

Translating evidence into practice for people with osteoarthritis of the hip and knee

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Abstract There is an international focus on improving the quality of care for people with chronic conditions, including those with chronic rheumatic conditions such as osteoarthritis (OA). A number of evidence-based clinical practice guidelines exist to guide clinician management of OA of the hip and knee. However, gaps and delays in the integration of these recommendations into practice still remain. This paper reviews the role of clinical practice guidelines within the contemporary discourse and practice of information translation. This discussion paper uses an OA quality improvement case study to illustrate how evidence for effective implementation strategies can be used in conjunction with a practical implementation model to plan and implement quality improvement projects.

Keywords Clinical pathway · Clinical practice guidelines · Evidence-based medicine · Evidence into practice · Health service redesign · Osteoarthritis hip · Osteoarthritis knee

Case study summary

In response to international and local evidence of gaps in adherence to international CPG recommendations for the care of OA hip and knee, a quality improvement project was designed to improve service delivery for people with OA hip and/or knee referred to rheumatology and orthopedic special-

ists within an acute care ambulatory setting. The project site was one of a seven-site collaborative clinical network.

The project rationale was: by improving the model of service delivery, clinicians would be supported in their implementation of pharmacological and nonpharmacological recommendations for care of OA hip and knee, patients would be supported in the self-management of their condition and integration of acute care and community care services would be improved.

The main project intervention was to implement an evidence-based osteoarthritis clinical pathway (OACP) that included recommendations for pharmacological and non-pharmacological care management for people with OA hip and/or knee and recommendations for the process of care.

The 9 month pilot implementation phase of the OACP project received funding through a Commonwealth of Australia grant under the Arthritis and Musculoskeletal Conditions Quality Improvement Program (AMQuIP). The Royal Melbourne Hospital, Human Research Ethics Committee approved it as a quality improvement project.

Full details of the intervention are summarized in the project final report and can be obtained from the author on request.

Introduction

Osteoarthritis (OA) is one of the most common chronic musculoskeletal conditions worldwide. It is rising in incidence and is associated with significant pain, disability, and cost to individuals and the community [1, 2]. In Australia, in 2004–2005, based on a National Health Survey, 15% of the population reported having arthritis of whom 51% reported OA [3]. People with OA are generally older and commonly experience multiple comorbid conditions. Since 1995, a number of evidence-based clinical practice guidelines have been published by medical specialist, primary practice clinicians, and other healthcare

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providers to guide the clinician management of OA hip and knee [4–11]. There is general agreement about priorities in management between American, UK, and European CPG [12]. However, a number of reports outline suboptimal care for patients with OA [13, 14], for older people with chronic pain [15], and those with multiple comorbid condition [16].

In rheumatology, as in other medical specialties, there is worldwide interest in developing and implementing patient-centered models of care to support integration of evidence into practice and improve patient health outcomes for people with chronic conditions, including OA [17, 18]. The complex factors driving these health service reforms are well-summarized in the Institute of Medicine (IOM) pivotal report, “Crossing the quality chasm: a new health system for the 21st century”,

there is ...more to know, more to do, more to manage, more to watch and more people involved than ever before [19].

The IOM report defines ten rules for system redesign to meet the needs of those with chronic conditions, one of which relates to evidence-based decision making.

Patients should receive care that is evidence based. Care should not vary illogically from clinician to clinician or from place to place [19].

This paper considers the effective implementation of evidence-based OA management. This information should be used in conjunction with a holistic approach to chronic disease system redesign that considers all quality of care domains; that care is safe, effective, patient-centered, timely, efficient, and equitable. The historical approach to the uptake of evidence into practice has been to focus on passive dissemination (diffusion) of information to individuals through social networks in which an assumption is made that the target individuals are aware, motivated, and capable of implementing necessary change. Support for this process has relied on the provision of resources in the form of standardized evidence-based clinical practice guidelines (CPG) and provision of skills training in the use of evidence-based medicine (EBM) methods. Educational methods have involved use of passive continuous medical education methods (CME).

A number of papers document widespread support for OA-CPG but there are delays in uptake, particularly of nonpharmacological recommendations, and variance in the application of recommendations by general practitioners and specialists, including rheumatologists, in different contexts [12, 20–22]. In addition, qualitative information suggests that the needs of patients are not being met with regard to the quantity and quality of information provided about OA and its treatment, emotional needs of patients, and patient–clinician communication [23, 24]. In Australia,

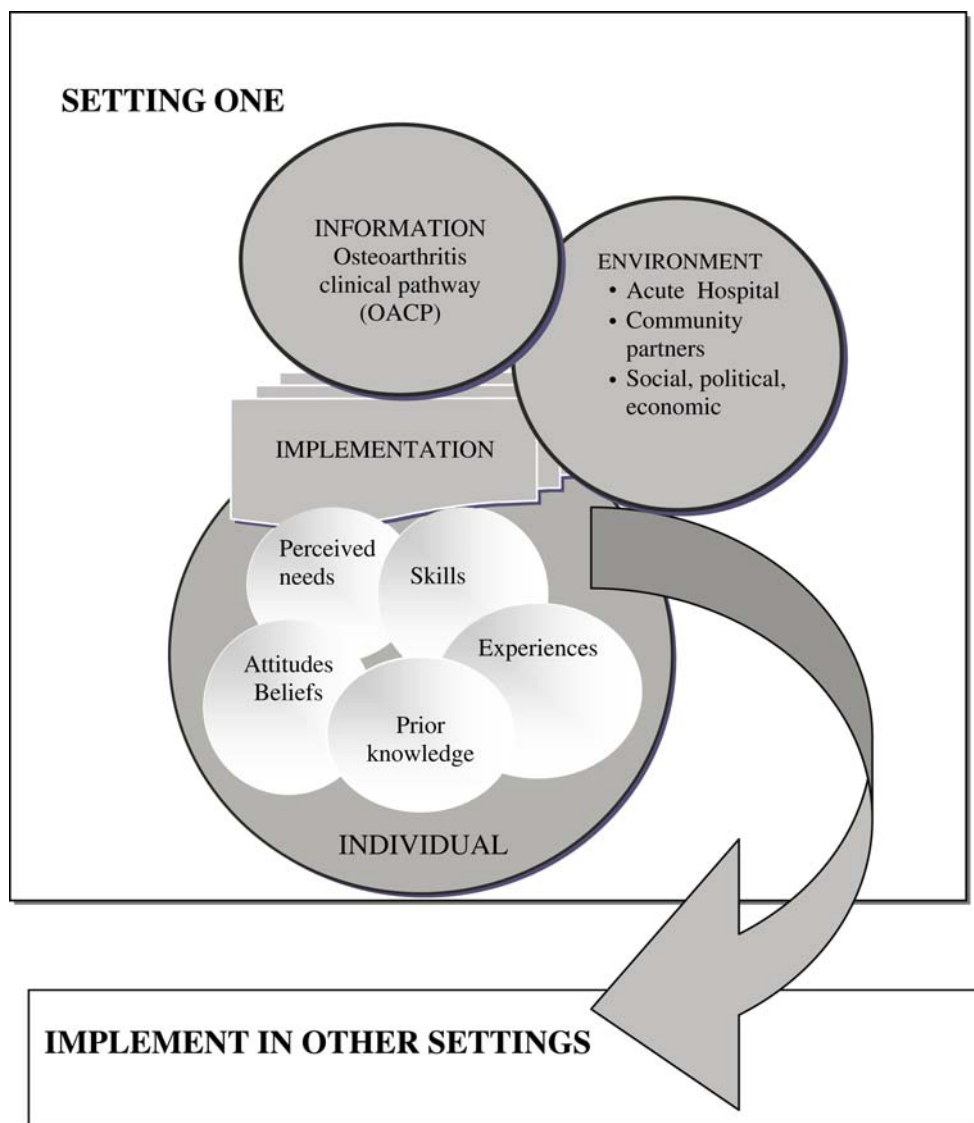
there are no national CPG for management of OA and there are no systematic collection of data that informs the level of adherence to international guideline recommendations. However, in our own university-affiliated metropolitan teaching hospital, quantitative and qualitative data have identified gaps in meeting patient expressed needs and in documentation of adherence to OA-CPG recommendations in keeping with international reports [25, 26].

Clinical practice guidelines in perspective: a new model for implementing change

While implementation of CPG in general have been associated with change in clinician practice and improved patient outcomes [27], there is marked variation in impact and reported lack of sustainability [28, 29]. A major advance in understanding factors that influence physician adoption of CPG was made by Cabana et al. who published a systematic review of 76 published studies using a structured socio-behavioral framework. The following factors were identified as major barriers to the implementation of CPG recommendations: lack of awareness or familiarity (physician knowledge), lack of agreement, lack of self-efficacy, lack of outcome expectancy, inertia of previous practice (physician attitudes), and external barriers (behavior) [30]. The primary response to the inadequate uptake of CPG by clinicians focused on improving the quality of the information by development of guidelines for development of CPG [31, 32]. More recently, increasing interest in effective implementation of guideline recommendations has resulted in a greater focus on this area within these documents and the AGREE instrument, a validated tool that provides a quantitative assessment of the quality of CPG [33].

Effective CPG integration is now understood to depend, not only on the nature of the information, but also on factors pertaining to an individual’s likelihood of adopting or rejecting CPG and the environmental factors influencing a particular setting (Fig. 1).

One point of confusion can relate to the terminology used in implementation literature. There is often variation in use of terms such as diffusion, dissemination and implementation. It is useful to distinguish between *passive diffusion* of information and *dissemination*; the latter involving an active, planned set of activities targeted to certain groups. In addition to diffusion and dissemination processes, *implementation* usually refers also to an active planning process that aims to integrate changes into established practice processes [34]. In many instances, research into these areas draws not only on traditional medical educational theories but also those of other disciplines such as sociological and anthropological, organizational, political, economic and marketing theory [35]. The systematic review of the effectiveness of

Fig. 1 Implementing evidence into practice

implementation strategies by Greenhalgh et al. provides a particularly useful summary of the effectiveness of various implementation strategies and the source of the supporting evidence (Table 1) [34].

Implementing an OACP: integrating theory in practice

In addition to identifying evidence-based implementation strategies, implementation of change requires formal planning and project management processes that need to be explicitly defined a priori. Planning should involve prioritization of recommendations to be implemented, identification of resources that need to be developed, and development of a program evaluation. A practical implementation framework is provided in Fig. 2. The model integrates project management with structural systems

necessary to support sustained change. A positive predisposition toward continuous quality improvement (CQI) requires leadership that is oriented toward and supports development of CQI policies and processes such as education and training in CQI, data collection, and management. In addition, the CQI system would integrate these processes with a patient-centered approach to minimizing risk of adverse events and managing such events if they arise.

Diagnostic and planning phase

In this phase, a number of activities can be undertaken to identify gaps in current practice within the setting, identify evidence-based interventions to improve care, prioritize recommendations for implementation, and identify the target level (system and person/s) at which change will occur.

Table 1 Evidence for effective interventions for implementation of innovations

Description of barrier/enabling factor	Health-related studies	Evidence from other disciplines
Nature of the innovation		
Relative advantage: clear evidence of advantage, e.g., cost-effectiveness	++	+++
Compatibility with existing values and norms	+++	
Complexity: simple innovations are more easily adopted	+++	
Complexity: use of incremental adoption of complex innovations	++	+++
Trialability: able to be tested by end user on a limited basis	+++	
Observability: the ability of end users to see visible benefits	+++	
Reinvention: the ability of the end user to adapt to own needs	+++	
Risk: the associated degree of uncertainty perceived by the end user as personal risk	+++	
Risk: reduction of risk through the use of opinion leaders		+++
Relevance to practice	++	+++
Knowledge required to use the innovation/information: more likely to be adopted if easily transferred between settings	++	+++
Support for technology, e.g., training, 'helpdesk'	++	+++
Factors relating to individuals		
General psychological factors such as tolerance of ambiguity, intellectual ability, motivation, values, learning style ^a	?	?
Context-specific psychological antecedents: motivated and capable	+++	
Context-specific psychological antecedents: meets an identified need		+++
Context-specific psychological antecedents: identified as congruent with individual's identity	++	
Meaning attached to the innovation by the individual	++	+++
Congruency of attached meaning by individual compared to that of management		++
Negotiation and reframing of meaning attached to an innovation	+++	
Authority of the decision to adopt an innovation may increase the adoption but reduce success of sustained implementation		++
Concerns in pre-adoption stage: awareness, sufficient information about nature of the innovation and how it will affect the individual		+++
Concerns in early use of innovation: continued access to information, integration of innovation with usual work process		+++
Concerns in established users' provision of feedback on consequences of the innovation		+++
General factors relating to diffusion and dissemination		
The structure and quality of social networks	++	+++
Homophily: that is, the similarity of individuals to whom the innovation is targeted	+++	
Opinion leaders: the particular influence of some individuals on their colleagues	+++	
Champions or key individuals	++	+++
Boundary spanners: people with significant ties in/between organizations	++	+++
Formal dissemination programs, e.g., led by an external change agency		+++
A receptive environment (strong leadership, clear vision, good managerial relations, risk taking climate, effective data systems)	++	+++

Adapted from Greenhalgh et al. [34].

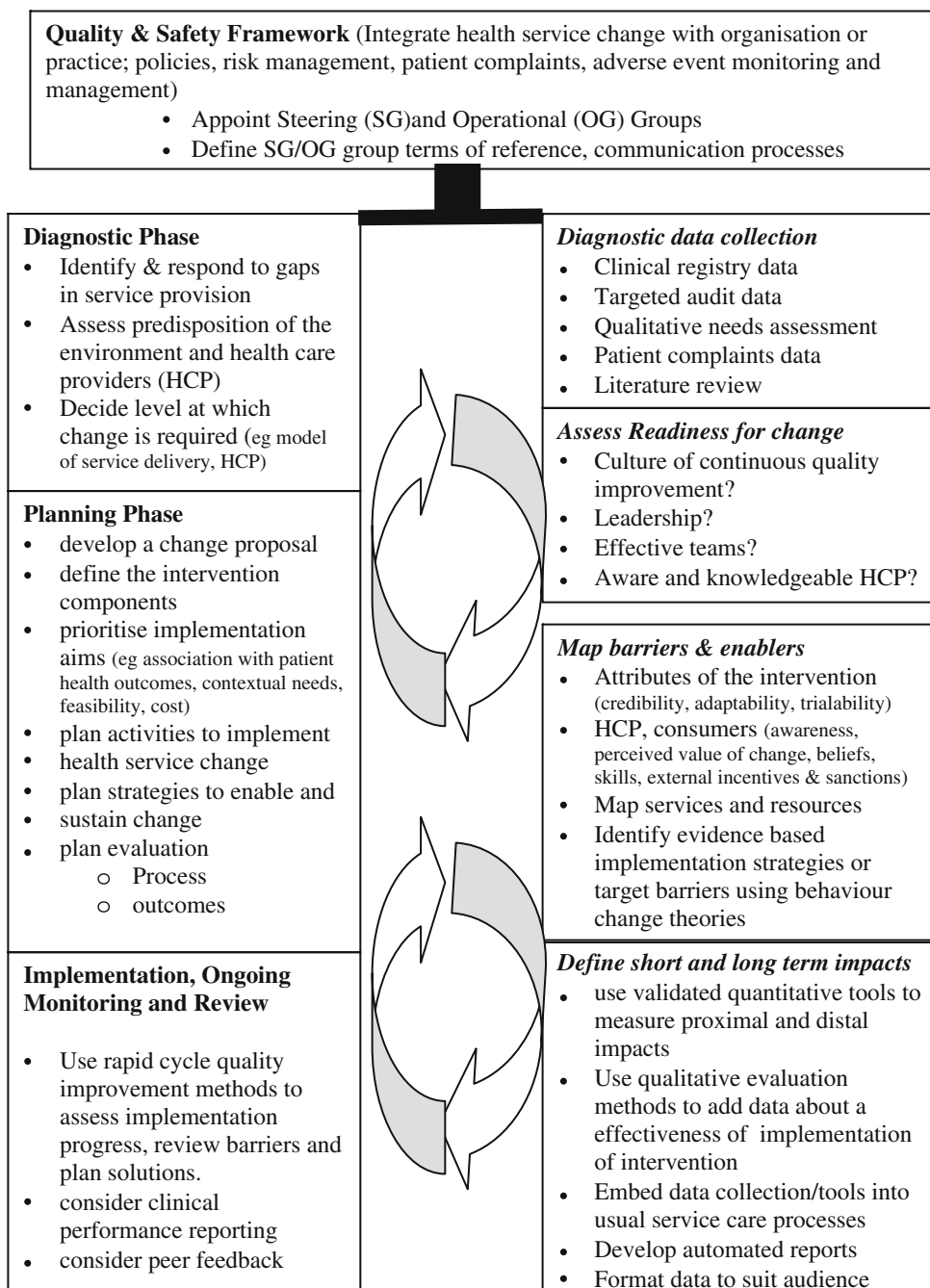
+++ : strong evidence, ++ : moderate evidence

^a The authors did not include in the SR.

It is important to consider the strategic use of staff where their participation has been associated with effective implementation. This includes clinical and executive leaders, opinion leaders, and 'boundary spanners' (those with significant relationships within or between organizations or settings). A consumer perspective is essential to ensure that a patient-centered program is developed. For our OACP project, we formed a steering group consisting of a hospital ambulatory care executive sponsor, high level representation from allied health, orthopedic, rheumatol-

ogy and clinical epidemiology departments, a general practice hospital liaison officer, a representative of the key consumer organization (Arthritis Victoria), and a patient with OA knee. The operational team included the musculoskeletal coordinator (MSK), a project manager, a clinical assistant to the MSK, a rheumatologist, and the project director (also a rheumatologist). The steering group met monthly over a 9-month period and the operational team weekly using explicit terms of reference for guiding their respective roles.

Fig. 2 Implementation process model



We used qualitative (process mapping, focus groups, key informant interviews) and quantitative (auditing, survey of rheumatologist perception of practice) data collection activities to map patient journeys over time, identify gaps in meeting expressed need, identify deficiencies in the documentation of adherence to OACP recommendations, and map system, clinician, and patient barriers to change [26]. Ideally, clinical data registries linked to administrative imaging and pathology databases can provide the greatest value for diagnostic data interrogation and monitoring of

quality improvement activities. This option was not available in our organization.

Prioritization of pathway recommendations may be guided by considering the level of evidence of the recommendation in relation to patient health outcomes, needs of the setting and patients in that setting, interdependency of a recommendation in relation to other recommendations, nature (modifiability) of the barriers to change, and cost (human, time, and other resources). Quality improvement tools, such as cause and effect (“fish bone”) diagrams, flow charts, mapping tools, and

pareto charts are useful for the diagnostic assessment of the setting and prioritization for change, and can be easily accessed on the Internet.

At the end of this phase, we had assessed current practice, had assessed the needs of patients, general practitioners and orthopedic and rheumatology specialists, had mapped barriers to OACP implementation, and had prioritized system redesign to support OACP recommendation implementation based on feasibility and timeframes for proposed solutions (Table 2). Ambulatory system redesign was facilitated by the constitution of the steering group. There was support from all stakeholders to develop a patient-centered OA hip and knee service, to be nested within the existing rheumatology clinic, and to be led by a physiotherapist whose role would be redesigned to that of a musculoskeletal coordinator (MSK). The primary focus of the implementation strategies was therefore at the level of the MSK with a secondary focus on other members of the OA health care provider team (rheumatologists, orthopedic surgeons, general practitioners, and community service providers).

Implementing and monitoring change

Operational, strategic, and resource based strategies were planned (Table 3) according to demonstrated evidence for effectiveness or tailored to overcome barriers. Research evidence pertaining to the effectiveness of tailored implementation strategies is limited [36–38] but, in practice, solving local policy, process, and cultural barriers in the absence of evidence to guide strategies, necessitates the use of local solutions and helps to engender a sense of empowerment within the project and clinical teams. Further research is needed in this area.

Reinforcing an effectively implemented change to ensure sustainability can be challenging, especially in the absence of ongoing external funding. We used strategic SG participation, designed operational strategies (the OA clinical database) to provide automated service utilization reports and performance reports. Integrating performance reports with quality and safety reporting pathways may also be important as a recent report identified that improved guideline adherence was associated with the use of timely, individual, and nonpunitive data feedback [39]. Other authors have emphasized the need for external incentives [40] and, in appropriate situations, sanctions may be required to ensure sustainable change. It will be important in the longer-term to develop funding models to support multidisciplinary ambulatory care appropriately integrating acute and community setting care for people with chronic conditions.

High staff turnover can be a barrier to sustained implementation of change and to plan for this we have developed a service manual for staff orientation and training. It is important to note that we have integrated the service with other existing

organizational programs for chronic disease management and with new organizational initiatives to improve prioritization of patients with OA hip and knee referred to orthopedic outpatients and placed on orthopedic waiting lists for joint replacement surgery. This will lead to further model refinement to allow direct community referrals to be triaged to musculoskeletal coordinator assessment before, and potentially replacing, specialist assessment for some patients.

The overall pilot evaluation was designed to assess the feasibility and effectiveness of program implementation and barriers to sustained implementation. A number of constraints, such as short time lines, limited evaluation funding, and a stipulation to use only quality improvement methodology (nonrandomized evaluation design) influenced the evaluation design. Adherence to OACP recommendations using a ‘before and after’ study design was therefore the primary focus of the proximal impact of OACP implementation. Failure of demonstration of project effectiveness may be due to failure to assess outcomes at the same level as the focus of the intervention; therefore, the primary target for evaluation of effectiveness of the OACP was at the level of the musculoskeletal coordinator. Qualitative and quantitative data was also gathered to identify barriers to patient uptake of recommendations and to assess patient and general practitioner satisfaction with the service. Qualitative data is especially useful for assessing the adequacy of implementation of complex programs in which outcomes may depend upon performance of a number of project components whose interdependencies may be poorly understood (the ‘black box’ effect).

A ‘Plan Do Study Act’ (PDSA) cycle of iterative project review was used by the SG and OT for monitoring the implementation progress. This process supports nonlinear implementation of multiple strategies that can be reviewed and refined during rapid cycles of testing and review.

A comprehensive systematic review of effective implementation strategies has demonstrated that single strategies may be as affective as multiple strategies. Most strategies have positive modest effects, on average being 8–10%, with reminders having the largest size effect of 14% [41]. However, most authors report considerable heterogeneity between studies making it difficult to generalize the effectiveness of strategies in one setting to another. Improved publication of description of interventions and implementation strategies using structured frameworks and common taxonomy may contribute to better understanding of factors that increase the likelihood of generalization of innovations [42, 43]. In addition, ideal evaluation of complex health service redesign remains elusive with ongoing debate about the appropriateness of biomedical research designs and new design models being tested that bridge the needs of academic clinicians and patients [44].

Table 2 Summary of implementation strategies for the OACP project

	Identified barriers	Strategies for implementation (strategic, resource-based and operational)
Innovation (OACP)	<p>Multiple recommendations of varied levels of evidence for multiple health professionals across different settings</p> <p>No standard documentation processes</p> <p>No electronic medical record</p> <p>Recommendations may change over time</p>	<p>Service redesign to provide a MSK coordinator</p> <p>Evidence-based recommendation summary tables</p> <p>A4 laminated OA management flow charts</p> <p>Checklist recommendation reminder sheet for MSK, rheumatologists and general practitioners</p> <p>Standard data documentation tool available in hard copy or electronic version (access database)</p> <p>Planned update of evidence-base according to AGREE recommendations [33].</p>
Clinicians		
Predisposing	<p>Lack of awareness of gaps in quality of care for people with OA</p> <p>Lack of prioritization of OA compared to other inflammatory rheumatic</p> <p>Low level of awareness of consumer-centered issues in chronic disease management</p> <p>Nihilism about ability to change system</p>	<p>Involvement of clinician leaders and consumer in steering group</p> <p>Peer review and scientific meeting presentations</p> <p>Dissemination of information about support for education and self-management in site newsletters</p> <p>Included baseline rheumatologist perception of practice as part of service development</p> <p>Provided audit and feedback of service performance at peer group meetings</p> <p>Included patient service satisfaction assessment</p> <p>Developed a patient goal setting care template for health professionals</p>
Enabling	<p>Access to updated knowledge about interventions</p> <p>Time constraints for supporting patient self-management and education</p> <p>Lack of training in medication management of MSK</p>	<p>Development of the evidence-based pathway recommendations</p> <p>Laminated pathway model of care</p> <p>Checklist reminders</p> <p>Website resources</p> <p>Implementation kit</p> <p>System redesign—developed role for a MSK coordinator</p> <p>Mapped community services, improved acute-community communication and referral systems to utilize community services more effectively</p> <p>Developed pain management protocols for MSK (integrated into electronic data collection tool)</p>
Reinforcing	<p>MSK staff turnover</p> <p>Sustaining interest and awareness</p>	<p>Allied health support for ongoing service with back up for MSK</p> <p>Developed service manual</p> <p>Integrated data documentation into usual care processes</p> <p>Developing service and clinical performance indicators provided using automated database reports</p>
Consumers	<p>High number of nonpatients from cultural and linguistically diverse (CALD) background</p> <p>Expressed low level of knowledge about OA condition</p> <p>Low level uptake of dietician referrals</p>	<p>Scheduled interpreter services to match with rheumatology assessment where possible</p> <p>Development of the OA information booklet</p> <p>Education by MSK</p> <p>Referral to self-management and rehabilitation programs</p> <p>Considering introduction of a ‘COACH’ support program [48]</p>

Barriers to clinician engagement in implementing evidence into practice

In addition to the well-recognized barriers to uptake of CPG, clinicians are inadequately trained in the theory and practice of

quality improvement methods, in qualitative evaluation methods, in project management, and about systems theory and its relationship to health quality domains. The language of quality improvement and change management is foreign and maybe rejected as ‘jargon’ (despite the fact that medical jargon

Table 3 Using theories of implementing change to design implementation strategies for improving care for people with OA hip and knee

Theories/models	Identified barriers	Implementation strategies
Relating to individuals		
Cognitive (focus on rational information seeking and decision making)	Uncertainty in emerging literature relating to Coxib risks, benefit of glucosamine, benefit of self-management programs	Provide summary of updated international recommendations for management OA hip and knee Discuss areas of debate to work toward group consensus about recommendations
Educational (focus on intrinsic motivation of professionals and apply evidence of effectiveness of interactive small group learning)	Lack of familiarity of rheumatologists with interactive small group learning methods Distrust of quality improvement 'jargon' and methods	Use peer group meetings to run team-based small group-based sessions to increase awareness of and provide 'hands-on' use of quality improvement methods and tools
Attitudinal (perceived behavioral control and self-efficacy)	Marked variation in self-reported practice and documentation of assessment and therapeutic recommendations for people with OA hip and knee	Short-term strategy to focus on MSK and patients for implementation OACP Longer-term strategy to influence rheumatologist practice by providing evidence of positive impacts of OACP implementation (audit feedback)
Relating to social context		
Social learning theory (focus on social influence of peers, role models)	Lack of well-developed communication pathways, shared care models between general practitioners and acute care rheumatologists Inadequately developed patient-centered model of (existing) care	Involvement of the acute care general practitioner liaison officer in the steering group to advise ways in which to engage GPs in the uptake and use of OACP recommendations, both at a strategic level and with regard to resource development Involvement of opinion leaders from various stakeholder groups in the steering group Involvement of patients at all levels of the project to advise on the design of the model of care and development of patient-related resources
Relating to the organization/settings		
System theory (focus on enabling systems and management)	Externally funded project that conformed to quality aims of the organization but was of uncertain prioritization within an overall organizational business plan	Involvement of key personnel on the steering group to advise strategies to support sustainability Integration of project within existing quality and safety framework to enable reporting of results through the quality and safety hierarchy Integration of the project with other mainstreamed organizational programs
Economic (focus on incentives, reimbursements)	Acute care setting ambulatory care payment does not support multidisciplinary outpatient care models Project did not fund GP engagement	Model designed to conform to state government new ambulatory care framework (ref) Identify opportunities for GP use of Commonwealth Government incentive payments for managing chronic conditions

Adapted from Grol [49].

is used on a daily basis by most physicians). In the presence of these barriers and in the absence of external incentives or regulation, there is limited impetus for physicians to engage in quality improvement activities. At the level of an individual consultation, clinicians have inadequate education and train-

ing about the theory and practice for supporting patient-condition self-management [16].

With regard to the specific example of implementing recommendations for OA hip and knee care into practice, there is limited evidence pertaining to cost-effective

interventions that support nonpharmacological lifestyle behavioral change. There is evidence for the cost-effectiveness of integrated chronic care programs for some conditions, but as yet there are few examples in the literature that relate to OA [17, 45, 46].

Finally, one of the major barriers to sustained uptake and timely implementation of evidence into practice pertains to lack of systems to support ongoing review and updating of evidence-based recommendations. The current recommendation for guidelines to be reviewed at least 3 yearly is based on work published in 2001 [47]. At that time, a survival analysis suggested that no more than 90% guidelines were valid at 3 years. Therefore, some guidelines may become outdated by the time they are published. The cost and responsibility for updating remains problematic in countries such as Australia where initial funding for guideline development usually does not include ongoing support for review and there is no centralized guidelines repository.

Conclusion

Despite a number of ongoing barriers to the integration of evidence into practice, there are now evidence-based practical approaches that can support rheumatologists to implement evidence into practice. The proposed implementation framework may appear to be most relevant in a medium or large organization where there are system resources to support the implementation process. However, the principles on which the framework is based can be applied to any practice and can be scaled according to size and resources.

Wider system planning is required to bridge the gaps in education and training and ensure that adequate resources are available for physicians to take on leadership roles in research and practice in health services redesign.

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