

Evidence Brief

Developing a National Pain Strategy for Canada

14 December 2017



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**Evidence Brief:
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The McMaster Health Forum's goal is to generate action on the pressing health-system issues of our time, based on the best available research evidence and systematically elicited citizen values and stakeholder insights. We aim to strengthen health systems – locally, nationally, and internationally – and get the right programs, services and products to the people who need them.

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KEY MESSAGES

What's the problem?

- The problem of chronic pain and why it is not being more effectively prevented and managed in Canada can be understood in relation to five features of the problem:
 - many Canadians suffer from chronic pain, but it is not well understood;
 - the framing of chronic pain only in relation to the opioid crisis is not conducive to long-term solutions;
 - there are limitations in existing programs and services for effectively managing (and preventing) chronic pain;
 - gaps in health-system arrangements limit the reach and impact of chronic-pain programs and services; and
 - limited national coordination inhibits progress.

What do we know (from systematic reviews) about four elements of a potentially comprehensive approach to addressing the problem?

- Element 1 (Better care) – Improve primary-care-based chronic-pain management and create/expand interdisciplinary specialty-care teams
 - This approach element speaks to getting the big picture right in preventing and managing chronic pain in primary and specialty care, which is where the rubber really hits the road for people living with or at risk for chronic pain. The Chronic Care Model's six features – self-management support, decision support, delivery-system design, clinical information systems, health-system changes, and community resources – are used to frame this big picture.
 - Generally, we found evidence supporting the use of self-management programs, multidisciplinary and stepped care, and clinical information systems to help manage chronic pain at the primary and secondary levels. We also found that embedding pain-management awareness into organizational structures may facilitate health-system changes. Finally, we found that citizen engagement can assist with the dissemination of information, process for developing interventions, and enhancing awareness and understanding.
- Element 2 (Better prevention/education) – Reduce the emergence of chronic pain and its sequelae (including opioid-use problems) once it has emerged
 - This approach element speaks to raising awareness and educating the public, employers and future health professionals, about the long-term societal shifts that would be conducive to optimal care.
 - We found evidence supporting the use of mass-media campaigns targeted at citizens and health professionals.
- Element 3 (Better research/implementation) – Diagnose the causes of emerging challenges, test innovations to address the causes, and scale up successful efforts
 - This approach element speaks to creating and using 'rapid strike' force that can intervene when new challenges emerge, such as the overly aggressive tapering of patients off opioids.
 - We found evidence supporting the use of theory-guided and empirically based approaches to identify promising innovations, engaging stakeholders to review and revise innovations, and using provider-targeted implementation strategies. However, evidence on the use of financial incentives to support the scale up of innovations was mixed.
- Element 4 (Better coordination) – Create a national coordinating body
 - We found a lack of evidence on this approach element, but we found one systematic review that suggested that some partnerships increased the profile of health inequalities on local policy agendas.

What implementation considerations need to be kept in mind?

- The most pressing barrier to implementation is the lack of coordination of existing efforts, which is why a key first step will be to allocate to a network or organization the responsibility for coordinating activities in the coming year so 'quick wins' can be achieved.
- The significant federal, provincial and territorial government attention being given to the opioid crisis and its relationship to chronic pain presents a key window of opportunity for broadening the conversation to our previous failures, to prevent and manage chronic pain effectively and open up a discussion about potential ways forward.

REPORT

Chronic pain is a serious health problem in Canada given its prevalence and impacts on physical functioning, disability and quality of life, as well as broader societal implications such as the extensive use of healthcare services by those with chronic pain, and productivity costs, among others.(1-3) While there may be significant costs associated with preventing and managing chronic pain (many of which are not covered by provincial health-insurance plans), failing to do so using evidence-based approaches may incur even greater costs. The money being spent to address the recent rise in illicit opioid-related morbidity and mortality is to some degree an example of such greater costs.

The significant public debate about the opioid crisis provides an opportunity to learn from the past and do much better for Canadians in the future. Given the large number of opioid-related deaths in Canada in the past year (estimated at 2,800 and predicted to grow by the end of 2017),(4) finding solutions to address the crisis is at the top of federal, provincial and territorial governments' agendas and the focus of significant media coverage.

At the federal government level, this priority has been formalized in the mandate letter for the new federal health minister, who has been asked to:

- work closely with other orders of government, as well as substance-use experts, service providers, first responders, law enforcement, and people with lived and living experience to ensure Canada's response to the opioid crisis is robust, well-coordinated and effective;
- work with the Minister of Public Safety and Emergency Preparedness to review Canada's framework for dealing with public-health emergencies;
- consult with provinces, territories and professional regulatory bodies to introduce guidelines to curb opioid misuse, ensure prescriptions are appropriately tracked in a consistent and patient-centred way, and increase transparency in the marketing and promotion of therapies; and
- use the government's regulatory powers to ensure that interested communities do not face undue barriers in introducing effective opioid substitution programs and treatment options.(5)

Box 1: Background to the evidence brief

This evidence brief mobilizes both global and local research evidence about a problem, four elements of a potentially comprehensive approach to addressing the problem, and key implementation considerations. Whenever possible, the evidence brief summarizes research evidence drawn from systematic reviews of the research literature and occasionally from single research studies. A systematic review is a summary of studies addressing a clearly formulated question that uses systematic and explicit methods to identify, select and appraise research studies and to synthesize data from the included studies. The evidence brief does not contain recommendations, which would have required the authors of the brief to make judgments based on their personal values and preferences, and which could pre-empt important deliberations about whose values and preferences matter in making such judgments.

The preparation of the evidence brief involved five steps:

- 1) convening a Steering Committee comprised of representatives from key organizations and the McMaster Health Forum;
- 2) developing and refining the terms of reference for an evidence brief, particularly the framing of the problem and four viable elements for addressing it, in consultation with the Steering Committee and a number of key informants and with the aid of several conceptual frameworks that organize thinking about ways to approach the issue;
- 3) identifying, selecting, appraising and synthesizing relevant research evidence about the problem, options and implementation considerations;
- 4) drafting the evidence brief in such a way as to present concisely and in accessible language the global and local research evidence; and
- 5) finalizing the evidence brief based on the input of several merit reviewers.

The four elements could be pursued simultaneously or in a sequenced way, and each element could be given greater or lesser attention relative to the others.

The evidence brief was prepared to inform a stakeholder dialogue at which research evidence is one of many considerations. Participants' views and experiences and the tacit knowledge they bring to the issues at hand are also important inputs to the dialogue. One goal of the stakeholder dialogue is to spark insights – insights that can only come about when all of those who will be involved in or affected by future decisions about the issue can work through it together. A second goal of the stakeholder dialogue is to generate action by those who participate in the dialogue and by those who review the dialogue summary and the video interviews with dialogue participants.

Finding solutions for the opioid crisis has also been a central discussion point in the federal, provincial, territorial health ministers’ meeting in October 2017. The ministers acknowledged that the issue constitutes a national public-health crisis and reaffirmed their commitment to collaborate with health professionals, experts, and people with lived and living experience to advance actions that address the crisis. Actions discussed included:

- addressing regulatory and other barriers to treatment;
- harm-reduction measures;
- exploring new and innovative treatment options and alternative public-health policies;
- sharing data and best practices; and
- reducing the stigma of problematic substance use.(6)

The media has also given significant attention to the opioid crisis and many of the same potential solutions. A recent media analysis by a patient advocate also identified the media coverage being given to the importance of awareness-raising and education, and to a number of cross-cutting themes, including:

- learning from people with lived experience;
- understanding and being sensitive to regional, ethnocultural and gender-based differences; and
- ensuring approaches to data collection and research are aligned with the information needs of those trying to develop solutions.(7)

But while the opioid crisis provides a strong impetus for action, the focus on short-term solutions to curb the use of opioids (e.g., efforts to address the diversion and illegal distribution of prescription medications) has delayed learning in a systematic way from our past experience with preventing and managing chronic pain, and identifying the longer-term solutions that would create a better future for Canadians at risk of or living with chronic pain.

The purpose of this evidence brief is to review the best-available data and research evidence about the problem of chronic pain and why it is not being more effectively prevented and managed in Canada, four elements of a potentially comprehensive approach to addressing this problem and its causes (which could form the basis for a national pain strategy), and key implementation considerations related to each of the elements.

The preparation of the evidence brief has been informed by the definitions in Table 1 below and guided by a decision to give primary attention to chronic non-cancer pain. That said, the focus on chronic pain is broad in the sense that we include transitions from acute (e.g., post-operative pain) into chronic pain and ways to prevent this. Also, while cancer pain is typically addressed in the context of cancer-related pain and symptom management (which is coordinated in most provincial and territorial health systems in a cancer care sub-system), with increasing efforts to support transitions from cancer treatment to primary- and community-care supports, as well as in creating, a more unified approach to managing pain.

Table 1: Definitions of key terms

Term	Working definition
Pain	“An unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage.”(8)
Chronic pain	“Chronic pain is the pain that persists over three months, beyond when an injury should have healed. Chronic pain can be intermittent (occurs in a pattern) or persistent (lasting more than 12 hours daily) and can be considered a disease itself. Usually the pain results from a known cause, such as surgery or inflammation from arthritis. Sometimes the cause of this pain is abnormal processing of pain by the nervous system, as in is the case of [neuropathic or nociplastic pain].”(9)
Biopsychosocial model for managing chronic pain	An interdisciplinary approach that addresses the dynamic interaction among physiological, psychological and social factors, and embraces the assessment and management of all dimensions of pain (e.g., emotional disorders, maladaptive cognitions, functional deficits, and physical deconditioning).(10)

While the brief strives to address all Canadians, where possible it also gives particular attention to those with existing mental health and substance-use problems, and those from different ethnocultural groups. The latter could include recently arrived immigrants and refugees, minority populations, Indigenous peoples, and certain religious groups, for whom the understanding of chronic pain, and values and preferences for managing chronic pain, may differ from the general population.

For example, Indigenous leaders would need to describe the type of Indigenous peoples-specific process that could ensure that any national pain strategy (or a separate initiative that is stand-alone or part of other nation-to-nation agreements) would appropriately recognize:

- the historical legacies of colonialism and racism;
- the consequences of residential schools and the ‘sixties scoop’;
- the distinctions among status and non-status and on- and off-reserve First Nations people;
- the importance of Indigenous ways of knowing and governance, and of using a strengths-based approach to working with Indigenous communities;
- barriers to accessing healthcare in both urban and remote communities;
- the federal and provincial government programs and the local cultural and linguistic supports available specifically for them; and
- the commitments to reconciliation and to interacting on a nation-to-nation basis made by the federal government.(11)

Box 2: Equity considerations

A problem may disproportionately affect some groups in society. The benefits, harms and costs of elements to address the problem may vary across groups. Implementation considerations may also vary across groups.

One way to identify groups warranting particular attention is to use “PROGRESS,” which is an acronym formed by the first letters of the following eight ways that can be used to describe groups†:

- place of residence (e.g., rural and remote populations);
- race/ethnicity/culture (e.g., First Nations and Inuit populations, immigrant populations and linguistic minority populations);
- occupation or labour-market experiences more generally (e.g., those in “precarious work” arrangements);
- gender;
- religion;
- educational level (e.g., health literacy);
- socio-economic status (e.g., economically disadvantaged populations); and
- social capital/social exclusion.

The evidence brief strives to address all Canadians, but (where possible) it also gives particular attention to two groups:

- individuals with existing mental health and substance-use problems; and
- individuals from different ethnocultural groups.

Many other groups warrant serious consideration as well, such as economically disadvantaged individuals who lack a third-party payer for their care or individuals receiving home care (including home-based palliative care), and a similar approach could be adopted for any of them.

† The PROGRESS framework was developed by Tim Evans and Hilary Brown (Evans T, Brown H. Road traffic crashes: operationalizing equity in the context of health sector reform. *Injury Control and Safety Promotion* 2003;10(1-2): 11–12). It is being tested by the Cochrane Collaboration Health Equity Field as a means of evaluating the impact of interventions on health equity.

THE PROBLEM

The problem of chronic pain and why it is not being more effectively prevented and managed in Canada can be understood in relation to five features of the problem that 18 key informant interviews confirmed are common across the country:

- 1) many Canadians suffer from chronic pain, but it is not well understood;
- 2) the framing of chronic pain only in relation to the opioid crisis is not conducive to long-term solutions;
- 3) there are limitations in existing programs and services for effectively managing (and preventing) chronic pain;
- 4) gaps in health-system arrangements limit the reach and impact of chronic-pain programs and services; and
- 5) limited national coordination inhibits progress.

Below we elaborate on each of these features in turn.

Many Canadians suffer from chronic pain, but it is not well understood

Estimates of chronic-pain prevalence among the adult population in Canada range from 15% to 29%, although current data are hard to come by, with a study from 2011 and a telephone survey from 2008-09 providing the most recent publicly available numbers. Moreover, it is likely that the prevalence of chronic pain will increase as the population ages. Supporting this notion, the 2008 Canadian Community Health Survey found that the prevalence of chronic pain that was rated moderate to severe was 24% among those aged 65 to 74, and 30% among those aged 75 to 84.(12)

The high and rising prevalence of chronic pain among older (and middle-aged) adults is troublesome for at least three reasons. First, chronic pain has been associated with the lowest quality of life compared to other chronic diseases, such as chronic heart or lung disease, and patients with chronic pain have double the risk of suicide compared to the national average.(1) Second, chronic pain can inhibit an individual's ability to manage activities of daily living and reduce their ability to work, resulting in both lower productivity and higher workplace absenteeism.(1) Third, it has been estimated that, when adding both direct and indirect costs, chronic pain costs more than cancer, heart disease and HIV combined, with productivity costs related to job loss and sick days estimated at a national cost of \$37 billion.(1)

Chronic pain is also a common problem among children and younger adults. A systematic review estimated that the median prevalence of chronic pain for children ranges from 11% to 38%.(13) The 2008 Canadian Community Health Survey found that 9.7% of Canadians aged 35 to 44 report usually having pain or discomfort that is moderate to severe.(12)

Despite the magnitude of the problem and its costs and consequences, pain is not well understood in the following ways: 1) biomedically in terms of the biological mechanisms that contribute to the development and persistence of chronic pain; 2) clinically in terms of prevention and management options, particularly non-pharmacological options; and 3) societally in terms of it being considered only as a symptom of a disease or injury, rather than a condition in and of itself. In part because of the latter point, clinical approaches often focus on identifying and treating specific diseases or injuries rather than preventing and managing pain as a condition unto itself. Furthermore, the use of a full range of approaches can be hampered by a persisting societal stigma attached to those suffering from chronic pain.(14)

Box 3: Mobilizing research evidence about the problem

The available research evidence about the problem was sought from a range of published and “grey” research literature sources. Published literature that provided a comparative dimension to an understanding of the problem was sought using three health services research “hedges” in MedLine, namely those for appropriateness, processes and outcomes of care (which increase the chances of us identifying administrative database studies and community surveys). Published literature that provided insights into alternative ways of framing the problem was sought using a fourth hedge in MedLine, namely the one for qualitative research. Grey literature was sought by reviewing the websites of a number of Canadian and international organizations, such as the Canadian Institute for Health Information and the Organisation for Economic Co-operation and Development.

Priority was given to research evidence that was published more recently, that was locally applicable (in the sense of having been conducted in Canada), and that took equity considerations into account.

Framing of chronic pain only in relation to the opioid crisis is not conducive to long-term solutions

Approaching chronic pain only using the frame of the opioid crisis directs attention to issues that have little to do with appropriate pain management (e.g., use of illicit sources of opioids and opioid overdoses) and to potential solutions that touch on only a small proportion of Canadians living with chronic pain (e.g., harm-reduction measures, opioid antidote availability, and overdose monitoring and reporting).

Moreover, there may be unintended consequences of the amount and nature of attention being given to the opioid crisis, including a worsening of the stigma surrounding the appropriate use of prescription opioids for managing chronic pain. This stigma can affect health professionals, who may worry about, for example, being singled out by prescription-monitoring systems designed to reduce the diversion of prescription opioids. The stigma can also affect patients, who may find themselves, for example, being tapered off prescription opioids overly aggressively and without the benefits of access to non-pharmacological approaches to managing chronic pain or the support of their friends and family.(14)

Nesting some of the antecedents of the opioid crisis in the context of the broader frame of our failures to prevent and manage chronic pain effectively in Canada expands the conversation dramatically. As we turn to the following sections, we can now start to ask difficult questions about whether our existing programs and services are effectively managing (and preventing) chronic pain, whether gaps in health-system arrangements are limiting the reach and impact of chronic-pain programs and services, and whether the limited degree of national coordination is inhibiting progress.

There are limitations in existing programs and services for effectively managing (and preventing) chronic pain

The first of two inter-related limitations in existing chronic-pain management programs and services involves the frequent lack of use of a biopsychosocial approach and appropriate goal-setting at both primary- and specialty-care levels. As implied in Table 1, a biopsychosocial approach moves beyond just the physiological experience of pain (to address the dynamic interaction among physiological, psychological and social factors) and beyond the assessment and management of that pain (to embrace the assessment and management of all dimensions of pain, including for example, emotional disorders, maladaptive cognitions, functional deficits, and physical deconditioning). Related to this, appropriate goal-setting moves beyond ‘treating the pain’ (to making measurable improvements in functioning and quality of life) for the many Canadians who will live with chronic pain for some or much of their lives (e.g., adults with arthritis).

The second of two interrelated limitations in existing chronic-pain management programs relates to the frequent lack of use of effective services, even at specialty-care levels. For example, only about half of chronic-pain clinics in Ontario were found to support the use of self-management interventions (e.g., coping strategies, neck care, yoga, and meditation and stress management) and, while based on even older data, only about one quarter of multidisciplinary pain clinics in Canada were found to offer any psychological therapies.(15) Limitations in access to effective services is perhaps even more concerning in children, for whom the impacts can include missing school, withdrawing from social activities, and internalizing symptoms in response to their pain, all of which can have detrimental effects on the attainment of development milestones.(13) We could not find studies that described how often non-opioid-based approaches are used to manage chronic pain in primary care, which is telling in itself. We could also not find studies that described how often programs and services aligned with the values and preferences of the patients they are meant to serve.

The third limitation in existing programs and services is in the lack of attention to identifying those at high risk of transitioning into chronic pain in the first place, and preventing it when possible. While experiencing pain following injury or a surgical procedure is quite normal, the persistence of pain need not be. A large-scale survey of the general population in Norway found that 24% of the surveyed population had received a surgical procedure in the previous three years. Of these individuals, 40% reported chronic pain in the area of

the surgery, 18% of whom reported that the pain was moderate to severe.(16) We could not find comparable data for Canada or data that would allow us to estimate the magnitude of the missed opportunities for preventing transitions into chronic pain. Compounding this limitation is the general lack of high-quality synthesized research evidence about risk factors for, and effective interventions to address, the transition from acute to chronic pain.

Gaps in health-system arrangements limit the reach and impact of chronic-pain programs and services

Existing delivery arrangements limit the reach and impact of chronic-pain programs and services in two ways. First, support for chronic-pain management is seldom provided by interdisciplinary teams, despite team-based care having been shown to be one of the most successful approaches to assist patients in regaining function.(1; 17) Instead, support is often provided primarily by a single provider at the primary-care level (e.g., family physician or, on occasion, pharmacist) or specialty-care level, with little coordination across them or with those with experience in key comorbidities or possible consequences, such as mental health and substance-use problems, or the broader social determinants of health. Support is also often provided in sub-optimal settings like hospital emergency departments. Second, chronic-pain management is seldom supported by educational and professional-development programs that are team based, independent of industry, reflective of what we know, or accommodating of emergent knowledge.(1) As an old (2009) but telling Canadian survey found, the mean total of number of hours dedicated for pre-licensure pain education was 16 for medicine, 31 for nursing, 28 for occupational therapy, 13 for pharmacy, and 41 for physical therapy.(18)

Financial arrangements also limit the reach and impact of programs and services supporting chronic-pain management, in several ways. First, funding from provincial and territorial ministries of health primarily supports prescription medication (for some) and most forms of physician-provided care (for all), despite evidence supporting the use of a broader range of services and the involvement of a broader array of health professionals, which effectively incentivizes patients to seek (and physicians to provide) only certain forms of support (e.g., interventional procedures in some provinces). Second, alternative sources of third-party funding – federal Non-Insured Health Benefits program, provincial workers' compensation schemes, automobile-insurance plans, and private health-insurance plans – create a complex and inequitable funding landscape for those living with chronic pain, depending on whether they are status First Nations, the cause of their pain is work or automobile-accident related, and/or they have access to private insurance or the money to pay out-of-pocket for needed services. For example, one Canadian study found the median monthly cost of care for those in chronic pain waiting to be treated at a multidisciplinary pain clinic was \$1,462, with nearly 95% of these expenditures being privately funded.(19) Third, there are typically no financial incentives to support chronic-pain management at primary- or secondary-care levels (particularly to improve access, for which as we return to later in the brief, the evidence is more supportive), as there are for other chronic conditions, such as diabetes, in some provincial and territorial health systems.

Governance arrangements also complicate matters. First, in terms of policy authority, it can be exceptionally difficult to identify who is stewarding the 'chronic pain file' in provincial and territorial ministries of health in the way that other chronic-disease portfolios are actively managed, and the centralization of the opioid crisis file in ministers' offices speaks to its political salience only in the short term. Second, in terms of organizational and professional authority, there is a lack of accreditation and training for pain clinics and the health professionals working in them, resulting in a mix of chronic-pain management approaches that are not clearly justified by the interplay of the existing evidence base, patients' values, and the clinical context.(20)

Finally, virtually all provincial and territorial health systems lack a well-oiled mechanism to diagnose the causes of emerging challenges in the care and support of Canadian patients, test innovations to address the challenges, and scale up successful efforts, despite Canada being home to some of the world leaders in the field of implementation science. Instead, quick solutions are sometimes chosen instead of evidence-based solutions. For example, presumably in response to political imperatives, Health Canada funded groups to design and deliver education programs about opioid prescribing before the recent opioid-prescribing guidelines were completed, and without having undertaken or requiring a robust diagnosis of the drivers of

current prescribing behaviour. With no guideline-implementation initiative in place, it's perhaps not surprising that emerging stories are suggesting some physicians are overly aggressive in tapering opioid dosages,(21) or that we have no mechanism in place to diagnose the drivers of this behaviour or to address them. While chronic pain may present particular challenges, given the lack of patient registries or treatment-monitoring systems for use in diagnosing challenges, and the political pressures to take immediate action to address the opioid crisis, it shares the absence of such a mechanism with most other chronic conditions, with the possible exception of cancer where significant long-term investments have been made in this area.

Limited national coordination inhibits progress

Canadian federalism creates difficulties in coordinating country-wide, long-term solutions, particularly in healthcare, where authority over health systems resides with provincial and territorial governments and federal/provincial/territorial agreements tend to be time-limited. In the specific case of chronic-pain prevention and management, five distinct manifestations of the lack of national coordination are inhibiting progress.

First, there are no forums in place for sharing, across jurisdictions, best practices in preventing and managing chronic pain (as opposed to only best practices in addressing the opioid crisis). In the absence of such forums, provincial and territorial initiatives are not building on the relevant work of those in other jurisdictions, with the potential consequences including delays in making progress, duplication of effort, and missed opportunities for greater efficiencies through collaboration. Those existing provincial and territorial initiatives that address the prevention and management of chronic pain, in whole or in part (and often with the specific lens of addressing the opioid crisis), and that we could identify through literature and website searches and key-informant interviews, are described in Table 2 below.

Second, there are no cross-national awareness-raising and education efforts, either targeting Canadians (who may be at risk for or living with chronic pain, or providing or failing to provide support to family members or friends living with chronic pain) or targeting employers (who may put their staff at risk for chronic pain or fail to support their staff living with chronic pain in their efforts to increase productivity and reduce workers' compensation or health-insurance plan expenses), despite similarities in many of the challenges faced across the country and the possibility that some regional and ethnocultural differences may be shared across at least some jurisdictions.

Third, national research commitments are not commensurate with the burden of illness associated with chronic pain, which is reflected in a much smaller evidence base supporting its prevention and management. As noted in a previous sub-section, chronic pain costs more than cancer, heart disease and HIV combined, when both direct costs (e.g., healthcare) and indirect costs (e.g., productivity losses) are included.(1) Focusing specifically on cancer, research funding was approximately \$390 million in 2008, while its direct healthcare costs alone were estimated at \$3.8 billion.(22; 23) If research funding for chronic pain was provided at a similar proportion, it would require almost a \$1-billion investment annually, as opposed to the \$80.7 million provided over the five years from 2003 to 2008.(1; 22)

Fourth, there are many emergent – but not yet fully established, interconnected or sustainably supported – independent national initiatives focused on chronic pain, key examples of which include the:

- Canadian Pain Care Forum, which is a national network of organizations seeking to improve the prevention and management of chronic pain;
- Coalition for Safe and Effective Pain Management, which is a new national network of organizations seeking to optimize the use of non-pharmacological approaches to chronic-pain management; (24)
- Canadian Pain Coalition, which was a national network of patient pain groups and health professionals and researchers involved in chronic pain, which has recently ceased operation due to a lack of sufficient funding, and which has planned for one of its key projects – Creating a Way Forward, focused on connections between chronic pain and return-to-work and stay-at-work planning – to continue under the auspices of the Canadian Injured Workers' Alliance;

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- Canadian Injured Workers Alliance, which is a national network of injured worker groups;
- Chronic Pain Network, which is a national research and knowledge translation program funded as part of the Canadian Institutes of Health Research (CIHR) Strategy for Patient Oriented Research;
- Canadian Pain Society, which is a national membership organization comprised of professional, research and lay members with an interest in pain and which acts as the Canadian chapter of the International Association for the Study of Pain; and
- Improving the Lives of Children (ILC) Foundation, which is a national charitable organization focused on addressing the burden of chronic pain and Ehlers Danlos Syndrome in children.

Table 2: Existing provincial and territorial initiatives that address the prevention and management of chronic pain, in whole or in part

Jurisdiction	Relevant strategies	Nature of investments (and time frame)	Results of evaluations
British Columbia	<ul style="list-style-type: none"> • Ongoing development of a pain-management and opioid harm-reduction strategy • PainBC’s efforts to improve chronic-pain management in the province, including: <ul style="list-style-type: none"> ○ self-management, support groups and coaching for those with chronic pain;(25) and ○ continuing professional education development opportunities and assessment tools to inform best-practice pain care (26) • Chronic Pain Self-Management Program’s six-week workshop that provides management support for those with chronic pain (27) 	<ul style="list-style-type: none"> • \$50,000 invested (in 2015) to support a second provincial pain summit to further develop a pain-management and opioid harm-reduction strategy (28) • \$1.5 million invested in PainBC (in 2017) to support provincial pain summit outcomes (29) • \$265 million invested over three years (2017-2020) to enhance the capacity of the health system to respond to overdose deaths, which includes a small allocation for educating physicians, pharmacists, nurse practitioners and other health professionals about how to support pain management (30) 	<ul style="list-style-type: none"> • No evaluations conducted to date
Alberta	<ul style="list-style-type: none"> • One of the province’s Strategic Clinical Networks – the Alberta Pain Network – asked to develop a provincial pain strategy (31) • One sub-group of Alberta Health’s Opioid Safety Working Group developing solutions to opioid addictions and pain management (specifically focused on access to care) (32) 	<ul style="list-style-type: none"> • Not publicly available, however, specific budgets have reportedly been set aside for these initiatives 	<ul style="list-style-type: none"> • Working groups are still in the process of developing outcome measures
Saskatchewan	<ul style="list-style-type: none"> • SaskPain Professional Practice Group created as a collaboration among health professionals from various disciplines, patient/family advocates, healthcare administrators, researchers and educators (33) 	<ul style="list-style-type: none"> • No dedicated funding identified 	<ul style="list-style-type: none"> • No publicly available evaluations identified
Manitoba	<ul style="list-style-type: none"> • Strategies focused on prescription drugs, with some focus on those used for pain management, including: 1) Manitoba Monitored Drugs Review Committee to review prescribing, dispensing and use of opioids and other monitored drugs;(34) and 2) Drug Program Information Network, which is an online, point-of-sale prescription drug database, connecting Manitoba Health and pharmacies across the province 	<ul style="list-style-type: none"> • No dedicated funding identified 	<ul style="list-style-type: none"> • No publicly available evaluations identified
Ontario	<ul style="list-style-type: none"> • Low back pain strategy, which includes: 1) evidence-based amendments to the Schedule of Benefits for diagnostic services; 2) education tools to assist in better management; and 3) testing new models of care, such as the Inter-professional Spine Assessment and Education Clinics Pilot program and the Primary Care Low Back Pain Pilot Program (35) • Self-management programs for chronic pain and other chronic conditions launched across Local Health Integration Networks (36) • Health Quality Ontario in the process of developing relevant practice standards with regards to opioid prescribing, including standards for: <ul style="list-style-type: none"> ○ opioid prescribing for chronic pain; ○ opioid prescribing for acute pain; ○ care for adults with progressive life-limiting illness; ○ opioid use disorder; ○ chronic pain (does not address opioid prescribing for chronic pain); and ○ low-back pain (37) 	<ul style="list-style-type: none"> • \$664,000 invested (in 2014) to expand and sustain the development of the federal referral guidelines for MRIs, CTs and other diagnostic imaging, including for back and neck pain for which diagnostic imaging is often used inappropriately (41) • \$1.33 million invested over three years (2015-2018) in the University Health Network’s ECHO Ontario demonstration project on chronic pain in three Local Health Integration Networks (41) • \$17 million invested annually (beginning in 2016) to create or enhance 17 chronic-pain clinics across the province (as part of Ontario’s Chronic Pain Network) to provide timely and appropriate chronic-pain management (42) 	<ul style="list-style-type: none"> • ECHO program evaluation is ongoing, with both quantitative and qualitative components

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	<ul style="list-style-type: none"> • Ontario College of Family Physicians administers the ministry-funded Medical Mentoring for Addictions and Pain Network that connects family physician mentees to mentor physicians with expertise in chronic pain and addictions who provide advice and support in chronic-pain management (38) • Additional initiatives that complement investments in chronic-pain management with an interdisciplinary approach, include: <ul style="list-style-type: none"> ○ Health Links (province-wide program that supports care for Ontarians with complex health needs that is patient-centred, team-based, and coordinated across home and community care, primary care and speciality-care sectors); (39) and ○ Health TAPESTRY (multi-site approach that combines interprofessional primary healthcare with community engagement to help patients navigate and access primary-care and community organizations) (40) 	<ul style="list-style-type: none"> • \$245 million invested over three years (2017-2020) to enhance referral pathways for the treatment of back pain and other bone and joint conditions (42) • \$222 million invested over three years (2017-2020) to address the opioid crisis, including \$15 million to support health professionals with appropriate pain management and opioid prescribing (42) 	
Quebec	<ul style="list-style-type: none"> • Réseau Universitaire Intégré de Santé (RUIS) created to support the development of infrastructure for harmonizing pain services from primary to tertiary care (43) • Quebec Pain Research Network created (44) • Ongoing development of knowledge-translation strategy to focus on disseminating opioid and pain guidelines to decision-makers, health professionals, patients and researchers 	<ul style="list-style-type: none"> • \$4.35 million invested over four years (beginning in 2008) to develop and operate the Quebec Pain Research Network and develop a Pain Patient Registry (45) • \$604 000 invested in pain research (in 2016-17) (46) • \$400,000 invested annually to support tertiary pain clinics in Quebec (46) 	<ul style="list-style-type: none"> • No publicly available evaluations identified
New Brunswick	<ul style="list-style-type: none"> • My Choice – My Health initiative created to support patient self-management of chronic diseases, including chronic pain (47) • Prescription-monitoring program added to eHealthNB electronic health records for select pharmaceuticals, including opioids such as Dilaudid and Percocet (48) • New guidelines for prescribing opioids for chronic pain developed by the College of Physicians and Surgeons of New Brunswick (49) 	<ul style="list-style-type: none"> • No dedicated funding identified 	<ul style="list-style-type: none"> • No publicly available evaluations identified
Nova Scotia	<ul style="list-style-type: none"> • Nova Scotia Chronic Pain Initiative created • Atlantic Mentorship Network for Pain & Addiction – the largest network of pain and addiction providers in Canada – created to support health professionals through mentor/mentee relationships in the management of pain and addiction, offering education, clinical support, and continuing medical education credit (50) • Opioid use and overdose framework created that explicitly considers the management of chronic pain (51) 	<ul style="list-style-type: none"> • Money presumably invested in the Nova Scotia Chronic Pain Initiative and in the Atlantic Mentorship Network for Pain & Addiction (50) 	<ul style="list-style-type: none"> • No publicly available evaluations identified (although expanded membership documented for the Atlantic Mentorship Network)
Prince Edward Island	<ul style="list-style-type: none"> • Atlantic Mentorship Network for Pain & Addiction created (see Nova Scotia above) (50) • As part of the Action Plan to Prevent and Mitigate Opioid-Related Overdoses and Deaths the province will establish a multi-stakeholder committee on pain management by December 2017 to consider changes to: 	<ul style="list-style-type: none"> • Money presumably invested in the Atlantic Mentorship Network for Pain & Addiction (50) 	<ul style="list-style-type: none"> • Evaluation of implementation of the drug-information system (2010) found: <ul style="list-style-type: none"> ○ project met Canada Health Infoway targets and achieved good uptake among pharmacies;

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	<ul style="list-style-type: none"> ○ pain management services, including care providers, medications and alternative non-pharmacologic treatments; ○ patient participation and education; ○ physician education on pain management; ○ adoption of pain-management guidelines by prescribers; ○ public education around opioid prescribing (52) ● Drug-information system allows for the tracking of pharmaceuticals, including opioid prescriptions for chronic pain (53) 		<ul style="list-style-type: none"> ○ physician uptake slow due to lack of apparent benefits; ○ administrative data made publicly available and can inform patient outcome and service quality indicators; and ○ some tracking and control issues have been reported including poly-doctor and poly-pharmacy behaviour (54)
Newfoundland and Labrador	<ul style="list-style-type: none"> ● Atlantic Mentorship Network for Pain & Addiction created (see Nova Scotia above) (50) ● ‘Improving health together’ framework for chronic-disease prevention and management identified chronic pain as one of eight areas of focus (55) ● Six-session chronic disease self-management program, including one for chronic pain, developed (56) ● Safe prescribing course is now mandatory for all physicians applying to practise medicine in Newfoundland and Labrador (57) 	<ul style="list-style-type: none"> ● \$50,000 invested (in 2017) in education for health professionals in pain and addictions (58) ● Money invested in the Atlantic Mentorship Network for Pain & Addiction (50) 	<ul style="list-style-type: none"> ● No publicly available evaluations identified
Nunavut	<ul style="list-style-type: none"> ● No relevant strategies or initiatives identified 	<ul style="list-style-type: none"> ● No dedicated funding identified 	<ul style="list-style-type: none"> ● No publicly available evaluations identified
Northwest Territories	<ul style="list-style-type: none"> ● No relevant strategies or initiatives identified 	<ul style="list-style-type: none"> ● No dedicated funding identified 	<ul style="list-style-type: none"> ● No publicly available evaluations identified
Yukon	<ul style="list-style-type: none"> ● No relevant strategies or initiatives identified 	<ul style="list-style-type: none"> ● No dedicated funding identified 	<ul style="list-style-type: none"> ● No publicly available evaluations identified

Fifth, there are no mechanisms to promote alignment between the work of the above initiatives focused on chronic pain and the broad array of existing national initiatives that intersect with chronic pain, with key examples of the latter including:

- Special Advisory Committee on Epidemic of Opioid Overdoses, which is a federal, provincial and territorial initiative created to provide advice on addressing the opioid crisis;
- Canadian Partnership Against Cancer, which is a national initiative created as part of the Canadian Strategy for Cancer Control and which addresses in part cancer-pain management;
- Mental Health Commission of Canada, which is a national initiative that created the Mental Health Strategy for Canada and which addresses in part mental health as a comorbidity among those living with chronic pain and substance-use problems arising from the management of chronic pain;
- Canadian Centre on Substance Use and Addiction, which is a national initiative that addresses substance-use problems, including those arising from the management of chronic pain;
- National Anti-Drug Strategy, which is a national initiative that initially addressed only illicit drugs but now also addresses prescription-drug misuse;
- bilateral federal/provincial agreements about mental health and home care, which (as noted in box 2) will over time benefit those living with chronic pain who have existing or emergent mental health and substance-use problems or who are receiving home care;
- federal, provincial and territorial initiatives related to the legalization of cannabis, which introduce opportunities in the long term, but are creating uncertainty in the short term for patients who use or may wish to use cannabis to manage their chronic pain;
- federal, provincial and territorial forums related to reconciliation with Indigenous peoples, which (as noted in the introduction), provide mechanisms for Indigenous leaders to describe the type of Indigenous peoples-specific process that could ensure that any national pain strategy (or a separate initiative that is stand-alone or part of other nation-to-nation agreements) would appropriately recognize historical legacies and reflect Indigenous ways of knowing, strengths and governance;
- Canadian Arthritis Society, which is a national charitable organization focused on addressing the burden of arthritis, including the burden of chronic pain among those living with arthritis, as well as other national charitable organizations whose constituents live with chronic pain; and
- the Canadian Institutes of Health Research (CIHR) institutes of aboriginal peoples health, cancer research, musculoskeletal health and arthritis, and neurosciences, mental health and addiction, and provincial health research funding bodies, which provide financial support for research and knowledge translation at least partly in the area of chronic pain.

While each of these initiatives has unique contributions to make towards improving the prevention and management of chronic pain, better coordination, through a national strategy, could help consolidate efforts in a way that could improve long-term sustainability (e.g., by reducing duplication), provide opportunities to better define the roles of each individual group, and ensure the strengths of each group are acknowledged and used to complement the strengths of others.

To date, we have witnessed the development (or ongoing development) of four national health strategies (i.e., Canadian Strategy for Cancer Control, Mental Health Strategy for Canada, National Anti-Drug Strategy and Special Advisory Committee on the Epidemic of Opioid Overdoses). There have also been a number of unsuccessful efforts to develop national strategies, including those related to arthritis and dementia, as well as a previous efforts focused on chronic pain (which did not succeed, in no small part because of the timing of the approach in relation to election cycles). Furthermore, while the efforts of the Canadian Centre on Substance Use and Addiction in developing the ‘first do no harm’ strategy for addressing the opioid crisis explicitly mention the importance of chronic-pain management, it does not have the degree of federal, provincial and territorial funding and coordination that are the hallmarks of some of the strategies described in Table 3.

Of the strategies that have been successful, two different approaches have been used to secure federal government support and funding. For the Canadian Strategy for Cancer Control, stakeholders involved in its development worked to create a national strategy prior to putting in a request with the federal government for funding. This approach contrasts that of the Mental Health Strategy for Canada, for which a request for federal funding was the first step in the process. Table 3 documents the development of these strategies and any lessons learned from the processes used to develop them, based on what we could find through literature and website searches, and key-informant interviews.

Table 3: Lessons learned from past national strategies

	Canadian Strategy for Cancer Control	Mental Health Strategy for Canada	National Anti-Drug Strategy	Special Advisory Committee on the Epidemic of Opioid Overdoses
Development process	<ul style="list-style-type: none"> • National Cancer Institute of Canada’s Advisory Committee on Cancer Control published a Framework for Cancer Control • Building on this framework, a consensus conference drafted a Canadian Strategy for Cancer Control • All major cancer groups in Canada endorsed this strategy • Health Canada announced \$250 million in funding over five years to implement the strategy (59) 	<ul style="list-style-type: none"> • Mental Health Commission of Canada initiated the processes to develop the framework for a mental health strategy • Targeted participants with past or current lived experience with mental health problems produced an initial framework with eight goals that was then sent to a diverse group for refinement • Based on this feedback, the commission identified four principles to guide the framework and developed a phased approach to implementation (60) 	<ul style="list-style-type: none"> • Federal government launched the National Anti-Drug Strategy as a partnership between 12 government departments and agencies and led by the Ministry of Justice • In 2013, the Speech from the Throne expanded the Anti-Drug Strategy from a focus on illicit drugs to include prescription-drugs misuse (61) 	<ul style="list-style-type: none"> • Creation sparked by <ul style="list-style-type: none"> ○ Unprecedented use of opioids and of opioid-related deaths across provinces and territories ○ Issue is high on governments’ agendas across the country, with available resources and political will to support new approaches • Using an iterative process of developing and piloting solutions
Key elements of strategy	<ul style="list-style-type: none"> • Established an inclusive council that serves as the board of directors – setting policy and providing executive direction – as well as a broad-based group representing the patient/survivor experience • Developed networks of cancer experts, known as Action and Working Groups • Created an enhanced cancer surveillance system • Invested in the following five strategic areas: <ul style="list-style-type: none"> ○ cancer prevention and early detection; ○ supporting the cancer patient’s journey; ○ supporting the cancer workforce; ○ encouraging cancer research; and ○ improving cancer information and access (62) 	<ul style="list-style-type: none"> • Increased the capacity of institutions (e.g., schools and workplaces), as well as families and caregivers, to promote good mental health and prevent mental illness • Trained front-line service providers in mental illness and suicide prevention • Supported families to address their own needs, including grief and loss from suicide • Improved access to mental health services, treatments and supports, including screening • Addressed underlying risk factors, such as poverty and trauma and strengthened the response to the mental health needs of population groups with high suicide rates • Established whole-of-government and pan-Canadian mechanisms to oversee mental health-related policies • Advocated for the following four strategic investments: 	<ul style="list-style-type: none"> • Created three action plans: 1) prevention action plan; 2) treatment action plan; and 3) enforcement action plan • Prevention action plans focused on three goals: <ul style="list-style-type: none"> ○ develop and implement community-based interventions to prevent illicit drug use; ○ discourage illicit drug use by providing information directly to youth; and ○ develop awareness materials and awareness sessions • Treatment action plan focused on four goals: <ul style="list-style-type: none"> ○ improve treatment systems, programs and services for illicit drug dependency; ○ enhance treatment and support for First Nations peoples and Inuit; ○ support treatment programs for youth in the justice system; 	<ul style="list-style-type: none"> • Developed a strategy focused on four areas: 1) prevention; 2) treatment; 3) harm reduction; and 4) enforcement • Prevention area focused on three goals: <ul style="list-style-type: none"> ○ better inform Canadians about the risks of opioids; ○ support better prescribing practices; and ○ reduce easy access to unnecessary opioids • Treatment area focused on two goals: <ul style="list-style-type: none"> ○ facilitate access to treatments for pain and opioid-use disorder; and ○ promote collaboration and knowledge sharing on innovative approaches to treatment and rehabilitation • Harm-reduction area focused on three goals: <ul style="list-style-type: none"> ○ communicating results from laboratory testing; ○ facilitating access to naloxone; and ○ reviewing supervised consumption site applications (64)

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		<ul style="list-style-type: none"> ○ increase the proportion of health spending devoted to mental health from seven to nine percent over 10 years; ○ increase the proportion of social spending devoted to mental health by two percentage points; ○ identify current mental health spending that should be re-allocated to improve efficiency; and ○ engage the private and philanthropic sectors in contributing resources to mental health (63) 	<ul style="list-style-type: none"> ○ support the use of drug-treatment courts; and ○ support research on new treatment models and on the consequences of illicit drug use (61) 	
Documented outcomes	<ul style="list-style-type: none"> ● Created of the Canadian Partnership Against Cancer (CPAC) to implement the Canadian Strategy for Cancer Control (59) 	<ul style="list-style-type: none"> ● Created the Mental Health Commission of Canada ● Developed the Framework for Action on Mental Health to inform the Health Accord negotiations in 2017 ● Succeeded in achieving the three tasks set out in the 2007 mandate: <ul style="list-style-type: none"> ○ development of a national mental health strategy; ○ development of an anti-stigma campaign; and ○ creation of a knowledge exchange centre (60) 	<ul style="list-style-type: none"> ● Each of the three action plans made considerable progress against their intended outcomes, particularly immediate outcomes, including: <ul style="list-style-type: none"> ○ launched the Mass Media Campaign and Drugs and Organized Crime Awareness Service, which has been found to increase the awareness and understanding of illicit drugs; ○ implemented the Drug treatment Funding Program, which provided funding to six provinces and one territory to expand treatment services; ○ increased safety in dismantling illicit drug operations through support provided during dismantlement activities, training of police officers and others ○ developed ad hoc partnerships across justice organizations such as the Canada Border Services Agency and the RCMP (61) 	<ul style="list-style-type: none"> ● Developed regulations to: <ul style="list-style-type: none"> ○ enable access to diacetylmorphine through the Special Access Program; ○ control fentanyl precursors; and ○ allow importation of drugs for an urgent public health need that have been authorized for sale in other countries but not yet in Canada ● Used federal levers to increase access to naloxone ● Provided grants to develop educational interventions targeted at patients and providers (64)

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<p>Summary of lessons learned</p>	<ul style="list-style-type: none"> • About development process <ul style="list-style-type: none"> ○ Patients were included as partners in the development process ○ Draft strategy had credible data on incidence, impact, cost-benefit, and successes from other countries ○ Draft strategy had broad support from professionals and patients ○ Draft strategy was seen as feasible and having potential for a big impact ○ Draft strategy provided a clear articulation of roles for Health Canada, provincial health authorities, professional organizations, and patient groups ○ Early support was provided from Health Canada, which was seen as key (59) 	<ul style="list-style-type: none"> • About both development and implementation processes <ul style="list-style-type: none"> ○ Mobilized commitment and support from highest political level ○ Invested in broad public and stakeholder engagement involving local, regional and national groups (which can lead to more inclusive, comprehensive and nuanced policy) ○ Positioned people living with mental health problems and illnesses and their families as the drivers of change in mental health (60) 	<ul style="list-style-type: none"> • About both development and implementation processes <ul style="list-style-type: none"> ○ Built on existing resources and leverage funding from other sources ○ Developed a strategy that featured a clear focus and coordinated approach, an effective governance structure and strong leadership and commitment ○ However, the limited availability of complementary services in some regions as well as the low public profile of the strategy were seen as decreasing efficiency by reducing stakeholder involvement and interest (61) 	<ul style="list-style-type: none"> • About the development process <ul style="list-style-type: none"> ○ Issues that are high on the agenda create environments in which it is easier to engage stakeholders, and while this is positive, it also creates challenges regarding decisions about who should be involved • About outcomes <ul style="list-style-type: none"> ○ Agreement about what constitutes success does not guarantee agreement about the strategies required for how to achieve that success (64)
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Additional equity-related observations about the problem

As noted in box 2 and in the accompanying text on the same page, this brief gives particular attention to those with existing mental health and substance-use problems and those from different ethnocultural groups (which could include recently arrived immigrants and refugees, minority populations, Indigenous peoples, and certain religious groups). We specifically looked for data and evidence about whether any of the five features of the problem manifest differently for them.

Chronic pain frequently occurs alongside mental health and substance-use problems. For example, in primary-care settings, more than 27% of patients with chronic pain were found to also meet diagnostic criteria for depression, and similar or higher estimates were made for comorbid substance-use disorders.⁽⁶⁵⁾ Similarly, 50% of people waiting for care at Canadian pain clinics were found to have moderate to severe levels of depression, with 34% of these individuals reporting having considered suicide.⁽²⁾ Generally, this comorbidity has been found to be bi-directional, whereby mental health conditions exacerbate chronic pain and vice versa. These comorbid conditions significantly increase the complexity of managing chronic pain and may require adaptations to suggested chronic-pain-management practices to avoid adverse effects on existing mental health or substance-use problems.⁽⁶⁶⁾ As well, health professionals may not have received adequate training to appropriately manage chronic pain and such comorbidities. To complicate matters further, individuals with mental health and substance-use problems already face significant stigma when seeking care, which may be compounded by the additional stigma associated with chronic pain and make accessing appropriate pain-management services even more difficult.

Individuals from different ethnocultural communities may, as noted in the introduction, differ from the general population in their understanding of chronic pain, and in their values and preferences for managing chronic pain. For example, groups may differ in whether they ascribe to a more biomedical, biopsychosocial or specific ethnocultural (e.g., traditional eastern) model,⁽⁶⁷⁾ and in whether they give significant weight to spiritual, social or environmental factors or to Indigenous ways of knowing. Such understandings, values and preferences can include whether and from whom they seek support for chronic pain and their adherence to what is recommended.⁽⁶⁸⁾ Language differences may further complicate the situation. Many health professionals have not received training in cultural competencies and how to adapt their approaches to preventing and managing chronic pain based on these competencies.

FOUR ELEMENTS OF A POTENTIALLY COMPREHENSIVE APPROACH FOR ADDRESSING THE PROBLEM

Many approaches could be selected as a starting point for deliberations about an approach for developing a national pain strategy. To promote discussion about the pros and cons of potentially viable approaches, we have selected four elements of a larger, more comprehensive approach to developing a national pain strategy. The four elements were developed and refined through consultation with the Steering Committee and key informants who we interviewed during the development of this evidence brief, and include a range of efforts that will support:

- 1) improving primary-care-based chronic-pain management and create/expand interdisciplinary specialty-care teams (better care);
- 2) reducing the emergence of chronic pain and its sequelae (including opioid-use problems) once it has emerged (better prevention/education);
- 3) diagnosing the causes of emerging challenges, test innovations to address the causes, and scale up successful efforts (better research/implementation); and
- 4) creating a national coordinating body (better coordination).

The elements could be pursued separately or simultaneously, or components could be drawn from each element to create a new (fifth) element. They are presented separately to foster deliberations about their respective components, the relative importance or priority of each, their interconnectedness and potential of or need for sequencing, and their feasibility.

The principal focus in this section is on what is known about these elements based on findings from systematic reviews. We present the findings from systematic reviews along with an appraisal of whether their methodological quality (using the AMSTAR tool) (9) is high (scores of 8 or higher out of a possible 11), medium (scores of 4-7) or low (scores less than 4) (see the appendix for more details about the quality-appraisal process). We also highlight whether they were conducted recently, which we define as the search being conducted within the last five years. In the next section, the focus turns to the barriers to adopting and implementing these elements, and to possible implementation strategies to address the barriers.

Box 4: Mobilizing research evidence about elements for addressing the problem

The available research evidence about elements for addressing the problem was sought primarily from Health Systems Evidence (www.healthsystemsevidence.org), which is a continuously updated database containing more than 6,000 systematic reviews and more than 2,500 economic evaluations of delivery, financial and governance arrangements within health systems. The reviews and economic evaluations were identified by searching the database for reviews addressing features of each of the approach elements and sub-elements.

The authors' conclusions were extracted from the reviews whenever possible. Some reviews contained no studies despite an exhaustive search (i.e., they were "empty" reviews), while others concluded that there was substantial uncertainty about the elements based on the identified studies. Where relevant, caveats were introduced about these authors' conclusions based on assessments of the reviews' quality, the local applicability of the reviews' findings, equity considerations, and relevance to the issue. (See the appendices for a complete description of these assessments.)

Being aware of what is not known can be as important as being aware of what is known. When faced with an empty review, substantial uncertainty, or concerns about quality and local applicability or lack of attention to equity considerations, primary research could be commissioned, or an element could be pursued and a monitoring and evaluation plan designed as part of its implementation. When faced with a review that was published many years ago, an updating of the review could be commissioned if time allows.

No additional research evidence was sought beyond what was included in the systematic review. Those interested in pursuing a particular element may want to search for a more detailed description of the elements or for additional research evidence about the elements.

Element 1 – Improve primary-care-based chronic-pain management and create/expand interdisciplinary specialty-care teams

All provincial and territorial health systems have their own mix of approaches for supporting optimal chronic-disease management in primary-care settings, however, most of these approaches remain a work in progress and few give focus to chronic-pain management specifically. Furthermore, there is room in most jurisdictions for improving the creation and expansion of interdisciplinary teams to support optimal chronic-pain management in primary care and in specialty care, as well as across these sectors when particularly challenging cases create a need for ongoing collaboration and communication. One way to organize thinking about how primary-care-based chronic-pain management can be strengthened, and how interdisciplinary specialty-care teams for chronic pain can be developed or strengthened (so that they're better positioned to support challenging cases of chronic pain and to support primary-care providers), is to use the Chronic Care Model.⁽⁶⁹⁾ This model combines the following six features, which constitute the sub-elements to be considered within element 1:

- self-management support (i.e., empowering and preparing patients to manage their health and healthcare through technology and other means);
- decision support (i.e., promoting primary care that is consistent with scientific evidence and patient preferences – such as the biopsychosocial model – through efforts to embed evidence-based guidelines, as well as related patient decision aids, into daily primary-care practice and to support their implementation through continuing professional development);
- delivery-system design (i.e., organizing programs and services to ensure the proactive, culturally sensitive delivery of effective, efficient clinical care and self-management support, and to strengthen interdisciplinary primary- and specialty-care teams);
- clinical information systems (i.e., organizing patient and population data to facilitate more efficient care, through efforts such as linking patient registries and treatment-monitoring systems, implementing electronic health records to provide reminders and prompts for providers and patients, and monitoring the performance of healthcare teams and the system in which they work);
- health-system changes (i.e., supporting organizations and introducing mechanisms that promote a culture which is conducive to safe, high-quality care, through efforts such as providing visible support for comprehensive system change that moves beyond sectoral “silos” and formalizes linkages between primary- and specialty-care providers and organizations); and
- community resources (i.e., mobilizing community resources to meet the full scope of patient needs within and outside of the health system).

This approach element speaks to getting the big picture right in preventing and managing chronic pain in primary and specialty care, which is where the rubber really hits the road for people living with or at risk for chronic pain.

Possible short-term (one-year), medium-term (three-year), and long-term (five-year) milestones to consider in planning for the implementation of this approach element and its sub-elements (as well as for monitoring progress towards implementing them) include:

- short term (one year):
 - use a systematic and transparent process to prioritize best practices in managing chronic pain in primary care (for both children and adults), from sources such as the guideline for opioids for chronic non-cancer pain, the interim guideline for reducing the role of opioids in pain management (which is focused on non-pharmacological approaches to chronic-pain management), and pain-management guidelines for family medicine (which is focused on a variety of types of both acute and chronic pain and both pharmacological and non-pharmacological therapies);
 - identify and support ‘quick wins’ in incorporating these best practices in existing self-management supports (e.g., patient portals), decision supports for primary care (e.g., patient decision aids and continuing professional development courses), clinical information systems (e.g., nascent chronic-

- pain-specific patient registries and treatment-monitoring systems and existing electronic health records, including reminders and prompts), and community resources;
- identify and support ‘quick wins’ in spreading delivery-system designs (e.g., interdisciplinary primary- and specialty-care teams) and health-system changes (e.g., formalized linkages between primary-care providers and specialty-care teams with clear referral guidelines, collaborative models, and formalized pathways back to primary care) that have shown promising results, but with accompanying formative and summative evaluations that build the evidence base as spread happens;
- medium term (three years):
 - transition to ‘living systematic review and guidelines’ model that ensures that best practices in preventing and managing chronic pain at both primary- and specialty-care levels are being continually identified;
 - use a systematic and transparent process to identify, leverage and, where needed, fill gaps in the landscape for incorporating best practices in self-management supports (e.g., patient portals), decision supports for primary and specialty care (e.g., patient decision aids and continuing professional development courses), clinical information systems (e.g., chronic-pain-specific patient registries and treatment-monitoring systems and existing electronic health records, including reminders and prompts), and community resources;
 - identify and push for changes in the financial arrangements (e.g., funding for prescription medication and physician-provided care, but not many effective services or other types of health professionals; complex and inequitable funding landscape depending on the third-party payer) and governance arrangements (e.g., lack of provincial and territorial stewards for the ‘chronic pain file’; lack of accreditation and training for pain clinics and the health professionals working in them) that hinder – but have the potential to accelerate – the spread of delivery-system designs and health-system changes that robust formative and summative evaluations demonstrate can improve health and the patient experience while keeping per capita costs manageable;
- long term (five years):
 - conduct a formative and summative evaluation of both the ‘living systematic review and guidelines’ model for best-practices identification and the ‘leveraging and gap-filling’ model for self-management supports, decision supports, clinical information systems, and community resources to identify and seize opportunities for increasing value, reducing costs or both in the operation of these models;
 - identify gaps in the spread of delivery-system designs and health-system changes and prioritize these areas for more contextualized support for spread.

We identified 20 systematic reviews and four economic evaluations that related to the features of the Chronic Care Model (e.g., self-management support; decision support; delivery-system design; clinical information systems; health-system change; and community resources). One recent high-quality systematic review (70) and several studies assessing the Chronic Care Model in general found that engaging in the types of activities aligned with the features of the model (which also serve as the sub-elements of element 1) have many benefits for people living with chronic diseases, including:

- increased access to specialists;
- improved patient and clinician experience;
- better use of technology (e.g., high rates of using secure electronic message threads and telephone calls to prepare patients for visits, and shared electronic health records);
- improved coordination of care (e.g., patient-perceived coordination);
- enhanced delivery of preventive services; and
- reduced hospitalizations and emergency department visits.(70-73)

Self-management support

We identified four systematic reviews (one recent high-quality, one recent medium-quality, one old medium-quality and one old low-quality) that addressed self-management support (the first sub-element). The evidence found generally suggests that self-management programs are effective at reducing levels of pain and disability for chronic low-back pain and for older adults (over the age of 60).(74; 75) These programs were found to be strongly supported by patients, with high levels of reported satisfaction.(74) One recent high-quality review found that self-management programs that employed a theory-based approach, either cognitive-behavioural theory or social-cognitive theory, had similar effects in reducing pain and disability, while programs without a theory-based component had no statistical effect on pain or disability.(74) The same review also addressed duration, finding that self-management programs of shorter duration (less than six weeks) tended to have a greater effect on reducing the intensity of pain as compared to longer duration programs.(74) However, programs lasting longer than 12 weeks had a slightly greater effect on reducing disability than those with shorter durations.(74) Due to insufficient evidence, one older medium-quality review was unable to determine whether self-management programs to reduce chronic pain were cost-effective for older adults.(75) The review did find that exercise-based interventions are cost-effective as a strategy for self-managing chronic pain and may reduce the number of visits of older adults to family physicians.(75)

Decision support

We identified four systematic reviews that addressed the decision-support feature of the Chronic Care Model (the second sub-element). One older low-quality review found that decision-support systems for clinicians and patients were effective at improving quality of care,(76; 77) while a recent medium-quality review found that electronic health records may support provider adherence to guidelines. Another older low-quality review was unable to determine the effects of computerized decision-support systems focused on chronic pain, but did emphasize that to support appropriate decision-making, these approaches would need to integrate patient-specific information.(78) The final recent high-quality systematic review examined clinicians' perspectives on the use of guidelines to inform practice.(79) The review found that clinicians reported relying on past experience, clinical judgment and accepted practice among their peers over the use of guidelines for low-back pain.(79) The review found that lack of time, limited expertise in low-back pain and the quantity of guidelines physicians are asked to reference, were all barriers to the use of guidelines to inform practice.(79)

Delivery system design

The majority of the evidence identified in relation to element 1 addressed aspects of delivery system design (the third sub-element). Six systematic reviews and three economic evaluations were identified that examined: 1) models of delivering programs and services for managing chronic pain; 2) which health professionals are best positioned to assist patients in managing chronic pain; and 3) specific interventions that support the management of chronic pain. First, for models of delivering programs and services for managing chronic pain, two recent systematic reviews, one of medium-quality and one of high-quality, as well as two costing studies found the following approaches to be effective at reducing the intensity of pain and disability:

- delivery of psychotherapies using internet-based interventions;
- early multidisciplinary interventions such as back school programs, case-manager-led programs, and physical-activity interventions;
- stepped-care interventions; and
- stratified primary-care management for low-back pain.(80-83)

For findings about which health professionals are best-positioned to assist patients in managing chronic pain, one medium-quality review found that compared to a control group, individuals receiving pharmacist-led medication review had small improvements in physical functioning and a significant improvement in patient

satisfaction.(84) One recent medium-quality review and one economic evaluation found that chiropractors are cost-effective for the management of chronic low-back pain.(85; 86) However, the systematic review found that in studies that also reported on clinical outcomes, chiropractic care was less cost-effective than care provided by family physicians.(85)

With respect to specific interventions, one recent medium-quality review explored the effects of patient-provider communication on pain and found that positive suggestions (e.g., suggesting that a particular treatment will result in positive outcomes) had a small effect on reducing pain, whereas emotional care (e.g., efforts to empathize with the patient) interventions were found to have no effect on reported levels of pain.(87) The same review found that procedural preparations (e.g., information giving, behavioural instruction, CBT, and relaxation) were generally effective for reducing pain.(87)

Clinical information systems

We identified two recent systematic reviews (one high-quality and one medium-quality) that focused on the fourth sub-element, which found that the use of clinical information systems (e.g., systems such as electronic health records that organize patient and population data to facilitate more efficient care) as part of chronic-care models improved the performance of healthcare practices, as well as health outcomes of patients.(88; 89)

Health-system changes

We identified two systematic reviews (one recent medium-quality and one older high-quality) that focused on health-system changes (the fifth sub-element).(90; 91) One of the systematic reviews related directly to changing cultures to be more supportive of chronic-pain management, while the other focused on factors that influence culture change more broadly. The systematic review that focused explicitly on the culture surrounding chronic-pain management examined the implementation of pain-resource-nurse programs, whereby a group of nurses is trained to support other professionals as experts in pain management, and to act as change agents for an organization.(90) The review found that embedding pain management awareness in organizational structures (e.g., policies and procedures, education, care standards) is critical to the success of the initiative, and had a positive significant effect on pain control.(90) The same review found that having support across the administration of a healthcare organization, as well as having support from health professionals working within the organization, is essential to establishing pain management as a priority. The older high-quality review that focused on culture change more generally found that the following factors influenced culture change:

- the types of change involved (i.e., process change or product change);
- the degree of change pursued (i.e., ranging from minor to radical change);
- the facilitators and inhibitors of change (revisited below);
- the financial stability of the organization;
- whether there is a strategic fit between the proposed change and the organization;
- public opinion;
- staff perceptions of change; and
- readiness for change among both internal and external stakeholders.(91)

Community resources

The evidence found addressed the community resources feature of the Chronic Care Model (the sixth sub-element) focused on mobilizing members of the community to contribute to the development of policy directions and the design of programs and services. In particular, three older medium-quality systematic reviews noted that:

- citizen engagement in healthcare could mean engaging consumers of healthcare services, community members and/or the public in general, as well as specific sub-groups that are involved in or affected by a particular issue (e.g., ethnoculturally diverse backgrounds);
- common tasks in community engagement include developing policy directions, recommendations and tools, and priority setting for resource allocation; and
- engagement can be helpful for improving the dissemination of information, the processes for developing interventions, and enhancing awareness and understanding among citizens.(92-94)

A summary of the key findings from the synthesized research evidence is provided in Table 4. For those who want to know more about the systematic reviews or economic evaluations contained in Table 4 (or obtain citations for the reviews and evaluations), a fuller description of the systematic reviews is provided in Appendix 1 and Appendix 2.

Table 4: Summary of key findings from systematic reviews relevant to Element 1 - Improve primary-care-based chronic-pain management and create/expand interdisciplinary specialty-care teams

Category of finding	Summary of key findings
Benefits	<ul style="list-style-type: none"> • Self-management support <ul style="list-style-type: none"> ○ One recent high-quality systematic review found that self-management programs for chronic lower-back pain had a moderate effect on reducing levels of pain and a small-to-moderate effect on levels of disability over the long term (12 months post-intervention) <ul style="list-style-type: none"> ▪ Self-management programs that did not employ the use of a theory (e.g., cognitive behavioural theory or social cognitive theory) had larger effect sizes for both measures of pain and disability. ▪ Programs of shorter duration (less than six weeks) tended to have a greater effect on reducing pain intensity, while longer programs had a slightly greater effect on reducing disability.(74) ○ One older medium-quality review found that self-management programs were generally effective among older adults (60+) when compared to usual care.(75) ○ One low-quality systematic review found that self-management interventions can be effectively tailored to patients using their oral history, self-report questionnaires, provider-reported assessments, and medical records.(95) • Decision support <ul style="list-style-type: none"> ○ One older low-quality review found clinician/patient-driven quality-improvement interventions were effective, with the most effective strategies being clinician-directed audit and feedback, decision-support systems and the use of small-group discussions in continuing medical education.(76) ○ One recent medium-quality review found that electronic health records may support the adherence to guidelines as well as a reduction in medication errors and adverse drug events for patients.(77) • Delivery-system design <ul style="list-style-type: none"> ○ One recent medium-quality systematic review found that internet-delivered psychological therapies provided improved pain and disability following treatment for non-headache chronic pain.(80) ○ One recent high-quality systematic review evaluated the safety and effectiveness of interventions for chronic post-surgery pain, including pharmacologic interventions and physical, surgical and psychological interventions. <ul style="list-style-type: none"> ▪ Pharmacological interventions, which included antidepressants, anti-epileptics, epidural injections, opioids, intravenous calcitonin and oral/intravenous naloxone demonstrated minimal differences in pain intensity between treatment and control groups.(96) ○ One recent high-quality systematic review found that early multidisciplinary interventions, (e.g., back school programs, case-manager-led programs, a physical activity intervention delivered in combination with multidisciplinary input, a psychosocial intervention delivered in conjunction with exercise, or stepped-care approaches) were more effective than conventional treatment in supporting return-to-work and in reducing absence due to pain among those living with chronic musculoskeletal pain. <ul style="list-style-type: none"> ▪ The review found that a stepped-care approach was more effective than the other four

	<p>interventions at increasing work participation, however no significant differences were reported between the interventions for effects on pain intensity or functional disability.(81)</p> <ul style="list-style-type: none"> ○ One recent medium-quality review explored the effects of patient-provider communication on pain and found that positive suggestions (e.g., suggesting that a particular treatment will result in positive outcomes) had a small effect on reducing pain, whereas emotional care (e.g., efforts to empathize with the patient) interventions were found to have no effect on reported levels of pain. <ul style="list-style-type: none"> ▪ The same review found that procedural preparations (e.g., information giving, behavioural instruction, CBT, and relaxation) demonstrated a small-to-moderate effect on reducing pain.(87) ○ One recent medium-quality review found that compared to the control group, individuals receiving pharmacist-led medication review for chronic-pain management experienced a reduction in pain intensity, small improvement in physical functioning and a significant improvement in patient satisfaction.(84) <ul style="list-style-type: none"> ● Clinical information systems <ul style="list-style-type: none"> ○ Two recent systematic reviews, one high-quality and one medium-quality, found that the use of clinical information systems (e.g., systems such as electronic health records that organize patient and population data to facilitate more efficient care) included as part of chronic-care models improved the performance of healthcare practices, as well as health outcomes of patients.(88; 89) ● Health-system changes <ul style="list-style-type: none"> ○ One recent medium-quality systematic review examined the implementation of pain resource-nurse programs, whereby a group of nurses is trained to act as pain experts for other professionals and change agents for the institution. The review found that embedding pain management awareness in organizational structures (e.g., policies and procedures, education, care standards) is critical to the success of the initiative and had a significant effect on pain control.(90) ○ The same review found that having support across the administration of a healthcare organization as well as having support from health professionals is essential to establishing pain management as a priority.(90) ● Community resources <ul style="list-style-type: none"> ○ One older medium-quality review noted that, in general, effective patient involvement required both personnel and financial commitments.(92) ○ Two other older medium-quality systematic reviews found that citizen engagement can be helpful for improving the dissemination of information and processes for developing interventions, as well as for enhancing awareness and understanding among citizens.(93; 94)
Potential harms	<ul style="list-style-type: none"> ● No systematic reviews were identified on potential harms
Costs and/or cost-effectiveness in relation to the status quo	<ul style="list-style-type: none"> ● Self-management support <ul style="list-style-type: none"> ○ Due to insufficient statistical evidence, one older medium-quality review was unable to determine whether self-management programs were a cost-effective strategy for managing chronic pain in aging adults (60+). <ul style="list-style-type: none"> ▪ The review did find that exercise-based interventions are cost-effective as a self-management strategy for managing chronic pain in aging adults compared to usual care, and further found evidence of cost-savings over more intensive control treatments.(75) ● Delivery-system design <ul style="list-style-type: none"> ○ One recent medium-quality systematic review found that managing low-back pain was more cost-effective when provided by a chiropractor than when managed by a general physician. However, in studies that also reported on clinical outcomes, very little difference was observed between the two treatments and chiropractic care was found to be less cost-effective.(85) ○ One costing study on the use of stratified primary-care management for low-back pain found that stratified interventions had significantly lower disability ratings in the short and long term and resulted in a \$62 cost saving per patient over the control group. <ul style="list-style-type: none"> ▪ The stratified intervention consisted of: 1) a screening method to allocate patients to one of three risk-defined groups; and 2) one of three treatment pathways developed with clinical experts.(82) ▪ One costing study evaluated community-based chiropractic care compared to a single information session encouraging self-management and found chiropractic care was cost-effective given a threshold value of \$44,000 per quality adjusted life year. <ul style="list-style-type: none"> ● The study also found an increase in health-related quality of life in both groups, with similar

	<p>mean increases.(86)</p> <ul style="list-style-type: none"> ○ One costing study examined the cost of a nurse follow-up intervention following multidisciplinary pain care and found no significant differences in health status or costs used for other healthcare resources between the intervention and control group after two years.(97) ○ One economic evaluation compared the delivery of cognitive-behavioural therapy modules through face-to-face delivery to internet-based modules and concluded that the internet-based intervention was at least as effective as the face-to-face intervention. <ul style="list-style-type: none"> ▪ The study found significant improvements in pain intensity, pain coping and quality of life for both interventions.(83)
<p>Uncertainty regarding benefits and potential harms (so monitoring and evaluation could be warranted if the option were pursued)</p>	<ul style="list-style-type: none"> ● Uncertainty because no systematic reviews were identified <ul style="list-style-type: none"> ○ Not applicable ● Uncertainty because no studies were identified despite an exhaustive search as part of a systematic review <ul style="list-style-type: none"> ○ Not applicable – no empty reviews were identified ● No clear message from studies included in a systematic review <ul style="list-style-type: none"> ○ Self-management support <ul style="list-style-type: none"> ▪ One low-quality systematic review comparing tailored to non-tailored self-management programs was unable to determine the relative effectiveness of each approach.(95) ▪ Due to insufficient evidence on effectiveness, one recent medium-quality review was unable to determine whether the use of digital health technologies to facilitate self-management programs is effective in reducing older adults’ pain intensity and pain interference.(98) ○ Decision support <ul style="list-style-type: none"> ▪ One older medium-quality review examined the use of computerized decision-support systems to help clinicians with the medical management of chronic pain. Due to insufficient data, the review was unable to determine the effects on either patient outcomes or provider performance. ▪ The same review emphasized that for these approaches to be successful they would need to integrate patient-specific information, however no chronic-pain-specific system supported this ability.(78) ○ Delivery-system design <ul style="list-style-type: none"> ▪ One recent high-quality systematic review evaluated the safety and effectiveness of interventions for chronic-post-surgery pain, including pharmacologic interventions and physical, surgical and psychological interventions. ▪ The same review reported variable results with regards to physical, surgical and psychological interventions, and due to insufficient evidence was unable to draw definitive conclusions. (96)
<p>Key features of the sub-element if it was tried elsewhere</p>	<ul style="list-style-type: none"> ● No systematic reviews were identified that provided information on key features of the sub-element if it was tried elsewhere
<p>Stakeholders’ views and experience</p>	<ul style="list-style-type: none"> ● Self-management support <ul style="list-style-type: none"> ○ One recent high-quality review found that self-management programs were patients’ favourite option for symptom management for chronic low-back pain, demonstrating an ability to evoke individuals’ consciousness, enthusiasm, and responsibility for their own health.(74) ○ One recent medium-quality systematic review found that older adults are willing to use digital health technologies, and that certain interventions including video-conferencing and touch-screen pain assessments were rated as being highly-acceptable and satisfactory.(98) ● Delivery-system design <ul style="list-style-type: none"> ○ One recent medium-quality systematic review found that 85% of patients receiving pharmacist-led medication management reported being completely satisfied with the treatment received.(84)

Element 2 – Reduce the emergence of chronic pain and its sequelae (including opioid-use problems) once it has emerged

While many initiatives and considerable investments have been made to curb the morbidity and mortality associated with the opioid crisis (e.g., harm-reduction measures, opioid antidote availability, and overdose monitoring and reporting), and more may be required before it can be fully addressed, as Table 2 suggests, fewer initiatives and much smaller investments have targeted raising awareness and educating the public, as well as employers and future health professionals, about:

- how common chronic pain is among Canadians (with estimates, as noted previously, ranging from 15% to 29%), how chronic pain is a symptom of many conditions (e.g., arthritis and cancer, to name just two) but is also a condition that needs to be managed proactively in its own right, how the transition from acute pain (e.g., post-surgery) to chronic pain can – in many but not certainly all circumstances – be avoided, and how a biopsychosocial approach and appropriate goal-setting can help Canadians live well with chronic pain);
- the many effective non-pharmacological options available to prevent and manage chronic pain;
- the many effective non-opioid pharmacological options available to manage chronic pain when non-pharmacological options don't achieve desired goals;
- the ineffectiveness of many opioid risk-mitigation strategies that are widely used; and
- the importance of supporting (and not stigmatizing) those living with chronic pain or those using (and prescribing) pharmacological options (including opioids) appropriately as part of an array of strategies to manage chronic pain.

Some initiatives and investments have targeted the education of practising health professionals, albeit in some recent cases before the release of the new guideline for opioids for chronic non-cancer pain.⁽⁹⁹⁾

While the previous approach element was focused on getting the big picture right in preventing and managing chronic pain in primary and specialty care, this approach element seeks to bring about the long-term societal shifts that would be conducive to optimal care.

Possible short-term (one-year), medium-term (three-year), and long-term (five-year) milestones to consider in planning for the implementation of this approach element and its sub-elements (as well as for monitoring progress towards implementing them) include:

- short term (one year):
 - develop a consortium of public, private not-for-profit and private for-profit partners, including groups involving patients with lived experience, to support the design, execution and evaluation of a country-wide public-education campaign addressing the above five points;
- medium term (three years):
 - expand the consortium of partners to support the design, execution and evaluation of public-education campaigns targeting specific regional or ethnocultural groups;
 - expand the consortium of partners to support the design, execution and evaluation of public-education campaigns targeting employers;
 - develop a consortium of educational leaders and people with lived experience to support the design, execution, incorporation in professional education programs, evaluation and regular updating of curricular supports focused on preventing and managing chronic pain;
- long term (five years):
 - explore opportunities for synergies with the partners leading public or employer campaigns with partially overlapping areas of focus
 - review formative and summative evaluations of past campaigns and partner campaigns to identify and seize opportunities for increasing value, reducing costs or both in the operation of future campaigns.

We identified 14 systematic reviews that directly addressed this element, and also synthesized relevant findings from three systematic reviews developed to inform the recent guidelines for opioids for chronic non-cancer pain.(99-112)

With respect to reducing the emergence of chronic pain, we found no systematic reviews about how to prevent the transition to chronic pain, but we found seven systematic reviews that related to the education of the public and health professionals as part of a broadly based prevention effort. Three recent reviews (two high-quality and one medium-quality) and four older medium-quality reviews evaluated the effectiveness of mass-media campaigns targeted at both groups. Though none of these reviews related explicitly to chronic pain, all seven reviews found positive effects from mass-media campaigns on a range of outcomes including health behaviour change, knowledge related to health conditions and prevention, awareness of symptoms, and the use of needed health services.(101; 103-107) One other older medium-quality review was identified that focused on education initiatives and on patient education for chronic low-back pain.(102) The review found that providing individuals with information booklets about back pain improved recovery in terms of pain score, work status, and healthcare utilization, relative to those receiving usual care or no intervention.(102) Furthermore, the review found that the information had a greater effect on improving disability when it was provided using a biopsychosocial model as compared to a biomedical model.(102)

Turning to reducing the emergence of the sequelae of chronic pain, we found:

- one review about instruments to assess patient-reported safety, efficacy, and use of opioid therapy for chronic pain reducing or discontinuing opioid therapy;
- four systematic reviews about strategies to mitigate risk in using opioids;
- one review about strategies to reduce or discontinue long-term opioid therapy; and
- five systematic reviews about non-opioid pain-management strategies.

The recent medium-quality review about instruments to assess patient-reported safety, efficacy and use of opioid therapy for chronic pain found the nine instruments (i.e., Pain Assessment and Documentation Tool (PADT), Bowel Function Index, Patient Assessment of Constipation Symptoms, Bowel Function Diary, Current Opioid Misuse Measure, Prescription Drug Use Questionnaire-patient version, Pain Medication Questionnaire, Prescription Opioid Misuse Index, and Prescribed Opioid Difficulties Scale) had equivocal clinical utility, and in some cases the assessments were too long to be feasibly implemented in routine clinical practice.(110)

The four systematic reviews about strategies to mitigate risk in using opioids, three of which were developed to inform the 2017 Canadian guideline for opioids for chronic non-cancer pain, found no conclusive evidence for the use of any of the following risk-mitigation strategies:

- urine-drug screening;
- treatment agreements;
- Naloxone co-prescription in the case of opioid use for chronic pain alone;
- tamper-resistant formulations;
- patch exchange programs; and
- choosing between immediate release or controlled release opioids.(99; 111)

The one systematic review about strategies to reduce or discontinue long-term opioid therapy found that interdisciplinary pain programs using such strategies resulted in the majority of participants discontinuing opioid use at program completion.(108) The review also found that replacement with buprenorphine and use of acupuncture resulted in high mean opioid discontinuation rates, while behavioural intervention, detoxification, and ketamine-assisted dose reduction generated moderate opioid discontinuation rates.(108) The discontinuation of long-term opioid treatment was associated with improved pain symptoms, function and quality of life following dose reduction.(108)

Finally, we identified five systematic reviews, including the three developed to inform the opioid guidelines, about non-opioid pain management strategies. Two recent high-quality reviews found that physical activity such as walking can improve pain scores and physical function relative to controls for individuals with dysmenorrhea, fibromyalgia, intermittent claudication, low-back pain, mechanical neck disorder, musculoskeletal diseases, patellofemoral pain, post-polio syndrome, rheumatoid arthritis and spinal cord injury.(109; 113) In addition, evidence from the three systematic reviews (publications pending) that were included in the guidelines recommend the use of the following therapies prior to trialing opioids:

- acupuncture, massage therapy, osteopathic manipulation, relaxation approaches, spinal manipulation, Tai Chi, and yoga for knee osteoarthritis, back pain, neck pain, fibromyalgia, and severe headaches or migraines;
- non-steroidal anti-inflammatory and duloxetine for chronic low-back pain; and
- Tai Chi, mindfulness-based stress reduction, exercise, multidisciplinary rehabilitation, spinal manipulation, massage therapy, and acupuncture for chronic low-back pain.(99)

A summary of the key findings from the synthesized research evidence is provided in Table 5. For those who want to know more about the systematic reviews contained in Table 5 (or obtain citations for the reviews), a fuller description of the systematic reviews is provided in Appendix 3.

Table 5: Summary of key findings from systematic reviews relevant to Element 2 - Reduce the emergence of chronic pain and its sequelae (including opioid-use problems) once it has emerged

Category of finding	Summary of key findings
Benefits	<ul style="list-style-type: none"> • Education of the public and health professionals on chronic pain <ul style="list-style-type: none"> ○ Three high-quality, three medium-quality and one low-quality review found positive effects of mass-media campaigns on a range of outcomes, including health behaviour changes (e.g., weight loss, physical activity and dietary awareness),(100; 104) voluntary lifestyle behaviours,(105) knowledge related to health conditions and prevention,(101) and the use of needed health services (e.g. cancer screening, immunization program).(103; 106) ○ One older medium-quality review found that providing individuals with information booklets about back pain improved recovery in terms of pain, work status, and healthcare utilization, relative to those receiving usual care or no intervention. <ul style="list-style-type: none"> ▪ Studies contained in the review that compared the effects of a biomedical booklet with a biopsychosocial booklet found that the latter had a greater effect on improving disability.(102) • Reducing the emergence of sequelae of chronic pain <ul style="list-style-type: none"> ○ One recent high-quality systematic review found that pedometers improved scores for pain and physical function relative to controls for individuals with musculoskeletal diseases.(109) ○ One recent medium-quality review synthesized research on instruments to assess patient-reported safety, efficacy and use of opioid therapy for chronic pain. The review found the nine instruments (i.e., Pain Assessment and Documentation Tool (PADT), Bowel Function Index, Patient Assessment of Constipation Symptoms, Bowel Function Diary, Current Opioid Misuse Measure, Prescription Drug Use Questionnaire-patient version, Pain Medication Questionnaire, Prescription Opioid Misuse Index, and Prescribed Opioid Difficulties Scale) had equivocal clinical utility as some did not contain items from all content areas, however the review found that in some cases the assessments were too long to be feasibly implemented in routine clinical practice.(110) ○ One recent high-quality review assessed the effectiveness of strategies to reduce or discontinue long-term opioid therapy and found interdisciplinary pain programs resulted in the majority of participants discontinuing opioid use at program completion. <ul style="list-style-type: none"> ▪ The review also found that buprenorphine-assisted dose reduction and acupuncture resulted in high mean opioid discontinuation rates, while behavioural intervention, detoxification, and ketamine-assisted dose reduction generated moderate opioid discontinuation rates. ▪ The review found that the discontinuation of long-term opioid treatment on patient outcomes resulted in improved pain symptoms, function and quality of life following dose reduction.(108)

<p>Potential harms</p>	<ul style="list-style-type: none"> ● Reducing the emergence of sequelae of chronic pain <ul style="list-style-type: none"> ○ An overview of Cochrane systematic reviews of adverse events associated with medium- and long-term opioid use found a 42% higher risk of adverse events and 175% increased risk of serious adverse events associated with opioid use when compared to placebo. <ul style="list-style-type: none"> ▪ Specifically, adverse events included constipation, dizziness, drowsiness, fatigue, hot flushes, increased sweating, nausea, pruritus and vomiting.(112)
<p>Costs and/or cost-effectiveness in relation to the status quo</p>	<ul style="list-style-type: none"> ● No costing studies or economic evaluations were identified
<p>Uncertainty regarding benefits and potential harms (so monitoring and evaluation could be warranted if the option were pursued)</p>	<ul style="list-style-type: none"> ● Uncertainty because no systematic reviews were identified <ul style="list-style-type: none"> ○ Preventing the transition to chronic pain ● Uncertainty because no studies were identified despite an exhaustive search as part of a systematic review <ul style="list-style-type: none"> ○ Not applicable – no ‘empty’ reviews were identified ● No clear message from studies included in a systematic review <ul style="list-style-type: none"> ○ Reducing the emergence of sequelae of chronic pain <ul style="list-style-type: none"> ▪ Significant variation in the definition of opioid misuse, limited one older medium-quality review from concluding on the effectiveness of either treatment agreements or urine drug testing at curbing use. ▪ The same review however, found some evidence to support the multicomponent management strategies, which were associated with a reduction in the use of opioids compared with pre-intervention conditions or control participants.(111) ▪ Systematic reviews conducted for the development of guidelines for opioids for chronic non-cancer pain were unable to find conclusive evidence for the use of the following risk-mitigation strategies: urine-drug screening; treatment agreements; naloxone co-prescription in the case of opioid use for chronic pain alone; tamper-resistant formulations; patch exchange programs; and choosing between immediate release or controlled release opioids.(99)
<p>Key elements of the sub-element if it was tried elsewhere</p>	<ul style="list-style-type: none"> ● No systematic reviews identified key elements of the sub-element that was tried elsewhere
<p>Stakeholders’ views and experience</p>	<ul style="list-style-type: none"> ● Reducing the emergence of sequelae of chronic pain <ul style="list-style-type: none"> ○ Recently developed opioid guidelines for non-cancer pain found that patients place a high value on achieving pain relief, but also on avoiding the adverse events of severe nausea, vomiting and constipation.(99) ○ One older medium-quality systematic review found that patients had more confidence in a booklet on back pain when it was accompanied with a physician-related cue than when provided on its own.(102)

Element 3 – Diagnose the causes of emerging challenges, test innovations to address the causes, and scale up successful efforts

As noted previously, virtually all provincial and territorial health systems lack a well-oiled mechanism to diagnose the causes of emerging challenges in the primary and specialty care of chronic conditions (at least outside the cancer sub-system in some cases), test innovations to address the challenges, and scale up successful efforts, despite Canada being home to some of the world leaders in the field of implementation science. The situation is no different for chronic pain, although it shares with some chronic conditions a lack of patient registries and treatment-monitoring systems in some provinces and territories, and it is for the time being relatively unique in a particular dimension of its accompanying challenges (the opioid crisis) having been raised to the level of high politics (with health ministers and even premiers actively discussing it), which can be both a help and a hindrance.

While approach element 1 spoke to getting the big picture right in preventing and managing chronic pain in primary and specialty care (where, as we noted earlier, the rubber really hits the road for people living with or at risk for chronic pain), and approach element 2 spoke to raising awareness and educating the public, employers and future health professionals (where the long-term societal shifts that would be conducive to optimal care are needed), this approach element is the ‘rapid strike’ force that can intervene when new challenges emerge (such as the overly aggressive tapering of patients off opioids).

While there are a number of organizing frameworks available to inform what a robust mechanism could look like, pursuing this element would build on both data- and evidence-driven and theory-guided approaches that ensure that innovations developed to address pressing challenges are attuned to the underlying causes of the problem and build on what’s known from the field of implementation science.⁽¹¹⁴⁾ In particular, three distinct but interrelated steps would characterize the mechanism:

- 1) diagnose the causes of an emerging challenge, which would combine:
 - data- and evidence-driven approaches (e.g., establishing and using registries and treatment-monitoring systems that draw on high-quality administrative and patient data to understand what’s known about the challenge and its causes); and
 - theory-guided approaches (e.g., using existing theories of behaviour change to rapidly collect and interpret data about the patient or provider behaviours that may need to change, and the current drivers of those behaviours);
- 2) test innovations to address the causes, which would include:
 - building on the theory-guided and empirically based approaches, to identify the most promising innovations to address the drivers of current behaviours (e.g., reminder and prompts built into clinical information systems);
 - assessing how the active ingredients in any innovation are likely to function given the nature of the behaviours being addressed and the context in which the innovation is being implemented, and considering the optimal approach for implementing it; and
 - engaging key stakeholders (including patients with lived experience and primary-care providers and specialty-care teams) to review and iteratively revise the chosen innovation and plan for implementation; and
 - evaluating whether the intended changes are realized after implementing a promising innovation, and revising the approach as necessary;
- 3) scale up successful efforts, which would be supported by adopting appropriate provider-targeted implementation strategies and/or appropriate health-system changes (e.g., changes to financial or governance arrangements) that can support the necessary behaviour changes among patients and health professionals.

Possible short-term (one-year), medium-term (three-year), and long-term (five-year) milestones to consider in planning for the implementation of this approach element and its sub-elements (as well as for monitoring progress towards implementing them) include:

- short term (one year):
 - support the design and implementation of registries and/or treatment-monitoring systems, where they don't already exist, to support the diagnosis of emerging challenges in preventing and managing chronic pain;
 - select through a competitive process a consortium of implementation scientists, implementation practitioners, and patient partners that has designed and can execute a cost-effective mechanism for addressing emerging challenges in preventing and managing chronic pain (that is supported by a clear governance model that allows policymakers and patient partners to set priorities, allocate resources, and monitor progress);
- medium term (three years):
 - achieve as much alignment as possible in registries and treatment-monitoring systems across the country to maximize the potential for cross-national learning and action;
 - deploy the mechanism to address at least three emerging challenges that have the potential to make dramatic improvements in the lives of people living with or at risk of chronic pain;
- long term (five years):
 - continue deploying the mechanism to address at least another three emerging challenges;
 - conduct a formative and summative evaluation of the mechanism to identify and seize opportunities for increasing value, reducing costs or both in the operation of the mechanism;
 - explore opportunities for synergies and possibly shared funding with partners seeking to improve the prevention and management of other chronic conditions with partially overlapping areas of focus.

Diagnose the causes of emerging challenges

With respect to the systematic approaches that could be adopted to diagnose the causes of the problem, we drew on work conducted for an evidence brief developed on optimizing clinical practice based on data, evidence and guidelines, which identified two potentially promising approaches.⁽¹¹⁴⁾ The first systematic approach identified was conducting and updating a systematic review that identifies key areas of practice that need to be optimized. This approach was used in one older high-quality systematic review that assessed the magnitude and the nature of clinical quality problems in general practice in the United Kingdom, Australia and New Zealand.⁽¹¹⁵⁾ The second systematic approach identified in the brief was the development of a comprehensive, integrated checklist which drew on a recent medium-quality review in which it was used to identify factors that might prevent or enable improvements in clinical practice (or more generally, to identify the determinants of practice).⁽¹¹⁶⁾

While no reviews were identified that directly addressed the design and implementation of registries and treatment-monitoring systems, we found one older medium-quality review that examined the effects of information technology on medication safety. The review found that computerized provider order-entry systems with clinical decision support was effective in reducing medication errors when targeted at a limited set of potentially inappropriate drugs.⁽¹¹⁷⁾

With respect to the theory-guided and empirically based approaches that could be adopted to diagnose the causes of the problem, we also drew on work conducted for the aforementioned evidence brief on optimizing clinical practice.⁽¹¹⁴⁾ The brief identified two promising theory-guided and empirically based approaches: the Behaviour Change Wheel and the Theoretical Domains Framework.^(118; 119) The Behaviour Change Wheel was developed through a recent medium-quality systematic review of 19 frameworks of behaviour change. The Behaviour Change Wheel is centred around a 'behaviour system' comprising three essential conditions: 1) capability (i.e., an individual's psychological and physical capacity to engage in a specified activity); 2) opportunity (social and physical factors that lie outside the individual that make a behaviour possible or

prompt it); and 3) motivation (cognitive processes that energize and direct behaviour).(118) These three conditions provide a basis for identifying the underlying causes of a particular problem, and then for designing interventions that address areas where the need for behaviour change has been prioritized (which is covered by the next step in the process, described below). The Theoretical Domains Framework, which was developed through an expert consensus process and validation exercise, offers 12 domains of behavioural determinants, which can be used to identify and explain influences on behaviours (or what needs to be changed), systematically designed interventions to adjust behaviours (which again, is covered by the second step below), or to enable process evaluations of interventions.(119; 120) A recent application of this approach indicates that at the stage of identifying what needs to be changed, it is important to specify who needs to do what differently and assess the barriers and enablers that need to be addressed (i.e., ascertain the causes of the problem).

Test innovations to address the causes

The identification of innovative approaches to address the underlying causes of emergent challenges would overlap with the theory-guided and empirically based approaches outlined above, as both the Behaviour Change Wheel and Theoretical Domains Framework were developed with the identification of problems as well as development of appropriate solutions in mind. For the latter purpose, the Behaviour Change Wheel focuses on developing solutions by considering nine groupings of interventions that could be used to address deficits in the three conditions outlined above (capability, opportunity and motivation), which are further encircled by seven policy activities that could be used to support the implementation of those interventions. Details of these interventions and activities are covered comprehensively in the original evidence brief that we drew from.(114)

Complementing the Behaviour Change Wheel, the Theoretical Domains Framework approaches the identification of innovative solutions by identifying who needs to do what differently through three key stages, including: 1) identifying gaps between evidence and practice (using explicit criteria and high-quality data and evidence); 2) identifying the types of behaviours that need to change in order to reduce or eliminate the evidence-to practice gap; and 3) specifying the health professional groups that need to change behaviour.

A key component of both structured/standardized and iterative/theory-guided and empirically based approaches is the need to first engage in a stakeholder-engagement process to specify who needs to do what differently in ascertaining the causes of the problem (which mostly relates to the previous step), as well as in identifying the most appropriate solutions for addressing the problem and helping to evaluate and revise them as necessary. We identified one systematic review that assessed stakeholder-engagement processes for program evaluation,(121) and three reviews that evaluated public- and consumer-engagement processes.(93; 122; 123) The review about stakeholder engagement found limited research evidence about stakeholder involvement in program evaluation. However, the review did find that there was considerable overlap in the key features of stakeholder-engagement processes in the literature, and indicated that the methodological centrepiece of these processes is entering into collaboration with a collective willingness to participate, and placing emphasis on the need to draw on the strengths of each member while respecting their unique positions and expertise.(121) Of the four reviews about public and consumer engagement, two indicated that it can be helpful for improving the dissemination of information and processes for developing interventions, as well as for enhancing awareness and understanding among citizens.(92; 93) However, all of the reviews indicated that the available evidence is limited and that it is difficult to draw firm conclusions about the benefits of particular public- and consumer-engagement processes.

Scale up successful efforts

Scaling up successful efforts, which includes putting in place the appropriate provider-targeted implementation strategies and/or appropriate financial incentives, overlaps with the theory-guided and empirically based approaches outlined above, specifically targeting the third condition of the Behaviour

Change Wheel - motivation. We recently produced two evidence briefs that comprehensively address the topics of provider-targeted implementation strategies and financial incentives, which we drew on for the evidence presented below.(114; 124)

With respect to provider-targeted implementation strategies, many approaches have been evaluated with a search conducted in November 2017 revealing more than 1,300 systematic reviews evaluating provider-targeted implementation strategies in Health Systems Evidence (www.healthsystemsevidence.org). While assessing these reviews is beyond the scope of this brief, a recent (non-systematic) review provides a summary of the results of the highest quality and most up-to-date systematic reviews produced by the Cochrane Effective Practice and Organizational Change (EPOC) group.(125) This set of systematic reviews from the EPOC group found beneficial effects for educational materials,(126) educational meetings,(125) educational outreach visits,(127) local opinion leaders that can champion change,(128) audit and feedback, computerized reminders,(129) and tailored interventions.(130) Each of these interventions has been found to have positive absolute effects ranging from 2% to 12%, but an older medium-quality systematic review found that combining them in multifaceted interventions does not result in increased effects.(131)

A notable finding across these reviews is that while the absolute effect sizes are similar, there are large distributions of observed effects. Given this, Grimshaw et al. suggest that the likely effects of interventions vary in relation to the degree to which the causal mechanisms of action for the intervention address the specific barriers identified.(132) In this evidence brief, the diagnosis of the problem has identified lack of awareness among clinicians of new recommendations and care pathways in guidelines, difficulty with identifying and interpreting recommendations in a timely fashion and a lack of system-wide accountability for implementing guidelines. Given this, the provider-targeted strategies that seem best poised to have an effect on addressing these challenges are information and education provision, integrating guidelines into information technologies most frequently used by clinicians, and adopting system-wide audit and feedback mechanisms. The key findings related to each of these interventions are outlined in Table 6. Overall, these findings indicate that:

- educational interventions can achieve improvements in professional practice with systematic reviews finding a median absolute improvement of:
 - 4.3% from printed educational materials,(126)
 - 6.0% from educational meetings (effects are larger with high attendance rates and when sessions mix interactive and didactic approaches, but lower for complex behaviours and non-severe outcomes),(125)
 - 4.8% and 6.0% from educational outreach for prescribing behaviours and other behaviours respectively (but effects are less certain when used to change more complex behaviours);(127)
- evidence about integrating guidelines into information technologies most frequently used by clinicians is mixed with:
 - a median absolute improvement in care of 4.3% from computerized reminders, but the use of more complex decision-support systems have not been as successful,(126)
 - a wide range of smartphone and tablet-based utilities for use in pre-, intra- and postoperative contexts being available that have found to be generally positive for enhancing care in a recent medium-quality review (but with most studies having methodological limitations);(133) and
- there is a 4.3% absolute improvement from using audit and feedback, but more than 16% absolute improvement is observed when baseline performance is low and/or when key intervention features are incorporated (e.g., when feedback is provided more than once, when it includes both explicit targets and an action plan, when the source of feedback is a supervisor or colleague, and when it is delivered both verbally and in a written format).(134)

One of the previously mentioned evidence briefs was prepared for a September 2015 dialogue and focused on how financial incentives can be used to optimize clinical practice, or in the context of this element, scale up promising innovations. The brief found seven overviews of systematic reviews about financial incentives and nine systematic reviews that complement these overviews.(124) We updated the search and added one

overview of systematic reviews about the effects of pay-for-performance that was published since the evidence brief about financial incentives was completed.(135)

The following are the key messages that were included in the evidence brief from 2015 about financial incentives for consumers, health professionals and organizations, which we have updated slightly using the newly identified overview:

- 1) financial incentives targeting citizens can be effective at changing behaviours such as those required before surgery (e.g., smoking cessation), but the evidence supporting these effects is either inconsistent (e.g., for improving adherence to medicines),(136) indicates that effects are not sustained in the long term (e.g., for promoting healthy behaviours such as changes in smoking, eating, alcohol consumption, and physical activity),(137-139) or require substantial cash incentives to sustain behaviour changes (e.g., for smoking cessation);(140)
- 2) the reviews of the evidence for the use of financial incentives for providers,(141-145) health organizations (146) and for both providers and health organizations,(135; 147-149) found that:
 - evidence is either insufficient,(143; 145; 148; 149) modest and of variable effects,(135; 142; 144) difficult to disentangle effects from those other interventions designed to improve quality,(135) or are based on perceived outcomes (e.g., organizational leaders),(146) and/or
 - incentives are more effective for changing some behaviours in the short run (e.g., for simple, distinct and well-defined behaviours such as providing priority services to specific populations)(142; 148) or for specific types of conditions (e.g., for chronic rather than acute care),(147) but not for other more complex behaviours (e.g., improving adherence to clinical-practice guidelines)(142) or over the long term (e.g., retention of human resources);(141) and
- 3) how they are designed (e.g., using cash incentives for citizens, selecting targets based on those with the largest room for improvement, and using process and intermediary outcome indicators as target measures) (150; 151) and complemented by other policy instruments (e.g., using cash plus other motivational interventions for citizens, combined with educational interventions and audit and feedback for health professionals) (137; 152) can be very important to achieve intended effects and avoid unintended consequences.

A summary of the key findings from the synthesized research evidence is provided in Table 6. For those who want to know more about the systematic reviews contained in Table 6 (or obtain citations for the reviews), a fuller description of the systematic reviews is provided in Appendix 4.

Table 6: Summary of key findings from systematic reviews relevant to Element 3 - Diagnose the causes of emerging challenges, test innovations to address the causes, and scale up successful efforts

Category of finding	Summary of key findings
Benefits	<ul style="list-style-type: none"> • Scale up successful innovations • Use provider-targeted implementation strategies <ul style="list-style-type: none"> ○ High-quality systematic reviews found absolute effect sizes related to changing behaviour to optimize practice ranging from 2% to 12% for printed educational materials, educational meetings, educational outreach, local opinion leaders, audit and feedback, computerized reminders, and tailored interventions.(153-159) ○ Five studies in a recent high-quality review found that issuing new surgical-practice guidelines resulted in a significant reduction in surgical-practice variation following dissemination of the guidelines.(160) ○ A wide range of smartphone and tablet-based utilities for use in pre-, intra- and postoperative contexts being available that have been found to be generally positive for enhancing care in a recent medium-quality review (but with most studies having methodological limitations).(161) • Provider-targeted financial incentives <ul style="list-style-type: none"> ○ There are mixed results for financial incentives to improve health professional behaviours and patient outcomes: <ul style="list-style-type: none"> ▪ a recent overview of systematic reviews found that payments for service, providing care to specific populations, providing a pre-specified level of care, changing activity, as well as improving quality, processes of care, referrals, admissions and prescribing costs, were effective;(142) ▪ the same overview noted that payments for working a specified time period, improving consultation or visit rates and promoting compliance with guidelines are ineffective;(142) ▪ a high-quality review that was published more recently than the overview found mixed effects for the use of pay-for-performance schemes for healthcare providers to improve quality of patient care and patient-relevant outcomes, and concluded that current evidence targeting individual providers is insufficient to support its adoption;(143) and ▪ an older high-quality review similarly found modest and variable effects of financial incentives on improving the quality of healthcare provided by primary-care physicians.(144) • Organization-targeted financial incentives <ul style="list-style-type: none"> ○ A recent high-quality systematic review that assessed leaders’ experiences and perceptions implementing activity-based funding and pay-for-performance hospital funding models found that: <ul style="list-style-type: none"> ▪ perceived benefits for activity-based funding included improved productivity and efficiency, ability to re-allocate funds, support for greater emphasis on evaluation, accountability and discharge planning, improved data accuracy, improved collaboration and communication, and improved quality and enhanced organizational transparency were associated with pay-for-performance models; ▪ unintended consequences included opportunistic behaviour, ‘cherry-picking’ patients with less complex conditions and who are less expensive to treat (possibly leading to the exclusion of more vulnerable patients), and inaccurate reporting and evaluation of quality outcomes; and ▪ barriers to implementation included lack of resources (e.g., constrained human resources given additional workload for providers), data collection (e.g., difficulty gathering accurate data and lack of experienced staff), and commitment factors (e.g., leaders’ skepticism or suspicion about the funding model).(146) • Combined professional- and organization-targeted financial incentives <ul style="list-style-type: none"> ○ A recent overview of systematic reviews that evaluated pay-for-performance interventions indicated that many studies have not found an effect, that it is often difficult to disentangle the effects of pay-for-performance interventions from those of other initiatives designed to improve the quality of healthcare, and that there can be spillover effects to care that are not being incentivized.(162) ○ A recent overview of systematic reviews indicated that: <ul style="list-style-type: none"> ▪ pay-for-performance programs were generally more effective for chronic care than acute care; ▪ pay-for-performance programs did not have a negative effect on access; ▪ there is no clear association between incentive size and the effectiveness of pay-for-performance programs; and

	<ul style="list-style-type: none"> ▪ the majority of the evidence suggests that England’s ‘quality and outcomes framework’ (a pay-for-performance scheme that rewards general practitioners for the quality of care they provide, but that also involved many other simultaneous changes, such as EHRs) is associated with some improved quality-of-care processes and intermediate patient outcomes (e.g., blood pressure and cholesterol levels).(147) ○ A recent overview of systematic reviews found that there are few rigorous studies of results-based financing, but that financial incentives for health professionals appear to be effective in the short run for simple, distinct and well-defined behavioural goals (but that there is less evidence supporting long-term changes).(148) ○ A recent medium-quality review comparing best-practice pricing, normative pricing, quality structures pricing models, and pay-for-performance schemes found insufficient evidence to conclude which model is the most beneficial, but indicated that the incentives need to be substantial to generate change in behaviour and practice, and need to be provided at a clinical-department level in order to improve quality and safety of clinical care.(149)
Potential harms	<ul style="list-style-type: none"> • Scale up successful innovations • Use provider- and/or organizational-targeted incentives to support changes <ul style="list-style-type: none"> ○ A recent overview of systematic reviews of pay-for-performance interventions found some evidence to suggest that inequalities between socio-economic groups have been reduced, but that others endured.(162) ○ Possible risks associated with results-based financing include: motivating unintended behaviours; ignoring important tasks that are not rewarded with incentives; improving or cheating on reporting rather than improving performance; widening the resource gap between rich and poor; and dependency on financial incentives.(148)
Costs and/or cost-effectiveness in relation to the status quo	<ul style="list-style-type: none"> • Scale up successful innovations • Use provider-targeted implementation strategies <ul style="list-style-type: none"> ○ The costs associated with implementing behaviour-change interventions can vary substantially with interventions such as printed educational materials costing substantially less than interventions such as educational outreach or audit and feedback. ○ While costs of interventions can vary substantially they need to be assessed in relation to the full chain of events from intervention, the resulting improvements in clinical practice, and the subsequent cost savings at the system level. For example, a cost-effectiveness analysis using this perspective for educational outreach found that it was cost-saving with an approximate absolute effect of 5%.(163) ○ A recent low-quality review of surgical auditing found a reduction in complications in the six included studies, which produced a reduction in costs. • Use provider- and/or organizational-targeted incentives to support changes <ul style="list-style-type: none"> ○ A recent overview of systematic reviews indicated that there is a potential for pay-for-performance interventions to be cost-effective, but that the evidence is not yet convincing enough to make a reliable conclusion.(162) ○ An older non-systematic review found one study that reported on the cost-effectiveness of a pay-for-performance program, and found that the estimated cost per quality-adjusted life years saved ranged from \$13,000 to \$30,000.(164)
Uncertainty regarding benefits and potential harms (so monitoring and evaluation could be warranted if the option were pursued)	<ul style="list-style-type: none"> • Uncertainty because no systematic reviews were identified <ul style="list-style-type: none"> ○ Not applicable • Uncertainty because no studies were identified despite an exhaustive search as part of a systematic review <ul style="list-style-type: none"> ○ Not applicable • No clear message from studies included in a systematic review <ul style="list-style-type: none"> ○ Not applicable
Key elements of	<ul style="list-style-type: none"> • Diagnose the causes of an emerging challenge <ul style="list-style-type: none"> ○ An older high-quality review used a systematic approach to assess the magnitude and the nature of

<p>the policy option if it was tried elsewhere</p>	<p>clinical quality problems in general practice in the United Kingdom, Australia and New Zealand.(115)</p> <ul style="list-style-type: none"> ○ A recent medium-quality review outlined a structured approach to identify factors that might prevent or enable improvements in clinical practice through an integrated checklist and five worksheets designed to support the development of tailored implementation strategies based on the areas identified as warranting targeted implementation effort.(116) ○ The behaviour change wheel was developed in a recent medium-quality review, and supports the identification of behaviours associated with underlying causes of a particular problem, and designing interventions to address areas where the need for behaviour change has been prioritized.(118) <ul style="list-style-type: none"> ● Test innovations to address the causes <ul style="list-style-type: none"> ○ An older high-quality review indicated that community-engagement activities used a variety of approaches, including convening community groups, committees and workshops, and engaging educators, champions and volunteers.(93) ○ A recent medium-quality review about public involvement in healthcare policy found that key features of public involvement are poorly defined and rarely detailed.(92) ○ A recent low-quality review outlined that having the potential to find common ground is a requirement for using public engagement to address issues, and that common goals include activities related to developing policy direction, recommendations and tools, priority setting, resource allocation and risk assessments.(122) <ul style="list-style-type: none"> ▪ The same review indicated that public-engagement processes include three broad characteristics: 1) a sponsor seeking input from the public; 2) participants considering an ethical- or values-based dilemma; and 3) provision of accurate and balanced information to participants about the dilemma.(122) ● Scale up successful innovations <ul style="list-style-type: none"> ● Use provider-targeted implementation strategies <ul style="list-style-type: none"> ○ A recent low-quality review of surgical auditing indicated that its value is likely enhanced when used for high-risk procedures, given that adverse events for them are likely to be of greater clinical and financial impact.(165) ● Use provider- and/or organizational-targeted incentives to support changes <ul style="list-style-type: none"> ○ Cash incentives for promoting healthy behaviours in citizens on average have greater effects as compared to other formats,(137) and sustained success rates are seen when resources are concentrated into substantial cash payments.(140) ○ A recent overview of systematic reviews indicated that: <ul style="list-style-type: none"> ▪ key features of effective pay-for-performance programs included lower baseline levels, involvement of stakeholders in target selection, and the utilization of process indicators instead of outcome measures; ▪ implementation of pay-for-performance yielded stronger effects where new funds were available and where there was sufficient awareness about the elements of the programs; and ▪ incentives targeted at the individual or team level achieve more positive results than those targeted at the hospital level.(147) ○ A high-quality systematic review of activity-based funding found that prerequisites for success include: organizational commitment to and support for the chosen funding model; required infrastructure to support the individuals and activities required to accurately measure quality in pay-for-performance models; information-technology and decision-support systems for producing, tracking and aggregating data; committed leaders who are supportive of the funding model; and involving physician leaders to support accurate data collection and to act as ‘champions’.(146) ○ An older medium-quality review noted that future pay-for-performance programs should define targets based on baseline room for improvement, use process and intermediary outcome indicators as target measures, engage stakeholders and communicate information directly, focus on both quality improvement and achievement, and target individuals and teams.(151)
<p>Stakeholders’ views and experience</p>	<ul style="list-style-type: none"> ● Scale up successful innovations <ul style="list-style-type: none"> ● Use provider- and/or organizational-targeted incentives to support changes <ul style="list-style-type: none"> ○ A recent medium-quality review found that financial incentives targeting citizens were more accepted if they are found to be effective, safe, recipient-focused and intrusion-minimizing, but may also be perceived as paternalistic, which can undermine an individual’s autonomy.(18)

Element 4 – Create a national coordinating body

As we note in Table 2 (where the focus is more on time-limited provincial and territorial initiatives) and again at the end of the problem section (where the focus is more on networks and organizations that will be key to preventing and managing chronic pain in the long run), there is a great deal of work being undertaken across the country. While much of the work is focused on addressing the opioid crisis, we encountered in the research literature, on websites and through our key informant significant support for dramatically improved coordination in the prevention and management of chronic pain. To date no one group has assumed a leadership role in coordinating existing efforts among provinces and territories or across networks and organizations.

A national coordinating body appears to have powerfully complemented a national strategy in the cases of cancer and mental health. The Canadian Strategy for Cancer Control provided the momentum for creating the Canadian Partnership Against Cancer, and since then the partnership has been instrumental in supporting the execution of and public reporting about the strategy. The Mental Health Commission of Canada, on the other hand, provided the momentum for creating the Mental Health Strategy for Canada and then transitioned to support its execution and public reporting.

A national coordinating body specific to chronic pain could take responsibility for engaging all relevant stakeholders (including patient partners, the many initiatives, networks and organizations described above, and federal, provincial and territorial leaders) in developing a national pain strategy and coordinating the contributions of these stakeholders in executing, learning from and iteratively revising the strategy. The development of the national coordinating body would ideally be informed by the lessons learned from existing national coordinating bodies and strategies (Table 3). Its areas of focus would presumably be determined by on-going assessments of where there is an appetite for collective action in provincial and territorial health systems, and for better supporting cross-system learning.

Possible short-term (one-year), medium-term (three-year), and long-term (five-year) milestones to consider in planning for the implementation of this approach element and its sub-elements (as well as for monitoring progress towards implementing them) include:

- Short term (one year):
 - allocate an existing network or organization responsibility to
 - coordinate activities in year one to achieve the milestones related to elements 1-3 so ‘quick wins’ can be achieved in that first year,
 - begin the process of drafting, again using a participatory process, a national pain strategy that can provide the basis for consultations once the national coordinating body is operational, and
 - design a national coordinating body for the prevention and management of chronic pain, using a participatory process, and allocate funds to supports its first five years of operation;
- medium term (three years):
 - finalize the national pain strategy (in year two) and complete one full year of implementation (in year three), monitoring and public reporting;
- long term (five years):
 - complete two more years of implementing the national pain strategy (in years four and five), monitoring and public reporting;
 - conduct a formative and summative evaluation of the national coordinating body (in year four) to identify and propose opportunities for increasing value, reducing costs or both if the coordinating body were to be renewed.

For this element, we found one older medium-quality review related to establishing a multi-stakeholder network. The review assessed the impact of organizational partnerships to improve public-health outcomes in England between 1997 and 2008, and found a lack of evidence of the effects of public-health partnership on outcomes. However, the qualitative studies included in the review suggested that some partnerships increased the profile of health inequalities on local policy agendas.(166)

A summary of the key findings from the synthesized research evidence is provided in Table 7. For those who want to know more about the systematic reviews contained in Table 7 (or obtain citations for the reviews), a fuller description of the systematic reviews is provided in Appendix 5.

Table 7: Summary of key findings from systematic reviews relevant to Element 4 – Create a national coordinating body

Category of finding	Summary of key findings
Benefits	<ul style="list-style-type: none"> • One older medium-quality review related to establishing a multi-stakeholder network found that partnerships increased the profile of health inequalities on local policy agendas (166)
Potential harms	<ul style="list-style-type: none"> • Not addressed by any identified systematic reviews
Costs and/or cost-effectiveness in relation to the status quo	<ul style="list-style-type: none"> • Not addressed by any identified systematic reviews
Uncertainty regarding benefits and potential harms (so monitoring and evaluation could be warranted if the option were pursued)	<ul style="list-style-type: none"> • Uncertainty because no systematic reviews were identified <ul style="list-style-type: none"> ○ Not applicable • Uncertainty because no studies were identified despite an exhaustive search as part of a systematic review <ul style="list-style-type: none"> ○ Not applicable • No clear message from studies included in a systematic review <ul style="list-style-type: none"> ○ One older medium-quality systematic review found a lack of evidence of the effects of public-health outcomes as a result of organizational partnerships in England between 1997 and 2008 (166)
Key elements of the policy option if it was tried elsewhere	<ul style="list-style-type: none"> • Not addressed by any identified systematic reviews
Stakeholders' views and experience	<ul style="list-style-type: none"> • Not addressed by any identified systematic reviews

Additional equity-related observations about the four elements

In our review of the synthesized research evidence included in this brief, we found relatively few insights into how the four elements should be tailored to meet the needs of the prioritized groups (i.e., individuals with existing mental health and substance-use problems and individuals from different ethnocultural communities). However, we were able to draw on literature more broadly that can speak to the equity-related observations for the first, second and third approach elements.

With respect to the first element – improve primary-care-based chronic-pain management and create/expand interdisciplinary specialty-care teams – findings from a recent scoping review we conducted suggest there is significant evidence supporting the use of collaborative care approaches (e.g., those that use an interdisciplinary team to integrate the delivery of mental health or addictions services with primary care) to address comorbid physical and mental health and substance-use conditions.⁽¹⁶⁷⁾ Specifically, it was found that these approaches are more effective than usual care in managing both conditions, particularly when they involve a mental health specialist working alongside an individual’s existing primary-care provider.⁽¹⁶⁷⁾

For different ethnocultural communities, we found one recent medium-quality systematic review that identified differences in the way pain is experienced and the efficacy of different management strategies across ethnocultural groups.⁽¹⁶⁸⁾ As previously noted, culture shapes various aspects of the experience of pain, including expression, lay remedies, expectations and perceptions of the health system, receptivity to interventions, and when and where to seek care.⁽¹⁶⁸⁾ In improving the capacity of primary care and specialty care to help patients manage chronic pain, it is critical to keep these cultural differences in mind and to improve the cultural competencies of those delivering these services. This may include ensuring the availability of:

- culturally diverse staff who reflect the nature of the community;
- providers and translators who speak clients’ languages;
- training for providers about the culture and language of the people they serve; and
- tailored pain-management approaches that are consistent with cultural norms.⁽¹⁶⁹⁾

We also found some evidence that pertains to the second element – reduce the emergence of chronic pain and its sequelae (including opioid-use problems) once it has emerged – in particular to the emergence of sequelae of chronic pain. We found one older low-quality systematic review that examined predictors of problematic opioid use by chronic-pain patients, and found that a history of substance use or a history of psychiatric disorders were associated with a higher risk of problem use than the general population.⁽¹⁷⁰⁾

Finally, with respect to third element – diagnose the causes of emerging challenges, test innovations to address the causes, and scale up successful efforts – in particular the sub-element of scale up successful innovations, we found an older medium-quality review that found pay-for-performance incentives may widen racial disparities in healthcare through cherry-picking patients.⁽¹⁷¹⁾ Findings from this review suggest that we should be mindful about the potential implications for such incentives and for further widening disparities between ethnocultural communities.

IMPLEMENTATION CONSIDERATIONS

To set the stage for discussing implementation considerations, Table 8 presents again the proposed milestones by one-, three- and five-year time frames, instead of by element as was done in the last section. Because the most pressing barrier to implementation and hence to achieving these milestones is the lack of coordination of existing efforts, the milestones related to the fourth element are presented first within each time frame, and the key milestone is allocating an existing network or organization the responsibility for coordinating activities in year one to achieve the milestones related to approach elements 1-3, so ‘quick wins’ can be achieved in that first year (and before a dedicated national coordinating body can be designed and funds allocated to support its first four years of operation). There are many networks and organizations that are well positioned to do this, including ones that already have existing agreements with the federal government or with federal government agencies that could simply be amended to allow them to take on and receive funding for these responsibilities on a time-limited basis. The Australian state of New South Wales has achieved similar milestones through its five-year (2012-16) chronic pain strategy.

Table 8. Proposed milestone by one-, three- and five-year time frames

Year	Milestone	Element
Year one	<ul style="list-style-type: none"> • Allocate an existing network or organization responsibility to <ul style="list-style-type: none"> ○ coordinate activities in year one to achieve the milestones related to elements 1-3 so ‘quick wins’ can be achieved in that first year ○ begin the process of drafting, again using a participatory process, a national pain strategy that can provide the basis for consultations once the national coordinating body is operational • Design a national coordinating body for the prevention and management of chronic pain, using a participatory process, and allocate funds to support its first five years of operation 	Element 4 – Create a national coordinating body
	<ul style="list-style-type: none"> • Use a systematic and transparent process to prioritize best practices in managing chronic pain in primary care (for both children and adults), from sources such as the guideline for opioids for chronic non-cancer pain, the interim guideline for reducing the role of opioids in pain management (which is focused on non-pharmacological approaches to chronic-pain management), and pain-management guidelines for family medicine (which is focused on a variety of types of both acute and chronic pain and both pharmacological and non-pharmacological therapies) • Identify and support ‘quick wins’ in incorporating these best practices in existing self-management supports (e.g., patient portals), decision supports for primary care (e.g., patient decision aids and continuing professional development courses), clinical information systems (e.g., nascent chronic pain-specific patient registries and treatment-monitoring systems; existing electronic health records, including reminders and prompts), and community resources • Identify and support ‘quick wins’ in spreading delivery-system designs (e.g., interdisciplinary primary- and specialty-care teams) and health-system changes (e.g., formalized linkages between primary-care providers and specialty-care teams with clear referral guidelines, collaborative models, and formalized pathways back to primary care) that have shown promising results, but with accompanying formative and summative evaluations that build the evidence base as spread happens 	Element 1 – Improve primary-care-based chronic-pain management and create/expand interdisciplinary specialty-care teams
	<ul style="list-style-type: none"> • Develop a consortium of public, private not-for-profit and private for-profit partners, including groups involving patients with lived experience, to support the design, execution and evaluation of a country-wide public-education campaign addressing the following five points: <ul style="list-style-type: none"> ○ how common chronic pain is among Canadians (with estimates, as noted previously, ranging from 15% to 29%), how chronic pain is a symptom of 	Element 2 – Reduce the emergence of chronic pain and its sequelae (including opioid-

	<p>many conditions (e.g., arthritis and cancer, to name just two), but also a condition that needs to be managed proactively in its own right, how the transition from acute pain (e.g., post-surgery) to chronic pain can – in many but certainly not all circumstances – be avoided, and how a biopsychosocial approach and appropriate goal-setting can help Canadians live well with chronic pain);</p> <ul style="list-style-type: none"> ○ the many effective non-pharmacological options available to prevent and manage chronic pain; ○ the many effective non-opioid pharmacological options available to manage chronic pain when non-pharmacological options don't achieve desired goals; ○ the ineffectiveness of many opioid risk-mitigation strategies that are widely used; and ○ the importance of supporting (and not stigmatizing) those living with chronic pain or those using (and prescribing) pharmacological options (including opioids) appropriately as part of an array of strategies to manage chronic pain 	<p>use problems) once it has emerged</p>
	<ul style="list-style-type: none"> • Support the design and implementation of registries and/or treatment-monitoring systems, where they don't already exist, to support the diagnosis of emerging challenges in preventing and managing chronic pain • Select through a competitive process a consortium of implementation scientists, implementation practitioners (sometimes called knowledge brokers) and patient partners that has designed and can execute a cost-effective mechanism for addressing emerging challenges in preventing and managing chronic pain (that is supported by a clear governance model that allows policymakers and patient partners to set priorities, allocate resources, and monitor progress) 	<p>Element 3 – Diagnose the causes of emerging challenges, test innovations to address the causes, and scale up successful efforts</p>
<p>Year three</p>	<ul style="list-style-type: none"> • Finalize the national pain strategy (in year two) and complete one full year of implementation (in year three), monitoring and public reporting 	<p>Element 4 – Create a national coordinating body</p>
	<ul style="list-style-type: none"> • Transition to 'living systematic review and guidelines' model that ensures that best practices in preventing and managing chronic pain at both primary- and specialty-care levels are being continually identified • Use a systematic and transparent process to identify, leverage and, where needed, fill gaps in the landscape for incorporating best practices in self-management supports (e.g., patient portals), decision supports for primary and specialty care (e.g., patient decision aids and continuing professional development courses), clinical information systems (e.g., chronic-pain-specific patient registries and treatment-monitoring systems; existing electronic health records, including reminders and prompts), and community resources • Identify and push for changes in the financial arrangements (e.g., funding for prescription medication and physician-provided care, but not many effective services or other types of health professionals; complex and inequitable funding landscape depending on the third-party payer) and governance arrangements (e.g., lack of provincial and territorial stewards for the 'chronic pain file'; lack of accreditation and training for pain clinics and the health professionals working in them) that hinder – but have the potential to accelerate – the spread of delivery-system designs and health-system changes that robust formative and summative evaluations demonstrate can improve health and the patient experience while keeping per capita costs manageable 	<p>Element 1 – Improve primary-care-based chronic-pain management and create/expand interdisciplinary specialty-care teams</p>
	<ul style="list-style-type: none"> • Expand the consortium of partners to support the design, execution and evaluation of public-education campaigns targeting specific regional or ethnocultural groups • Expand the consortium of partners to support the design, execution and evaluation of public-education campaigns targeting employers • Develop a consortium of educational leaders and people with lived experience to support the design, execution, incorporation in professional education programs, evaluation and regular updating of curricular supports focused on preventing and managing chronic pain 	<p>Element 2 – Reduce the emergence of chronic pain and its sequelae (including opioid-use problems) once it has emerged</p>

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	<ul style="list-style-type: none"> Achieve as much alignment as possible in registries and treatment-monitoring systems across the country to maximize the potential for cross-national learning and action Deploy the mechanism to address at least three emerging challenges that have the potential to make dramatic improvements in the lives of people living with or at risk of chronic pain 	Element 3 – Diagnose the causes of emerging challenges, test innovations to address the causes, and scale up successful efforts
Year five	<ul style="list-style-type: none"> Complete two more years of implementing the national pain strategy (in years four and five), monitoring and public reporting Conduct a formative and summative evaluation of the national coordinating body (in year four) to identify and propose opportunities for increasing value, reducing costs or both if the coordinating body were to be renewed 	Element 4 – Create a national coordinating body
	<ul style="list-style-type: none"> Conduct a formative and summative evaluation of both the ‘living systematic review and guidelines’ model for best-practices identification and the ‘leveraging and gap-filling’ model for self-management supports, decision supports, clinical information systems, and community resources to identify and seize opportunities for increasing value, reducing costs or both in the operation of these models Identify gaps in the spread of delivery-system designs and health-system changes and prioritize these areas for more contextualized support for spread 	Element 1 – Improve primary-care-based chronic-pain management and create/expand interdisciplinary specialty-care teams
	<ul style="list-style-type: none"> Explore opportunities for synergies with the partners leading public or employer campaigns with partially overlapping areas of focus Review formative and summative evaluation of past campaigns and partner campaigns to identify and seize opportunities for increasing value, reducing costs or both in the operation of future campaigns 	Element 2 – Reduce the emergence of chronic pain and its sequelae (including opioid-use problems) once it has emerged
	<ul style="list-style-type: none"> Continue deploying the mechanism to address at least another three emerging challenges Conduct a formative and summative evaluation of the mechanism to identify and seize opportunities for increasing value, reducing costs or both in the operation of the mechanism Explore opportunities for synergies and possibly shared funding with partners seeking to improve the prevention and management of other chronic conditions with partially overlapping areas of focus 	Element 3 – Diagnose the causes of emerging challenges, test innovations to address the causes, and scale up successful efforts

Returning now to the full range of potential barriers to implementing the approach elements, potential barriers exist at the levels of patients/citizens, providers (e.g., physicians), organizations and systems (Table 9).

Table 9: Potential barriers to implementing the approach elements

Levels	Element 1 – Improve primary-care based chronic pain management and create/expand interdisciplinary specialty-care teams	Element 2 – Reduce the emergence of chronic pain and its sequelae (including opioid-use problems) once it has emerged	Element 3 – Diagnose the causes of emerging challenges, test innovations to address the causes, and scale up successful efforts	Element 4 - Create a national coordinating body
Patient/citizen	<ul style="list-style-type: none"> • Patients who are accustomed to managing chronic pain using particular approaches now may resist a transition to best practices (and later to emergent best practices as the evidence base evolves), particularly if they face financial barriers to accessing them • Patients who are using opioids now may stop accessing primary and specialty care because they feel their concerns or needs are not being met in a climate that puts addressing the opioid crisis ahead of (not alongside) managing chronic pain 	<ul style="list-style-type: none"> • Patients and citizens whose focus is the opioid crisis may resist a public-education campaign that prioritizes messages about the prevention and management of chronic pain over messages about harm reduction 	<ul style="list-style-type: none"> • Patients who are using opioids now may not choose to participate in patient registries or treatment-monitoring systems because they feel the data will be misused in a climate that puts addressing the opioid crisis ahead of (not alongside) managing chronic pain 	<ul style="list-style-type: none"> • Patients and citizens whose focus is the opioid crisis may resist a national coordinating body (and interim body) whose focus is only in part to address the opioid crisis • Patients who have a primary condition like arthritis or suffer from post-cancer-treatment pain may continue to align their efforts only with networks and bodies that focus on this condition
Provider	<ul style="list-style-type: none"> • Primary- and specialty-care providers who are accustomed to or who benefit financially from managing chronic pain using particular approaches now may resist a transition to best practices (and later to emergent best practices as the evidence base evolves) • Primary-care providers (particularly solo practitioners) may lack the infrastructure and/or experience to promote self- 	<ul style="list-style-type: none"> • Primary- and specialty-care providers who are accustomed to or who benefit financially from managing chronic pain using particular approaches now may resist a public-education campaign that prioritizes messages about other approaches 	<ul style="list-style-type: none"> • Primary- and specialty-care providers who are accustomed to or who benefit financially from managing chronic pain using particular approaches now may resist innovations to address the causes of any emerging challenges related to their preferred approaches • Primary- and specialty-care 	<ul style="list-style-type: none"> • Primary- and specialty-care providers may resist a national coordinating body (and interim body) that does not give significant voice to their provincial and territorial professional associations

	management supports and community resources, to use decision supports and clinical information systems, or to engage in formalized linkages with specialty-care teams		providers may resist innovations or tests of innovations that are not developed in close partnership with their provincial and territorial professional associations	
Organization	<ul style="list-style-type: none"> • Networks and organizations promoting particular best-practice sources may resist a systematic and transparent process to select among them • Speciality-care teams may resist accreditation or other mechanisms to ensure they are adequately supporting primary-care providers 	<ul style="list-style-type: none"> • Professional education programs may resist changes to the design of curricular supports focused on preventing and managing chronic pain 	<ul style="list-style-type: none"> • Specialty-care teams may resist the collection of data that may suggest they are not adhering to best practices and may resist efforts to change their existing practices 	<ul style="list-style-type: none"> • Some networks or organizations may resist the allocation of year-one responsibilities to an interim body and/or the creation of a new body other than their own • Existing coordinating bodies in related areas (e.g., cancer and mental health) may resist a perceived infringement on their area of focus
System	<ul style="list-style-type: none"> • Provincial and territorial initiatives – specifically those related to self-management supports, decision supports, clinical information systems, delivery-system designs, health-system changes and community resources – may not be willing to prioritize chronic pain • Provincial and territorial policymakers may resist assigning public servants as stewards for the ‘chronic pain file,’ particularly while it remains so politically charged because of the opioid crisis 	<ul style="list-style-type: none"> • Provincial and territorial policymakers whose focus is the opioid crisis may resist a public-education campaign that prioritizes messages about the prevention and management of chronic pain over messages about harm reduction • Provincial and territorial policymakers may be unwilling to wait until years two and three for the design, execution and evaluation of public-education campaigns targeting specific regional or 	<ul style="list-style-type: none"> • Provincial and territorial policymakers whose focus is the opioid crisis may prioritize only those emerging challenges related to the crisis (and the data needed to address them) • Provincial and territorial patient registries and treatment-monitoring systems may not be willing to align their approaches in ways that maximize the potential for cross-national learning and action 	<ul style="list-style-type: none"> • Federal, provincial and territorial policymakers may want to continue to make short-term politically driven investments in addressing the opioid crisis rather than a long-term investment in improving the prevention and management of chronic pain

		ethnocultural groups		
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A number of potential windows of opportunity could be capitalized upon (Table 10), which also need to be factored into any decision about whether and how to pursue one or more of the approach elements.

Table 10: Potential windows of opportunity for implementing the approach elements

Type	Element 1 – Improve primary-care based chronic-pain management and create/expand interdisciplinary specialty-care teams	Element 2 – Reduce the emergence of chronic pain and its sequelae (including opioid-use problems) once it has emerged	Element 3 – Diagnose the causes of emerging challenges, test innovations to address the causes, and scale up successful efforts	Element 4 - Create a national coordinating body
General	<ul style="list-style-type: none"> • There is significant federal, provincial and territorial government attention being given to the opioid crisis, and the upcoming meeting of health ministers in January 2018 will see them re-visit the issue again • Nesting the opioid crisis in the context of the broader frame of our failures to prevent and manage chronic pain effectively in Canada opens up a much broader conversation about potential ways forward • These ways forward can intersect synergistically with other federal, provincial and territorial areas of focus, including mental health and addictions, home care, and reconciliation with Indigenous peoples 			
Element-specific	<ul style="list-style-type: none"> • Many sources of best practices in preventing and managing chronic pain have recently been developed • Most provinces and territories have been using the Chronic Care Model or something similar to build capacity in primary care to more proactively prevent and manage chronic conditions (if not chronic pain specifically), which can make possible some ‘quick wins’ 	<ul style="list-style-type: none"> • Existing sources of best practices in preventing and managing chronic pain provide a strong basis for the messages to be used in a public-education campaign and hence for supporting the long-term societal shifts that would be conducive to optimal care 	<ul style="list-style-type: none"> • Existing patient registries and treatment-monitoring systems, and Canadian expertise in the science and practice of implementation can be leveraged to create a ‘rapid strike’ force that can intervene when new challenges emerge 	<ul style="list-style-type: none"> • Federal, provincial and territorial policymakers are already working closely to address the opioid crisis and to strengthen care for mental health and addictions and home care • Many networks and organizations would be well positioned to act as in interim national coordinating body

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APPENDICES

The following tables provide detailed information about the systematic reviews identified for each option. Each row in a table corresponds to a particular systematic review and the reviews are organized by element (first column). The focus of the review is described in the second column. Key findings from the review that relate to the option are listed in the third column, while the fourth column records the last year the literature was searched as part of the review.

The fifth column presents a rating of the overall quality of the review. The quality of each review has been assessed using AMSTAR (A Measurement Tool to Assess Reviews), which rates overall quality on a scale of 0 to 11, where 11/11 represents a review of the highest quality. It is important to note that the AMSTAR tool was developed to assess reviews focused on clinical interventions, so not all criteria apply to systematic reviews pertaining to delivery, financial, or governance arrangements within health systems. Where the denominator is not 11, an aspect of the tool was considered not relevant by the raters. In comparing ratings, it is therefore important to keep both parts of the score (i.e., the numerator and denominator) in mind. For example, a review that scores 8/8 is generally of comparable quality to a review scoring 11/11; both ratings are considered “high scores.” A high score signals that readers of the review can have a high level of confidence in its findings. A low score, on the other hand, does not mean that the review should be discarded, merely that less confidence can be placed in its findings and that the review needs to be examined closely to identify its limitations. (Lewin S, Oxman AD, Lavis JN, Fretheim A. SUPPORT Tools for evidence-informed health Policymaking (STP): 8. Deciding how much confidence to place in a systematic review. *Health Research Policy and Systems* 2009; 7 (Suppl1):S8.

The last three columns convey information about the utility of the review in terms of local applicability, applicability concerning prioritized groups, and issue applicability. The third-from-last column notes the proportion of studies that were conducted in Canada, while the second-from-last column shows the proportion of studies included in the review that deal explicitly with one of the prioritized groups. The last column indicates the review’s issue applicability in terms of the proportion of studies focused on chronic pain. Similarly, for each economic evaluation and costing study, the last three columns note whether the country focus is Canada, if it deals explicitly with one of the prioritized groups and if it focuses on chronic pain.

All of the information provided in the appendix tables was taken into account by the evidence brief’s authors in compiling Tables 4-6 in the main text of the brief.

Appendix 1: Systematic reviews relevant to Element 1 – Improve primary-care-based chronic-pain management and create/expand interdisciplinary specialty care teams

Sub-element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on chronic pain
Self-management support (i.e., empowering and preparing patients to manage their health and healthcare through technology and other means)	Effectiveness of self-management programs for chronic lower-back pain (74)	<p>This review included 13 studies investigating the effectiveness of self-management programs (SMPs) for chronic lower-back pain (CLBP).</p> <p>The results were grouped based on the immediacy of pain post-intervention, including immediate, short-term, intermediate-term, and long-term follow-up. Overall, it was found that SMPs can have a moderate effect on CLBP and a small to moderate effect on disability. As such, SMP can be regarded as an effective approach for CLBP management.</p> <p>Nine trials reported on disability data immediately post-intervention, showing that SMPs have a moderate but significant effect in reducing disability at this time point. Five trials reported on disability data approximately three months post-intervention, showing a moderate but significant effect on reducing disability at short-term follow-up. Three trials reported on disability data approximately six months post-intervention, reporting a small but significant effect in reducing disability at intermediate follow-up. Finally, four trials reported on disability data at 12 months post-intervention, demonstrating small but significant effects on reducing disability at long-term follow-up.</p> <p>The data was further analyzed based on sub-group characteristics, including education modes, use of theory, and intensity (duration) of program. It was found that face-to-face SMPs and internet-based SMPs showed moderate, significant improvements on pain intensity and disability compared to controls. Regarding the use of theory, it was found that programs based on Cognitive Behavioural Therapy had an effect size of -0.27 on pain intensity and -0.24 on disability. Programs based on Social Cognitive Theory had an effect size of -0.23 on pain intensity and -0.29 on disability. Programs without theory showed encouraging trends both in reducing pain and disability, with effect sizes of -0.73 and -0.51, respectively. In terms of intensity, it was found that programs of shorter duration (less than six weeks) tended to have a greater effect on reducing pain intensity while longer programs (longer than six weeks) had a slightly greater effect on reducing disability.</p> <p>The authors identified two limitations to this study. The first being their concern that only a small number of RCTs might have been eligible for the performance of a meta-analysis at some time points due to small sample size, limiting the</p>	2015	8/10	0/13	0/13	13/13

Developing a National Pain Strategy for Canada

Sub-element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on chronic pain
		<p>study's generalizability. Secondly, some concern was brought on by the clinical heterogeneity among the trials. The authors attempted to account for this by setting strict inclusion criteria and performing sub-group analyses.</p> <p>The results of this study are generally consistent with those of two other studies on the same topic. Authors note that, overall, SMPs are a favourable option of symptom management for patients with CLBP, demonstrating an ability to evoke individuals' consciousness, enthusiasm and responsibility for their own health, as well as strengthen their capacity for pain self-management. To achieve the greatest results, practitioners are advised to systematically integrate common pain-management programs into a self-management program.</p>					
	<p>Cost-effectiveness of Self-Management Methods for the Treatment of Chronic Pain for older populations (75)</p>	<p>This review included 10 studies investigating the cost-effectiveness of self-management methods for alleviating chronic pain in older populations.</p> <p>Although the study aimed to exclusively target populations aged 65 and over, no such data was available. As a result, the selection criteria were widened to include studies with an average population age of 60 years and over. In seven of the 10 included studies, self-management was found to be effective compared to usual care; in the remaining three studies, there was no significant difference. Various methods were used to calculate cost-effectiveness, including cost per Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) pain score reduction, cost per Abnormal Involuntary Movement Scale (AIMS) score improvement, and cost per quality-adjusted life years (QALY) gained. Although there is insufficient statistical evidence to declare that these self-management interventions are definitely cost-effective based on QALY outcomes, many techniques report a > 50% chance of cost-effectiveness. Eight studies suggested that the cost of developing and delivering self-management interventions may be partially offset by savings incurred from the reduction of subsequent healthcare resource usage. Of the 10 included studies, nine focused on exercise-based interventions while one was based on a telephone advice service for patients.</p> <p>Overall, evidence showed that exercise-based interventions may be cost-effective as a self-management strategy for managing chronic pain in aging adults compared to usual care. In addition, it was found that reinforcing exercise classes with follow-up care could also be cost-effective. Many exercise-based self-management interventions showed cost savings over more intensive control treatments or usual care, suggesting that participants would require fewer visits to their general practitioner or hospital if they keep up with their exercise regimen. In the study analyzing a telephone-based follow-up intervention compared to</p>	2010	5/10	0/11	0/11	11/11

McMaster Health Forum

Sub-element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on chronic pain
		<p>usual care, results showed that the intervention significantly improved AIMS outcome measures for non-significant cost increases. However, it is unclear how much people would be willing to pay for such a service. As such, authors deemed it difficult to draw strong conclusions regarding the cost-effectiveness of this intervention.</p> <p>Costing evidence was of mixed quality in the included papers. Although most trials used the WOMAC scale as the principal outcome measure, authors found it difficult to generalize a cost-effectiveness conclusion due to the lack of consensus among the papers regarding the size of clinically significant improvements and data on patients' willingness to pay for each unit improvement in WOMAC. Attempts to convert the WOMAC outcomes into the preferred QALY outcome measure resulted in great variations and error thresholds. Of the studies that did report QALY outcomes, only one detected a statistically significant improvement from the self-management programs.</p>					
	<p>Efficacy of tailored self-management interventions among adults with mobility-impairing neurological and musculoskeletal conditions (95)</p>	<p>This review included 13 studies describing tailored self-management interventions among adults with neurological and musculoskeletal conditions that characteristically result in mobility impairments.</p> <p>The studies included in the review typically compared tailored interventions to non-tailored interventions or usual care among adults with chronic pain, stroke or arthritis. It was found that the tailored interventions were diverse in their delivery formats, dosing, behaviour-change techniques, and tailoring strategies. The authors of the review identified 13 personal characteristics (e.g., preferences and theoretical constructs) and four types of assessment formats (i.e. oral history, self-report questionnaires, provider-reported assessments, and medical records) that were used to tailor the self-management interventions. Results show that it was common to tailor intervention content using self-report questionnaires that assessed personal characteristics pertaining to impairment and preferences. Content was then matched to personal characteristics using clinical judgment or computer algorithms.</p> <p>The most common intervention topics included physical activity, emotion-management strategies, and pain-management strategies. The most common delivery formats were face-to-face contacts via group or one-to-one instruction. Four interventions primarily used distance education approaches via internet or phone. The duration of intervention ranged from four to 52 weeks, including follow-up visits. The most common intervention frequency was once per week or every other week. The length of each intervention ranged from five to 60 minutes.</p>	<p>Not reported in detail</p>	<p>3/9</p>	<p>1/13</p>	<p>0/13</p>	<p>8/13</p>

Developing a National Pain Strategy for Canada

Sub-element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on chronic pain
		<p>The total number of contacts ranged from zero to 30 contacts. It was found that the most common behaviour-change techniques employed were presenting instructive information, feedback about performance, self-monitoring of behaviour, action planning, problem-solving/barrier-identification, and stress management/emotional regulation. The most common tailoring techniques included psychosocial constructs, preferences, current behaviour, symptoms, impairments, barriers, demographic, risk of an adverse event, physical and/or mental function, and probability of success.</p> <p>Several factors are now facilitating opportunities to optimize and disseminate tailored self-management interventions, including advances in technology, big data analytics, and sequential multiple assignment randomized trials (SMART). National research priorities also present opportunities to advance the science of tailoring.</p> <p>A noted limitation of this study was that very few of the included studies adequately described the decision rules for matching content. In addition, the lack of effect size calculations and missing studies fitting within the inclusion criteria may have limited the results. In order to advance the science of tailoring self-management interventions, the authors recommend conducting comparative effectiveness research and further developing a taxonomy to standardize descriptions of tailoring.</p>					
	<p>The role of digital health technologies in managing pain in older people (98)</p>	<p>This review included nine studies pertaining to the role of digital health technologies in managing pain in older people.</p> <p>Results demonstrated that while older people are willing to use mobile technologies to help manage their pain, emphasis should be placed on the provision of adequate technology usage training and maintained connectedness with clinicians. Overall, there is some evidence showing that integrating digital health technology into older people’s pain self-management plans is feasible and acceptable, however, such practices must be informed by a thorough understanding of older people’s pain management needs to ensure effective integration of the technology into clinical practice.</p> <p>Two studies reported high acceptability and satisfaction of the videoconference- and touchscreen computer-based pain-assessment interventions, while an internet-delivered pain-management intervention was shown to be highly useful and user-friendly. Older people’s experience of using a digital pen for pain assessment also indicated high user acceptance and ease of use. Other</p>	2015	6/9	0/9	0/9	9/9

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Sub-element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on chronic pain
		<p>interventions included an internet-delivered mind-body exercise program, remote pain assessment via videoconference, and a patient’s self-reported pain assessment using a touchscreen computer. While older people report a willingness to use digital health technologies at home for pain management, very few studies have tested their efficacy in this setting. In addition, there was insufficient evidence demonstrating the effectiveness of digital health technologies in actually reducing older people’s pain intensity and pain interference. Some barriers to the usage of digital technology by older people include technological adoption barriers relating to battery life and training.</p> <p>Overall, authors reported a lack of high-quality studies investigating the effectiveness of digital health technologies in the management of older people’s pain, with most limited to pilot or feasibility studies that are not adequately powered. It should also be noted that some limitations of this review include the exclusion of studies published in languages other than English, non-empirical research, and unpublished reports.</p>					
	<p>Management of post-surgical chronic pain (96)</p>	<p>This systematic review included 66 trials that evaluated the effectiveness and safety of various interventions for the management of chronic post-surgical pain (CPS). The main clinical effectiveness outcome described was pain intensity and the primary harm outcome was serious adverse events. Included studies were grouped as primarily pharmacological, or as primarily physical, surgical, psychological and other interventions.</p> <p>Studies evaluating pharmacological interventions reported the effectiveness and safety of antidepressants, anti-epileptics, capsaicin, epidural injections and associated interventions, local anesthetics, neurotoxins, N-methyl-d-aspartate receptor antagonists, opioids, intravenous calcitonin and oral/or intravenous naloxone. Interventions produced variable findings, with the majority of studies demonstrating minimal differences in pain intensity and adverse events between treatment and control groups.</p> <p>In studies examining physical, surgical, psychological and other types of interventions, the following treatments were evaluated: acupuncture/dry needling, exercise, limb cover/lining, spinal cord stimulation, surgery, cutaneous magnetic stimulation, laser therapy, sensory discrimination training, mindfulness-based stress reduction, mirror therapy and joint manipulation. Studies generated variable results, with insufficient evidence to deduce any definite conclusions on effectiveness or adverse events.</p>	<p>2016</p>	<p>9/10 (AMSTAR rating from McMaster Health Forum)</p>	<p>2/66</p>	<p>0/66</p>	<p>66/66</p>

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Sub-element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on chronic pain
		No firm conclusions could be reported with regards to the effectiveness and safety of the CPSP-management interventions assessed in this review due to reasons such as the highly variable findings, and the high risk of bias among many of the largest included trials.					
Decision supports (i.e., promoting primary care that is consistent with scientific evidence and patient preferences – such as the biopsychosocial model – through efforts to embed evidence-based guidelines, as well as related patient decision aids, into daily primary-care practice, and to support their implementation through continuing professional development)	Use of computerized decision-support systems in chronic-pain management (78)	<p>This review included nine studies examining the use of computerized decision-support systems (CDSSs) in chronic-pain management, and well as their feasibility and effectiveness.</p> <p>Seven of the nine studies in this review described CDSSs specific to pain-related conditions, and all were designed to assist clinicians with the medical management of pain. Evaluated studies were exclusively feasibility studies and varied widely in design and level of description. All were non-experimental and most were methodologically weak. Patient and clinician acceptability rating of CDSSs ranged from moderate to high. However, due to insufficient data, definitive conclusions regarding the impact of CDSSs on provider performance and patient outcomes could not be determined.</p> <p>Overall, the authors discuss that the potential for CDSSs to improve the quality of chronic-pain management in the primary-care context is substantial. However, in order to do so, primary-care practitioners must first conduct a comprehensive patient assessment on the patient’s pain experience, history of and preferences for pain treatment, and personal goals and priorities. A CDSS then provides a way to elicit and integrate such patient-specific information in a manner that is convenient and timely for both physicians and patients. Currently, however, CDSSs developed for chronic-pain management have yet to fulfil this promise, as these systems have been predominantly biomedical in focus and designed only to assist physicians in the medical management of pain symptoms. Demonstrating the clinical value of these systems is a critical step in convincing healthcare professions that the benefits of investing in a CDSS for pain management outweighs its potential risks.</p> <p>Language bias and the small number and weak methodological rigour of the included studies present as key limitations of this paper. The authors also noted that in all the included studies, study investigators were the CDSS developers, which may have skewed the studies’ results due to conflicts of interest.</p>	2006	4/10 (AMSTAR rating from McMaster Health Forum)	0/9	0/9	7/9

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Sub-element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on chronic pain
Delivery-system design (i.e., organizing programs and services to ensure the proactive, culturally sensitive delivery of effective, efficient clinical care and self-management support, and to strengthen interdisciplinary primary- and specialty-care teams)	Psychological therapies for the management of chronic pain in adults (80)	<p>This review included 15 studies exploring internet-delivered psychological therapies for the management of chronic pain in adults.</p> <p>The results of the study were categorized based on the type of pain and effect. For participants with headache conditions, psychological therapies delivered through the internet were found to reduce pain and moderately reduce disability post-treatment. No clear evidence indicated that psychological therapies improved depression or anxiety post-treatment. In patients with non-headache conditions, psychological therapies improved pain and disability post-treatment with a moderate effect size, and disability at follow-up with a small effect size. A small effect was found with regards to reduction in depression and anxiety post-treatment in this population.</p> <p>The authors concluded that there was insufficient evidence in the included studies to make definitive conclusions regarding the efficacy of psychological therapies delivered via the internet in participants with headache conditions. In general, psychological therapies were found to reduce pain and disability post-treatment, although no clear evidence of benefit was found for disability, depression and anxiety post-treatment. These positive effects on disability were sustained at follow-up.</p> <p>Although the effects are promising, considerable uncertainty remains around the estimates of effect due to the small number of included studies and their limited methodological rigour. Due to the novelty of the method of delivery, the authors recommend that the satisfaction and acceptability of these therapies be further explored in the population.</p>	2013	7/11	0/15	0/15	15/15
	Effectiveness of back-to-work interventions for those with regional musculoskeletal pain (81)	<p>This review included 20 randomized controlled trials that evaluated the effectiveness of early multidisciplinary interventions in promoting work participation and reducing sick leave in adults experiencing regional musculoskeletal pain. Five types of interventions were assessed: back school programs, case-manager-led programs, a physical-activity intervention delivered in combination with multidisciplinary input, a psychosocial intervention delivered either in conjunction with exercise, workplace, or conventional clinical management, and stepped-care approaches.</p> <p>Synthesized results indicate that early multidisciplinary interventions are more effective than comparisons in supporting return-to-work and reducing absence due to pain among individuals experiencing musculoskeletal pain. Additionally, the meta-analysis component of the review suggests that a stepped-care approach</p>	2016	8/10 (AMSTAR rating from McMaster Health Forum)	3/20	0/20	0/20

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Sub-element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on chronic pain
		<p>is more effective than the other four types of interventions in facilitating work participation.</p> <p>No significant findings from the analyses on sick leave data were produced for any of the five categories of interventions. Likewise, negligible differences were found between interventions with regards to their effects on pain intensity and functional disability.</p> <p>Due to the clinical heterogeneity and system-level differences across the included trials, the authors acknowledge uncertainty as to the effectiveness of early multidisciplinary interventions.</p>					
	Effect of patient-practitioner communication on pain (87)	<p>This review included 51 studies exploring the effect of patient-practitioner communication on pain.</p> <p>The interventions analyzed in the study were separated into three categories: cognitive care, emotional care and procedural preparation. Only five included studies were concerned with chronic pain. In general, it was found that communication has a small effect on acute pain.</p> <p>The 19 cognitive-care studies demonstrated that positive suggestion may reduce pain, whereas a negative suggestion may increase pain to a small extent. The 14 emotional-care studies presented no evidence of a direct effect on pain, although four studies showed a tendency for emotional care to lower patients' pain. Finally, 23 procedural-preparation interventions demonstrated a weak to moderate effect on lowering pain. Procedural-preparation interventions included information giving, behavioural instruction, cognitive-behavioural interventions, relaxation, hypnosis, and emotional-focused interventions.</p> <p>The interventions in the included studies varied widely. For example, one study compared the effect of modifying two single sentences while other studies applied interventions consisting of many different components that were compared to one another. Included studies also varied greatly with regards to rationale, content, complexity, the kind and number of healthcare practitioners, and duration and frequency of delivery. This heterogeneity in study design made it difficult for authors to analyse the most efficacious component or intervention. In addition, the review presents several limitations relating to the integrity of the studies, as most did not check intervention fidelity. The control conditions in many studies were also poorly described, rendering the contrast between intervention and control unclear. Finally, there were many statistical</p>	2012	7/10 (AMSTAR rating from McMaster Health Forum)	1/51	0/51	5/51

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Sub-element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on chronic pain
		<p>insufficiencies with the included studies, with most lacking an a priori power calculation, an appropriate sample size, and appropriate blinding.</p>					
	<p>Economic evaluation of chiropractic care compared to other interventions for spine pain in the United States (85)</p>	<p>This review included 25 studies comparing the costs of chiropractic care to other interventions for spine pain in the United States.</p> <p>Chiropractic care was found to be commonly compared to care from a medical physician, with few details about the care received. Although cost comparison studies suggest that healthcare costs were generally lower among patients whose spine pain was managed with chiropractic care, the studies reviewed had many methodological limitations. Overall, 11 out of 12 (92%) cost-comparison studies from private health plans reported that healthcare costs were lower with chiropractic care, demonstrating a reduction by a mean of 36 %. In five of six (83 %) included studies that were based on data from worker compensation plans, healthcare costs were reported as being lower for patients whose spine pain was managed with chiropractic care. In studies that also examined clinical outcomes, however, there were few differences in efficacy between groups, and healthcare costs were reported as higher for those receiving chiropractic care. In this group, only two of five (29 %) studies showed that healthcare costs were lower for patients whose low-back pain was managed by chiropractic care. In all the studies, the effects of adjusting for differences in socio-demographic, clinical, or other factors between study groups were unclear.</p> <p>This review only examined studies published in English in the U.S., limiting its generalizability to other settings. The included studies also varied widely in their methodology, which posed a challenge for the authors when interpreting their findings. The studies included in the review also only evaluated costs from a third-party-payer perspective.</p>	<p>2015</p>	<p>5/10 (AMSTAR rating from McMaster Health Forum)</p>	<p>0/25</p>	<p>Not reported in detail</p>	<p>Not reported in detail</p>
	<p>Effects of interventions focusing on psychosocial risk factors for patients with non-chronic lower-back pain (172)</p>	<p>This review included 13 studies investigating the effects of interventions focusing on psychosocial risk factors for patients with non-chronic lower-back pain.</p> <p>Studies included in the review compared individuals with non-chronic lower-back pain who received information addressing psychosocial risk factors, and those who received usual care. Results from the studies indicated that none of the information strategies utilized had any significant effect on pain, quality of life, work issues, or healthcare use. In terms of functional status, one study found that there was an improved score of 0.6 on a 10-point Patient-Specific Functional Scale for patients who had received legitimate advice compared to those who received sham advice. None of the other six studies reported any significant</p>	<p>2013</p>	<p>8/10 (AMSTAR rating from McMaster Health Forum)</p>	<p>0/13</p>	<p>0/13</p>	<p>0/13</p>

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Sub-element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on chronic pain
		<p>impact on function. The only study assessing the effects of coordination in the work setting found no impact on any outcome.</p> <p>Based on the results of this review, the authors postulate that no specific intervention directed towards psychosocial risk factors can be systematically recommended for patients consulting for non-chronic lower-back pain in primary care.</p> <p>In the present review, study results were weighted based on their methodological quality. Lack of blinding was frequent, but the authors assert that this is inherent in this type of intervention. The lack of descriptions of co-interventions and protocol compliance were identified as the greatest limitations of this review.</p>					
	Efficacy of pharmacist-led medication review in chronic-pain management (84)	<p>This review included five studies evaluating the effectiveness of pharmacist-led medication review in chronic-pain management.</p> <p>The review found that, compared to the control group, participants receiving pharmacist-led medication review experienced a 0.8-point reduction in pain intensity on a 10-point rating scale at three months, a 0.7-point reduction at six months, a 4.84- and 3.83-point improvement in physical functioning on a 68-point function subscale at three and six months, and a significant improvement in patient satisfaction overall. Insufficient data was found to report differences in quality of life and adverse effects.</p> <p>Pain intensity was reported in all the trials using different scales. One study used the Health Background Questionnaire-Initial Patient Visit, while others used the WOMAC scale and Chronic Pain Grade Questionnaire. Four out of the five studies showed a significant reduction in pain scores at follow-up. Although the remaining study reported a statistically significant reduction in pain scores at three-month follow-up, they were not significant at six or 12 months. Physical function was an outcome in all the studies. Pain interference was assessed with various daily activities as part of the Pharmacotherapeutic Pain Inventory. Only one study reported a statistically significant improvement in physical functioning at three months and six months in the intervention group compared to control. Patient satisfaction was reported by three studies using a modified version of the Treatment Helpfulness Questionnaire. In one study, significant patient satisfaction was reported for various components of the pharmaceutical-care program, including pharmacy service, delivery of medication, pharmacist phone calls, and pharmacist counselling. However, there was no significant difference in satisfaction with the whole program domain of the patient satisfaction survey. In</p>	2012	5/10 (AMSTAR rating from McMaster Health Forum)	1/5	0/5	5/5

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Sub-element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on chronic pain
		<p>another study, intervention group patients were significantly more satisfied with treatment at three- and 12-months follow-up but not at six months. In the final study, 85% of patients in the intervention group reported being totally satisfied with the treatment received.</p> <p>In terms of limitations, the authors reported that only English-language studies were included, which may have led to language bias. In addition, publication bias may have been introduced as no attempt was made to locate unpublished trials.</p>					
Clinical information systems (i.e., organizing patient and population data to facilitate more efficient care, through efforts such as linking patient registries and treatment-monitoring systems, implementing electronic health records to provide reminders and prompts for providers and patients, and monitoring the performance of healthcare teams and the system in which they work)	Effectiveness of chronic-care models (88)	This systematic review aimed to synthesize international evidence on the effectiveness of elements of chronic-care models for improving healthcare practices and health outcomes within primary-healthcare settings. With 77 studies included, only two reported improvements to healthcare practices or health outcomes for people living with chronic disease. There were significant variations between studies regarding what combination of elements were included in the chronic-care model. Therefore, the study could not identify any optimal combination of chronic-care model elements that led to health improvements.	2013	6/10 (AMSTAR rating from McMaster Health Forum)	Not reported in detail	Not reported in detail	0/77
	Effectiveness of comprehensive-care programs for patients with multimorbidity, and their impact on patients, informal caregivers and professional caregivers (89)	<p>The review included programs that varied greatly in terms of target patient groups, implementation settings, number of interventions, and the number of chronic-care model components.</p> <p>The review found moderate evidence of a beneficial effect of comprehensive care on inpatient healthcare utilization and healthcare costs, health behaviour of patients, perceived quality of care, and satisfaction of patients and caregivers.</p> <p>The review found insufficient evidence of a beneficial effect of comprehensive care on health-related quality of life in terms of mental functioning, medication use, and outpatient healthcare utilization and healthcare costs.</p> <p>The review found no evidence of a beneficial effect of comprehensive care on cognitive functioning, depressive symptoms, functional status, mortality, quality of life in terms of physical functioning, or caregiver burden.</p>	2011	5/9 (AMSTAR rating from McMaster Health Forum)	4/42	33/42	0/42
Health-system changes (i.e., supporting organizations and introducing	Implementation of pain resource-nurse programs (90)	<p>This review included 11 studies examining the best practices for the implementation of pain resource-nurse programs.</p> <p>Although the results revealed a wide array of program designs, research methodology, practice settings and reported outcomes, four key elements were</p>	2012	6/9 (AMSTAR rating from McMaster	1/11	0/11	0/11

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Sub-element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on chronic pain
mechanisms that promote a culture which is conducive to safe, high-quality care, through efforts such as providing visible support for comprehensive system change that moves beyond sectoral “silos” and formalizes linkages between primary- and specialty-care providers and organizations)		<p>identified as essential to effective pain resource-nurse programs and useful for program design and development: leadership commitment and active involvement in embedding a culture of effective pain management throughout the organization; addressing staff-related and organization-related challenges and barriers to pain management; a combination of strategies to overcome these barriers; and collaborative multidisciplinary teamwork and communication. Embedding pain-management awareness into organizational structures was also found to have a significant impact on pain control. These structural components include policies and procedures, education, care standards, etc. Support from administration as well as nurses, physicians, pharmacists and other healthcare workers was found to be essential to establishing pain management as a priority. Finally, appropriate allocation of resources for pain management across the care setting is also integral for the success of the program.</p> <p>Based on evidence in the included studies, the authors recommend the use of evidence-based models utilizing a collaborating multidisciplinary approach to establish a pain-resource nurse program and develop the competencies of nurses who lead acute-pain teams.</p>		Health Forum)			
Community resources (i.e., mobilizing community resources to meet the full scope of patient needs within and outside of the health system)	Examining the peer-reviewed empirical evidence on outcomes of public involvement in healthcare policy (92)	<p>The outcome of public involvement in healthcare policies remains largely under-developed and poorly documented. There is little to no evidence for the longer-term impact demonstrated by public involvement. There is no clear conclusion on the effectiveness of policy development from involvement activities. The review includes no evidence regarding the effectiveness of public involvement with regards to optimizing clinical practice.</p> <p>There is some evidence for the developmental role of public involvement (e.g., enhancing awareness, understanding and competencies among lay participants), but the unclear definition of success impedes on forming a conclusion about public involvement.</p> <p>There is limited data available to address the primary research questions.</p> <p>The key features of public involvement remain poorly defined, and its objectives are rarely specified in the literature. Indicators used to determine outcomes of this form of intervention remain inconsistent and poorly specified.</p>	2010	4/9 (AMSTAR rating from McMaster Health Forum)	5/19	0/19	0/19
	Effectiveness of community-engagement approaches and	There is little evidence on the effects of specific interventions on health promotion. Varying qualities of evidence suggest that interventions that engage the community improve the dissemination of information and the development of interventions. The review includes no evidence regarding the effectiveness of	Not reported in detail	9/10 (AMSTAR rating from	4/21	Not reported in detail	0/21

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Sub-element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on chronic pain
	methods for health-promotion interventions (93)	<p>community-engagement approaches and methods for health-promotion interventions with regards to optimizing clinical practice.</p> <p>The evidence from one study suggests that community champions used in planning/design or delivery of health-promotion interventions can increase their level of knowledge, skills and confidence following training, and they feel that they make the greatest impact in areas in which they have ownership and a stronger voice within their communities.</p> <p>The community-engagement approaches reviewed included the use of community groups, committees, educators, volunteers, workshops and champions. In addition, the community-engagement methods and approaches focused on the planning, design and delivery of interventions in areas of cardiovascular health, childhood immunization, injury prevention, sexual health, smoking, alcohol use, nutrition and physical activity.</p>		McMaster Health Forum)			
	Examining the effects of involving patients in the planning and development of healthcare (94)	<p>A review of 337 studies involving patients in the planning and development of healthcare found that few studies described the effects of involving patients in the planning and development of healthcare. The review defined patient involvement as “the active participation in the planning, monitoring, and development of health services of patients, patient representatives, and wider public as potential patients”.</p> <p>Case studies reporting on project administrators’ views about the impacts of patient engagement support the view that involving patients has contributed to changes to services. An evidence base does not exist for the effects on use of services, quality of care, satisfaction, or health of patients.</p> <p>The effects of patient involvement on accessibility and acceptability of services or impact on the satisfaction, health or quality of life of patients, has not been examined. The effect of patient contributions to the planning and development of services on the quality and effectiveness of these services across various settings is unknown.</p>	2000	5/9 (AMSTAR rating from McMaster Health Forum)	2/42	Not reported in detail	0/40

Appendix 2: Cost-effectiveness studies relevant to Element 1 - Improve primary-care-based chronic-pain management and create/expand interdisciplinary specialty care teams

Sub-element	Focus of study	Study characteristics	Sample description	Key features of the intervention(s)	Key findings
Delivery system design (i.e., organizing programs and services to ensure the proactive, culturally sensitive delivery of effective, efficient clinical care and self-management support, and to strengthen interdisciplinary primary- and specialty-care teams)	Economic evaluation of stratified primary care management for low back pain (82)	<i>Publication date:</i> 2011 <i>Jurisdiction studied:</i> U.K. <i>Methods used:</i> Randomized control trial	1573 adults aged 18 and over experiencing back pain with consultations at ten general practices in England.	Stratified model of care according to the estimated risk of poor prognosis is compared to the usual, one-size-fits-all primary care strategy. The stratified intervention consists of two complementary components: (1) a previously validated, simple-to-use prognostic screening method to allocate patients into one of three risk-defined groups. (2) Three treatment pathways, developed with clinical experts, were matched to these risk groups. The proposed intervention is predicted to improve clinical outcomes while remaining cost-effective.	Results show that the adjusted Roland Morris Disability Questionnaire scores were significantly higher in the intervention group compared to the control group at four months and 12 months, with cost savings of over £34 over the control group. The study findings indicate that a stratified approach, by use of prognostic screening with matched pathways, will have important implications for the future management of back pain in primary care.
	Economic evaluation of chiropractic care versus self-management in patients with musculoskeletal chest pain (86)	<i>Publication date:</i> 2016 <i>Jurisdiction studied:</i> Denmark <i>Methods used:</i> Retrospective cohort study	115 adults aged 18-75 with acute, non-specific chest pain of musculoskeletal origin were recruited from a cardiology department in Denmark	Patients were randomised to four weeks of community-based chiropractic care or to a single information session aimed at encouraging self-management as a complement to usual care.	Patient cost and health-related quality-adjusted life years and Short Form 36-item Health Survey were compared in cost-effectiveness analyses over 12 months. It was found that mean costs were €2183 lower for the group with chiropractic care, but this difference was not statistically significant. The incremental cost-effectiveness ratio suggested that chiropractic care was cost-effective with a probability of 97%, given a threshold value of €30 000 per QALY gained. In both groups, there was an increase in the health-related quality of life, and the mean increases were similar over 12 months.
	Economic evaluation of home visits by specially trained nurses after patient discharge from multi-disciplinary pain care (97)	<i>Publication date:</i> 2008 <i>Jurisdiction studied:</i> Denmark <i>Methods used:</i> Economic Evaluation of prospective, randomised controlled trial	102 adult patients with chronic non-malignant pain who had completed treatment regime at the Multidisciplinary Pain Centre at Copenhagen University Hospital	The overall objectives of the nurse follow-up intervention were to enable the patients to stay physically and socially active and to maintain their mental health and psychological well-being, and to reduce patients' demand for other services from the healthcare system. The first nurse follow-up visit took place immediately after discharge from the hospital. Further visits were a four, eight, 12, 16, 20, and 24 months. These visits were meant to (1)	Results of the study found that no statistically significant differences in health status can be observed between intervention and control groups after a 2-year intervention period. Overall, the cost of the nurse intervention program was 35,000€ at the time of the study in 2004. The average cost per patient was estimated at 668€ per patient. During the observation period the average patient in the intervention group used

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Sub-element	Focus of study	Study characteristics	Sample description	Key features of the intervention(s)	Key findings
				<p>support the patient in maintaining relevant pharmacotherapy in managing side effects, (2) guide the patient on relevant changes in pharmacotherapy, (3) reinforce the patient's knowledge about chronic pain, pain treatment, and sleep disturbances due to pain, (4) reinforce the patient's knowledge about coping strategies, support the patient using appropriate coping strategies, and finally, (5) detect symptoms of pain-associated depression at an early phase.</p>	<p>other health care resources worth 4004€, while the average patient in the control group used 7464€. This difference (3460€) was not statistically significant.</p>
	<p>Economic Evaluation of an internet-based cognitive-behavioural intervention for non-specific chronic pain (83)</p>	<p><i>Publication date:</i> 2014 <i>Jurisdiction studied:</i> Netherlands <i>Methods used:</i> Economic evaluation</p>	<p>72 participants of the Pain Center of the University Medical Center Groningen in the Netherlands. Patients 18 years or older were included in the study if they presented non-specific chronic pain complaints or chronic pain complaints for which no somatic treatment could be offered. They must also have access to the internet. Study participants were randomly assigned to an Internet or group course; 50 participants completed the intervention. Participants were assessed at baseline, immediately after the 7-week course, and at the booster session 2 months after.</p>	<p>The internet intervention course comprised of the same program and content as the group course delivered to the control group. This course consisted of two-hour sessions teaching participants about the cognitive-behavioural model of the pain circle and methods to escape it. Prior to the beginning of the course, a manual was sent to participants containing information about how to access the Internet course. Each week, participants gained access to a new module. The course took place over a duration of seven weeks, with one final booster module delivered two months after the completion of the program.</p>	<p>The study reported significant improvements in pain coping, locus of control, and aspects of global health-related quality of life in both the Internet and group courses at the end of the program. At the two-month follow-up after the completion of the program, improvements in pain intensity, pain coping, and some quality of life dimensions was significantly greater in completers of the Internet course than in the group course. The authors concluded that the Internet-based cognitive-behavioural intervention was at least as effective as the face-to-face group intervention, if not more so.</p>

Appendix 3: Systematic reviews relevant to Element 2 – Reduce the emergence of chronic pain and its sequelae (including opioid-use problems) once it has emerged

Sub-element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on chronic pain
Education of the public and health professional on chronic pain	Effectiveness of mass-media interventions for HIV prevention (101)	<p>Included studies examined the effectiveness of several types of media interventions, including signage, radio, television, educational literature, newspapers or magazines, and promotional materials. Of campaigns studied, 83% involved a combination of two or more types of media interventions. Most campaigns focused on condom promotion.</p> <p>Mass-media interventions were associated with significant increases in condom use, HIV-related transmission knowledge, and prevention knowledge. Interventions conducted in African nations and in countries with lower Human Development Index scores, longer campaigns, and campaigns where message content was tailored to the target audience and refusal rates were low, resulted in greater increases in condom use. Increases in transmission knowledge were found to be the greatest in Asian countries, in countries with lower Human Development Index scores, and for more recent campaigns.</p>	2013	8/11 (AMSTAR rating from McMaster Health Forum)	0/54	0/54	0/54
	Examining the effectiveness of mass media on the utilization of health services (103)	<p>Mass-media interventions studied in this review include formal mass-media campaigns (15 of 20 studies) and media coverage of health-related issues (five of 20 studies). Most of the mass-media campaigns studied aimed to promote the use of certain health services (e.g. cancer screening, immunization programs). All of the studies (which were of variable methodological quality) apart from one concluded that planned mass-media campaigns and unplanned mass-media coverage can both positively influence the utilization of health services. While there were differences in magnitude of effects, all effects observed were positive.</p>	1999	8/11 (AMSTAR rating from McMaster Health Forum)	1/20	0/20	0/20
	Describing recent studies of stand-alone mass-media campaigns to increase physical activity (104)	<p>Three controlled trials, five cohort studies, five cross-sectional studies and three single-group studies were included, with three studies addressing findings from VERB, a longitudinal national mass-media campaign (2002-06) for “tweens” aged 9-13 years at baseline.</p> <p>A median absolute increase of 3.4% and a median relative increase of 6.7% were observed between 10 studies with participants self-reporting physical activity change in terms of self-reported physical activity levels. Three studies evaluating self-reported time spent in physical activity reported a median relative change of 4.4% (range 3.1% to 18.2%). Two studies reported participants were more active following a campaign (relative to before), and one study reported a self-reported physical activity increase with a short-term mass-media weight-loss program.</p>	2011	6/10 (AMSTAR rating from McMaster Health Forum)			

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		Overall, the evidence supporting stand-alone mass-media campaigns for physical activity increases is modest, inconsistent and insufficient to truly determine efficacy.					
	Examining effectiveness of online interventions to achieve population-wide change in voluntary lifestyle behaviours (105)	The overall impact of online interventions across all studies was small but statistically significant. The largest impact for online interventions was found when compared with wait lists and placebos, followed by comparison with lower-tech online interventions. No significant difference was found when compared with sophisticated print interventions. However, online interventions offer a small effect with the advantage of lower costs and larger reach. Shorter interventions generally achieved larger impacts and greater adherence.	2009	6/11 (AMSTAR rating from McMaster Health Forum)	Not reported in detail	0/22	0/22
	Implementation interventions to increase cancer screening rates (106)	This systematic review found that client reminders, small media coverage and provider audit and feedback appear to be effective strategies to increase screening uptake for breast, cervical and colorectal cancers. One-on-one education appears to be an effective intervention to increase screening uptake for breast and cervical cancers, and a potential intervention to increase screening uptake for colorectal cancer. While reducing structural barriers (e.g., reducing time or distance between screening location and target group) appears to be an effective strategy to increase screening uptake for breast and colorectal cancers, its effectiveness for cervical cancer screening is not known.	2010	4/10 (AMSTAR rating from McMaster Health Forum)	1/66	0/66	0/66
	Effectiveness of online social network health behaviour interventions (107)	Nine of 10 included studies reported significant improvement with one or more aspects of health behaviour change or outcomes related to behaviour change, with effect sizes small in magnitude, statistically non-significant and ranging widely from 0.05 (95% CI 0.45-0.35) to 0.84 (95% CI 0.49-1.19). Significant improvements were reported for weight loss, physical activity and dietary awareness. Among four studies reporting on physical-activity behaviour change, effect sizes were considered negligible in one, medium between groups in two, and large between groups in another. A small effect size was observed in a study measuring eating behaviour change. Effect sizes on weight change as a downstream variable ranged from negligible to large, and negligible to small effects were observed in a study measuring quality of life. Participation attrition varied widely, ranging from 0% to 84%, with engagement and fidelity being relatively low (5% to 15% in most studies). Overall, there is only modest evidence suggesting interventions involving online social networks are effective to achieve health behaviour change.	2014	8/10 (AMSTAR rating from McMaster Health Forum)	0/10	0/10	0/10
Reducing the emergence of sequelae of chronic pain	Examine the association of treatment agreements and urine drug	The review included eleven studies in the qualitative analysis that examined the association of treatment agreements and urine drug testing with opioid misuse outcomes in outpatients with chronic non-cancer pain. Six of these studies were conducted in pain specialty settings, and five studies were conducted in primary care settings.	2009	7/11 (AMSTAR rating from McMaster	1/11	1/11	11/11

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<p>testing with opioid misuse outcomes in outpatients with chronic non-cancer pain (111)</p>	<p>Outcome measures varied substantially across studies, and no studies examined the clinically important outcomes of opioid abuse, dependence, overdose, or death. In the four studies that included comparison groups, multicomponent management strategies were associated with a reduction in patient misuse of opioids compared with pre-intervention conditions or control participants. In the seven studies that did not have control groups, a wide variation in opioid misuse after implementation of treatment agreements, urine drug testing, or both was observed.</p> <p>The conclusions are limited by the significant variation in the definition of opioid misuse in the identified studies, and the weak evidence available to support the use of opioid treatment agreements and urine drug testing to reduce opioid misuse.</p>		<p>Health Forum)</p>			
<p>Back schools for the management of low back pain (173)</p>	<p>This review included 31 studies that investigated the treatment of chronic low back pain by back schools. Treatment by back schools was compared to usual care control groups, other active treatments and multimodal treatments. Different types of back schools were also compared with one another.</p> <p>Studies that compared treatment by back schools with usual care or waiting list generally supported the efficacy of the former treatment, with two studies demonstrating a significant reduction in pain in the back school group.</p> <p>Studies comparing back school treatment with other active interventions produced variable findings.</p> <p>Several studies comparing the efficacy of multimodal treatments to back school treatment included a back school intervention in one or more treatment arms, thereby rendering it difficult to isolate specific intervention effects from these studies.</p> <p>In studies comparing different types of back school interventions, no independent treatment effect of back schools could be extracted from the data.</p> <p>No firm conclusions could be reached with regards to the efficacy and safety of back schools for chronic low back pain treatment due to reasons such as considerable inter-study heterogeneity, and low statistical power. Thus, the findings of this review should be interpreted with caution.</p>	<p>2015</p>	<p>8/10 (AMSTAR rating from McMaster Health Forum)</p>	<p>Not reported</p>	<p>0/31</p>	<p>31/31</p>
<p>Instruments to assess patient-reported safety, efficacy or misuse of opioid therapy</p>	<p>This review synthesized research developing or validating instruments to assess patient-reported safety, efficacy, and/or misuse in opioid therapy for chronic pain. Within the 14 included studies, nine instruments were described: Pain Assessment and Documentation Tool (PADT), Bowel Function Index (BFI), Patient Assessment of Constipation Symptoms (PAC-SYM), Bowel Function Diary (BF-Diary), Current Opioid Misuse Measure (COMM), Prescription Drug Use Questionnaire-patient version (PDUQ-p), Pain Medication Questionnaire</p>	<p>2012</p>	<p>5/11 (AMSTAR rating from McMaster Health Forum)</p>	<p>0/14</p>	<p>0/14</p>	<p>14/14</p>

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	<p>for chronic pain (110)</p>	<p>(mPMQ), Prescription Opioid Misuse Index (POMI), and Prescribed Opioid Difficulties Scale (PODS). The quality of the included studies and instruments were assessed across 5 criteria: Categories of psychometric testing performed across all studies of each instrument, results of reliability and validity testing, risk of bias, generalizability to general medical practice settings, and clinical utility.</p> <p>Included studies employed a broad range of categories of tests within the six psychometric testing categories, with most demonstrating statistical significance.</p> <p>Reliability testing was performed on COMM, PDUQ-p, BFI, and the BF-Diary, with all four instruments demonstrating good test re-test reliability. Validity testing based on content, response processes, internal structure, and relationship to other variables (responsive, discriminative, criterion, and predictive validity) produced variable findings among the examined instruments.</p> <p>With respect to risk of bias and generalizability to general medical practice settings, several limitations were identified in the included studies. These include biases associated with patient selection, and generalizability limitations linked to inclusion/exclusion criteria.</p> <p>All instruments were rated as having equivocal clinical utility, as some did not contain items from all content areas, and/or were too long to be feasibly implemented in routine clinical practice.</p> <p>The authors acknowledge that the paucity of safety and efficacy items, coupled with the lack of testing of examined instruments in clinical practice, warrants further research.</p>					
	<p>Information on low back pain management (102)</p>	<p>This review included 11 randomized controlled trials that examined the effectiveness of information provision on low back pain (LBP) treatment and prevention, in comparison with other treatments. Eight types of information provision interventions were examined: Educational booklets versus usual care or no intervention, educational booklets alone versus educational booklets with a physician-related cue, biopsychosocial model-based booklet versus biomedical model-based model, educational booklet versus physical therapy, booklet versus cognitive/behavioural interventions, video programs, media campaigns and internet-based information.</p> <p>Findings suggest that educational booklets increase patients' knowledge about back trouble, and improved recovery in terms of pain, work status, and health care utilization, relative to those receiving usual care or no intervention.</p> <p>In studies examining educational booklets both with and without physician-related cues, it was found that patients had a greater confidence in the booklet when it was concomitantly implemented with a physician-related cue. However, booklets, with or without a physician-related cue, did not significantly modify patients' pain intensity.</p>	<p>2004</p>	<p>6/10 (AMSTAR rating from McMaster Health Forum)</p>	<p>0/11</p>	<p>0/11</p>	<p>2/11</p>

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		<p>Studies comparing biomedical model-based booklets with biopsychosocial model-based booklets demonstrated an increased capacity of the latter resource in improving disability.</p> <p>In a large study which compared the effect of a biomedical booklet to a physical therapy intervention, findings suggest that there is a trend toward less severe pain symptomatology in the latter treatment.</p> <p>A trial comparing cognitive/behavioural therapy interventions with information pamphlets produced insignificant inter-group differences in pain symptomatology.</p> <p>In a trial examining the efficacy of an interactive videodisc with a biomedical booklet against a biomedical booklet alone, findings suggest that patients' knowledge improved to a greater extent upon exposure to the former intervention.</p> <p>One longitudinal prospective study found a significant decline in the prevalence of back pain upon implementation of a public health multimedia campaign.</p> <p>A study investigating the impact of internet-based information on LBP disability and health care costs demonstrated that internet-based information produced significant improvements in pain, disability, role function, and health distress.</p> <p>The authors acknowledge variability in the extent to which various forms of information provision are sufficient to prevent LBP occurrence, recurrence, and system-level consequences.</p>					
	<p>Dose reduction of long-term opioid therapy (108)</p>	<p>This review included 67 studies that assessed the effectiveness of strategies to reduce or discontinue long-term opioid therapy (LTOT) and patient outcomes following dose reduction among adults experiencing chronic pain. Eight intervention categories were examined: interdisciplinary pain programs, buprenorphine-assisted dose reduction, behavioural interventions, detoxification, ketamine-assisted dose reduction, acupuncture, other outpatient programs, and other interventional programs.</p> <p>In studies examining interdisciplinary pain programs, the majority of participants discontinued opioid use at program completion.</p> <p>Studies assessing the effectiveness of buprenorphine-assisted dose reduction produced high mean opioid discontinuation rates among patients transitioning from LTOT to buprenorphine.</p> <p>Studies reporting on the effectiveness of behavioural interventions generated moderate opioid reduction and discontinuation rates.</p>	<p>2017</p>	<p>8/10 (AMSTAR rating from McMaster Health Forum)</p>	<p>Not reported</p>	<p>0/67</p>	<p>67/67</p>

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	<p>Detoxification produced positive findings, with a high mean opioid discontinuation rate demonstrated in four included studies.</p> <p>Ketamine-assisted dose reduction generated moderate opioid discontinuation rates, as evidenced by four included studies.</p> <p>In three studies assessing the effectiveness of acupuncture, opioid discontinuation rates were high among patients.</p> <p>Studies investigating other outpatient programs produced moderate mean opioid discontinuation rates, while studies evaluating other interventional programs generated high mean opioid discontinuation rates.</p> <p>The studies that assessed the effect of dose reduction or discontinuation of LTOT on patient outcomes demonstrated improved pain symptoms, function and quality of life following dose reduction. The reported incidence of opioid withdrawal symptoms during opioid reduction varied significantly between studies.</p> <p>Given the low quality of evidence overall and the heterogeneity across the different interventions, results should be interpreted with caution.</p>					
<p>Overview of adverse events associated with medium- and long-term use of opioids for chronic non-cancer pain (112)</p>	<p>This review included 16 Cochrane Reviews detailing the adverse events associated with medium- and long-term use of opioids for chronic non-cancer pain (CNCP).</p> <p>In the included reviews, 14 different opioids for a variety of chronic non-cancer pain were investigated. Overall, there was found to be a 42% higher risk of any adverse events and a 175% increased risk of serious adverse events associated with opioid use when compared to placebo. It was found that the risk for specific adverse events, including constipation, dizziness, drowsiness, fatigue, hot flushes, increased sweating, nausea, pruritus, and vomiting, was increased with opioid usage as well.</p> <p>Clinicians should be aware that a significant risk increase exists for a number of adverse events when opioids are used for CNCP in adults. As there is limited evidence to support the efficacy of long-term use of opioids in CNCP, an absence of evidence of improvement in function and pain scores when high doses of opioids are used, and robust evidence of harm associated with medium to long-term opioid use, prescribers should proceed with caution prior to initiating treatment with opioids. Even greater caution should be taken when transitioning from short-term to medium- and long-term use of opioids for people with CNCP.</p> <p>Policymakers should also understand that there are a number of adverse events, including serious adverse events, when opioids are used for CNCP. This should be considered in policy decisions.</p>	<p>2017</p>	<p>7/9 (AMSTAR from McMaster Health Forum)</p>	<p>Not reported in detail.</p>	<p>0/16</p>	<p>16/16</p>

Appendix 4: Systematic reviews relevant to Element 3 – Diagnose the causes of emerging challenges, test innovations to address the causes, and scale up successful efforts

Sub-element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on chronic pain
Diagnose the causes of an emerging challenging	Information technology interventions to improve medication safety (117)	<p>The review included 10 studies that examined the effects of three categories of information technology (IT) interventions on medication safety in primary care: computerized provider order entry (CPOE) with clinical decision support (CDS), pharmacist-led IT interventions and telemedicine interventions. Improvement of medication safety was characterized as a reduction of medication errors and/or adverse drug events.</p> <p>Inconsistencies in findings are prevalent in six studies that investigated the effectiveness of CPOE with CDS. However, results generally suggest that CPOE with CDS was effective in reducing medication errors when targeted at a limited set of potentially inappropriate drugs.</p> <p>Two trials examined the effectiveness of pharmacist-led IT interventions. One trial presented inconclusive findings, while the other trial demonstrated the effectiveness of a pharmacist-led IT intervention in decreasing the prescribing of potentially inappropriate medications.</p> <p>In the two trials examining the effects of telemedicine systems on adverse drug events, neither of the two interventions reduced adverse drug events.</p> <p>The equivocal results of the included RCTs, coupled with the high risk of bias of the included studies, reveal a need for further investigation prior to large-scale implementation of IT interventions.</p>	2011	6/9 (AMSTAR rating from McMaster Health Forum)	3/10	0/10	0/10
	Quality of clinical care in general practice in the UK, Australia and New Zealand (115)	<p>The majority (85%) of included studies assessed the quality of care provided for chronic conditions and 12% and 2% examined preventive care and acute conditions.</p> <p>The processes of care in the almost of all of the studies did not meet standards of care as outlined by in national guidelines or those set by the investigators.</p> <p>While the review outlines deficiencies in the research, clinical and policy agendas in general practice, additional work is required to assess the quality of clinical care in a representative sample of the population, identify reasons for substandard care, and test strategies to improve the clinical care provided in general practice.</p>	1999	8/10 (AMSTAR rating from McMaster Health Forum)	0/90	0/90	0/90

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	Development of a checklist for identifying determinants of practice (116)	<p>The review identified 12 checklists focused on identifying determinants of practice but none were found to be comprehensive as compared to an aggregated list of determinants and domains.</p> <p>The identified checklists were used to develop a checklist with 57 potential determinants of practice grouped in seven domains: guideline factors, individual health professional factors, patient factors, professional interactions, incentives and resources, capacity for organisational change, and social, political, and legal factors.</p> <p>Five worksheets were also developed to facilitate the application of the checklists.</p>	Not reported in detail	4/9 (AMSTAR rating from McMaster Health Forum)	0/12	0/12	0/12
	Development of a method for characterising and designing behaviour change interventions (118)	<p>Nineteen frameworks of behaviour change interventions were identified and used to develop a new framework called the behaviour change wheel. Of the frameworks identified, none assessed the full spectrum behaviour-change interventions.</p> <p>At the centre of the behaviour change wheel is the 'behaviour system', which consists of three essential conditions: capability, opportunity, and motivation. The behaviour change system is encircled by nine interventions that can be used to address deficits in one or more of the elements of the behaviour system, and around these are seven categories of policy that can be used to enable the implementation of these interventions.</p> <p>The behaviour change wheel successfully used to characterize interventions within the English Department of Health's 2010 tobacco control strategy and the National Institute of Health and Clinical Excellence's guidance on reducing obesity.</p>	Not reported in detail	6/8 (AMSTAR rating from McMaster Health Forum)	0/19	0/19	0/19
Testing innovations	Stakeholder involvement in program evaluation (121)	<p>A review of 41 studies on the involvement of stakeholders in program evaluation consisted of reports of original research on stakeholder involvement, independent of actual evaluations, or reports of actual evaluations or meta-evaluations. There are a small percentage of studies reporting original research. Nearly half of the reviewed studies were set in health or education. The dominance of these disciplines suggests that stakeholder involvement is emphasized to a greater extent within these disciplines.</p> <p>Considerable overlap was found between the component and component features that the studies addressed reflecting a conceptive commonality among researchers of stakeholder involvement. The component, <i>Affective Aspects of Involvement and Collaboration, Communication, and Interaction</i>, where parties “enter into collaboration with the appropriate degree of willingness to participate ...draw on the strengths of each while respecting the positions and expertise of each other” reflects the methodological center of stakeholder involvement.</p>	2010	4/9 (AMSTAR rating from McMaster Health Forum)	Not Reported	0/41	0/41

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		The review found very little research on stakeholder involvement in evaluation. The limited number of studies reviewed should not be taken to imply that stakeholder involvement has received little attention in the broader literature					
Effectiveness of community engagement approaches and methods for health promotion interventions (93)		<p>There is little evidence on the effects of specific interventions on health promotion. Varying qualities of evidence suggest that interventions that engage the community improve the dissemination of information and the development of interventions. The review includes no evidence regarding the effectiveness of community engagement approaches and methods for health promotions interventions with regards to optimizing clinical practice.</p> <p>The evidence from one study suggests that community champions used in planning/design or delivery of health-promotion interventions can increase their level of knowledge, skills and confidence following training, and feel that they make the greatest impact in areas in which they have ownership and a stronger voice within their communities.</p> <p>The community engagement approaches reviewed included the use of community groups, committees, educators, volunteers, workshops, and champions. In addition, the community engagement methods and approaches focused on the planning, design and delivery of intervention(s) in areas of cardiovascular health, childhood immunization, injury prevention, sexual health, smoking, alcohol, nutrition, physical activity.</p>	Not reported in detail	9/10 (AMSTAR rating from McMaster Health Forum)	4/21	2/21	0/21
Public deliberation as a method for increasing public input for health research (122)		<p>Public deliberation is presented in the literature as a specific area of political science, and it encourages members of the public to engage in and to be informed about issues that shape their public life. Evidence remains consistent in suggesting that public deliberation is a method of obtaining public input on decisions that are important to society. The goals of public deliberation are to obtain informed public opinion, to obtain input that includes underrepresented individuals and groups, to bring insights into social values and ethical principles, and to promote the acceptance of public decisions. In addition, the effects of deliberation on participants improve understanding of the complexity of decisions and enhance civic-mindedness. Identified issues that are best suited for public deliberation involve ethical and social dilemmas. It is also important to note that the potential to find common ground is a requirement for issues addressed through public deliberation. Common deliberative tasks in health care for include the development of policy direction, recommendations, and tools, priority setting and resource allocation, and risk assessments.</p> <p>The process of public engagement is facilitated through discussion and prompts the public to develop solutions to societal problems posed to them. It includes three broad characteristics: a sponsor seeking input from participants (i.e., the public); participants considering the ethical- or values-based dilemma; and an information phase in which participants are given accurate and balanced information about the relative positions involved by way of educational materials.</p>	2010	1/9 (AMSTAR rating from McMaster Health Forum)	Not reported in detail	Not reported in detail	Not reported in detail

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Scale up successful innovations	Effects of continuing education meetings and workshops on professional practice and healthcare outcomes (125; 154)	Educational meetings (e.g., courses, conferences, lectures, workshops, seminars and symposia) for physicians and other health professionals, alone or combined with other interventions, improved professional practice and the achievement of treatment goals by patients. Seven of 81 studies targeted interventions for improving the detection of cancer, and these studies did not find any statistically significant impact of educational meetings on professional practice. The effects on professional practice and patient outcomes were small and varied between studies. It appeared that higher attendance at meetings was associated with enhanced effects, that mixed education (interactive and didactic) was more effective than either alone, and that the effects were lower for more serious outcomes and complex behaviours.	2006	10/11 (AMSTAR rating from McMaster Health Forum)	4/81	1/81	0/81
	Effects of printed educational materials on professional practice and healthcare outcomes (126)	<p>Printed educational materials are utilized to improve health professionals' knowledge, attitudes, skills and awareness to improve practice and patient outcomes. Common means of presentation include paper formats (e.g., monographs), publications in peer-reviewed journals, and clinical-practice guidelines. The review focused on passive dissemination of printed educational materials, which involves the distribution of published or printed recommendations for clinical care (including monographs, publications in peer-reviewed journals, and clinical-practice guidelines) being delivered personally or through mass mailing. Most of the printed educational materials utilized in the studies were endorsed, did not specify an educational component, were printed in black and white with a few tables and figures, and were longer than two pages. The systematic review included 45 studies (31 of which were interrupted time series analyses and 14 randomized controlled trials), and nearly all included studies (44/45) aimed to compare the effectiveness of printed educational materials to no intervention. When used alone and compared to no intervention, the review found that printed educational materials have a small beneficial effect on professional practice outcomes. However, the review indicated that there is insufficient information to reliably estimate the effect of printed educational materials on patient outcomes.</p> <p>The authors also aimed to identify the influence of various characteristics of printed educational materials in determining the effectiveness of the intervention. It was noted that effectiveness may vary more according to: 1) source of information; 2) tailoring; 3) purpose; 4) level of evidence; and 5) format, and that effectiveness may not vary much based on the frequency, mode, or duration of delivery.</p>	2011	8/11 (AMSTAR rating from www.rxforchange.ca)	12/45	Not reported in detail	0/45
	Whether different factors influence the effectiveness of educational outreach visits (EOVs), and whether adding another	Educational outreach visits allow trained persons to visit health professionals where they practise and offer them information on how to change their practices to improve how they care for their patients. The information offered might include feedback about their performance, or could be based on how to overcome obstacles in changing behaviours. Multifaceted interventions that included educational outreach and distribution of educational materials and/or other intervention, compared to a control group, compared to audit and feedback and compared to educational materials, were all found to be generally	2007	8/11 (AMSTAR rating from www.rxforchange.ca)	1/69	1/69	0/69

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	<p>intervention to EOVs, such as the use of patient-mediated interventions or using manuals or computerized reminders to prompt health professionals to perform clinical actions, alters their effectiveness (127)</p>	<p>effective for improving appropriate care. Educational-outreach interventions used alone compared to a control group and compared to educational materials were found to be generally effective. There was insufficient evidence for comparisons of multifaceted versus educational meetings, educational outreach visits versus continuity of care, and multifaceted versus reminders. The authors concluded that educational-outreach visits alone or when combined with other interventions have relatively consistent and small effects on prescribing that are potentially important. The effects on other professional behaviours, however, appeared to be more variable. Additionally, the authors point out that while educational outreach visits may be costly, the savings may outweigh the costs if the intervention is targeted at inappropriate prescribing and its effects are enduring.</p>					
	<p>Effects of audit and feedback on professional practice and healthcare outcomes (134)</p>	<p>The audit and feedback process consists of an individual's professional practice or performance being measured and compared to professional standards or targets (i.e., auditing of professional performance). The results of this comparison are subsequently delivered to the individual in hopes of encouraging the individual to follow professional standards (i.e., providing feedback). The process is often used in combination with other interventions such as reminders or educational meetings, and is often used in healthcare settings. Most of the studies included in the review measured the effects of audit and feedback on physicians, and some measured the effects on nurses or pharmacists. In all comparisons (audit and feedback alone compared to no other interventions, audit and feedback with educational meetings compared to no intervention, audit and feedback as part of a multifaceted intervention compared to no intervention, audit and feedback combined with complementary interventions compared to audit and feedback alone, and audit and feedback compared to other interventions) audit and feedback was found to be generally effective. However, the authors note that it is uncertain according to the evidence whether audit and feedback is more effective when used in combination with other interventions. Using multi-variable meta-regression, the authors indicated that the effectiveness of feedback may increase when baseline performance is low, when feedback is provided more than once, when it includes both explicit targets and an action plan, when the source of feedback is a supervisor or colleague, and when it is delivered both verbally and in a written format.</p>	<p>2007</p>	<p>8/11 (AMSTAR rating from www.rxforcchange.ca)</p>	<p>11/140</p>	<p>Not reported in detail</p>	<p>0/140</p>
	<p>Effects of on-screen, point-of-care computer reminders on processes and outcomes of care (129)</p>	<p>Computer reminders lead to a 4.2% median improvement in process adherence for all outcomes, 3.3% for medication ordering, 3.8% for vaccinations and 3.8% for test ordering. Generally, point-of-care computer reminders achieve small improvements in physician behaviour.</p>	<p>2008</p>	<p>9/11 (AMSTAR rating from McMaster Health Forum)</p>	<p>1/28</p>	<p>0/28</p>	<p>0/28</p>

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	<p>Effects of tailored interventions to address barriers to change in health professional performance (130)</p>	<p>Tailored interventions to change professional practice are interventions planned following an investigation into the factors that explain current professional practice and any reasons for resisting new practice. These factors are referred to as barriers to change.</p> <p>It was found that the selection of interventions tailored to prospectively identified barriers is more likely to improve professional practice than no intervention or than dissemination of guidelines or educational materials alone. The overall effectiveness of such interventions, as indicated by the meta-regression, is modest. However, there is wide variation in effectiveness between studies and between the targeted behaviours within single studies, from lack of effect to relatively large effect.</p> <p>There is currently insufficient evidence on the most effective approaches to tailoring, including how barriers should be identified and how interventions should be selected to address the barriers. There is also no evidence about the cost-effectiveness of tailored interventions compared to other interventions to change professional practice. As such, authors recommend that it is reasonable to employ low-cost tailored interventions in practice, but that evidence on the cost-effectiveness of the alternative methods of tailoring is needed to justify the use of more costly tailored approaches.</p> <p>In 13 studies, more than one method was used to identify barriers. These methods included interviews with health professionals and occasionally patients (n=11), focus group interviews (n=10), questionnaire surveys (n=6), review of the literature (n=4), review of performance data (n=2), a meeting or workshop (n=2), and other methods including observation and consultation with an expert group (n=4). Some studies employed a variety of methods.</p> <p>Studies reported barriers in the following Cochrane Effective Practice and Organisation of Care (EPOC) domains: administrative concerns (n=13); clinical uncertainty (n=9); patient expectations (n=5); information management (n=3); sense of competence (n=2); financial disincentives (n=2); and other (n=15). Barriers in the 'other' category included negative staff attitudes, anxiety about changing practice, a perception that the clinical issue was not a priority, and advocacy of certain drugs by pharmaceutical companies.</p> <p>In terms of the influence of prospective identification of barriers on intervention design, six studies reported drawing on behavioural theory to guide the choice of strategies in response to the identified barriers. The other 20 studies made no reference to any theoretical foundation when developing interventions.</p>	2009	No rating tool available for this type of document	Not applicable	Not applicable	Not applicable
	<p>Examine the uses of smartphones and tablet devices in surgery (133)</p>	<p>This review focused on evaluating the use of mobile phones and tablet devices in surgical contexts. The utilities examined were organized into 1) diagnostics, 2) telemedicine, 3) operative navigation, 4) training, 5) data collection, 6) patient education, 7) behaviour change and 8) operative planning. The review suggests</p>	2014	6/10 (AMSTAR rating from	0/39	0/36	0/36

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	that mobile technologies have a wide range of innovative utilities in peri-operative care. These include aiding teams in surgical diagnoses, educating patients regarding upcoming procedures, and reducing anxiety in children before surgery. However, the review also suggests that the limited methodologies of the included studies indicates that the current evidence is of low quality. The review also discusses the inherent difficulties associated with completing clinical trials of the myriad of available surgical apps, acknowledging that some relevant papers may have been missed inadvertently.		McMaster Health Forum)			
Examine the effects of pay-for-performance in healthcare (135)	This review focused on the effects of pay-for-performance (P4P) from a wide array of systematic reviews. Twenty-two reviews contained mixed evidence regarding the effects of P4P, none of which was determined to be convincing for informing future policy directives toward P4P programs. Many studies failed to find an effect and the methodologies of the reviews struggled to isolate P4P from other improvement models. The review thus concludes by stating that the limited number of studies and poor methodological quality of studies warrants further research into P4P models and their effects.	2011	No rating tool available for this type of document	n/a (includes reviews, not single studies)	n/a (includes reviews, not single studies)	n/a (includes reviews, not single studies)
Effectiveness of cash or voucher financial incentives for simple and complex health behaviour change in high-income countries (137)	<p>The findings of this review generally suggested that a financial incentive was more effective than no financial incentive for health behaviour change. The average effect of the financial incentives relative to no intervention or usual care was greater for short-term (<= 6 months) smoking cessation, long-term (>6 months) smoking cessation, vaccination or screening attendance, and all three complex health behaviours combined.</p> <p>There was no convincing evidence to suggest differential effects between groups based on follow-up time or total incentive value for smoking cessation, although analyses suggested some effect of cash-only financial incentives compared to other formats, and increased incentive values. For vaccination or screening attendance, cash plus other motivational components were found to be more effective than cash or vouchers alone; no effects were found for different incentive values. For physical activity, a difference of 16 additional minutes of daily physical activity was observed between financial incentive and control groups.</p> <p>For all behaviours combined, some evidence suggested a decreased effect with increasing post-intervention follow-up and increasing incentive value.</p> <p>Average effect of cash-only financial incentives was greater than for other formats.</p>	2012	9/11 (AMSTAR rating from McMaster Health Forum)	0/16	0/16	0/16
Incentives for improving human resource outcomes in healthcare (141)	Thirty-three reviews summarizing the effectiveness of incentives for improving human resources in healthcare (e.g., job satisfaction, turnover rates, recruitment, retention) were identified, of which 13 reviews meeting quality criteria were finally included. Mixed evidence was found for the use of financial incentives: while there may be a positive influence on job satisfaction and healthcare provider recruitment, there was a lack of evidence supporting such an influence on retention. Higher wages were found to influence job satisfaction and aid	2012	No rating tool available for this type of document	n/a (includes reviews, not single studies)	n/a (includes reviews, not single studies)	n/a (includes reviews, not single studies)

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	<p>recruitment and initial retention, although the effectiveness on retention was found to decline after five years. Financial compensation was also found to not necessarily be the most effective strategy to retain nurses versus other factors such as a positive work environment. While there is a relative lack of evidence to show that financial incentives are important for medical student and physician retention for rural and remote communities, findings suggest that financial compensation, scholarship schemes, benefits and loan repayments may be linked to healthcare-provider recruitment in these areas.</p> <p>The review found that direct compensation through salaries, indirect payment through benefit packages, and financial incentives in general were often the first incentives considered, and higher salaries and indirect compensation remained popular, although their effectiveness for key outcomes remained unclear. Mixed results were reported for the effectiveness of non-financial incentives, and incentives emphasizing work-life balance (e.g., child care), and strategies such as those providing opportunities for collaboration, were both found to improve job satisfaction and staff retention. While child-care supports, social hours, family supports and workload adjustments were found to be effective, they were not always clearly defined in included reviews. Based on the findings of the review, the authors suggested a strategy combining financial and non-financial incentives (e.g., high-quality working environments, opportunities for professional growth) might be more effective on human resource outcome improvements than financial incentives alone.</p>					
Effectiveness of pay-for performance schemes targeting individual healthcare providers for improving quality of patient care and patient-relevant outcomes (143)	<p>Uncontrolled studies included in this review indicated that the pay for-performance scheme improved quality of care, although higher quality studies did not report similar findings. Interrupted time series studies suggested mixed effects of the scheme, with two not detecting any process of care or clinical outcome improvements, one reporting initially statistically significant improvements in guideline adherence which became minimal over time, and two others reporting statistically significant blood pressure control improvements and hemoglobin A1C control declines.</p> <p>Specific to preventive care, two randomized controlled trials ranked highly by the authors found significant but small effects on vaccination rates, while two other studies found no effect on mammography, and Pap spears and mammography combined. Other studies found mixed results between significant effects on one outcome and no effect on another. Specific to long-term care and chronic conditions, one highly-ranked randomized controlled trial found no differences between treatment and control arms in assessing proportion of patients smoke-free. Additionally, an interrupted time series study reported no findings suggestive of a faster rate of increase in quality scores for incentivized indicators (asthma, diabetes, hypertension, coronary disease) compared to before pay-for-performance implementation, and no improvements in non-incentivized indicators. While pay-for-performance schemes may be useful in identifying elements of care valued within a given healthcare organization, current evidence targeting individual practitioners is</p>	2012	9/10 (AMSTAR rating from McMaster Health Forum)	1/30	0/30	0/30

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		insufficient to support its adoption, and its efficacy on quality of care and patient relevant-outcomes remains uncertain.					
Effects of financial incentives on the quality of healthcare provided by primary-care physicians (144)		<p>This review focused on studies involving monetary transfer (change in amount, level or method of payment) targeting primary-care physicians, primary-care teams, and addressing quality of care related to patients' health and well-being. Modest and variable effects on quality of healthcare provided by primary-care physicians were reported. While six studies reported statistically significant positive effects with financial incentives, the majority were across only one of many quality measures used in the study, and involved significant selection bias and poor study designs. One study found no effect of financial incentives on quality of care.</p> <p>The review's findings suggested that the following characteristics influenced financial incentive effectiveness: amount and method of payment (salary, fee-for-service, performance bonus, payment target (individual or team), timing); the importance of the income relative to other motivators (intrinsic motivation or other extrinsic motivators such as autonomy); opportunity costs of changing behaviour (other priorities for physicians); heterogeneity across physicians; and heterogeneity in marginal costs of changing behaviour (e.g., administration costs).</p> <p>The authors reported evidence was insufficient to either support or oppose financial incentive use to improve primary-care physician service-provision quality, and implementation of such incentive schemes and their assessment require careful and rigorous designs.</p>	2009	10/10 (AMSTAR rating from McMaster Health Forum)	0/7	0/7	0/7
Interventions for supporting nurse retention in rural and remote areas (145)		<p>Five relevant reviews were identified. With regards to financial incentives, one review synthesizing 43 empirical studies targeting nurses and physicians identified five types of programs addressing return of service: service requiring scholarships; educational loans with service requirements; service-option educational loans; loan repayment programs; and direct financial incentives. While the review identified substantial evidence on incentives for return of service as a health policy intervention to attract human health resources to underserved areas, there was limited evidence on rural area retention. Financial-incentive programs were found to place substantial numbers of health workers in underserved areas, and participants were more likely to work in underserved areas for longer durations relative to non-participants, although they were less likely to remain at their site of original placement.</p> <p>A second systematic review addressing effectiveness of different retention strategies found 14 relevant papers (n=1 on nurse retention, n=6 on medical practitioners, n=5 on health professionals with an emphasis on medical doctors, n=1 on psychiatrists). While financial incentives were the most commonly reported strategy, the review offered limited support for their efficacy, with results indicating they were more effective in improving recruitment and short-term retention than fostering long-term underserved-area service retention.</p>	2012	No rating tool available for this type of document	n/a (includes reviews, not single studies)	n/a (includes reviews, not single studies)	n/a (includes reviews, not single studies)

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		<p>Some evidence suggested strategies involving some form of obligation (e.g., visa conditions restricting area of practice or loan repayment) might be effective in longer retention durations. Other evidence indicated non-financial incentives (e.g., providing quality working and housing conditions) might have a greater impact on retention-related decisions.</p> <p>Overall, while financial incentives were the only strategies that had been evaluated properly, evidence supporting their effectiveness on long-term nurse retention was still found to be very limited, with some evidence suggesting they lacked effectiveness. Evidence on “direct and indirect financial incentives (direct payments, service requiring scholarships, educational loans with service requirements, loan repayment programs)” was classified as being of moderate strength and indirect. In comparison, effectiveness of education and continuous professional-development interventions (e.g., recruitment from and training in rural areas, targeted admission of students from rural backgrounds) was rated as being based on moderate-strength, indirect evidence. Regulatory interventions (e.g., increased opportunities for recruitment to civil service) were rated as having low-strength and indirect evidence, and personal and professional support interventions (e.g., general rural infrastructure improvement, supportive supervision, and measures to reduce healthcare workers’ feelings of isolation) were rated as having a combination of moderate-strength, indirect evidence and strong direct evidence.</p>					
	<p>Leaders’ experiences and perceptions implementing activity-based funding and pay for-performance hospital funding models (146)</p>	<p>All of the included studies focused on leaders’ experiences with implementing organizational incentives, but none clearly described ‘how’ funding models were implemented.</p> <p>Five themes were identified based on leaders’ experiences: 1) prerequisites for success; 2) perceived benefits; 3) barriers/challenges; 4) unintended consequences; and 5) leader recommendations.</p> <p>Prerequisites for success include: full organizational commitment to and support for the chosen funding model; required infrastructure to support the individuals and activities required to accurately measure quality in pay-for-performance models; information-technology and decision-support systems for producing, tracking and aggregating high-quality, timely, accessible, clinically relevant data; committed leaders who are supportive of the funding model and recognize the benefits that can be achieved; and involving physician leaders to support accurate data collection and to act as ‘champions’.</p> <p>Perceived benefits for activity-based funding included improved productivity and efficiency, ability to reallocate funds, supporting greater emphasis on evaluation, accountability and discharge planning, improved data accuracy, and improved collaboration and communication. Improved quality and enhanced organizational transparency were associated with pay-for-performance models.</p>	<p>2013</p>	<p>8/9 (AMSTAR rating from McMaster Health Forum)</p>	<p>0/14</p>	<p>0/14</p>	<p>0/14</p>

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		<p>Barriers/challenges to implementation included lack of resources (e.g., constrained human resources given additional workload for providers), data collection (e.g., difficulty gathering accurate data and lack of experienced staff for data collection), and commitment factors (e.g., leaders' skepticism or suspicion about the funding model).</p> <p>Unintended consequences included opportunistic behaviour, 'cherry-picking' patients with less complex conditions and who are less expensive to treat (possibly leading to the exclusion of more vulnerable patients), and inaccurate reporting and evaluation of quality outcomes.</p> <p>Leader recommendations included the need to have support for the funding model change from different leaders within the organization (including administrators, health professionals and staff) from the beginning of the transition to ensure full engagement during the entire implementation process. Recommendations to support quality improvement at the program/unit level included providing educational resources for hospitals and training programs, increasing collaboration and cooperation with other units and project groups/committees, increasing interprofessional communication and interaction, and sharing data collection personnel, protocols and tools.</p>					
	<p>Summarize evidence on incentives that encourage providers to follow best practices for the use of specific medicines and other health technologies (147)</p>	<p>A total of 148 papers, 25 reviews and two reviews of reviews were found, with most of the studies set in the U.S. and the U.K. Most of the reviews examined the use of financial incentives like pay-for performance (P4P). The authors generally found that there were opportunities to implement more incentives to follow best practices within the National Health Service (NHS).</p> <p>For the primary sector, the authors suggested that an incentive program that financially rewards GPs who demonstrate adherence to formally recognized guidance on the use of medicines could have a beneficial effect on quality of care and patient outcomes. Such a program would target mostly chronic conditions and would be assessed using process indicators and clinical outcomes. Furthermore, by taking advantage of existing infrastructure and data-collection processes, occasions of ineffective medicines use could be identified.</p> <p>For secondary care, it was found that P4Ps generally improved quality of health care. Barriers to implementing such incentives, especially negative or punitive ones, included the possibility of adversarial relationships between regulatory bodies and providers.</p> <p>The overview also examined the use of contracts between clinical commissioning groups (CCGs), who purchase healthcare services for their local populations, and providers. These contracts generally state that in order to qualify for a potential incentive scheme, providers must meet agreed upon targets with regards to best practices. The authors concluded that this is feasible only on a selective basis given the limited resources, the relatively little</p>	<p>2014</p>	<p>2/9 (AMSTAR rating from McMaster Health Forum)</p>	<p>Not reported in detail.</p>	<p>0/27</p>	<p>0/27</p>

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	<p>competitive pressure between providers, and the mutually dependent relationships between CCGs and providers.</p> <p>Best-practice tariffs were found to stimulate the use of best practice, and were recommended to be applied to additional areas that have variance in performance, are high-volume in patients, and have existing data collection systems, quality initiatives, and evidence-based standards. Promising non-financial incentives included the use of a system to profile specialists and direct patients to them, and the use of an audit and feedback system. It was also suggested that the NHS could investigate physicians' outcome data in similar manner to their current practice of investigating surgeons' mortality rates and complication rates.</p> <p>The authors concluded by emphasizing that future newly implemented incentive schemes should be monitored to evaluate their impact.</p>					
Assess the success of results-based financing schemes in low- and middle-income countries (148)	<p>This overview found 10 systematic reviews. Evidence evaluating the effectiveness of results-based financing (RBF) was generally weak, inconsistent, or impossible to quantify, with almost no evidence on the cost-effectiveness of RBF. This is partially due to the difficulty of isolating their effects given that they were usually implemented alongside other initiatives and changes. While some evidence suggests that financial incentives for healthcare recipients and individual health professionals were effective in the short run for simple, well-defined goals, there was less evidence that they sustain long-term changes.</p> <p>RBFs also could encourage negative unintended behaviours, like corruption, ignoring important tasks unrelated to incentives, and cherry-picking patients that make it easier to reach targets. It could also promote dependency on financial incentives, bureaucratization, and widen the resource gap between the rich and the poor.</p> <p>The authors concluded RBFs are only likely to be helpful in situations where a lack of motivation or resources is partially responsible for the underlying problems. The design of financial incentives requires an understanding of the underlying problem and the mechanisms through which financial incentives could help. Designers should pay attention to the level of implementation, the choice of targets and indicators, and the proportion of financing paid based on results. Lastly, ongoing monitoring of RBF schemes is essential to determining their effectiveness.</p>	2007	6/9 (AMSTAR rating from McMaster Health Forum)	n/a (includes systematic reviews, not single studies)	n/a (includes systematic reviews, not single studies)	n/a (includes systematic reviews, not single studies)
Effectiveness of existing mechanisms to integrate medical care quality and safety into healthcare pricing	<p>The literature review identified four healthcare pricing models: best-practice pricing, normative pricing, quality structures pricing models and pay-for-performance schemes.</p> <p>For best-practice pricing, there are some reported benefits to the approach; however, the studies contained inconsistent methodologies. A study about best-practice tariffs found improvements in quality of care (i.e. improved diagnostic</p>	Not reported in detail	6/10 (AMSTAR rating from McMaster Health Forum)	Not reported in detail	Not reported in detail	Not reported in detail

	<p>and funding arrangements (149)</p>	<p>assessments and proper medication, decreased lengths of stays). However, the approach has yet to be fully evaluated.</p> <p>For the normative pricing approach, which influences delivery of care, there is limited evidence on its impact on quality and safety of healthcare. Some studies reported improvements in performance among radiologists (i.e., reduced reporting turnaround times) after a financial incentive was added for target performance.</p> <p>For the quality structures pricing approach, which links pricing to structural approaches (i.e., accreditation, clinical quality registries linked to clinical benchmarking, and other safety improvement activities), most of the evidence indicates funding has an impact when clinical services are involved with clinical quality registries linked to clinical benchmarking. The studies reported significant improvements in providers' adherence to evidence-based practices, and reductions in post-surgical complications and mortality. However, there is no evidence to directly link performance and the level of funding. There is limited evidence to support other structural approaches in the improvement of quality and safety in healthcare.</p> <p>For pay-for-performance programs, the literature review reported that there is little evidence on the effect of these programs on patient outcomes, which in most cases was the mortality rate. Hospitals participating in a pay-for-performance program found that mortality remained the same as baseline reports. One study identified adverse effects to pay-for-performance programs, such as increased hospital admissions, cost shifting, cherry-picking or misreporting. One study surveyed 66 hospitals and determined that 75% reported making structural and organizational changes (i.e., more involvement and leadership) as a result of an incentive scheme.</p> <p>There is insufficient evidence to conclude which model is the most beneficial. Overall, some conclusions can be made: incentives need to be substantial to generate change in behaviour and practice; incentives need to be provided at a clinical-department level in order to improve quality and safety of clinical care; and further research is needed to expand the literature scope to include outpatients and other departments.</p>					
	<p>Effectiveness of behaviour change interventions to encourage generic drug prescriptions in the U.K. National Health Service and similar settings (152)</p>	<p>This rapid evidence synthesis included systematic reviews of interventions reporting outcomes relevant to generic drug utilization and related primary studies. Financial incentives (fund holding, drug budgets) were assessed in a review by Sturm et al. (2005) to determine their effects on prescribing policies, specifically on drug use, healthcare utilization, health outcomes and costs. While the review's included studies had serious limitations and careful consideration was noted as being required in interpreting review results, budgeting funds to a group of individual physicians and providing them financial responsibility for their own budget was found to increase generic drug use. Among intervention studies, a primary study was conducted in the United Kingdom with general</p>	<p>2013</p>	<p>No rating tool available for this type of document</p>	<p>0/23</p>	<p>0/23</p>	<p>0/23</p>

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	<p>practitioners at 10 institutions in the Wirral Health Authority from 1992 to 1993, assessing the impact of a financial incentive combined with standard setting for improvement, interactive education, and established cost-saving and clinical audit performance standards. Compared against no intervention, the proportion of generic prescribing increased by 5% in the intervention group, although a high risk of bias was noted for randomization, allocation concealment and potentially for baseline characteristics, and differences began declining after an additional three months. Overall, findings suggest financial incentives with educational interventions and audit/feedback provision may be most effective in encouraging physician generic prescribing, although evidence is generally weak, and practical and cost-related considerations must be considered.</p>					
<p>Examine the value of adding functioning information into case -mix systems with respect to the prediction of resource use as measured by costs and length of stay (162)</p>	<p>This review focused on examining the value of adding functioning information into case-mix systems with respect to the prediction of resource use as measured by costs and length of patient stay.</p> <p>Four studies addressed the value of adding functioning information into case-mix systems with costs as the outcome parameter. Three of these studies focused on the Diagnosis Related Groups (DRG) case-mix systems in hospital settings. An undisclosed number of these suggest that older patients have higher dependence on activities of daily living (ADL), and that this is significantly associated with higher costs of hospitalization even after adjusting for DRG costs and other patient characteristics.</p> <p>Five studies investigated the effects of adding functioning information to case-mix systems with respect to patient length of stay. These studies suggest that adding functional information into DRG case-mix systems in acute hospital settings increases the explained variance in length of stay in elderly patients from 8% to 28%.</p> <p>Overall, the review provides evidence that functioning information is an important factor for determining patients' healthcare needs and resource use. Adding functioning information into case-mix systems strengthens the predictive power of these systems as well as the variance explained with regard to costs and length of stay.</p>	2014	3/9 (AMSTAR rating from McMaster Health Forum)	0/10	7/10	0/10

Appendix 5: Systematic reviews relevant to Element 4 - Create a national coordinating body

Option element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on chronic pain
	To review the impact of organizational partnerships in public health on health outcomes and inequalities in health (166)	Findings suggest that there is not yet any clear evidence of the effects of public-health partnerships on health outcomes. However, qualitative studies suggested that some partnerships increased the profile of health inequalities on local policy agendas. Both the design of partnership interventions and of the studies evaluating them meant it was difficult to assess the extent to which identifiable successes and failures were attributable to partnership working.	2008	6/9 (AMSTAR rating from McMaster Health Forum)	0/15	0/15	0/15



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