/Phrase	3763
S80	(MH "Continuity of Patient Care")	Search modes - Boolean/Phrase	3978
S79	TX approach*	Search modes - Boolean/Phrase	84281
S78	TX access*	Search modes - Boolean/Phrase	70022
S77	TX delivery N2 service*	Search modes - Boolean/Phrase	4200
S76	TX health* N12 delivery	Search modes - Boolean/Phrase	24204
S75	(MH "Health Care Delivery,	Search modes - Boolean/Phrase	2369

	Integrated")		
S74	(MH "Health Care Delivery")	Search modes - Boolean/Phrase	14940
S73	TX community N12 service*	Search modes - Boolean/Phrase	21026
S72	(MH "Community Health Services")	Search modes - Boolean/Phrase	8003
S71	TX rural N12 service*	Search modes - Boolean/Phrase	4235
S70	(MH "Rural Health Services")	Search modes - Boolean/Phrase	2706
S69	TX metrol*	Search modes - Boolean/Phrase	59
S68	TX telemed*	Search modes - Boolean/Phrase	2403
S67	TX telehealth*	Search modes - Boolean/Phrase	1781
S66	TX telerehab*	Search modes - Boolean/Phrase	90
S65	(MH "Teleradiology")	Search modes - Boolean/Phrase	137
S64	(MH "Telenursing")	Search modes - Boolean/Phrase	1196
S63	(MH "Telemedicine")	Search modes - Boolean/Phrase	1983
S62	(MH "Telehealth")	Search modes - Boolean/Phrase	1376
		<b>Models of Care Segment</b>	
S61	S58 or S59 or S60	Search modes - Boolean/Phrase	86292
S60	S52 or S53 or S54 or S55 or S56 or S57	Search modes - Boolean/Phrase	39759
S59	S36 or S37 or S38 or S39 or S40 or S41 or S42 or S43 or S44 or S45 or S46 or S47 or S48 or S49 or S50 or S51	Search modes - Boolean/Phrase	8610
S58	S1 or S2 or S3 or S4 or S5 or S6 or S7 or S8 or S9 or S10 or S11 or S12 or S13 or S14 or S15 or S16 or S17 or S18 or S19 or S20 or S21 or S22 or S23 or S24 or S25 or S26 or S27 or S28 or S29 or S30 or S31 or S32 or S33 or S34 or S35	Search modes - Boolean/Phrase	42595
S57	TX chronic N6 illness*	Search modes - Boolean/Phrase	5518
S56	TX chronic N6 disorder*	Search modes - Boolean/Phrase	3181
S55	TX chronic N6 condition*	Search modes - Boolean/Phrase	4704
S54	TX chronic N6 injur*	Search modes - Boolean/Phrase	1304
S53	TX chronic N6 disease*	Search modes - Boolean/Phrase	31036
S52	(MH "Chronic Disease")	Search modes - Boolean/Phrase	17929
		<b>Chronic Disease Segment</b>	
S51	TX musculoskeletal N6 disorder*	Search modes - Boolean/Phrase	1311
S50	TX musculoskeletal N6 condition*	Search modes - Boolean/Phrase	520
S49	TX musculoskeletal N6 injur*	Search modes - Boolean/Phrase	1086
S48	TX MSK	Search modes - Boolean/Phrase	49
S47	TX musculoskeletal N6	Search modes - Boolean/Phrase	3022



	disease*		
S46	TX epicondylitis	Search modes - Boolean/Phrase	312
S45	(MH "Tennis Elbow")	Search modes - Boolean/Phrase	477
S44	(MH "Musculoskeletal Abnormalities")	Search modes - Boolean/Phrase	298
S43	(MH "Muscular Diseases")	Search modes - Boolean/Phrase	826
S42	(MH "Hand Deformities")	Search modes - Boolean/Phrase	25
S41	(MH "Foot Diseases")	Search modes - Boolean/Phrase	869
S40	(MH "Foot Deformities")	Search modes - Boolean/Phrase	324
S39	(MH "Fasciitis")	Search modes - Boolean/Phrase	96
S38	(MH "Cartilage Diseases")	Search modes - Boolean/Phrase	192
S37	(MH "Bone Diseases")	Search modes - Boolean/Phrase	629
S36	(MH "Musculoskeletal Diseases")	Search modes - Boolean/Phrase	2179
		<b>MSK Segment</b>	
S35	(MH "Osteoarthritis, Knee")	Search modes - Boolean/Phrase	563
S34	(MH "Osteoarthritis, Hip")	Search modes - Boolean/Phrase	285
S33	TX spinal osteophyt*	Search modes - Boolean/Phrase	102
S32	(MH "Spinal Osteophytosis")	Search modes - Boolean/Phrase	102
S31	TX coxarthr*	Search modes - Boolean/Phrase	24
S30	TX joint disease*	Search modes - Boolean/Phrase	2976
S29	(MH "Joint Diseases")	Search modes - Boolean/Phrase	1090
S28	TX bechterew*	Search modes - Boolean/Phrase	2
S27	TX still* disease*	Search modes - Boolean/Phrase	63
S26	(MH "Still's Disease, Adult-Onset")	Search modes - Boolean/Phrase	39
S25	TX sjogren*	Search modes - Boolean/Phrase	4
S24	TX sjogren*	Search modes - Boolean/Phrase	741
S23	(MH "Sjogren's Syndrome")	Search modes - Boolean/Phrase	497
S22	TX oligoarthr*	Search modes - Boolean/Phrase	47
S21	TX polyarthr*	Search modes - Boolean/Phrase	169
S20	TX gout*	Search modes - Boolean/Phrase	946
S19	TX rheuma*	Search modes - Boolean/Phrase	15932
S18	(MH "Rheumatic Diseases")	Search modes - Boolean/Phrase	856
S17	TX sclerod*	Search modes - Boolean/Phrase	979
S16	(MH "Scleroderma, Systemic")	Search modes - Boolean/Phrase	791
S15	TX reiter*	Search modes - Boolean/Phrase	627
S14	TX spondy*	Search modes - Boolean/Phrase	1779
S13	TX anky*	Search modes - Boolean/Phrase	998
S12	(MH "Spondylitis, Ankylosing")	Search modes - Boolean/Phrase	623
S11	(MH "Spondylarthropathies")	Search modes - Boolean/Phrase	50
S10	TX lupus	Search modes - Boolean/Phrase	2701
S9	(MH "Lupus Erythematosus, Systemic")	Search modes - Boolean/Phrase	2033

S8	TX arthr*	Search modes - Boolean/Phrase	29377
S7	(MH "Spondylarthritis")	Search modes - Boolean/Phrase	69
S6	TX osteoarthr*	Search modes - Boolean/Phrase	7188
S5	(MH "Osteoarthritis")	Search modes - Boolean/Phrase	4929
S4	(MH "Gout")	Search modes - Boolean/Phrase	720
S3	(MH "Arthritis, Rheumatoid")	Search modes - Boolean/Phrase	5744
S2	(MH "Arthritis, Psoriatic")	Search modes - Boolean/Phrase	292
S1	(MH "Arthritis")	Search modes - Boolean/Phrase	3257
<b>Arthritis Segment</b>			

## Embase Search Strategy (26 Aug 2009)

EMBASE 1980 to 2009 Week 34

#	Searches	Results	Search Type
1	arthritis/	24793	Advanced
2	psoriatic arthritis/	4321	Advanced
3	rheumatoid arthritis/	60342	Advanced
4	gout/	5252	Advanced
5	osteoarthritis/	24517	Advanced
6	osteoarthr*.mp.	39686	Advanced
7	spondylarthritis/	221	Advanced
8	arthr*.mp.	208830	Advanced
9	systemic lupus erythematosus/	31107	Advanced
10	lupus.mp.	46815	Advanced
11	spondyloarthropathy/	2625	Advanced
12	ankylosing spondylitis/	7562	Advanced
13	spondylitis/	1849	Advanced
14	ankyl*.mp.	10631	Advanced
15	spondy*.mp.	22196	Advanced
16	reiter*.mp.	3746	Advanced
17	systemic sclerosis/	6551	Advanced
18	sclerod*.mp.	10126	Advanced
19	rheumatic disease/	10338	Advanced
20	rheuma*.mp.	105292	Advanced
21	gout*.mp.	6407	Advanced
22	polyarthr*.mp.	6398	Advanced
23	oligoarthr*.mp.	607	Advanced
24	Sjogren syndrome/	8812	Advanced
25	sjogren*.mp.	7359	Advanced
26	sjogren*.mp.	9066	Advanced
27	adult onset Still disease/	307	Advanced
28	still* disease*.mp.	1021	Advanced
29	bechterew*.mp.	275	Advanced
30	joint disease*.mp.	5015	Advanced
31	arthropathy/	7552	Advanced
32	coxarthr*.mp.	704	Advanced

33	spinal osteophyt*.mp.	19	Advanced
34	hip osteoarthritis/	3087	Advanced
35	spondylosis/	1330	Advanced
36	knee osteoarthritis/	7484	Advanced
37	musculoskeletal disease/	9198	Advanced
38	bone disease/	7665	Advanced
39	chondropathy/	1811	Advanced
40	fasciitis/	1159	Advanced
41	foot malformation/	2632	Advanced
42	foot disease/	2503	Advanced
43	hand malformation/	1625	Advanced
44	muscle disease/	5274	Advanced
45	musculoskeletal system malformation/	241	Advanced
46	tennis elbow/	997	Advanced
47	epicondylitis.mp.	1058	Advanced
48	(musculoskeletal adj6 disease*).mp.	10121	Advanced
49	MSK.mp.	208	Advanced
50	(musculoskeletal adj6 injur*).mp.	3939	Advanced
51	(musculoskeletal adj6 condition*).mp.	890	Advanced
52	(musculoskeletal adj6 disorder*).mp.	2995	Advanced
53	Chronic disease/	36986	Advanced
54	(chronic adj6 disease*).mp.	147736	Advanced
55	(chronic adj6 injur*).mp.	7050	Advanced
56	(chronic adj6 condition*).mp.	12519	Advanced
57	(chronic adj6 disorder*).mp.	14079	Advanced
58	(chronic adj6 illness*).mp.	8004	Advanced
59	or/1-58	516699	Advanced
60	telemedicine/	1315	Advanced
61	teleradiology/	172	Advanced
62	telehealth/	226	Advanced
63	telenursing/	16	Advanced
64	telehealth.mp.	421	Advanced
65	telemed*.mp.	2951	Advanced
66	telerehab*.mp.	71	Advanced
67	metrol*.mp.	914	Advanced
68	rural health care/	3410	Advanced

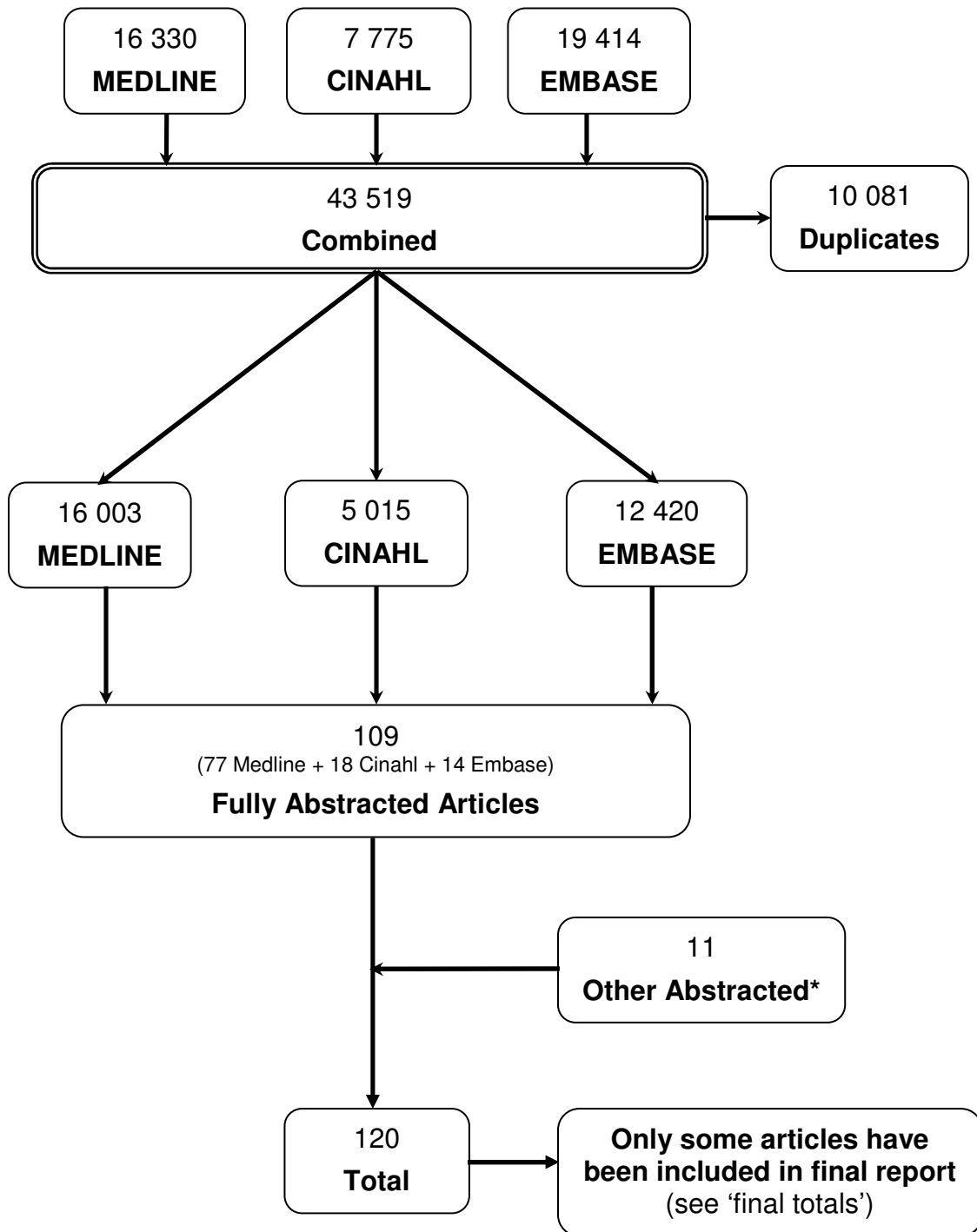
69	(rural adj12 service*).mp.	2943	Advanced
70	community care/	18770	Advanced
71	(community adj12 service*).mp.	10086	Advanced
72	health care delivery/	42125	Advanced
73	integrated health care system/	336	Advanced
74	(health* adj12 delivery).mp.	49692	Advanced
75	(delivery adj2 service*).mp.	3990	Advanced
76	access*.mp.	166944	Advanced
77	approach*.mp.	552747	Advanced
78	patient care/	86536	Advanced
79	(care adj2 deliver*).mp.	45525	Advanced
80	continuum.mp.	9660	Advanced
81	continuit*.mp.	12720	Advanced
82	clinical pathway/	1643	Advanced
83	(clinic* adj2 pathway?).mp.	2588	Advanced
84	(critical adj2 path?).mp.	219	Advanced
85	patient referral/	28086	Advanced
86	referral*.mp.	53508	Advanced
87	consultation/	25132	Advanced
88	consultation*.mp.	40754	Advanced
89	((path? or pathway?) adj20 care).mp.	2323	Advanced
90	((path? or pathway?) adj20 healthcare).mp.	209	Advanced
91	((path? or pathway?) adj20 service*).mp.	627	Advanced
92	primary health care/	11238	Advanced
93	primary care.mp.	36711	Advanced
94	primary healthcare.mp.	867	Advanced
95	primary health care.mp.	14038	Advanced
96	health service/	41761	Advanced
97	health care service*.mp.	4255	Advanced
98	healthcare service*.mp.	1117	Advanced
99	(patient* adj4 team?).mp.	2590	Advanced
100	nursing/	11771	Advanced
101	patient centered care.mp.	240	Advanced
102	patient centred care.mp.	134	Advanced
103	patient focus?ed care.mp.	83	Advanced
104	Multidisciplinary care team*.mp.	35	Advanced

105 multidisciplin*.mp.	22218	Advanced
106 multi-disciplin*.mp.	1782	Advanced
107 interdisciplin*.mp.	11487	Advanced
108 inter-disciplin*.mp.	195	Advanced
109 intradisciplin*.mp.	15	Advanced
110 intra-disciplin*.mp.	3	Advanced
111 team*.mp.	43971	Advanced
112 interdisciplinary communication/	1126	Advanced
113 cross-disciplin*.mp.	297	Advanced
114 interprofession*.mp.	849	Advanced
115 inter-profession*.mp.	150	Advanced
116 multiprofession*.mp.	432	Advanced
117 multi-profession*.mp.	237	Advanced
118 collaborat*.mp.	38147	Advanced
119 (outcome? adj2 assessment?).mp.	71027	Advanced
120 health care quality/	56263	Advanced
121 (qualit* adj2 care).mp.	61524	Advanced
122 (qualit* adj2 healthcare).mp.	631	Advanced
123 (qualit* adj2 health care).mp.	59718	Advanced
124 nurse practitioner/	2131	Advanced
125 nurse attitude/	1372	Advanced
126 nurse pract*.mp.	3056	Advanced
127 (expand* adj10 role*).mp.	2998	Advanced
128 (extend* adj10 role*).mp.	2324	Advanced
129 expanded scope*.mp.	41	Advanced
130 extended scope*.mp.	30	Advanced
131 advanced practice*.mp.	361	Advanced
132 (advanced adj10 practitioner*).mp.	172	Advanced
133 specialist*.mp.	55830	Advanced
134 specialt*.mp.	14664	Advanced
135 (model* adj2 nurs*).mp.	710	Advanced
136 (nurse* adj2 clinician*).mp.	206	Advanced
137 nursing discipline/	33	Advanced
138 rehabilitation nursing/	12	Advanced
139 occupational health nursing/	1069	Advanced
140 (model* adj20 care).mp.	18716	Advanced

141	care model*.mp.	1058	Advanced
142	shared care.mp.	455	Advanced
143	shared healthcare.mp.	1	Advanced
144	shared health care.mp.	6	Advanced
145	care management.mp.	16582	Advanced
146	coordinat*.mp.	80806	Advanced
147	co-ordinat*.mp.	5614	Advanced
148	cooperat*.mp.	68123	Advanced
149	co-operat*.mp.	5559	Advanced
150	(public adj3 partnership?).mp.	475	Advanced
151	partnership*.mp.	7587	Advanced
152	integrat*.mp.	137605	Advanced
153	"cost"/	20758	Advanced
154	"cost benefit analysis"/	31219	Advanced
155	"cost control"/	17662	Advanced
156	"cost of illness"/	5153	Advanced
157	"health care cost"/	65644	Advanced
158	(cost or costs or costed or costing or costly).mp.	270578	Advanced
159	or/60-158	1562958	Advanced
160	outcome*.mp.	767409	Advanced
161	159 and 160	241216	Advanced
162	59 and 159	81435	Advanced
163	59 and 161	21932	Advanced
164	162 or 163	81435	Advanced
165	limit 164 to (human and english and yr="1999 -Current" and (adult <18 to 64 years> or aged <65+ years>))	19414	Advanced

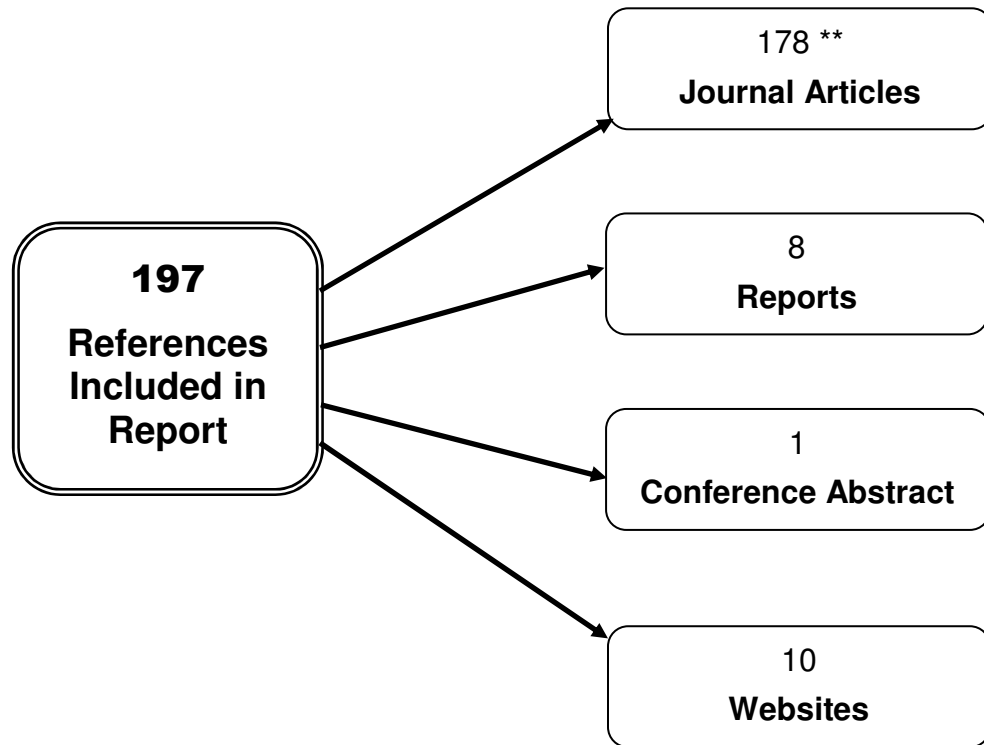


## Total Number of Articles Found and Included for Data Abstraction



\* hand searches of reference listings, personal communication, etc.

## Total Numbers for References Included in Report



\* includes references found in literature search, hand searches of reference listings, personal communication, etc.