

Evidence Brief

Taking a Step Towards Achieving Worry-free Surgery in Ontario

30 October 2017



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Evidence Brief:
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McMaster Health Forum

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 drugs to the people who need them.

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Merit review

The evidence brief was reviewed by a small number of policymakers, stakeholders and researchers in order to ensure its scientific rigour and system relevance.

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KEY MESSAGES

What's the problem?

- At least five broad groups of factors make it challenging to achieve worry-free surgery in Ontario:
 - the growing scope and volume of surgeries creates challenges for the health system;
 - peri-operative complications create ripple effects for patients, caregivers, health professionals and the health system;
 - many patients do not receive optimal peri-operative risk assessment and management;
 - peri-operative risk assessment and management is not consistently being optimized based on the best-available data, evidence and guidelines; and
 - system-level factors make it difficult to support the widespread uptake of optimal peri-operative risk assessment and management.

What do we know (from systematic reviews) about three viable elements to address the problem?

- Element 1 – Strategies to support the implementation of optimal peri-operative risk assessment and management
 - This element could include using provider-targeted implementation strategies, engaging patients and the public in supporting change (e.g., through shared decision-making, decision aids and supports for patient adherence to guidelines), and developing mass-media campaigns to raise awareness about the need to address the overuse of unnecessary routine testing.
 - Provider-targeted implementation strategies generally have an absolute effect between 2% and 12%, and key strategies could include education provision, integrating guidelines into information technologies used by professionals, and adopting system-wide audit and feedback mechanisms.
 - Many systematic reviews have documented benefits for shared decision-making interventions, including decision aids (e.g., increased knowledge, patient-practitioner communication and participation in decisions, reduced decisional conflict, and more realistic perception of outcomes and risk), and for mass-media campaigns (e.g., health behaviour changes and knowledge related to health conditions).
- Element 2 – Financial arrangements that support the implementation of optimal peri-operative risk assessment and management
 - This element could include using patient/citizen-, provider- and/or organization-targeted financial incentives, or modifying case-mix funding for peri-operative care services to reflect optimal peri-operative care pathways.
 - Financial incentives targeting patients/citizens, providers, organizations, and both providers and organizations can be effective, but the effects are either modest or variable.
 - Activity-based funding is associated with increases in admission to post-acute care after hospitalization and with severity of illness, but this does not translate to systematic differences in mortality rates or volume of care.
- Element 3 – Broader system arrangements that support the implementation of optimal peri-operative risk assessment and management
 - This element focuses on governance arrangements to enhance system-wide accountability and on delivery arrangements to support implementation.
 - While often cited as an example of a governance arrangement to enhance system accountability, the evidence for the effects of public reporting is mixed.
 - Many systematic reviews outline benefits for delivery arrangements that could be used to support implementation, including efforts to ensure care pathways are aligned with the most recent guidelines (e.g., through order sets), improving teamwork and communication, enabling remote monitoring of discharged surgical patients, and quality and safety monitoring systems (e.g., surgical checklists).

What implementation considerations need to be kept in mind

- While many barriers to implementing these elements may exist at the level of patients/citizens, providers, organizations and systems, perhaps the biggest barriers are the potential resistance to dropping pre-operative routine testing, to standardizing care, and to monitoring and evaluating practices.
- Windows of opportunity for implementing these elements might include a growing focus on improving patient safety, reducing the overuse of low-value healthcare services, and optimizing clinical practice.

REPORT

The volume of surgeries is growing worldwide, with more than 200 million surgeries performed each year. Despite more sophisticated peri-operative care (e.g., better selection of patients who could benefit from surgery, new and emerging surgical techniques, improved capacity for early detection of complications, and enhanced recovery pathways), as well as national and international initiatives to improve the quality and safety of surgeries, rates of surgery-related complications remain high.(1)

The 2016 Canadian guidelines for peri-operative cardiac risk assessment and management for patients who undergo non-cardiac surgery noted that one in every 30-40 adults has major non-cardiac surgery annually worldwide (with major surgery defined as requiring overnight hospital admission), and more than 10 million of the more than 200 million patients having surgery will suffer a major cardiac complication (i.e., cardiac death, cardiac arrest or myocardial infarction/injury) in the first 30 days after surgery. Moreover, the mean age and number of cardiac risk factors is also increasing among patients who undergo surgery.(2)

Risk assessment and management for surgical patients remains sub-optimal. Many patients are undergoing unnecessary pre-operative testing (as compared to what is recommended in the best available clinical-practice guidelines), which for patients can mean a poor patient experience (with worries and delays) and sub-optimal health outcomes (including harms arising from false positives). Unnecessary testing can also contribute to high costs.(3)

Optimizing peri-operative risk assessment and management can therefore contribute to improving the patient experience of care (including quality and satisfaction) and the health of populations, as well as to reducing the per capita cost of healthcare (i.e., the ‘triple aim’ of health systems).(4)

This evidence brief aims to inform deliberations that could help take a step towards achieving worry-free surgery in Ontario, with a specific focus on enhancing the uptake of the best available clinical-practice guidelines for peri-operative risk assessment and management. In doing so, it mobilizes the best available data and evidence to identify factors driving the problem, elements of a potentially comprehensive approach to address the problem, and implementation

Box 1: Background to the evidence brief

This evidence brief mobilizes both global and local research evidence about a problem, three elements of a potentially comprehensive approach for 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 the Canadian Cardiovascular Society’s guideline panel on peri-operative cardiac risk assessment and management and McMaster University (including the McMaster Health Forum);
- 2) developing and refining the terms of reference for an evidence brief, particularly the framing of the problem and three elements of a potentially comprehensive approach 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 three elements of a potentially comprehensive approach for addressing the problem were not designed to be mutually exclusive. They 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.

considerations. The evidence brief also includes the systematically elicited values that citizens believe should drive decision-making in this area. As explained in Box 1, the evidence brief does not contain recommendations. Moving from evidence to recommendations would have required the authors to introduce their own values and preferences. Instead, the intent is for this evidence brief to inform deliberations where participants will themselves decide what actions are needed based on the available research evidence, citizens' value, and both their own experiential knowledge and insights arising through the deliberations.

To draw attention to equity considerations, the evidence brief also focuses on two groups in the province. Specifically, when considering the factors driving the problem and the elements of a potentially comprehensive approach for addressing it, the evidence brief describes what's known in particular about older adults and those living with multiple chronic conditions. Peri-operative risk assessment and management may pose particular challenges for both groups (see Box 2).

In the sections that follow, we propose key definitions to ensure a common conceptual understanding and we provide a brief overview of the important characteristics of the health system in Ontario. We then describe the range of challenges associated with delivering optimal peri-operative risk assessment and management in the province. Following this we discuss three elements of a potentially comprehensive approach for addressing these challenges (including what is known from the best available research evidence about these elements), as well as key implementation considerations associated with each element.

Key definitions

This evidence brief uses several key terms that need to be defined. These terms and associated definitions and descriptions are outlined in Table 1. We provide additional detail about harmful events in Figure 1.

In addition to the terms listed in Table 1, this evidence brief introduces the concept of 'worry-free surgery.' We define worry-free surgery as:

- engaging the patient and the care team in the decision-making process about whether to proceed with surgery in light of the patient's needs, conditions, values and preferences;
- minimizing risk for peri-operative complications by proactively identifying and addressing risk factors; and
- using care pathways that are informed by the best available clinical-practice guidelines.

This evidence brief contributes to taking a step towards achieving worry-free surgery in Ontario by providing the foundation for deliberations about how we can improve peri-operative risk assessment and management.

Box 2: Equity considerations

A problem may disproportionately affect some groups in society. The benefits, harms and costs of elements of an approach to addressing 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 Ontarians, but (where possible) it also gives particular attention to two groups:

- older patients; and
- patients with multiple chronic conditions.

Many other groups warrant serious consideration as well, and a similar approach could be adopted for any of them.

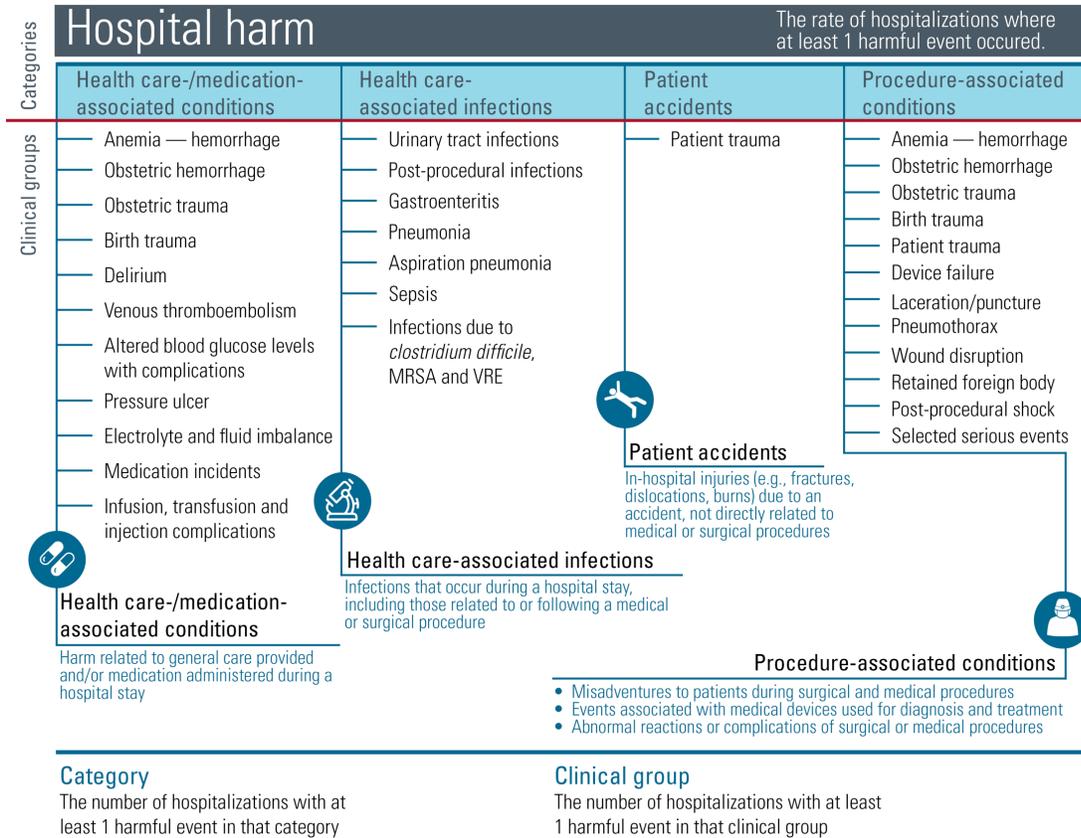
[†] The PROGRESS framework was developed by Tim Evans and Hilary Brown (Evans T, Brown H. Road traffic crashes: operationalizing equity in the context of health sector reform. *Injury Control and Safety Promotion* 2003;10(1-2): 11-12). It is being tested by the Cochrane Collaboration Health Equity Field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

Achieving worry-free surgery does not mean that surgeries will no longer involve a risk of complications, or that the multiple and legitimate sources of worry expressed by patients, caregivers and providers should be downplayed. Indeed, anxiety is common among surgery patients, can alter their decisions (e.g., a voluntary delay of surgical treatment), and has been found to be associated with poorer outcomes, including worse acute post-operative pain, the development of chronic post-surgical pain, longer hospitalizations, and increased hospital re-admissions.(5) Common sources of worry can include, but are not limited to, patient age, the types of condition(s) requiring surgery, the type of surgery, the wait time for surgery, undergoing surgery in a low-volume hospital, the credentialing of providers, pain management, and access to social support. Achieving worry-free surgery is thus a call to action to explicitly acknowledge and where possible address potential sources of anxiety, and ensure that patients will receive optimal surgical care regardless of where and by whom the care is provided. Optimal peri-operative risk assessment and management is a key component of such care.

Table 1: Definition and description of key terms used in the evidence brief

Term	Definition and description
Surgery (also referred to as 'surgical procedure' or 'operation')	<ul style="list-style-type: none"> • A branch of medicine concerned with diseases and conditions requiring or amenable to operative procedures • A surgery can be performed as an inpatient case, same-day case or outpatient case. • It is also possible to group surgeries into four categories based on the timing of the surgeries: <ul style="list-style-type: none"> ○ elective surgery (i.e., a surgery that is scheduled in advance because it does not involve a medical emergency); ○ semi-elective surgery (i.e., a surgery that must be done to preserve the patient's life, but that does not need to be performed immediately); ○ urgent surgery (i.e., a surgery that can wait until the patient is medically stable, but that should generally be done today or tomorrow); and ○ emergency surgery (i.e., a surgery that must be performed without delay to avoid risk of permanent disability or death).
Peri-operative	<ul style="list-style-type: none"> • The period describing the duration of a patient's full surgical pathway. This period generally includes three common phases: pre-operative (before the surgery), intra-operative (during the surgery), and post-operative (after the surgery).
Risk	<ul style="list-style-type: none"> • The probability that an event will occur (e.g., that an individual will become ill or die within a stated period of time or by a certain age).(6)
Risk assessment	<ul style="list-style-type: none"> • "The qualitative or quantitative estimation of the [probability] of adverse effects that may result from exposure to specified health hazards or from the absence of beneficial influences."(6)
Risk management	<ul style="list-style-type: none"> • "The steps taken to alter (i.e., reduce) the levels of risk which an individual or population is subject to."(6)
Complication	<ul style="list-style-type: none"> • An unfavourable evolution or consequence of a disease, a health condition or a treatment, which may occur throughout the surgical pathway.
Adverse event	<ul style="list-style-type: none"> • "...[U]nintended injuries or complications that result in disability at the time of discharge, a prolonged hospital stay, or death. Adverse events are caused by...the care provided to patients rather than the patient's underlying disease process. Not all adverse events are avoidable given current health care knowledge."(7)
Harmful event	<ul style="list-style-type: none"> • "...[U]nintended outcome of care that may be prevented with evidence-informed practices and that is identified and treated in the same hospital stay."(8) • The Hospital Harm Framework developed by the Canadian Institute for Health Information and the Canadian Patient Safety Institute identifies 31 types of harm grouped into four categories, some of which relate directly to surgery-related complications (see Figure 1).
Never event	<ul style="list-style-type: none"> • "...[P]atient safety incidents that result in serious patient harm or death, and that can be prevented by using organizational checks and balances."(9) • Examples of never events include, but are not limited to: performing surgery on the wrong body part or the wrong patient; performing the wrong surgical procedure; leaving an unintended foreign object in a patient following a procedure; and using improperly sterilized instruments or equipment provided by the healthcare facility.(9)
Clinical-practice guideline	<ul style="list-style-type: none"> • "Statements that include recommendations, intended to optimize patient care, that are informed by a systematic review of evidence and an assessment of the benefits and harms of alternative care options."(10)

Figure 1: The Hospital Harm Framework (8) (figure reproduced with permission from the Canadian Institute for Health Information)



Overview of contextual factors related to achieving worry-free surgery in Ontario

A number of features of the health system in Ontario provide the context within which any step will be taken towards achieving worry-free surgery in Ontario. We provide below a brief summary of how the health system in Ontario is organized in terms of its governance, financial and delivery arrangements. This background information can help with interpreting the evidence presented about the problem, three elements of a potentially comprehensive approach for addressing it, and implementation considerations.

Who can make what types of decisions

- The Ontario government has constitutional responsibility for healthcare, but it intersects with the federal government in areas where the latter has responsibility (e.g., First Nations) or sets broad terms under which financial transfers are provided.(11)
- The Ontario government has the authority to make a number of decisions about how the system works, but it has also delegated some of this authority to other organizations, such as the ones that regulate what different types of professionals (e.g., nurses or doctors) can do, the private not-for-profit and private for-profit hospitals and other organizations that provide surgical care, and the Local Health Integration Networks that plan, integrate and fund that care in 14 regions within the province.(11)
- Health Quality Ontario supports continuous quality improvement, as well as public reporting about clinical practice, among other topics, and makes evidence-based recommendations about standards of care and funding of technologies.

How money flows through the system

- Medically necessary care for eligible Ontario residents that is provided in hospitals (or Independent Health Facilities) and by physicians is fully paid for as part of Ontario's publicly funded health system.(12)
- Public spending on healthcare in Ontario is mostly financed through taxes, while private spending is financed primarily through out-of-pocket payments and premiums paid to private insurance plans.(12)
- Hospitals and other organizations providing surgical procedures are funded in part using Quality-Based Procedures formulae calculated based on the costs of all of the services required as part of an optimal clinical pathway for an episode of care (or for a discrete part of the clinical pathway).(12) Some organizations are also experimenting with 'bundled care,' a form of case-mix funding in which hospital and home-care dollars are combined and 'tied' to individual patients (specifically those undergoing lung-cancer surgery or hip/knee replacements).(12)
- Many physicians are paid fee-for-service, but up to one-third of income received by physicians in Ontario is now paid through alternative payment models. Other health professionals such as nurses are typically paid, through salaries or contracts, by the hospitals and other organizations where they work.(12)
- Many other healthcare and community services such as prescription drug coverage, community support services and long-term care homes may be wholly, partly or not paid for by the health system, and any remaining costs need to be paid by patients, families or their private insurance plans.(12)

How care is organized to reach those who need it

- Many services, including surgical procedures, traditionally provided in capital-intensive hospitals are now being provided in community-based speciality clinics (e.g., Independent Health Facilities and Out of Hospital Premises).(13)
- Healthcare in Ontario is delivered by professionals in 28 regulated health professions, as well as by unregulated health workers (e.g., physician assistants working in hospitals and personal support workers providing home care).(12)
- Technology is used to support the delivery of care through a teletriage system called Telehealth Ontario (to assess a health problem and provide advice, but not diagnose or prescribe treatment), and through telemedicine (videoconferencing to provide clinical care at a distance through the Ontario Telemedicine Network), as well as through an increasing number of patient portals that provide patients with access to their personal health information.(12)
- Health Links (82 out of an approximate planned total of 100 are currently in operation) support the delivery of integrated care for those with complex needs, which is typically people living with four or more chronic diseases (who comprise roughly 5% of the population).(14)

THE PROBLEM

In this section, we describe the challenges associated with taking a step towards achieving worry-free surgery in terms of five related but distinct issues:

- 1) the growing scope and volume of surgeries creates challenges for the health system;
- 2) peri-operative complications create ripple effects for patients, caregivers, health professionals and the health system;
- 3) many patients do not receive optimal peri-operative risk assessment and management;
- 4) peri-operative risk assessment and management is not consistently being optimized based on the best-available data, evidence and guidelines; and
- 5) system-level factors make it difficult to support the widespread uptake of optimal peri-operative risk assessment and management.

Each of these issues is discussed in turn below.

The growing scope and volume of surgeries creates challenges for the health system

An analysis using the Canadian Classification of Intervention codes revealed that the scope of surgical procedures in Ontario has increased more than 400% in the past decade, from just under 3,500 surgical procedures in 2000 to about 18,000 in 2012.⁽¹⁵⁾ A recent analysis identified the top 10 high-volume inpatient surgeries in the province in 2015-16 (see Table 2).⁽¹⁶⁾

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 “hedgies” 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 Institute for Clinical Evaluative Sciences, Health Quality Ontario, Canadian Institute for Health Information, Canadian Patient Safety Institute, Choosing Wisely Canada, and the World Health Organization.

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

Table 2: Top 10 high-volume inpatient surgeries in Ontario, 2015–16 (16)

Surgical interventions	Number of inpatient surgeries in 2015–16	Percentage of inpatient surgeries in 2015–16
Caesarean section delivery	38,611	7.1
Knee replacement surgery	27,185	4.9
Hip replacement surgery	21,268	3.9
Fractures	17,129	3.2
Coronary artery angioplasty	16,625	3.1
Hysterectomy	15,519	2.9
Removal of appendix	14,073	2.6
Prostatectomy	9,402	1.7
Hernia	9,235	1.7
Coronary artery bypass graft	8,334	1.5

For many of these types of surgeries, the number of surgeries performed has grown steadily over the past years in Ontario. For example:

- 28.4% of women gave birth by caesarean section (known as C-section) in 2015, an increase of 8.2% from 1999;
- 19,848 hip replacements were performed in 2013-14, an increase of 19.2% from 2009-10; and
- 25,765 knee replacements were performed in 2013-14, an increase of 18.4% from 2009-10.(17)

Several factors contribute to the growing number of surgeries being done, including changing demographics (e.g., population growth and aging), a growing number of people suffering from chronic diseases, new surgical techniques, and the capacity to perform surgery on older and sicker patients. In addition, there have been efforts across the country to reduce wait times for – by increasing the volume of – many types of surgeries, including cancer surgery, heart surgery, hip and knee replacement surgery, and cataract surgery.(18)

Peri-operative complications create ripple effects for patients, caregivers, health professionals and the health system

Despite improvements in the quality and safety of surgeries, rates of surgery-related complications remain high.(1) In 2014-15, patients suffered potentially preventable harm in more than 138,000 hospitalizations in Canada, or about one in 18 hospitalizations (5.6%). Of the patients who experienced harm, approximately 20% experienced more than one harmful event while in hospital.(8) For surgical patients, the harm rate was 7.6%. Of all surgical patients with at least one harmful event, 5.3% died in hospital. In contrast, 0.4% of surgical patients who did not experience a harmful event died in hospital.(8)

However, most complications occur within 30 days *after* a surgical patient has been discharged. In 2014-15, the hospital re-admission rate for surgery patients was 7% in Ontario (recognizing that some patients may have multiple re-admissions and discharges from hospital within any given year). Some of these re-admitted patients would have received care in the hospital or in the community after being discharged that was inadequate in some way.(19)

Post-operative complications can vary depending on the type of surgery. An analysis conducted by the Canadian Institute for Health Information identified the five types of surgery that were associated with the largest number of re-admissions:

- percutaneous coronary intervention;
- colostomy (a surgery where a portion of the large intestine is brought through the abdominal wall to carry stool out of the body);
- unilateral knee replacement;
- hysterectomy (the surgical removal of the uterus); and
- pacemaker implantation/removal.

Among these types of surgery, two major causes of complications are cardiac issues and infection.(20) The number of complications (and re-admissions) are likely to continue to grow as a result of an increasing number of surgeries being performed on sicker patients (e.g., frail elderly patients and patients with multiple chronic conditions). It is also likely to grow because of an increased number of complex surgeries being performed that are associated with a high risk of complications (e.g., surgeries for esophagus, hepato-biliary, lung, ovarian and pancreatic cancer).(21)

Surgery-related complications have serious consequences that can create ripple effects for everyone, including:

- patients: beyond physical harm, complications can have serious emotional, mental, social and financial consequences for patients;(8)
- caregivers: caregivers experience similar consequences, including the physical, emotional, mental, social and financial burden of carrying out the care tasks required for their loved ones;(8)

- health professionals: professionals also experience the impact of surgery-related complications, including the guilt, remorse, anger, loss of self-confidence, confusion, stress from threats of legal action, and the diminished opinions of colleagues, all of which can have an impact on their continuing high performance and career satisfaction; and
- health policymakers and managers: surgery-related complications can also pose a significant burden on the health system as a result of substantial increases in morbidity, longer hospitalization, adverse effects, and pre-mature mortality,(2) as well as increased levels of public dissatisfaction towards the system and increased system costs, all of which can create significant stress for policymakers and managers.

Many patients do not receive optimal peri-operative risk assessment and management

Despite an increasing focus on and initiatives aimed at improving quality and safety in the health system, many patients still do not receive optimal peri-operative risk assessment and management. The overuse of unnecessary pre-operative testing (commonly referred to as ‘routine testing’) is a stark example of sub-optimal peri-operative risk assessment and management.(22-26) A recent report by Health Quality Ontario, in partnership with Choosing Wisely Canada, revealed that many low-risk surgery patients are undergoing unnecessary pre-operative testing with little evidence that it will improve health outcomes.(27) This observation resonates with a recent report by the Canadian Institute for Health Information about unnecessary care in Canada, which estimates that 18% to 35% of patients who had a low-risk procedure had a pre-operative test in Ontario, many of which would have been unnecessary.(28)

Several professional societies in Canada have formulated recommendations regarding pre-operative investigations that are commonly used, but that are not supported by research evidence and could potentially expose patients to harm. Some of the investigations include:

- pre-transfusion testing (blood type and screen) for all pre-operative patients;
- baseline chest X-ray in asymptomatic patients (except as part of surgical or oncological evaluation);
- baseline laboratory studies (complete blood count, coagulation testing, or serum biochemistry) for asymptomatic patients undergoing low-risk non-cardiac surgery;
- baseline electrocardiogram for asymptomatic patients undergoing low-risk non-cardiac surgery;
- resting echocardiography as part of pre-operative assessment for asymptomatic patients undergoing low- and intermediate-risk non-cardiac surgery; and
- cardiac stress testing for asymptomatic patients undergoing low- and intermediate-risk non-cardiac surgery.(29)

Such routine testing usually provides little added value beyond documenting the patient’s medical condition and can:

- lead to further unnecessary downstream testing that may increase patient harm (given each test can have inherent risks);
- result in substantial delays (adding unnecessary steps in the care pathway during which the patient lives in suffering) and/or cancellation of surgeries;
- increase patient anxiety or provide a false sense of reassurance; and
- increase health-system costs.(3; 27)

Peri-operative risk assessment and management is not consistently being optimized based on the best-available data, evidence and guidelines

Optimizing clinical practice based on the best-available data, evidence and guidelines remains challenging at multiple levels. At the health professional level, changing established behaviours can be very difficult. Many factors must be considered in trying to do so, including social/professional role and identity, beliefs about capabilities, beliefs about consequences, environmental context and resources, social influences, behavioural regulation, and nature of the behaviour.(30) Sustaining new behaviours can also be difficult. A recent

systematic review revealed that health professionals' adherence to a clinical-practice guideline decreased after a year in about half of the cases examined.(31)

Patients can also struggle to adhere to often-complex pre-operative and post-operative instructions. A lack of adherence to those instructions can lead to the cancellation of surgical procedures and negative health outcomes. For example, a recent systematic review found that non-adherence to professional recommendations regarding diet, physical activity, medical care and support group attendance was common among bariatric surgery patients.(32) Several factors may contribute to patient non-adherence, such as a lack of patient education and insufficient time spent by health professionals providing the instructions, the consequences of which may be exacerbated by low levels of health literacy among many surgical patients.(33)

Health systems and organizations in other provinces and countries are also struggling with the challenge of consistently optimizing clinical practice based on data, evidence and guidelines, both in general and in the specific domain of peri-operative risk assessment and management. However, Ontario is somewhat unique given that it is home to many centres and initiatives with world-class expertise that can support practice optimization, as we recently documented in an evidence brief about practice optimization and in a book about how the Ontario health system works.(13; 34) In addition, a number of initiatives can specifically support practice optimization in peri-operative risk assessment and management in Ontario. Examples of these initiatives include:

- Quality-Based Procedures, whereby payments are calculated based on the costs of all of the services required as part of an optimal clinical pathway for an episode of care (or for a discrete part of the clinical pathway) for the following surgical procedures: primary unilateral hip or knee replacement, bilateral hip or knee replacement, knee arthroscopy, unilateral cataract surgery, non-routine and bilateral cataract surgery, elective repair of lower-extremity occlusive disease, elective aortic-aneurysm repair, gastrointestinal endoscopy, tonsillectomy, and prostate, colorectal, breast and thyroid cancer surgery;(12)
- supports for the implementation of Quality-Based Procedures, including:
 - standardized digital order sets, which are being developed and made available for all Quality-Based Procedures, including select surgical procedures,
 - QBP Connect, which offers evidence-based tools and resources to support the adoption of Quality Based Procedures,
 - Quality Improvement and Health System Funding Reform, which helps organizations adopt the Quality-Based Procedures strategy and integrated funding models;
- provincial surgery-specific quality-improvement initiatives, such as:
 - provincial mandate for hospitals to use and report publicly on adherence to surgical safety checklists,
 - Ontario Surgical Quality Improvement Network, which provides participating hospitals with data to identify top performers and areas for improvement, and to track progress in surgical quality improvement (with these hospitals accounting for 58% of Ontarians who have surgery),(35) and
 - National Surgical Quality Improvement Program – Ontario (NSQIP-ON), which extends the comparators (and hence enables benchmarking against) major hospitals in the rest of Canada and in the U.S.;
- more generally focused provincial quality-improvement initiatives that can support optimal surgical care, such as:
 - Choosing Wisely in Hospitals campaign, which aims to reduce pre-operative testing in non-cardiac surgeries,
 - Emergency Department Return Visit Quality Program, which supports Ontario's hospitals in reviewing data on return visits to their emergency departments, conducting audits to identify the underlying causes of these return visits, and taking steps to address these underlying causes, and
 - provincial mandate for hospitals to report publicly in a range of areas related to hospital safety beyond surgical-safety checklists, with some related to surgeries (e.g., surgical-site infections); and
- a range of local quality-improvement initiatives, such as Drop the Pre-op toolkit led by the North York General Hospital's Preoperative Assessment Clinic, which supports the implementation of interventions designed to reduce unnecessary visits and decrease unnecessary investigations in pre-operative clinics.(29)

Despite their leadership roles, some of these centres and initiatives have been facing several challenges, including insufficient and insecure funds to achieve the necessary reach and impact, as well as a certain confusion regarding their roles and responsibilities. Such confusion can arise among health professionals, as well as among patients and health-system leaders, when the scope of responsibilities between them overlap, and when they use different frameworks, tools and language without any effort at coordination at the sectoral if not the system level.(34)

System-level factors make it difficult to support the widespread uptake of optimal peri-operative risk assessment and management

A variety of features about the governance, financial and delivery arrangements within Ontario’s health system may also limit capacity to support widespread uptake of optimal peri-operative risk assessment and management. We summarize key examples of system-level challenges in Table 3.

Table 3: Overview of key system-level factors that make it difficult to support the widespread uptake of optimal peri-operative risk assessment and management

Health system building blocks	Challenge	Description of the challenge
Governance <i>(who can make what types of decisions)</i>	Limitations in accountability	<ul style="list-style-type: none"> Accountability agreements between payers (typically Local Health Integration Networks) and providers (e.g., hospitals) focus more on operational indicators such as volume and less on key quality indicators (e.g., whether the right peri-operative risk assessment and management was provided at the right time to the right patient for the right reason, and whether the provision of unnecessary care was avoided).(30) Peri-operative assessment and management are often driven by organization-wide protocols that may not align with global-level evidence, system-level mandates or professional-level preferences.
	Shortfalls in data collection and reporting	<ul style="list-style-type: none"> Surgical outcomes in Ontario (including surgical volumes, complications and outcomes) are not consistently reported publicly by hospitals and other organizations that are not participating in the NSQIP-ON program, which makes it impossible to follow patients to a common point in time (e.g., 30 days after surgery) and hence to estimate complication rates.
Financial <i>(how money flows through the system)</i>	Limits to organization-funding models	<ul style="list-style-type: none"> Quality-Based Procedures is a funding model that is used only for some surgeries and that does not typically involve rapid updating as new clinical-practice guidelines are published. Funding models do not typically incorporate financial disincentives and become challenging to use in achieving particular policy objectives (like optimizing peri-operative risk assessment and management) when the benefits and harm of services accrue to some patients but not others, when some patients place a high value on the services, and when the motivation is saving money rather than improving quality.
	Challenges with the dominant physician-remuneration model	<ul style="list-style-type: none"> Fee-for-service remuneration creates incentives for physicians to provide more, but not necessarily more appropriate, peri-operative risk assessment. When billing schedules are not updated regularly, fee-for-service remuneration creates disincentives for the uptake of new models of peri-operative risk assessment and management (e.g., remote monitoring and support after hospital discharge).
Delivery <i>(how care is organized to reach those who need it)</i>	Lack of clarity regarding who is responsible for ordering pre-operative tests	<ul style="list-style-type: none"> A study exploring anesthesiologists’ and surgeons’ perceptions about routine pre-operative testing in low-risk patients in Ontario revealed several factors contributing to confusion about pre-operative test ordering, including: <ul style="list-style-type: none"> lack of clarity by hospital management or a lack of written policies as to who is ultimately responsible for ordering routine pre-operative tests; variations in hospital directives across the province; conflicts between hospital and professional policies; and struggles for health professionals to keep up-to-date with evidence-based practices in their field (and the guidelines of other professional groups).(30)

	<p>Difficulties with communication and coordination among health professionals</p>	<ul style="list-style-type: none"> • The same study in the row above also revealed that communication is often lacking among health professionals and that this can be driven by many factors, including the lack of clarity regarding professional roles and responsibilities, and the fact that health professionals (in this study, anesthesiologists and surgeons) are often engaging with patients at different times and in different locations. • One consequence of this lack of communication is that health professionals order investigations “just in case” they are expected to by another colleague, and a quote from this study provides a helpful example of this point: <ul style="list-style-type: none"> ○ “A surgeon may order the investigations ‘in case’ the attending anesthesiologist needs it and in hopes that the patient will move smoothly through the pre-admission assessment process. The anesthesiologist who sees the patient prior to the surgery orders the investigations ‘in case’ the attending anesthesiologist needs them and could not cancel investigations ordered by the surgeon because they have not identified the reason for ordering the investigations. The interesting thing about the team influence is that although anesthesiologists and surgeons greatly influence whether pre-operative investigations are ordered by another team member, these health professionals rarely have direct contact with one another and communication is difficult.”(30)
	<p>Difficulty in balancing often competing priorities in the system</p>	<ul style="list-style-type: none"> • Health professionals are increasingly called upon to balance (often competing) system-, provider- and patient-level priorities, and feel unable or ill-equipped to do so. For example, some physicians have indicated that they have not been taught how to appropriately handle a conversation with their patient about not ordering a specific test or treatment that the patient feels they need. • Additionally, time pressures during each patient visit may limit a health professional’s ability to properly engage a patient in shared decision-making. • Similarly, deficiencies in risk communication have been observed in the field of surgery, and misleading risk perceptions can significantly jeopardize the informed-consent process, contribute to anxiety, and alter decisions of surgical patients.(5) This is exacerbated by the fact that risk can be understood differently by patients, caregivers and health professionals.(36)
	<p>System fragmentation</p>	<ul style="list-style-type: none"> • The overuse of unnecessary pre-operative tests may be exacerbated in situations where patient data are not properly shared between health professionals, or when electronic medical records are not readily accessible and duplicate investigations are ordered.(27) which can lead to fragmented surgical pathways that can result in reduced ability to detect complications early.

Additional equity-related observations about the problem

An important element of the problem that requires further discussion is how the problem may disproportionately affect certain groups or communities. With respect to improving peri-operative risk assessment and management, many groups warrant attention. However, as mentioned earlier, this evidence brief focuses on two groups for illustrative purposes: older patients and patients with multiple chronic conditions.

The most recent Canadian census indicates that the proportion of seniors in the population has been steadily growing since the 1960s. There are now more people in the country above age 65 than there are people below age 15.(37) The number of frail older adults in Canada is expected to rise from 1.1 million to more than 2 million by 2035.(38) In Ontario, people who are 65 years and older make up 16.7% of the population, which is roughly the same as the national average of 16.9%.(37) The aging population will lead to a growing demand for select surgical procedures.(18) This will pose unique challenges for enhancing peri-operative risk assessment and management given that older adults are more likely to have multiple chronic conditions, complex medication regimens, physical and cognitive impairments, and reduced cardiac, pulmonary and renal function. These factors predispose older adults to increased risk for peri-operative complications and for prolonged hospital stays, which in turn increase risk for additional complications and harmful events.(39) While the aging population suggests the need for even greater attention to implementing evidence-based peri-operative risk assessment and management,(40) efforts to do so are constrained because current

recommendations for peri-operative risk assessment and management in older patients are often derived from data collected in predominantly younger cohorts.(39)

Additionally, it is important to note how sub-optimal peri-operative risk assessment and management affects those living with multiple chronic conditions given that these tasks are necessarily more complex for such individuals. In Canada, it has been recently estimated that 12.9% of adults are living with two or more chronic conditions and that 3.9% are living with three or more chronic conditions.(41) A recent analysis of administrative health data revealed that the age-standardized prevalence of two or more chronic conditions was 27.8% in 2011-12 in Ontario (which represents a 25.2% relative increase over the 2001-02 estimate of 22.2%). The number of people with three or more chronic conditions is also growing in the province, with an age-standardized prevalence of 10.9% in 2011-12 (which represents a 43.4% relative increase over the 2001-02 estimate of 7.6%).(42) Also, people with three or more chronic diseases are more likely to be women, be older, have lower income, and have not completed high school.(41) Moreover, people living with multiple chronic conditions are more likely to have low income and face specific challenges in terms of peri-operative risk assessment and management. For example, a report by the Canadian Institute for Health Information revealed that complex surgical patients (i.e., patients with diseases in addition to the one they are being hospitalized for, and/or those who are treated by several types of physicians) are at higher risk of hospital harm, with 42% of high-complexity surgical patients having experienced more than one harmful event (as compared to 32% of high-complexity medical patients).(8) They also face serious challenges in the coordination of post-operative care, as found by a survey of patients with complex-care needs in 11 countries, including Canada. Specifically, 50% of Canadian patients reported experiencing gaps in hospital or surgery discharge planning, such as not receiving a written care plan after discharge (27%), having no arrangements for follow-up visits (26%), and not receiving clear instructions on which medication to take (11%).(43)

Citizens' views about key challenges related to achieving worry-free surgery

A citizen panel was convened in Hamilton, Ontario on 29 September 2017. A total of 11 ethno-culturally and socio-economically diverse citizens were provided an abridged version of the evidence brief, which was written in plain language.(44) Details about the recruitment and approach to convening the panel are available in the panel summary, which can be downloaded from the McMaster Health Forum website.(45) Participants had experiences as patients and/or caregivers with a variety of surgeries (including day and elective surgeries, as well as urgent and emergency surgeries) for diverse conditions (e.g., vision problems, balance disorders, joint pain, scoliosis, obesity and cancer). During the deliberation about the problem, citizens were asked to share their greatest source of worry about surgery-related risks before, during and after surgery (while in hospital and back at home), what sources of worry could have been avoided, and what needs to change to take a step towards achieving worry-free surgery in Ontario. We summarize the key challenges identified by citizens in Table 4, where rows 2-6 correspond to the five groups of factors described in the preceding sections.

Table 4: Summary of citizens’ views about challenges related to taking a step towards achieving worry-free surgery

Challenge	Description
<p>What constitutes ‘worry-free surgery’ may vary greatly</p>	<ul style="list-style-type: none"> • Initial discussions focused on the proposed concept of ‘worry-free surgery,’ and these discussions revealed the need to re-examine the concept in light of several important considerations, including that: <ul style="list-style-type: none"> ○ worries evolve throughout the surgical journey (some worries may come and go at any given time); ○ many different people worry about surgery-related complications, not just patients and caregivers (e.g., citizens in their capacity as taxpayers, health professionals, managers and policymakers); ○ the lack of information and communication throughout the surgical journey is often the greatest source of worry as it exacerbates a sentiment of uncertainty about the surgical procedures and associated risks; and ○ some factors that are critical to achieving worry-free surgery are not made explicit in the definition, including: <ul style="list-style-type: none"> ▪ information sharing and clear communication between the patients and the care team (e.g., information about the health condition, the benefits and risks associated with each treatment option, and what to expect before, during and after a surgery), ▪ information sharing across the system (e.g., having a comprehensive system in place to systematically collect and share patient information across providers and settings), ▪ continuity of care throughout the surgical journey, ▪ co-creation of the care team (of which patients and caregivers are a part), ▪ co-creation of the support systems needed by patients and caregivers, and ▪ personalization (patients and caregivers have different personalities, skills, competencies and worries which must be considered). • While the need for better information sharing (and for more information) emerged as a predominant theme during the discussions, some participants expressed that they were sometimes overwhelmed with information provided by health professionals, and had some difficulty finding trustworthy information sources (especially on the internet).
<p>More surgeries are being performed, which creates challenges for society as a whole</p>	<ul style="list-style-type: none"> • Some participants suggested that the growing volume of surgeries may also be driven by patients actively seeking medical care for various problems (e.g., clouded vision, joint pain, obesity), which ultimately leads to more medically necessary surgical procedures (e.g., cataract surgeries, knee and hip replacement surgeries, bariatric surgeries). Participants suggested that empowered patients should be added as a contributing factor to the growing volume of surgeries being performed, along with the factors presented in the brief.
<p>Surgery-related complications have serious consequences for everyone</p>	<ul style="list-style-type: none"> • Participants commonly agreed on the serious ripple effects of surgery-related complications. • Several participants expressed empathy towards health professionals who must deal with competing priorities and growing workloads, as well as the potential legal and professional threats when surgery-related complications occur. They expressed concerns that we may not have a system in place to care for the carers. • They also pointed out that surgery-related complications (particularly those that can be prevented) contribute to distrust in the health system.
<p>How we assess and manage risk with surgery patients is not always optimal</p>	<ul style="list-style-type: none"> • Participants (several of whom experienced multiple surgeries in different settings) reported experiences that varied greatly in how surgery-related risks were assessed and managed.

	<ul style="list-style-type: none"> • The majority of participants reported negative experiences due to the following factors: a lack of information and communication with the care team, a lack of continuity of care, the absence of a clear contact person who was easily accessible and could answer their questions at any given time (either a health professional or peer), and problems navigating the system before the surgery and after being discharged. • Several factors were identified that can impede meaningful patient and caregiver engagement in risk assessment and management, including: <ul style="list-style-type: none"> ○ patients and caregivers feeling vulnerable during the surgical journey; ○ adopting a deferential attitude towards health professionals; and ○ the surgery itself often appears like a ‘black box’ to patients and caregivers. • One participant who had cancer surgery reported a positive experience with regards to risk assessment and management. This participant pointed out the importance of having access to a case manager, as well as group information sessions with peers who experienced the same surgeries to mitigate potential sources of worries, and empower patients to play an active role as full members of their care team.
<p>Peri-operative risk assessment and management is not always delivered based on the best available data, evidence and guidelines</p>	<ul style="list-style-type: none"> • There was a general lack of awareness among participants about the existence of clinical-practice guidelines that could support optimal risk assessment and management. • While participants acknowledged the importance of having surgical care based on the best-available research evidence (including clinical-practice guidelines), they also emphasized that such evidence rarely includes the lived experiences of previous surgery patients, who could make a significant contribution to: <ul style="list-style-type: none"> ○ informing other patients, empowering them, and mitigating their potential worries; and ○ informing health professionals, managers and policymakers about what is needed for optimal surgical care.
<p>Health system-level factors make it difficult to support widespread uptake of optimal peri-operative risk assessment and management</p>	<ul style="list-style-type: none"> • Discussions about health system-level factors focused on four key challenges: <ul style="list-style-type: none"> ○ fragmentation of care was perceived as one of the biggest challenges to supporting the widespread uptake of optimal models of surgical care (with an emphasis on the lack of coordination between providers delivering specialized care, and those delivering home and community care); ○ the significant shift towards more surgeries being done without the patient being hospitalized contributed to: 1) the misperception that such surgeries are not risky, 2) the uptake of models of care similar to ‘assembly lines’ with limited opportunities for information and communication, and 3) patients and caregivers not being properly equipped to engage in risk assessment and management; ○ serious concerns were expressed about how current physician-remuneration arrangements impede the adoption of optimal models of care; and ○ the absence of a comprehensive system to collect and report surgical data (including the number of surgeries being done and rates of complications and outcomes) was identified as a serious factor limiting any quality-improvement efforts.

THREE ELEMENTS OF A POTENTIALLY COMPREHENSIVE APPROACH FOR ADDRESSING THE PROBLEM

Many approaches could be selected as a starting point for deliberations about taking a step towards achieving worry-free surgery in Ontario by improving peri-operative risk assessment and management. To promote discussion about the pros and cons of potentially viable approaches, we have selected three elements of a potentially comprehensive approach to address the problem. The three elements were developed and refined through consultation with the Steering Committee and key informants who we interviewed during the development of this evidence brief. The elements are:

- 1) strategies to support the implementation of optimal peri-operative risk assessment and management;
- 2) financial arrangements that support the implementation of optimal peri-operative risk assessment and management; and
- 3) broader system arrangements that support the implementation of optimal peri-operative risk assessment and management.

The elements could be pursued separately or simultaneously, or components could be drawn from each element to create a new (fourth) 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.

To inform the citizen panel convened on 29 September 2017, we included the same three elements of a potentially comprehensive approach to address the problem in the citizen brief as are included in this evidence brief. These elements were used as a starting point for the panel deliberations. During the deliberations, we identified several values and preferences from citizens in relation to these elements, which we summarize below in relation to each element.

In addition to citizens' values and preferences for each element, the 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 of a potentially comprehensive approach for addressing the problem

The available research evidence about elements of a potentially comprehensive approach for addressing the problem was sought primarily from Health Systems Evidence (www.healthsystemsevidence.org), which is a continuously updated database containing more than 6,200 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 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 element 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 element or for additional research evidence about the element.

Element 1 – Strategies to support the implementation of optimal peri-operative risk assessment and management

This element focuses on using provider-targeted strategies to support the implementation of the best-available clinical-practice guidelines for peri-operative risk assessment and management, one example of which is the Canadian Cardiovascular Society guidelines on peri-operative cardiac risk assessment and management for patients who undergo non-cardiac surgery.⁽²⁾ This will require using the problem described in the evidence brief, and engaging citizens and other key stakeholders (as we have done through the citizen panel and through the stakeholder dialogue that this evidence brief was prepared to inform) to identify and use appropriate strategies to support system-wide implementation of the guidelines.

This element might therefore include efforts to identify implementation strategies that are best suited to bring about the needed behavioural changes, which could include:

- using relevant provider-targeted implementation strategies such as:
 - providing information and education for health professionals (e.g., through materials, meetings and outreach),
 - integrating guidelines into information technologies most frequently used by health professionals, such as smartphone apps that could be used by health professionals to determine optimal peri-operative care pathways based on the best-available guidelines, and
 - adopting system-wide audit and feedback mechanisms for peri-operative care;
- engaging patients and the public in supporting changes, such as:
 - engaging patients and the public in guideline dissemination and implementation,⁽⁴⁶⁾
 - fostering better communication and shared decision-making between health professionals and patients based on the best-available guidelines,
 - educating patients/citizens about what peri-operative care they need (e.g., through decision aids or plain language surgical care pathways), and
 - supporting patient adherence to guidelines; and
- developing mass-media campaigns to raise awareness about the need to address overuse of unnecessary routine testing.

Key findings from the citizen panel

Eight values-related themes emerged during the discussion about element 1: safety, excellent patient experiences, trust, credibility, competence/expertise, accountability, collaboration and adaptability.

- Safety and excellent patient experiences were the two most prominent values that emerged during the discussions. These two values were related to expected outcomes that should guide the implementation of optimal peri-operative risk assessment and management.
- Three additional values also emerged regarding needed efforts to raise public awareness about clinical-practice guidelines: trust, credibility and competence/expertise. When asked about what is needed to meaningfully engage surgery patients (and their caregivers) in risk assessment and management, discussions revealed the need to raise awareness about the existence of clinical-practice guidelines, inform and educate patients to recognize trustworthy information sources, and provide peer support so that people with lived experiences can help their fellow patients, as well as tools to equip patients and caregivers to engage in high-level conversations about surgical procedures (including tools for those with limited literacy skills and those for whom English is a second language). In addition, participants emphasized that organizations producing and supporting the uptake of these guidelines must be perceived as trustworthy and credible given their unique competence and expertise.
- Accountability also emerged as an important value-related theme. Health organizations and professional regulatory bodies should be held accountable to enforce the uptake of clinical-practice guidelines as standards of practice (using carrots to incentivize professionals/organizations and sticks when they deviate from the standards). In the same vein, professional regulatory bodies should consider credentialing as a strategy to ensure that health professionals use clinical-practice guidelines. However,

there were mixed views among participants about the capacity of professional regulatory bodies for self-policing.

- Collaboration among patients, caregivers, providers and organizations also emerged as a key value-related way to proceed. Several participants highlighted that strategies proposed in the brief were perceived as targeting individual health professionals. They indicated that strategies may be more promising if they target entire care teams (which includes patients and caregivers) in order to support optimal peri-operative risk assessment and management.
- Lastly, while participants recognized that clinical-practice guidelines should be promoted as ‘standard practices,’ they should not be a substitute to professional judgment and may require adaptations to meet specific patients’ needs, values and preferences.

Key findings from systematic reviews

We recently convened a stakeholder dialogue about addressing overuse of health services, and the evidence brief that informed it (and two on related topics) included several components of the activities listed above related to using provider-targeted strategies and engaging patients and the public in supporting change.(47; 48) We have incorporated the key findings from those components in this brief, and updated the findings where we found new systematic reviews.

Using provider-targeted implementation strategies

In several recent evidence briefs,(34; 47; 49) we have identified strategies and techniques, and methods for delivering them to optimize clinical practice (i.e., provider-targeted implementation strategies). Many such approaches have been evaluated, and as of July 2017 there were more than 1,200 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.(50) This set of systematic reviews from the EPOC group found beneficial effects of optimizing clinical practice for educational materials,(51) educational meetings,(52) educational outreach visits,(53) local opinion leaders who can champion change,(54) audit and feedback,(55) computerized reminders,(56) and tailored interventions.(57) 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 on optimizing practice.(58) In addition, 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.(59)

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.(50) In this evidence brief, the diagnosis of the problem has identified lack of awareness among health professionals 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 health professionals (e.g., through smartphone apps), and adopting system-wide audit and feedback mechanisms. The key findings related to each of these interventions are outlined in Table 4. 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,(51)

- 6.0% from educational meetings (effects are larger with high attendance rates and when sessions mix interactive and didactic approach, but lower for complex behaviours and non-severe outcomes),(50; 52)
- 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);(50; 53)
- evidence about integrating guidelines into information technologies most frequently used by health professionals 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,(50; 56)
 - a wide range of smartphone and tablet-based utilities for use in pre-, intra- and post-operative 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);(60) 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).(55)

Engaging patients and the public in supporting change

We identified eight systematic reviews that examined shared decision-making between providers and patients, of which three were high quality,(61-63) and five medium quality.(64-68) These reviews found:

- no significant effect of patient participation in primary care on patient- or disease-related outcomes;(64; 65)
- mixed (but mostly positive) effects of tools designed to support shared decision-making with reviews indicating that:
 - tools and resources such as communication-skills workshops or education sessions, coaching sessions targeted at patients or health professionals, computerized decision aids, video-based interventions to improve informed decision-making and shared decision-making, counselling sessions, booklets or DVD decision aids and paper-based hand-outs, had some positive effects on knowledge, participation, decisional conflict and self-efficacy of disadvantaged populations, but no significant effect on adherence levels, anxiety, screening/treatment preferences, intentions or uptake,(61)
 - tools to promote shared decision-making in serious illness improved knowledge, and some tools (e.g., video advance care planning tool to assist in discussions of treatment preference with patients with advanced dementia, and an advanced directive documentation guide designed for patients with low health literacy) changed treatment decisions,(66) and
 - videos designed to educate patients and involve them in the decision-making process for prostate care improved knowledge about prostate cancer and about the risks and benefits of different treatment options, improved health and physical functioning, and improved satisfaction with the decision-making process;(67)
- mixed effects of shared decision-making interventions for people with mental illness;(62)
- the most frequently reported barriers by health professionals for implementing shared decision-making were time constraints, lack of applicability due to patient characteristics, and lack of applicability based on the clinical situation, and the most frequently reported facilitators were provider motivation and perception that shared decision-making would lead to improved clinical processes and patient outcomes;(68) and
- interventions targeting both patients and providers had a positive effect compared to usual care and compared to interventions targeting patients alone.(63; 65)

We also identified several reviews that found benefits for decision aids and for other strategies to support them and their families when deciding on optimal approaches to care. One recent high-quality review

evaluated strategies for reducing regional variation in the use of surgery and found mixed results, with most of the included studies reporting decreases in procedure rates and increases in rates of less invasive surgical procedures, but the only study that assessed effects on regional variation had mixed results.(59) Other reviews that we identified found evidence that decision aids:

- increase patients' knowledge of screening and treatment options;(69-72)
- encourage patient involvement;(72)
- support realistic perception of outcomes and risk;(70; 72-75)
- reduce decision-related conflict;(72)
- increase patient-practitioner communication;(72) and
- support professionals to provide information and counselling about the available choices.(69)

However, one older high-quality review, found two studies that evaluated a patient decision aid for people with mental health conditions combined with health professional education, and found no significant effects on clinical outcomes or hospital re-admission rates.(62)

Lastly, an overview of systematic reviews that evaluated the effects of interventions on promoting evidence-based prescribing for and medicine use by patients found that no single strategy improved medicine use outcomes across all tested diseases.(76) However, the overview indicated that interventions that were found to be effective included approaches that supported medication self-monitoring and self-management, simplified dosing, and interventions directly involving the pharmacist in medicine management.

Developing mass-media campaigns to raise awareness

As outlined in a recent evidence brief, mass-media campaigns could be used to support behaviour change by both patients and providers. The brief found seven recent and one older systematic reviews that evaluate the effectiveness of mass-media campaigns, of which three are high quality,(77-79) four medium quality (80-83) and one low quality.(84) No additional reviews were identified from our searches of Health Systems Evidence. Five of the reviews examined the effects of mass-media campaigns on patients or the public, two focused on both patients and providers, and one focused on the use of social media by providers.

Seven of the reviews 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),(77-80) voluntary lifestyle behaviours,(81) knowledge related to health conditions and prevention,(78) awareness of symptoms,(84) and the use of needed health services (e.g. cancer screening, immunization programs).(79; 82) The last review examined the use of social media by health professionals and trainees to facilitate communication or improve patient knowledge, and found that discussion forums were the most commonly studied tools, with many also including social-media tools as part of a complex intervention.(83) Findings from the review were mixed with six of 13 included studies reporting a statistically significant improvement in communication or patient knowledge.(83)

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 1.

Table 5: Summary of key findings from systematic reviews relevant to Element 1 – Strategies to support the implementation of optimal peri-operative risk assessment and management

Category of finding	Summary of key findings
Benefits	<ul style="list-style-type: none"> • 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%-12% for printed educational materials, educational meetings, educational outreach, local opinion leaders, audit and feedback, computerized reminders, and tailored interventions.(51-57) ○ 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.(59) ○ 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).(60) • Engage patients and the public in supporting change <ul style="list-style-type: none"> ○ One high-quality review found clinically significant effects for shared decision-making interventions in three of 21 included studies.(65) ○ One high-quality review found moderate positive effects of shared decision-making interventions on knowledge, participation, decisional conflict and self-efficacy of disadvantaged populations, and indicated that interventions appeared to benefit disadvantaged groups more than groups with higher literacy, education and socio-economic status.(61) ○ One medium-quality review found evidence that supports several tools targeted toward shared decision-making in immediate clinical choices, with the two advance care planning tools (a video advance care planning tool to assist in discussions of treatment preference with patients with advanced dementia, and an advanced directive documentation guide designed for patients with low health literacy and available for free on the internet) supported by the strongest evidence.(66) ○ One medium-quality review indicated that patients reported improved health and physical functioning, improved knowledge about the risks and benefits of different treatment options, and increased satisfaction with the decision-making process.(67) ○ One recent high-quality review evaluated strategies for reducing regional variation in the use of surgery and found mixed results with most of the included studies reporting decreases in procedure rates and increases in rates of less invasive surgical procedures, but the only study that assessed effects on regional variation had mixed results.(59) ○ Three high-quality (70; 72; 73), five medium-quality (64-68) and one low-quality reviews (85) found evidence that decision aids: <ul style="list-style-type: none"> ▪ increase patients’ knowledge of screening and treatment options;(69-72) ▪ encourage patient involvement;(72) ▪ support realistic perception of outcomes and risk;(70; 72-75) ▪ reduce decision-related conflict;(72) ▪ increase patient-practitioner communication;(72) and ▪ support professionals to provide information and counselling about the available choices.(69) • Develop mass-media campaigns <ul style="list-style-type: none"> ○ Three high-quality, three medium-quality and one low-quality reviews 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),(77; 80) voluntary lifestyle behaviours,(81) knowledge related to health conditions and prevention,(78) awareness of symptoms,(84) and the use of needed health services (e.g. cancer screening, immunization program).(79; 82)
Potential harms	<ul style="list-style-type: none"> • Engage patients and the public in supporting change <ul style="list-style-type: none"> ○ One recent medium-quality review found that for disease-related outcomes, no overall effect of patient participation could be demonstrated, with some studies finding deterioration in disease-related outcomes.(86)

<p>Costs and/or cost-effectiveness in relation to the status quo</p>	<ul style="list-style-type: none"> ● 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%.(87) ○ A recent low-quality review of surgical auditing found a reduction in complications in the six included studies which produced a reduction in costs.
<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"> ○ Use provider-targeted implementation strategies <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"> ○ Not applicable
<p>Key elements of the policy option if it was tried elsewhere</p>	<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 indicating 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.(88) ● Engage patients and the public in supporting change <ul style="list-style-type: none"> ○ One high- and one medium-quality review found that interventions targeting both patients and providers had a positive effect compared to usual care and compared to interventions targeting patients alone.(63; 65) ○ Based on the limited evidence available as well as expert opinion, a low-quality review recommends five components for efforts to frame and communicate clinical evidence: understanding the patient’s (and family members’) experience and expectations; building partnerships; providing evidence, including a balanced discussion of uncertainties; presenting recommendations informed by clinical judgment and patient preferences; and checking for understanding and agreement.(85) ● Develop mass-media campaigns <ul style="list-style-type: none"> ○ A recent high-quality review on the effectiveness of mass-media interventions for HIV prevention found 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.(78) ○ An older medium-quality review found that shorter interventions generally achieved larger impacts and greater adherence.(81)
<p>Stakeholders’ views and experience</p>	<ul style="list-style-type: none"> ● Engage patients and the public in supporting change <ul style="list-style-type: none"> ○ One medium-quality review found that providers reported barriers to implementing shared decision-making in clinical practice such as time constraints, lack of applicability due to patient characteristics, and lack of applicability based on the clinical situation.(68) ○ The same review found that facilitators reported by providers for implementing shared decision-making in clinical practice were healthcare provider motivation, their perception that putting shared decision-making into practice would lead to improved clinical processes, and their perception that putting shared decision-making into practice would lead to improved patient outcomes.(68)

Element 2 – Financial arrangements that support the implementation of optimal peri-operative risk assessment and management

Efforts to use financial arrangements to support changes in clinical practice should complement rather than be a substitute for other policy instruments, and therefore this element needs to be considered in combination with the other two. In addition, optimizing the use of financial arrangements to support change requires that they be individually crafted according to local context.⁽⁸⁹⁾

Given this, determining the right mix of financial arrangements to use will similarly require using the problem described in the evidence brief, and engaging citizens and other key stakeholders, to identify and use a mix of financial arrangements that are best poised to support change.

In general, financial arrangements that could be used to supporting change at the level of organizations and health professionals could include:

- using patient/citizen-, provider- and/or organization-targeted financial incentives (e.g., link the quality of care with funding and provide no payment for the additional costs associated with preventable errors, including never events); and
- modifying case-mix funding for peri-operative care services to reflect optimal peri-operative care pathways as identified by the best-available clinical-practice guidelines (e.g., Quality-based Procedures or bundled payments).

Key findings from the citizen panel

Four values-related themes emerged during the discussion about element 2: efficiency (value for money), based on data and evidence, trust, and accountability. We introduce the first two themes in the first bullet below, and one theme in each of the bullets that follow.

- There were mixed views about the efficiency of providing financial rewards to professionals and organizations to support their adherence to clinical-practice guidelines. Participants made the case that if health-system leaders and stakeholders agree that clinical-practice guidelines are the right thing to do (since they are based on the best-available research evidence), then no financial rewards should be provided for this.
- Financially rewarding patients for adhering to pre- and post-surgical instructions also generated mixed views. On the one hand, some participants saw this as a potentially cost-effective strategy that could lead to better health outcomes in the short term, while limiting system costs (e.g., surgeries not being delayed or cancelled because patients are adhering to pre-surgical instructions and no re-admissions are happening because patients are adhering to post-surgical instructions). Others were opposed to rewarding patients for doing what was already good for them, and a few were concerned that some patients would take advantage of such rewards (even if they do not fully adhere to pre- and post-surgical instructions).
- There were also mixed views regarding the use of financial penalties to support the adherence to clinical-practice guidelines. On the one hand, participants were generally opposed to financially penalizing professionals if they do not adhere to clinical-practice guidelines. On the other hand, participants suggested that professionals should be held accountable (through reprimands and credentials being removed) by their organizations and professional regulatory bodies. Participants were more inclined to use financial penalties with health organizations if clinical-practice guidelines were not routinely used.

Key findings from systematic reviews

Using patient/citizen-, provider- and/or organization-targeted financial incentives

An evidence brief prepared for a September 2015 dialogue found seven overviews of systematic reviews about financial incentives and nine systematic reviews that complement these overviews.(49) We updated the search and added one overview of systematic reviews about the effects of pay-for-performance (90) that was published since the evidence brief about financial incentives was completed.

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

- 1) financial incentives targeting patients/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),(91) 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),(92-94) or require substantial cash incentives to sustain behaviour changes (e.g., for smoking cessation);(95)
- 2) the reviews of the evidence for the use of financial incentives for providers,(96-100) health organizations (101) and for both providers and health organizations,(90; 102-104) found that:
 - evidence is either insufficient,(98; 100; 103; 104) modest and of variable effects,(90; 97; 99) difficult to disentangle effects from those other interventions designed to improve quality,(90) or are based on perceived outcomes (e.g., organizational leaders),(101) 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)(97; 103) or for specific types of conditions (e.g., for chronic rather than acute care),(102) but not for other more complex behaviours (e.g., improving adherence to clinical-practice guidelines)(97) or over the long term (e.g., retention of human resources);(96) 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) (76; 105) 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) (92; 106) can be very important to achieve intended effects.

We provide more detailed findings from these reviews in Table 5 below.

Modifying case-mix funding for peri-operative care services to reflect optimal peri-operative care pathways

We identified four systematic reviews with relevant information about modifying case-mix funding, of which three focused on activity-based funding models (i.e., shaping payments, incentives using diagnosis-related groups, and bundled payments)(101; 107; 108) and the other focused on capturing patient needs in case-mix funding models.(109) A recent high-quality review that evaluated activity-based funding found that it is associated with a 24% increase in admission to post-acute care after hospitalization, an increase in severity of illness (although this might be due to changes in diagnostic coding required for implementation), and no systematic differences in mortality rates or volume of care as compared to usual payment models.(107) Another high-quality systematic review on bundled payments may create financial incentives for providers to decrease the number and cost of services included in the bundle, and that the transition from a cost-based or fee-for-service reimbursement to a bundled payment was generally associated with a decline in spending of 10% or less. Bundled payments were also associated with a decrease in utilization of services (between 5% and 15%) and costs of services included in the bundle.(108) In addition, a recent high-quality review identified several recommendations from leaders for implementing activity-based funding, which included ensuring appropriate supports are in place from the outset of implementation, providing educational resources, fostering enhanced collaboration, communication and interaction between units and committees,

and sharing personnel for data collection, protocols and tools.(101) Lastly, the recent low-quality review about capturing patient needs in case-mix funding indicated that the addition of functional information to case-mix systems enhances predictive ability and improves homogeneity across case-mix groups for costs and length of stay.(109) Moreover, the same review indicated that case-mix systems that incorporate functioning information can better predict resources needed and outcomes for frail older adults and those with functional impairments.

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 6 (or obtain citations for the reviews), a fuller description of the systematic reviews is provided in Appendix 2.

Table 6: Summary of key findings from systematic reviews relevant to Element 2 – Financial arrangements that support the implementation of optimal peri-operative risk assessment and management

Category of finding	Summary of key findings
Benefits	<p>Using provider- and/or organization-targeted financial incentives</p> <ul style="list-style-type: none"> • Patient-targeted financial incentives <ul style="list-style-type: none"> ○ A recent overview of systematic reviews concluded that there is some evidence to support the use of financial incentives for improving adherence to medicines by patients, but that the evidence is inconsistent.(91) ○ Two recent high-quality reviews (92; 94) and one recent medium-quality review (93) assessed financial incentives for encouraging healthy behaviours (e.g., achieving sustained changes in smoking, eating, alcohol consumption and physical activity) and found that they: <ul style="list-style-type: none"> ▪ were generally more effective than providing no financial incentive for health behaviour change, and that on average have greater effects when cash-only incentives are used as compared to other formats;(92) ▪ increased attainment and maintenance (up to 18 months from baseline) of target levels of behaviour change;(94) ▪ sustained change in overall behaviour up to two to three months after the removal of incentive, but this change was not maintained thereafter;(94) ▪ had a decreased effect over time, with increased post-intervention follow-up and increased incentive value;(92-94) and ▪ were more accepted if they are found to be effective, safe, recipient-focused, intrusion-minimizing and viewed as benefiting both recipients and wider society, but may also be perceived as paternalistic, which can undermine an individual’s autonomy.(93) ○ A recent high-quality review that assessed financial incentives for supporting long-term smoking cessation found that: <ul style="list-style-type: none"> ▪ incentives may boost cessation rates while in place, but that sustained success rates are seen only where resources were concentrated into substantial cash payments for abstinence; and ▪ incentives for pregnant smokers may improve cessation rates, both at end-of-pregnancy and at post-partum assessment stages.(44) • 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;(97) ▪ the same overview noted that payments for working a specified time period, improving consultation or visit rates and promoting compliance with guidelines are ineffective;(97) ▪ 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 practitioners is insufficient to support its adoption;(98) and

	<ul style="list-style-type: none"> ▪ 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.(99) • 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 reallocate 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).(101) • 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 is not being incentivized.(109) ○ 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 ▪ 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).(102) ○ 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).(103) ○ 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.(104) <p>Modifying case-mix funding</p> <ul style="list-style-type: none"> • A recent high-quality review that evaluated activity-based funding found that it is associated with a 24% increase in admission to post-acute care after hospitalization, an increase in severity of illness (although this might be due to changes in diagnostic coding required for implementation) and no systematic differences in mortality rates or volume of care as compared to usual payment models.(107) • A recent low-quality review about capturing patient needs in case-mix funding indicated that the addition of functional information to case-mix systems enhances predictive ability and improves homogeneity across case-mix groups for costs and length of stay.(109) • The same review indicated that case-mix systems that incorporate functioning information can better predict resources needed and outcomes for frail older adults and those with functional impairments. • One high-quality systematic review on bundled payments found that they may create financial incentives for providers to decrease the number and cost of services included in the bundle, and that the transition from a cost-based or fee-for-service reimbursement to a bundled payment was generally associated with a decline in spending of 10% or less. Bundled payments were also associated with a decrease in utilization of services (between 5% and 15%) and costs of services included in the bundle.(108)
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Potential harms	<p>Using provider- and/or organization-targeted financial incentives</p> <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.(109) • 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.(103)
Costs and/or cost-effectiveness in relation to the status quo	<p>Using provider- and/or organization-targeted financial incentives</p> <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.(109) • 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.(110)
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 ‘empty’ reviews were identified) • No clear message from studies included in a systematic review <ul style="list-style-type: none"> ○ Not applicable
Key elements of the policy option if it was tried elsewhere	<p>Using provider- and/or organization-targeted financial incentives</p> <ul style="list-style-type: none"> • Cash incentives for promoting healthy behaviours in citizens on average have greater effects as compared to other formats,(92) and sustained success rates are seen when resources are concentrated into substantial cash payments.(95) • 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.(102) • 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’.(101) • 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.(105) <p>Modifying case-mix funding</p> <ul style="list-style-type: none"> • A recent high-quality review identified several recommendations from leaders for implementing activity-based funding, which included ensuring appropriate supports are in place from the outset of implementation, providing educational resources, fostering enhanced collaboration, communication and interaction between units and committees, and shared personnel for data collection, protocols and tools.(95)
Stakeholders’ views and experience	<p>Using patient-, provider- and/or organization-targeted financial incentives</p> <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.(93)

Element 3 – Broader system arrangements that support the implementation of optimal peri-operative risk assessment and management

The efforts to support optimal peri-operative care outlined in elements 1 and 2 likely need to be accompanied by broader (non-financial) system arrangements. Specifically, this might require modifications to:

- governance arrangements to enhance system-wide accountability (e.g., through public reporting); and
- delivery arrangements to:
 - ensure care pathways/packages of peri-operative care reflect what is recommended in the best-available clinical-practice guidelines (e.g., by revising order sets to adhere to guideline recommendations and incorporating them in electronic medical records);
 - improve teamwork and communication within surgical teams;
 - enable remote monitoring following discharge from hospital to ensure timely follow-up and identification of potential complications; and
 - implement quality and safety monitoring systems that:
 - encourage a culture of continuous quality improvement where mistakes are openly reported (e.g., never events),
 - ensure accountability for hospitals to develop and implement quality-improvement plans that will make measureable progress in enhancing implementation of optimal peri-operative risk assessment and management,
 - provide routine safety procedures (e.g., surgical checklists) and opportunities for identifying how to improve (e.g., operating room black boxes), and
 - encourage routine and open discussion and problem solving with patients and families as full and active participants.

Key findings from the citizen panel

Two values-related themes emerged during the discussion about element 3: continuously improving and equity.

- Continuously improving peri-operative risk assessment and management was the most prominent value related to ways to proceed. When asked about what kinds of broader health-system changes are required to take a step towards achieving worry-free surgery in Ontario, participants emphasized the need to support current quality-improvement initiatives across the province. They were more inclined to start improving teamwork and communication, and providing routine safety procedures, which were perceived as low-hanging fruit that will ultimately instill culture changes. Yet, they also reinforced the need to put a comprehensive system in place to collect data about surgical outcomes, as well as a system allowing health organizations to document problems and notify professional regulatory bodies whenever professionals were not adhering to clinical-practice guidelines. They expressed frustration that such a comprehensive system was not already in place, and argued that it was a fundamental element to any quality and safety monitoring systems.
- Equity also emerged as a value related to criteria about whether to proceed with some mechanisms such as public reporting of performance data. A few participants worried that such mechanisms could compromise equity since it could create perverse incentives for certain professionals and organizations to cherry-pick patients that may help them score well, or avoid those who may cause them to score poorly in their performance reports.

Key findings from systematic reviews

Governance arrangements to enhance system-wide accountability

We identified six reviews related to performance reporting (of which five were included in another recent evidence brief).(111) Overall, the evidence is mixed, with one relatively recent medium-quality review suggesting that public reporting could lead to improvements in performance and patient outcomes,(112) and

three other reviews – one recent, one older medium-quality review, and one recent low-quality review – reporting either mixed or limited evidence.(113-115) However, despite the mixed evidence, it was suggested that targeting providers and managers with reports was a better strategy since they had the power to change things,(115) and that the following elements are needed in a public reporting strategy: 1) clear objectives that include accountability and quality improvement; 2) targets that include health organizations; 3) report content that is transparent and comprehensive; 4) information provided in easy-to-use formats; and 5) wide distribution of reports using a variety of approaches.(116) Lastly, a recent medium-quality review evaluated approaches for effectively presenting performance information to support patient decision-making and found that patient understanding and informed choices are best supported when information displays are less complex. The review indicated that simplifying performance information can be achieved by presenting a small set of indicators, framing results in a positive direction, using non-technical language and presenting results in familiar contexts.(117)

Delivery arrangements to support implementation

We identified 13 systematic reviews related to the second sub-element, delivery arrangements to support the implementation of optimal peri-operative risk assessment and management. We provide a summary of the key findings from the systematic reviews in relation to the possible activities listed under the sub-element.

We found three systematic reviews that related specifically to enhancing care pathways.(118-120) One older medium-quality review on enhanced recovery pathways (i.e., evidence-based standardized pre-operative, in-hospital and post-operative care) in colorectal surgery found a reduction in hospital length of stay, decreased morbidity and no increase in hospital re-admissions.(120) The remaining two reviews were medium quality and examined the effects of using order sets.(118; 119) Both of the reviews noted that the quality of the evidence on order sets was low. However, the first review found that order sets improved guideline adherence, treatment outcomes and processes of care (e.g., decreasing time to deliver care to patients).(118) The second review found that the use of order sets increased levels of compliance for both diagnosis and treatment.(119)

We identified five systematic reviews related to teamwork and communication within surgical teams. One recent medium-quality review examined team-based approaches (e.g., interprofessional care) in the reduction of surgical site infections.(121) The review identified three main approaches that were most commonly used by interprofessional teams:

- 1) the ‘bundled approach’ combines three to five elements of practice into a care bundle to promote standardized care;
- 2) ‘sharing responsibility’ targets the different segments of the patient journey (i.e., peri-operative) and clearly assigns roles to different team members; and
- 3) ‘adhering to best practices’ include best-practice guidelines in care bundles.

Four systematic reviews focused on team-based training and enhancing communication within surgical teams.(122-125) One recent medium-quality review examined teamwork assessment tools and their effectiveness in obstetric emergencies.(125) The review found that the most reliable tools were the Clinical Teamwork Scale, the Global Assessment of Obstetric Team Performance, and the Global Rating Scale of performance. However, limitations were noted in terms of the quality and validity of the tools. In addition, results from one older low-quality review were positive and found that team-training interventions used in the operating room can improve team-based outcomes, and as a result increase patient safety.(122) Moreover, one recent medium-quality review on interventions to reduce surgical adverse events found that effect of team training was mixed.(123) Medical team training significantly reduced post-operative adverse events, however training programs that included role playing and video teaching were not shown to significantly decrease adverse events. Training videos on safety practices were found to be effective in preventing needle-stick injuries. Lastly, while not within surgical settings, one recent high-quality systematic review examined health professional communication-skills training and patients’ clinical outcomes in primary-care and

rehabilitation settings.(124) The review found that communication-skills training for health professionals had small effects in improving patient satisfaction with care and reduced pain and disability.

We identified one recent medium-quality systematic review related to remote monitoring following discharge from hospital surgical care. The review found that telemedicine was used for post-operative care in three ways: 1) scheduled follow-up; 2) routine monitoring; and 3) management of issues as they presented. The review found reductions in terms of time, travel and cost to patients without compromising clinical outcomes. Both patients and healthcare providers reported high satisfaction with telemedicine.(126)

Lastly, we identified two systematic reviews related to implementing quality and safety monitoring systems, and the reviews focused specifically on surgical safety checklists. A recent medium-quality review assessed the impact of surgical safety checklists on the quality of teamwork and communication in the operating room.(127) The review found a positive association between the use of safety checklists and the quality of the teamwork in the operating room setting. The review also identified potential adverse effects of checklists, and that incorporating them into busy, interprofessional operating room settings may be challenging, which is noteworthy because the review points out that poor usage of checklists can have dysfunctional effects on teamwork. The second review was older and of low quality, but found similar results. Surgical safety checklists were found to improve teamwork, collaboration and compliance with safety measures and reduce morbidity and mortality.(128) While our search was limited to systematic reviews, a single study of the effects of surgical-safety checklists, which was brought to our attention during the review process, found that the implementation of these checklists in Ontario was not associated with significant reductions in operative mortality or complication.(129; 130)

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 3.

Table 7: Summary of key findings from systematic reviews relevant to Element 3 – Broader system arrangements that support the implementation of optimal peri-operative risk assessment and management

Category of finding	Summary of key findings
Benefits	<ul style="list-style-type: none"> • Delivery arrangements to support implementation <ul style="list-style-type: none"> ○ Ensure care pathways/packages of peri-operative care <ul style="list-style-type: none"> ▪ One older medium-quality review found that enhanced recovery pathways in colorectal surgery reduced in-hospital length of stay, decreased morbidity and had no increase in hospital re-admissions.(120) ▪ One recent medium-quality review found that order sets improved guideline adherence, treatment outcomes and processes of care.(118) ▪ Similarly, one older medium-quality review found that the use of order sets increased levels of compliance for both diagnosis and treatment.(119) ○ Improve teamwork and communication within surgical teams <ul style="list-style-type: none"> ▪ One recent medium-quality review identified three main approaches that were the most commonly used team-based approaches to reduce surgical site infections: using a bundled approach, sharing responsibility, and, adhering to best practice.(121) ▪ One recent medium-quality review found that the most reliable teamwork assessment tools in obstetric emergencies were the Clinical Teamwork Scale, the Global Assessment of Obstetric Team Performance, and the Global Rating Scale of performance.(125) ▪ One older low-quality review examined team-training interventions used in the operating room and found that they can improve team-based outcomes, and as a result increase patient safety.(122) ▪ One recent medium quality review on interventions to reduce surgical adverse events found that medical team training significantly reduced post-operative adverse events.(123) ○ Enable remote monitoring following discharge from hospital <ul style="list-style-type: none"> ▪ One recent medium-quality systematic review on telemedicine for post-operative care found reductions for patients in terms of time, travel and cost without compromising clinical outcomes.(126) ○ Implement quality and safety monitoring systems <ul style="list-style-type: none"> ▪ One recent medium-quality review found that surgical safety checklists improve teamwork and communication in the operating room.(127) ▪ Similarly, one older low-quality review found that surgical safety checklists improve teamwork, collaboration and compliance with safety measures and reduce morbidity and mortality.(128)
Potential harms	<ul style="list-style-type: none"> • Delivery arrangements to support implementation <ul style="list-style-type: none"> ○ Ensure care pathways/packages of peri-operative care <ul style="list-style-type: none"> ▪ One recent medium-quality review reported two potential harms: 1) order sets decreased orders with a date and found an unintended increase in night-time sedation orders; and 2) increased frequency of corticosteroid therapy orders, which increased the number of patients experiencing hyperglycemia.(118) ○ Implement quality and safety monitoring systems <ul style="list-style-type: none"> ▪ One recent medium-quality review found that poor checklist usage can have dysfunctional effects on teamwork.(127)
Costs and/or cost-effectiveness in relation to the status quo	<ul style="list-style-type: none"> • Delivery arrangements to support implementation <ul style="list-style-type: none"> ○ Ensure care pathways/packages of peri-operative care <ul style="list-style-type: none"> ▪ One older medium-quality review found enhanced recovery pathways through the provision of optimal care using efficient practice.(120) ○ Enable remote monitoring following discharge from hospital <ul style="list-style-type: none"> ▪ One recent medium-quality systematic review on telemedicine for post-operative care found health-system savings, as telemedicine appointments freed up clinic appointments, improving access to surgical programs and decreasing wait times.

	<p>Patient savings were also reported in terms of travel times and costs, as well as associated savings in patients and families no longer having to take time off work.(126)</p>
<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"> ○ Governance arrangements to enhance system-wide accountability <ul style="list-style-type: none"> ▪ Overall, the evidence is mixed for public reporting, with one relatively recent medium-quality review suggesting that public reporting could lead to improvements in performance and patient outcomes,(112) and three other reviews – one recent, one older medium-quality review, and one recent low-quality review – reporting either mixed or limited evidence.(113-115)
<p>Key elements of the policy option if it was tried elsewhere</p>	<ul style="list-style-type: none"> ● Governance arrangements to enhance system-wide accountability <ul style="list-style-type: none"> ○ One recent low-quality review found that public reports should target providers and managers who have the power to change things.(115) ○ One older low-quality review suggested that the following elements are essential to a public reporting strategy: 1) clear objectives; 2) targets; 3) transparent and comprehensive content; 4) easy-to-use formats; and 5) wide distribution using a variety of approaches.(116) ○ A recent medium-quality review evaluated approaches for effectively presenting performance information to support patient decision-making and found that patient understanding and informed choices are best supported when information displays are less complex.(117) ○ The same review indicated that simplifying performance information can be achieved by presenting a small set of indicators, framing results in a positive direction, using non-technical language and presenting results in familiar contexts.(117) ● Delivery arrangements to support implementation <ul style="list-style-type: none"> ○ Improve teamwork and communication within surgical teams <ul style="list-style-type: none"> ▪ Within primary-care and rehabilitation settings, one recent high-quality systematic review found that health professional communication training had small effects on patients’ satisfaction and on pain and disability.(124)
<p>Stakeholders’ views and experience</p>	<ul style="list-style-type: none"> ● Delivery arrangements to support implementation <ul style="list-style-type: none"> ○ Improve teamwork and communication within surgical teams <ul style="list-style-type: none"> ▪ One recent high-quality systematic review found that health professional communication training in primary-care and rehabilitation settings had small effects on patients’ satisfaction and on pain and disability.(124) ○ Enable remote monitoring following discharge from hospital <ul style="list-style-type: none"> ▪ One recent medium-quality systematic review on telemedicine for post-operative care found that both patients and healthcare providers reported high satisfaction and ease of use with a range of modalities of telemedicine.(126)

Additional equity-related observations about the three elements

In our review of the synthesized research evidence, we found an older and medium-quality review which revealed that both pay-for-performance and public reporting may widen racial disparities in healthcare (through ‘cherry-picking patients’ who may help healthcare providers and hospitals score well, or avoiding those who may cause them to score poorly, or who may be racial minorities, in order to make their statistics look better).(131) Findings from this review suggest that we should be mindful about the potential implications of public-reporting programs, and the possible risk of widening disparities for older patients and patients with multiple chronic conditions requiring surgery.

IMPLEMENTATION CONSIDERATIONS

A number of barriers might hinder implementation of the three elements of a potentially comprehensive approach to taking a step towards achieving worry-free surgery, which need to be factored into any decision about whether and how to pursue any given element (Table 8). While potential barriers exist at the levels of providers, organizations and systems (if not patients/citizens, who are unlikely to be aware of or particularly interested in the specifics of these approach elements), perhaps the biggest barriers are the potential resistance to dropping unnecessary pre-operative testing, to standardizing care, and to monitoring and evaluating clinical practices (particularly if they involve public reporting and overly frequent changes to their practice).

Table 8: Potential barriers to implementing the elements

Levels	Element 1 – Strategies to support the implementation of optimal peri-operative risk assessment and management	Element 2 – Financial arrangements that support the implementation of optimal peri-operative risk assessment and management	Element 3 – Broader system arrangements that support the implementation of optimal peri-operative risk assessment and management
Patient/citizen	<p>Many patients/individuals share the belief that ‘more is better’ (i.e., more pre-operative testing may improve risk assessment and management, and lead to better outcomes), and could thus be resistant to dropping unnecessary routine testing (132)</p> <p>The majority of patients have a marked tendency to overestimate the benefits of medical interventions and underestimate harms (132)</p> <p>Patients/individuals are increasingly looking online to determine which investigations, treatments or procedures may benefit them and, as a result, may demand services that have been deemed overused and argue against the attempt to remove or limit these services</p> <p>Some patients may not feel sufficiently informed to properly contribute to this process</p>	<p>Some citizens may not think that providing additional financial compensation to health professionals for providing care that is aligned with current clinical-practice guidelines is warranted (133)</p>	<p>Some patients and their families may not initially feel comfortable with being followed remotely by their surgeon post-discharge, instead of through in-person appointments</p>
Provider	<p>Care providers rarely discuss the risks and harms of overuse with patients (132)</p> <p>Some care providers may feel reluctant to apply recommendations (such as those formulated by Choosing Wisely) if they have the impression that they will be unacceptable to patients (132)</p> <p>Surgical teams often do not see what happens after patients are discharged (no immediate feedback)</p> <p>Providers may view standardization efforts as an encroachment on their professional autonomy or scope of practice</p>	<p>Some care providers may view standardization efforts as a threat to their income</p> <p>Some providers may worry that the use of order sets, medical directives and rigid structures could lead to poor decision-making around peri-operative risk assessment and management</p>	<p>Some care providers may resist monitoring and evaluation, particularly if they involve public reporting and overly frequent changes to their practice</p> <p>Some providers may worry that the use of order sets, medical directives and rigid structures could lead to poor decision-making around peri-operative risk assessment and management</p>

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	<p>Some providers may not be aware of (or agree with) the services that have been identified as overused and they may view the service as necessary, which could be the result of many reasons such as publication bias (i.e., where they read mostly what should be done and not what shouldn't) or industry pressure where more is viewed as better</p> <p>Many providers prefer to be 'better safe than sorry' in providing services and therefore may further resist having limitations placed on the types of services that can be offered</p> <p>Some providers may worry that the use of order sets, medical directives and rigid structures could lead to poor decision-making around peri-operative risk assessment and management</p>		
Organization	<p>Some organizations may have competing interests and priorities and therefore may resist collaborating with such initiatives</p> <p>Some organizations may view such initiatives as requiring extra resources (e.g., shared decision-making requires more time with patients and hence more resources)</p> <p>Organizations do not have the same capacity to support the widespread implementation of guidelines (difference between large or academic institutions versus smaller or community hospitals)</p>	<p>Some organizations may resist financial changes if they do not believe they are feasible from a budgetary standpoint</p> <p>Organizations do not have the same capacity to support the widespread implementation of guidelines (a possible difference between large or academic institutions versus smaller or community hospitals)</p>	<p>Some organizations may resist monitoring and evaluation, particularly if they involve public reporting and overly frequent changes to their practice</p> <p>Some organizations may be experiencing fatigue (e.g., some organizations and their management may be tired of new ideas so there may be resistance to implementing another new initiative)</p> <p>Some organizations may not have the infrastructure to implement the necessary changes</p> <p>Organizations may perceive these initiatives as just another passing fad, and therefore may not invest energy in them</p> <p>Organizations do not have the same capacity to support the widespread implementation of guidelines (difference between large or academic institutions versus smaller or community hospitals)</p>
System	<p>Some health system leaders may not be aware of the issues and the potential negative outcomes of the overuse of unnecessary pre-operative testing</p> <p>Some system leaders may lack the political will to address the issues identified in this evidence brief</p>	<p>Some system leaders may not want to invest in a more rigorous and dynamic approach to financial incentives, which involves more rigorous monitoring and evaluation, and more time-limited uses of financial incentives</p>	<p>There is currently no clear commitment from system leaders to use some of these types of policy levers</p> <p>System-level strategies (e.g., province-wide implementation of surgical safety checklists) may fail if they do not address the local unique environment and specific culture of each organization (129; 130)</p>

On the other hand, a number of potential windows of opportunity could be capitalized upon (Table 9), which also need to be factored into any decision about whether and how to pursue one or more of the approach elements. These potential windows of opportunity include a growing focus in the province on improving patient safety, reducing the overuse of low-value healthcare services, and optimizing clinical practice.

Table 9: Potential windows of opportunity for implementing the elements

Type	Element 1 – Strategies to support the implementation of optimal peri-operative risk assessment and management	Element 2 – Financial arrangements that support the implementation of optimal peri-operative risk assessment and management	Element 3 – Broader system arrangements that support the implementation of optimal peri-operative risk assessment and management
General	<ul style="list-style-type: none"> • The growing awareness of and interest in improving patient safety puts pressure on health-system leaders and care providers to improve clinical practice.(8) • There is an opportunity to build on the tremendous activity to improve patient safety in Ontario and across Canada (including quality and patient safety councils in most provinces, leaders from regional authorities and hospitals, as well as many national organizations who dedicate all or part of their mandate to patient safety). • The overuse of low-value healthcare services (including unnecessary pre-operative testing) is an issue of national and international interest.(28; 47; 134) • The Excellent Care for All Act provides a legislative impetus to optimizing clinical practice based on data, evidence and guidelines.(135) • Ontario Deputy Minister of Health (Dr. Bob Bell) is a surgeon focused on using data to drive policy changes, which could help garner interest and action on this issue. • Ontario is home to some of the world’s best data, evidence, guideline and implementation ‘shops’ that can support clinical-practice optimization.(34) • The Department of Health Research Methods, Evidence, and Impact (McMaster University) identified “Achieving Worry-Free Surgery” as a key research theme to its central research strategy, with the aim of pursuing collaboration opportunities in this area to build evidence and impact from bench to bedside to policy, mobilizing new, better and innovative health research methods. 		
Element-specific	<ul style="list-style-type: none"> • The Canadian Cardiovascular Society Guidelines Committee and key Canadian opinion leaders called for up-to-date guidelines that used the GRADE system of evidence assessment for patients who undergo non-cardiac surgery.(2) • The Canadian Cardiovascular Society has committed to develop apps designed to facilitate the adoption of guidelines into daily clinical practice.(136) • Health Quality Ontario and Choosing Wisely Canada are working together to promote awareness among health professionals and the public about unnecessary investigations, treatments and procedures, in order to help them make informed choices and help ensure high quality care,(137) which could help garner further interest in addressing the issue in a more comprehensive manner. 	<ul style="list-style-type: none"> • Quality-Based Procedures in Ontario can be a stimulus for practice optimization. 	<ul style="list-style-type: none"> • Since 2015, Health Quality Ontario supports hospitals to improve surgical care in Ontario through the Ontario Surgical Quality Improvement Network, a forum in which surgical teams can discuss best practices, share local innovations, and discover ways of improving surgical care.(35) • Hospitals in Ontario increasingly use order sets for these purposes.

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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 surgery. 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 surgery.

All of the information provided in the appendix tables was taken into account by the evidence brief’s authors in compiling Tables 1-3 in the main text of the brief.

Appendix 1: Systematic reviews relevant to Element 1 - Strategies to support the implementation of optimal peri-operative risk assessment and management

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 surgery
Using relevant provider-targeted implementation strategies	Effect of practice guidelines and decision aids on use of surgery and regional variation (59)	This review focused on the literature evaluating the effect of practice guidelines and decision aids on use of surgery and regional variation. Of the 27 included studies, five evaluated population-based rates of procedures to examine the influence of guidelines on the decision to perform surgery; two of these studies indicated significant changes in rates reflecting guideline recommendations. Ten studies examined the influence of decision aids on population-based rates of surgery; three of these studies reported significant effects, however, the direction of influence varied according to the type of operation and clinical context. This variation was also present in studies that evaluated the impact of decision aids and shared decision-making programs in clinical practice. The types of procedures examined varied substantially, however, most studies that reported statistically significant outcomes observed decreases in rates of procedures based on guideline implementation.	2012	10/11 (AMSTAR rating from McMaster Health Forum)	3/27	0/27	27/27
	Effects of printed educational materials on professional practice and healthcare outcomes (51)	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.	2011	8/11 (AMSTAR rating from www.rxforchange.ca)	12/45	Not reported	2/45

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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 surgery
		<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>					
	<p>Effects of continuing education meetings and workshops on professional practice and healthcare outcomes (52)</p>	<p>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.</p>	<p>2006</p>	<p>10/11 (AMSTAR rating from McMaster Health Forum)</p>	<p>4/81</p>	<p>1/81</p>	<p>1/81</p>
	<p>Whether different factors influence the effectiveness of educational outreach visits (EOVs), and whether adding another 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 (53)</p>	<p>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 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</p>	<p>2007</p>	<p>8/11 (AMSTAR rating from www.rxforchange.ca)</p>	<p>1/69</p>	<p>1/69</p>	<p>0/69</p>

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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 surgery
		visits may be costly, the savings may outweigh the costs if the intervention is targeted at inappropriate prescribing and its effects are enduring.					
	Effects of audit and feedback on professional practice and healthcare outcomes (55)	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.	2007	8/11 (AMSTAR rating from www.rxfchange.ca)	11/140	Not reported	0/140
	Determine if auditing combined with systematic feedback of information on process and outcomes of care results in lower costs of surgical care (88)	This review focused on determining if auditing combined with systematic feedback of information on process and outcomes of care results in lower costs of surgical care. All of the six included studies showed a positive effect of surgical auditing on quality of healthcare. Cost savings were duly noted as well. These reductions ranged from \$16 to \$356 per patient for general or vascular procedures. The review therefore concludes that auditing may be of greater value when high risk procedures are evaluated, since the prevention of adverse events in such procedures may have high clinical and financial impact.	2013	3/10 (AMSTAR rating from McMaster Health Forum)	0/6	0/6	6/6

McMaster Health Forum

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 surgery
	Effects of on-screen, point-of-care computer reminders on processes and outcomes of care (56)	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.	2008	9/11 (AMSTAR rating from McMaster Health Forum)	1/28	0/28	0/28
	Examine the uses of smartphones and tablet devices in surgery (60)	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 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.	2014	6/10 (AMSTAR rating from McMaster Health Forum)	0/39	0/36	36/36
	Effects of tailored interventions to address barriers to change in health professional performance (57)	<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</p>	2009	No rating tool available for this type of document	Not applicable	Not applicable	Not applicable

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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 surgery
		<p>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>					
Engaging patients and the public in supporting change	Effects of interventions designed to support shared decision-making on health inequalities (61)	<p>Shared decision-making interventions evaluated by included studies include communication skills workshop or education sessions, coaching sessions targeted at patients or health professionals, computerized decision aids, video-based interventions to improve informed decision-making and shared decision-making, counselling sessions, booklet or DVD decision aids, and paper-based hand-outs promoting informed decision-making. Ten of 21 interventions studied were specifically targeted at disadvantaged groups. These interventions focused on issues such as cultural differences and literacy levels.</p> <p>The shared decision-making interventions studied had no significant effect on disadvantaged patients’ adherence levels, anxiety health outcomes, screening/treatment preferences, intentions or uptake. Pooling of study results found moderate positive effects of shared</p>	2012	10/11 (AMSTAR rating from McMaster Health Forum)	0/19	0/19	0/19

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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 surgery
		<p>decision-making interventions on knowledge, participation, decisional conflict and self-efficacy of disadvantaged populations.</p> <p>Seven studies compared the effects of interventions between high- and low-literacy groups. Results indicated that shared decision-making interventions appeared to benefit disadvantaged groups more than groups with higher literacy, education and socio-economic status. Interventions specifically tailored to the needs of disadvantaged groups appeared to be the most effective</p>					
	Shared decision-making interventions for people with mental health conditions (62)	There is limited research available on the effects of provider-, patient- or carer-directed shared decision-making interventions for people with mental health conditions. This review only found two studies, both of which involved the use of a patient decision aid combined with health professional education. Neither study reported significant effects on clinical outcomes or hospital rates. Effects of shared decision-making interventions on patient satisfaction were mixed. Neither study reported any harms related to shared decision-making interventions. While there is no evidence of harm, there is insufficient evidence to support changes to clinical practice.	2008	10/10 (AMSTAR rating from McMaster Health Forum)	0/2	1/2	0/2
	Interventions for improving the adoption of shared decision-making by health professionals (63)	<p>Studies that used outcome measures reported by observers to evaluate shared decision-making interventions showed that interventions targeting both patients and providers had a positive effect compared to usual care and compared to interventions targeting patients alone. Studies comparing interventions targeting health professionals with usual care reported that shared decision-making interventions had a positive effect.</p> <p>The low quality of evidence identified by this review makes it difficult to evaluate whether shared decision-making interventions are effective. However, the findings of this review suggest that any intervention that targets patients, providers or both is more effective than no intervention.</p>	2009	9/10 (AMSTAR rating from McMaster Health Forum)	7/39	0/39	0/39
	Patients' perceptions of sharing in decisions: A systematic review of interventions to enhance shared decision-making in	This systematic review evaluated the effectiveness of interventions to improve health professionals' adoption of shared decision-making in routine clinical practice, as seen by patients. Only three of the 21 included studies found clinically significant effects for shared decision-making interventions that favoured the intervention examined. These three studies were the only ones that involved multifaceted interventions including both health professional education and a patient-mediated intervention (i.e., patient decision aid). This finding	2009	7/11 (AMSTAR rating from McMaster Health Forum)	4/21	1/21	2/21

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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 surgery
	routine clinical practice (65)	suggests that, from the perspective of patients, interventions that target both the health professional responsible for sharing a decision with the patient, and also the patient, are promising options to enhance shared decision-making in routine clinical practice.					
	Tools to promote shared decision-making in serious illness (66)	<p>Tools identified in this review address advance care planning, palliative care and goals of care communication, feeding options in dementia, lung transplant in cystic fibrosis, and truth telling in terminal cancer. Tools to promote shared decision-making can be used to inform future decisions through advance care planning, or to support immediate treatment decisions.</p> <p>The two advance care planning tools supported by the strongest evidence are a video advance care planning tool to assist in discussions of treatment preference with patients with advanced dementia, and an advanced directive documentation guide designed for patients with low health literacy and available for free on the internet. Both tools had effects on clinical decisions. The evidence identified in this review supports several tools geared toward shared decision-making in immediate clinical choices. The majority of these tools were shown to improve knowledge, and select tools changed actual treatment decisions.</p>	2014	6/10 (AMSTAR rating from McMaster Health Forum)	1/38	6/38	1/38
	Experience with shared decision-making programs in VA shared decision-making programs for prostate care (67)	Shared decision-making programs (SDPs) are videos designed to educate patients and involve them in the decision-making process. The evidence on the impacts of SDPs on treatment preferences for prostate care is limited. Patients enrolled in the two included studies demonstrated improved knowledge about prostate cancer after viewing the SDP. In one study, patients reported improved health and physical functioning, improved knowledge about the risks and benefits of different treatment options, and were more satisfied with their decision-making process.	1997	4/9 (AMSTAR rating from McMaster Health Forum)	0/2	0/2	1/2
	Health professionals' perceptions of the barriers and facilitators to implementing shared decision-making in clinical practice (68)	The majority (89%) of participants in included studies were physicians. The most frequently reported barriers to implementing shared decision-making in clinical practice were time constraints, lack of applicability due to patient characteristics, and lack of applicability based on the clinical situation. The most frequently reported facilitators to implementing shared decision-making in clinical practice were healthcare provider motivation, their perception that putting shared decision-making into practice would lead to improved clinical processes, and their perception that putting shared decision-making into practice would lead to improved patient outcomes.	2006	6/10 (AMSTAR rating from McMaster Health Forum)	6/38	4/38	0/38

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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 surgery
	Efficacy of different decision aid tools compared to regular care for women facing several options in the specific field of obstetric care (69)	<p>The review found that all decision aid tools, except for Decision Trees, facilitated significant increases in knowledge.</p> <p>The computer-based information tool, the decision analysis tools, individual counselling and group counselling interventions presented significant results in reducing anxiety levels.</p> <p>The Decision Analysis Tools and the Computer-based Information tool were associated with a reduction in levels of decisional conflict.</p> <p>The Decision Analysis Tool was the only tool that presented evidence of an impact on the final choice and final outcome.</p> <p>Decision aid tools can assist health professionals in providing information and counselling about choices during pregnancy, and support women in shared decision-making.</p> <p>The review suggested that the choice of a specific tool should depend on resources available to support their use, as well as the specific decisions being faced by women, their healthcare setting and providers.</p>	2010	7/11 (AMSTAR rating from McMaster Health Forum)	2/10	0/10	0/10
	Evaluate the effect of practice guidelines and decision aids on use of surgery and regional variation (59)	Of the 27 included studies, five evaluated population-based rates of procedures to examine the influence of guidelines on the decision to perform surgery; two of these studies indicated significant changes in rates reflecting guideline recommendations. Ten studies examined the influence of decision aids on population-based rates of surgery; three of these studies reported significant effects, however, the direction of influence varied according to the type of operation and clinical context. This variation was also present in studies that evaluated the impact of decision aids and shared decision-making programs in clinical practice. The types of procedures examined varied substantially, however, most studies that reported statistically significant outcomes observed decreases in rates of procedures based on guideline implementation.	2012	10/11 (AMSTAR rating from McMaster Health Forum)	3/27	0/27	27/27
	Effects of different types of personalized risk communication for consumers making decisions about	There was little evidence to suggest that personalized risk communication (written, spoken or visually presented) increases uptake of screening tests, or promotes informed decision-making by patients. In three studies, personalized risk communication interventions lead to a more accurate risk perception, and three other trials reported that interventions lead to increased knowledge. More	2007	10/11 (AMSTAR rating from McMaster Health Forum)	1/41	0/41	1/41

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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 surgery
	taking screening tests (70)	detailed personalized risk communication (i.e., those which present numerical calculations of risk) may be associated with a smaller increase in uptake of tests.					
	Effectiveness of cancer-related decision aids (71)	<p>Thirty-four randomized controlled trials (RCTs) of decision aids were identified for use in screening or prevention and treatment of cancer.</p> <p>Decision aids were found to significantly improve knowledge about screening as well as preventive/treatment options as compared to usual practice.</p> <p>General anxiety was not increased in most trials and was significantly reduced in a screening context.</p> <p>Decision-related conflict was reduced, but not when screening and preventive/treatment studies were analyzed separately.</p>	2007	4/11 (AMSTAR rating from McMaster Health Forum)	5/34	1/34	3/34
	Efficacy of different decision-aid tools compared to regular care for women facing several options in the specific field of obstetric care (72)	<p>Decision aids increase patient involvement, and improve knowledge and realistic perceptions of outcomes.</p> <p>Patients exposed to decision aids with explicit values clarification versus those without explicit values clarification were better informed and achieved decisions more consistent with their values.</p> <p>Decision aids, compared to typical care interventions, resulted in lower decisional conflict related to feeling uncertain about personal values and feeling uninformed, and reduced the number of passive patients in decision-making and those left feeling undecided post-intervention.</p> <p>In the four studies that measured this outcome, decision aids positively affected patient-practitioner communication.</p>	2010	9/11 (AMSTAR rating from McMaster Health Forum)	Not Reported in detail – description states: Australia; Canada; China; Finland; Netherlands ; U.K.; U.S.	0/10	0/10
	To evaluate the effects of attribute framing (positive versus negative) and goal framing (gain versus loss) of the same health information, on understanding, perception of	Attribute framing in a positive manner caused more positive perceptions of effectiveness than negatively-framed messages, but did not cause a change in persuasiveness of the message. For screening messages, loss messages led to a more positive perception of effectiveness than gain messages.	2007	10/11 (AMSTAR rating from McMaster Health Forum)	Not Reported	1/34	2/34

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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 surgery
	effectiveness, persuasiveness, and behaviour of health professionals, policymakers and patients (73)						
	Effectiveness of interventions that provide patients with cancer risk and cancer screening information tailored to their personal attributes (74)	<p>Tailored information regarding cancer risk and screening led to increased cancer risk perception and knowledge of breast cancer compared to generic information.</p> <p>There is limited evidence to suggest that a website tailored for risk factors would be effective</p>	Not Reported	7/11 (AMSTAR rating from McMaster Health Forum)	0/40	1/40	1/40
	Overview of the impact on risk perception accuracy of genetic counselling (75)	<p>Overall, studies found that an increased proportion of individuals correctly perceived their risk after counselling rather than before, and those who did not had smaller deviations from their objective risk than before counselling.</p> <p>The positive effects were sustained at follow-up one year later.</p> <p>Some studies observed no impact at all, or only observed an impact for low-risk participants.</p>	2007	5/9 (AMSTAR rating from McMaster Health Forum)	Not Reported	0/9	1/9
Developing mass-media campaigns to raise awareness	Effectiveness of online social network health behaviour interventions (77)	<p>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).</p>	2014	8/10 (AMSTAR rating from McMaster Health Forum)	0/10	0/10	0/10

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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 surgery
		Overall, there is only modest evidence suggesting interventions involving online social networks are effective to achieve health behaviour change.					
	Effectiveness of mass-media interventions for HIV prevention (78)	<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 (79)	<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).</p> <p>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 (80)	<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</p>	2011	6/10 (AMSTAR rating from McMaster Health Forum)	Not reported in detail	2/16	0/16

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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 surgery
		<p>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> <p>Overall, the evidence supporting stand-alone mass-media campaigns for physical activity increases is modest, inconsistent and insufficient to truly determine efficacy.</p>					
	Examining effectiveness of online interventions to achieve population-wide change in voluntary lifestyle behaviours (81)	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 (82)	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	1/66	0/66
	Examining the use of social media by health professionals and trainees (83)	Discussion forums were the most commonly studied tools (43/96; 44.8%). Many studies included the social-media tool as part of a complex intervention, or utilized a pre-existing tool (e.g., Facebook, YouTube, Twitter). The majority of the tools were based in an educational setting (n=66), or professional setting (n=18). Administration, critical appraisal, research and public health appeared most often in terms of common specialties. Most tools aimed to facilitate communication (59/96, 61.5%) or improve knowledge (41/96, 42.7%), and measured outcomes related to health professionals' experiences, including satisfaction levels, degree/type of communication, and professional behaviours. The most commonly measured outcome was peer-to-peer communication. The majority of studies were quantitative and cross-sectional in nature.	2012	4/9 (AMSTAR rating from McMaster Health Forum)	Not reported in detail	0/284	0/284

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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 surgery
		<p>Among 13 quantitative studies evaluating social-media-tool efficacy, 12 studies involved a positive value associated with the intervention, although only six reported statistically significant findings for the primary outcome. Among qualitative studies evaluating social-media tools (n=21), the majority evaluated communication facilitation using discussion forums in nursing education settings.</p> <p>These findings suggest that social media use by health professionals and trainees is widespread, particularly in education settings</p>					

Appendix 2: Systematic reviews relevant to Element 2 – Financial arrangements that support the implementation of optimal peri-operative risk assessment and management

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 surgery
Using patient-, provider- and/or organizational-targeted financial incentives	Examine the effects of pay-for-performance in healthcare (90)	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)
	Interventions to improve safe and effective medicines use by patients (91)	<p>Seventy-five reviews were included, and focused on interventions with diverse aims, including behaviour change support, risk minimization and skills acquisition. While no single strategy was found to improve all medicine-use outcomes across all diseases, populations or settings, medicines self-monitoring and self-management programs, simplified dosing regimens and directly involving pharmacists in medicine reviews appeared to be effective strategies. Delayed antibiotic prescriptions, practical management tools such as reminders and packaging, education or information combined with self-management skills training, counselling or other such strategies, and financial incentives were also associated with some positive effects, although effects were less consistent. Some strategies (e.g., directly observed therapy), providing information or education alone, were found to be relatively ineffective or to have variable effects (e.g., ineffective on medicine adherence, but improving knowledge for informed medicines choices).</p> <p>Based on several studies, the authors concluded that there was some evidence supporting the effectiveness of financial incentives in terms of adherence, although with mixed results. Two studies suggested that financial incentives targeting physicians were found to increase immunization rates. Three reviews investigated financial incentives targeting patients for immunization uptake, and found mixed results: one reported improved immunization uptake, although a smaller effect than with organizational change interventions; another showed non-significant changes with both financial incentives and with complex health-systems interventions including patient financial incentives; and a third showed significant increases compared to no</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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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 surgery
		intervention or telephone calls or prompts, but not other interventions. One review also suggested increased medicines adherence or uptake with financial incentives.					
	Effectiveness of cash or voucher financial incentives for simple and complex health behaviour change in high-income countries (92)	<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	2/16	0/16
	Incentives for improving human resource outcomes in healthcare (96)	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 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	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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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 surgery
		<p>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>					
	Examining the impact of financial incentives on health professional behaviour and patient outcomes (97)	Overall, researchers concluded that payment for service, payment for providing care for a patient or specific population, payment for providing a pre-specified level of care or providing change in activity or quality of care, were effective. Mixed results were obtained for mixed or other system interventions, and payment for working for a specified time period was generally ineffective. Financial incentives were found to be effective in improving processes of care, referrals and admissions, and prescribing costs. They showed mixed effects for consultation or visit rates, and they were found to be generally ineffective in promoting compliance with guidelines. However, these results should be treated with caution due to the low to moderate quality of evidence of the studies included in each review.	2010	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 pay-for-performance schemes targeting individual	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	2012	9/10 (AMSTAR rating from McMaster)	1/30	2/30	0/30

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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 surgery
	healthcare providers for improving quality of patient care and patient-relevant outcomes (98)	<p>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 insufficient to support its adoption, and its efficacy on quality of care and patient relevant-outcomes remains uncertain.</p>		Health Forum)			
	Effects of financial incentives on the quality of healthcare provided by primary-care physicians (99)	<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</p>	2009	10/10 (AMSTAR rating from McMaster Health Forum)	0/7	0/7	0/7

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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 surgery
		<p>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>					
	<p>Interventions for supporting nurse retention in rural and remote areas (100)</p>	<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. 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</p>	<p>2012</p>	<p>No rating tool available for this type of document</p>	<p>n/a (includes reviews, not single studies)</p>	<p>n/a (includes reviews, not single studies)</p>	<p>n/a (includes reviews, not single studies)</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 surgery
		<p>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 (101)</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>1/14</p>	<p>0/14</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 surgery
		<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 (102)</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>2014</p>	<p>2/9 (AMSTAR rating from McMaster Health Forum)</p>	<p>Not reported in detail. Most from U.S. and U.K.</p>	<p>1/27</p>	<p>0/27</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 surgery
		<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 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 (103)	<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</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)

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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 surgery
		<p>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>					
	<p>Effectiveness of existing mechanisms to integrate medical care quality and safety into healthcare pricing and funding arrangements (104)</p>	<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 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</p>	<p>Not reported in detail</p>	<p>6/10 (AMSTAR rating from McMaster Health Forum)</p>	<p>Not reported in detail – Description states: Canada, Australia, New Zealand, U.S., U.K.</p>	<p>Not reported in detail</p>	<p>Not reported in detail</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 surgery
		<p>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 pay-for performance on clinical efficacy, access and equity, coordination and continuity, patient-centredness and cost-effectiveness (105)</p>	<p>Congruent with previous evidence on the pay-for-performance scheme in primary- or acute-care settings, the review suggested that clinical effectiveness results from 47 studies suggested a general improvement of 5% in clinical effectiveness was observed. While positive effects were reported in diabetes, asthma and smoking cessation, the scheme most frequently failed to affect acute care. Effects on non-incentivized quality measures varied greatly. One study also suggested a potential positive spillover effect as well.</p> <p>Twenty-eight studies supported the notion that the pay-for performance scheme did not have negative effects on patients belonging to certain age groups, ethnic groups, comorbid statuses or socio-economic statuses. Before-and-after studies without control groups have provided some support for positive effects with coordination of care, although a time-series study suggested no effect and a potential negative spillover effect as well. In terms of patient-centredness, two studies found no effect (potentially due to a ceiling effect), while one found positive effects. Cost-effectiveness of pay-for-</p>	<p>2009</p>	<p>7/10 (AMSTAR rating from McMaster Health Forum)</p>	<p>2/128</p>	<p>1/128</p>	<p>8/128</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 surgery
		<p>performance schemes was confirmed by four studies, although health gain findings were varied.</p> <p>Findings suggested that purely positive financial rewards generate more positive effects than competition-based incentives with winners and losers. Fixed threshold and continuous scale rewards for target achievements or improvements have both been found to have positive effects in some studies, and no or mixed effects in others. In general, positive effects are clearly larger in initially low performers with significant room for improvement, relative to already high performers. Programs aimed at the individual provider and/or team level(s) generally reported positive results; programs aimed at hospitals generally reported smaller positive effects. While a combination of incentives at different target units was rarely used, two studies reported positive results.</p> <p>As per the findings of this review, 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.</p>					
	<p>Effectiveness of behaviour change interventions to encourage generic drug prescriptions in the U.K. National Health Service and similar settings (106)</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 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,</p>	2013	No rating tool available for this type of document	0/23	0/23	0/23

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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 surgery
		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.					
Modifying case-mix funding for peri-operative care services to reflect optimal peri-operative care pathways	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 (109)	<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
	Examine the impact of activity-based funding of hospitals on mortality, severity of illness and volume of care (107)	<p>This review focused on assessing the effect of activity-based funding (ABF) on mortality rates, discharge rates following hospitalization, severity of illness and volume of care.</p> <p>The review found consistent and robust differences between ABF and no-ABF in discharge to post-acute care, showing a 24% increase with ABF. Results also suggest a possible increase in readmission with ABF, and an apparent increase in severity of illness (perhaps reflecting differences in diagnostic coding). Although the review found no consistent, systematic differences in mortality rates and volume of</p>	2012	10/11 (AMSTAR rating from McMaster Health Forum)	0/65	9/65	Not reported in detail

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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 surgery
		<p>care, results varied widely across studies, some suggesting benefits from ABF, and others suggesting deleterious consequences.</p> <p>The review concludes by stating that the available evidence does not demonstrate a consistent impact of ABF on mortality in either acute or post-acute care. The most notable finding was a large increase in admissions to post-acute care (PAC) after a hospital stay; however, these results were limited to the U.S.</p>					
	Examine the effect of bundled payment on healthcare spending and quality (108)	<p>The review included 58 studies that examined 20 different bundled-payment interventions. Bundled payment was defined as a method in which payments to healthcare providers are based on the predetermined expected costs of a grouping of related healthcare services. Bundled-payment interventions may aggregate costs over time within a single provider, aggregate costs across providers, and/or involve warranties where costs of complications are rolled into a single payment. Bundled payments may create financial incentive for providers to decrease the number and cost of services included in the bundle.</p> <p>The review found that the transition from a cost-based or fee-for-service reimbursement to bundled payment was generally associated with a decline in spending of 10% or less. Additionally, bundled payment was associated with a decrease in utilization of services included in the bundle, demonstrated through reductions in length of stay or use of specific services. Most of these reductions were between 5% and 15%. There were inconsistent and mixed findings on the effect of bundled payment on quality measures.</p> <p>Only a few studies included analyses of differential effects by key contextual factors. There was low-quality evidence that for-profit providers generally experienced larger declines in utilization under bundled payment than their non-profit counterparts. Additionally, providers with greater financial pressure had greater reductions in utilization. None of the studies included analyses of differential effects by key design factors.</p>	2011	10/11 (AMSTAR rating from McMaster Health Forum)	2/58	Not reported in detail	Not reported in detail
	Leaders' experiences and perceptions implementing activity-based	All of the included studies focused on leaders' experiences with implementing organizational incentives, but none clearly described 'how' funding models were implemented.	2013	8/9 (AMSTAR rating from McMaster)	0/14	1/14	0/14

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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 surgery
	funding and pay for-performance hospital funding models (101)	<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>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</p>		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 surgery
		groups/committees, increasing interprofessional communication and interaction, and sharing data collection personnel, protocols and tools.					

Appendix 3: Systematic reviews relevant to Element 3 – Broader system arrangements that support the implementation of optimal peri-operative risk assessment and management

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 surgery
Governance arrangements to enhance system-wide accountability	Evaluating the effectiveness of public reporting of healthcare quality as a quality-improvement approach (112)	The report found that public reporting is associated with improvement in healthcare performance. Nineteen medium-quality studies that focused on public reporting in hospitals found a decrease in mortality. Among 19 high-quality studies that involved health plans and long-term care, there was generally a positive impact on patient outcomes (i.e., satisfaction with care, reduced pain). Studies that examined harms (i.e., reduced access to services and patient engagement) resulting from public reporting found more evidence of no harm than evidence of harm. In one study, there was an increase in mortality that was attributed to public reporting. Thirteen low-quality studies found that public reporting does not contribute to reduced access for patients. Ten studies showed that healthcare providers made positive changes after public reports, including offering new services, policy changes, and participating in quality-improvement activities. Forty-seven medium-quality studies found little to no impact of public reporting on the selection of healthcare providers by patients or their caregivers. The qualitative studies indicate public reports may not have been readily accessible to patients when they were selecting healthcare providers. The characteristics of public reports and the context were rarely described among the quantitative studies. One study found that the communication method affected the use of public reports. The report’s findings indicated that public reports have more of an	2011	7/10 (AMSTAR rating from McMaster Health Forum)	2/198	5/198	22/198

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		impact in competitive markets, and that improvements are more likely among providers with lower ratings in initial public reports.					
Examining the impact of public reporting on patient outcomes and disparities (113)		Three studies in nursing homes assessed quality measures and found improvements in measures of pain, delirium and activities of daily living. There is limited evidence that public reporting has a favourable effect on outcomes in nursing homes. Two of the 14 studies conducted in hospitals showed positive effect on patient outcomes (i.e., reduced mortality rates, general quality of care). The remaining studies showed no effect or a mixed effect. The review found no studies that focused on the effect of public reporting in the outpatient setting.	2013	7/10 (AMSTAR rating from McMaster Health Forum)	0/25	7/25	8/25
Examining the effects of public reporting on patient care to promote quality of care (114)		Overall, there is mixed evidence on the impact of public reporting in improving patient outcomes, while the impact on improving patient safety and patient-centredness remains relatively unknown. Eight studies found mixed results on the effects of public reporting on selection of health plans. Some studies found that individuals were willing to switch their current health plans to a higher patient-rated health plan. Nine studies found that publicly reporting performance data did not affect selection of hospitals by individuals. However, 11 studies found an increase in quality-improvement activity due to releasing performance data to the public. There is mixed evidence for using publicly released performance results to improve outcomes (i.e., effectiveness, patient safety, patient-centredness, decrease in mortality rates). Five studies found that publicly released performance data affected patients' choice of providers. Individuals were less likely to select a provider with higher published mortality rates. Some studies indicated that public reporting may cause unintended consequences such as reluctance among surgeons to operate on high-risk patients for fear of receiving low ratings.	2006	5/11 (AMSTAR rating from McMaster Health Forum)	0/45	1/45	13/45
Examining the factors associated with dissemination of performance information and continuous improvement (115)		The review focused on potential factors that are associated with the dissemination of performance information in health organizations. Dissemination is not enough to produce improvement initiatives, but depends on the cohesion of interrelated factors, which include: context of governance; organizational context of potential users; nature of knowledge; and processes and incentives. Coherence is an important factor on the dissemination of performance information, as organizations that value cumulative knowledge-based changes are more likely to succeed. Producers of knowledge and potential users play a key role in dissemination of performance information. Knowledge producers play a key role through their leadership and credibility during knowledge dissemination and in providing user support. Potential	2010	3/9 (AMSTAR rating from McMaster Health Forum)	Not reported in detail	0/19	0/19

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	<p>users are important to develop user capacity to interpret the information and apply changes.</p> <p>The review suggests that managers and health professionals are the preferred beneficiary of performance information due to their key roles in a health system.</p> <p>The review suggests that it is preferable to use more than one incentive, but also to ensure balance between the incentives used, and ensure that they are in line with the context of system governance.</p>					
Identifying successful key factors of an effective reporting program (116)	<p>The report identified six key components of effective public reporting programs: objective(s), audience, content, products, distribution and impacts (intended and unintended). The authors suggested that the objectives of public-reporting programs should include accountability, quality improvement and patient choice. The view of accountability sees citizens as active participants in health-systems transformation. For quality improvement, there is mixed evidence on whether making reports public has a greater impact. Patient choice is more applicable to market-based healthcare systems rather than publicly funded healthcare. The audience of public reporting is key to developing the remaining components. Five studies indicated that reports that are intended to promote quality improvement should be targeted to healthcare organizations that can bring about changes.</p> <p>The content of public reporting may need to address the level of aggregation in reports, limitations of existing data, usefulness, and context for providers and healthcare organizations that can be acted on directly. The product must reduce cognitive effort for citizens (i.e., visual cues, readable text size) and address the needs of multiple audiences. Distribution encompasses paper reports, websites and news media; however, there is little evidence in the literature that describes which method of distribution is more effective. Direct engagement may get information and key messages distributed, without the use of traditional reporting material. The authors found no studies to evaluate effective accountability. Three studies found improvement among quality measures (i.e., number of health regions that are using a report in their planning, number of referenced journal citations, number of media stories) after the implementation of public reporting.</p>	Not reported	2/9 (AMSTAR rating from McMaster Health Forum)	1/13	2/13	3/13
Examining the effects of pay-for-performance and public reporting on	<p>In this review, only one empirical study provided data on how pay-for-performance and public reporting programs may have a neutral, narrowing or widening effect on racial disparities in healthcare. A major public-reporting program</p>	2006	4/9 (AMSTAR rating from	0/1	0/1	1/1

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	racial disparities in healthcare (131)	increased disparities in coronary artery bypass graft rates. Interviews with leaders of 15 major performance incentive programs in the United States indicated that current programs are not designed to reduce disparities, and often lack characteristics that may be important in reducing disparities.		McMaster Health)			
	Examining what is known about the effective presentation of healthcare performance information for patient decision-making (117)	In this review, it was found that among 31 articles, patients better understand and make more informed choices when information regarding healthcare performance (costs and quality) is displayed in a less complex manner. This can be achieved by displaying results in a positive direction and using non-technical language. Using recognizable graphics and limiting the amount of information presented, while not a prescriptive measure, can enhance presentation and improve patient confidence in shared decision-making.	2013	5/10 (AMSTAR rating from McMaster Health Forum)	0/31	1/31	1/31
Delivery arrangements	Examining the effectiveness of order sets in improving guideline adherence, treatment outcomes, processes of care, efficiency, and cost (118)	This review focused on the effectiveness of order sets in improving guideline adherence, treatment outcomes, processes of care, efficiency and cost. Of the 18 studies included in this review, no randomized controlled trials were found. There were no inconsistencies between the results reported by studies involving different types of order sets. While the studies suggested generally positive outcomes, they were of low quality, and warrant further investigation.	2009	6/10 (AMSTAR rating from McMaster Health Forum)	3/18	1/18	0/18
	Examining the effectiveness of order sets in improving guideline adherence, diagnosis and treatment outcomes, processes of care, efficiency or cost (119)	This analysis sought to determine whether order sets are effective tools in improving guideline adherence, diagnosis and treatment outcomes, processes of care, efficiency or cost. Of the 22 studies included in this review, no randomized controlled trials were found. While the studies generally suggested generally positive outcomes in terms of increased levels of compliance for both diagnosis and treatment through the use of order sets, the evidence obtained was of low to very-low quality, and warrants further investigation.	2009	7/10 (AMSTAR rating from McMaster Health Forum)	2/22	Not reported in detail	2/22
	Examining governance models for integrated primary/secondary care (138)	This review focused on understanding the elements of current integrated primary and secondary healthcare and how they support integrated healthcare governance. Individual adaptation of healthcare systems is not enough to produce cohesive and easily navigable health systems. Rather, this depends on combining secondary care with primary-care organizations to coordinate health services within sectors. Ten elements of integrated governance models were identified in the literature: 1) joint planning; 2) integrated information-communication technology; 3) change management; 4) shared clinical priorities; 5) incentives; 6) population focus; 7) measurement	2012	5/9 (AMSTAR rating from McMaster Health Forum)	4/21	2/21	0/21

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	<p>by using data as a quality improvement tool; 8) continuing professional development supporting the value of joint working; 9) patient/community engagement; and 10) innovation.</p> <p>The review suggests that the adoption and use of electronic health records will cost before it pays, but will be pivotal to managing performance and quality across the healthcare system. Complex funding divides between primary- and secondary-care systems continue to be problematic for integrated care in industrialized nations. Furthermore, current literature lacks empirical evidence that integration at scale across primary/secondary care provides the clinical, financial and system benefits it aspires to achieve.</p>					
Examining the effectiveness of interventions to improve handovers in surgery and assessing compliance of described methodologies with the guidelines of the Joint Commission for design and implementation of handover improvement tools (139)	<p>This review focused on the largely unstructured process of patient handover between clinical teams in peri-operative care and interventions to improve handovers in surgery and assess compliance with guidelines set by the Joint Commission.</p> <p>All reviewed studies indicate some degree of improvement in handover based on the implementation of computerized checklists, proformas and other operating protocols.</p> <p>1) Standardization of critical content, 2) Hardwiring hospital systems with standardized tools (such as checklists), 3) Allowing opportunities to ask questions, 4) Reinforcing quality measures through audits, and 5) Education in the conduct of handovers were termed the “SHARE” framework. Compliance with the SHARE model was found to be highly variable, despite existing evidence for surgical checklists.</p>	2013	7/10 (AMSTAR rating from McMaster Health Forum)	1/19	0/19	18/19
Examining the effectiveness of enhanced recovery pathways in improving health outcomes and resource utilization (120)	<p>The analysis focused on enhanced recovery pathways (ERP) to reduce morbidity and improve the effectiveness of care in colorectal surgery. ERP consists of evidence-based appraisals of all interventions performed in an episode of care, and have been associated with reductions in durations of hospital stays, re-operations and mortality. ERP includes a 20-step model of standardized peri-operative care.</p> <p>Adherence to ERPs have been found to achieve improvements in the quality of care by standardizing healthcare processes and optimizing the use of healthcare resources. The analysis recommends the routine use of ERPs following colorectal and gastrointestinal surgical procedures.</p>	2010	7/11 (AMSTAR rating from McMaster Health Forum)	0/6	Not reported in detail	Not reported in detail
Examining the effectiveness of regional collaborations as a	<p>This review focused on identifying regional collaborations in surgical practices related to quality improvement.</p>	2006	4/11 (AMSTAR rating from McMaster	0/7	0/7	7/7

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	<p>tool for quality improvement in surgery (140)</p>	<p>Communities of practice were established in the studies selected for review. Success criteria among these communities of practice included: 1) the establishment of trust among health professionals and institutions; 2) the availability of accurate and complete data related to trends in patient mortality and quality of care respective to different types of surgical procedures; 3) clinical leadership; 4) institutional commitment to fostering a community of practice to improve health outcomes; and 5) training and methodological support for quality management from national, state or regional multidisciplinary institutions.</p> <p>The review suggests that quality control in surgery is feasible and can be successful in improving outcomes for patients and in developing professional multidisciplinary networks. It suggests that, at the regional level, collaborations that follow the aforementioned success criteria benefit from a community of practice framework that links organizational quality management with professional-development culture.</p>		<p>Health Forum)</p>			
	<p>Examining team training interventions and their effects on communication within the operating room (OR) (122)</p>	<p>The focus of this review was to assess team training interventions and their effects on communication within the OR. All 12 studies included in this review found statistically significant before-and-after improvements in team practices and in some secondary outcome measures such as reduced complication rates following training interventions.</p> <p>The review found that training interventions have utility in enhancing team communication and unit cohesion. However, interventions developed in response to specific OR contexts and operational cultures are more likely to become embedded in clinical practice.</p>	<p>2009</p>	<p>2/9 (AMSTAR rating from McMaster Health Forum)</p>	<p>1/12</p>	<p>Not reported in detail</p>	<p>Not reported in detail</p>
	<p>Describing the tools available to assess team effectiveness in obstetric emergencies (125)</p>	<p>This review focused on the use of specific assessment tools to evaluate teamwork during obstetric emergencies.</p> <p>Six of the 13 studies included anesthetists in the simulated emergencies. Five studies evaluated teamwork through reliability measures (using independent inter-rater agreement), one study used only validity measures and statistical measures with generic scores, and one study used both reliability and validity measures.</p> <p>The review suggests that, of all models used to evaluate teamwork and performance during obstetric emergencies, the Clinical Teamwork Scale (CTS), Global Assessment of Obstetric Team Performance (GAOTP) and Global Rating Scale of performance (GRS) were the most reliable. However, the lack of quality of</p>	<p>2016</p>	<p>5/10 (AMSTAR rating from McMaster Health Forum)</p>	<p>2/13</p>	<p>0/13</p>	<p>3/13</p>

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		evidence in the studies conducted suggests more research needs to be done to establish the validity of teamwork tools for non-technical skills.					
Identifying and describing the strategies and processes used by multidisciplinary teams of healthcare professionals to reduce surgical site infections (121)	<p>This review focused on identifying the strategies and processes used by various healthcare teams to reduce surgical site infections (SSI).</p> <p>Multidisciplinary team-based approaches were analyzed. These included: 1) using a bundled approach (best practices from which up to five elements are undertaken as complete activities that are diligently implemented); 2) sharing responsibility (whereby team collaborations are circumscribed by predetermined roles based on profession); and 3) adhering to best practices.</p> <p>The review suggests that all studies, and particularly those which adhered to guidelines alone, overlooked the involvement of allied health professionals, such as dietitians, in preventing SSI. As such, it did not recommend a single team-based approach to preventing SSI, but instead acknowledged the lack of involvement of allied health professionals in crafting guidelines and implementing preventive action.</p>	2015	6/9 (AMSTAR rating from McMaster Health Forum)	1/13	0/13	13/13	
Examining the effectiveness of communication-skills training for health professionals on patients' clinical outcomes in primary-care and rehabilitation settings (124)	<p>This review focused on investigating the effectiveness of communication-skills training for health professionals on clinical outcomes in primary and rehabilitation care.</p> <p>Sixteen of the included randomized controlled trials focused on communication training that emphasized patient participation through shared decision-making. Among these studies, it was found that training had both a minor beneficial effect on patients' satisfaction with care compared to controls, and minor beneficial effects on pain and disability. The evidence for these findings, although statistically significant, is of low quality according to the GRADE system.</p> <p>The review suggests that communication training does not always equate with improvements in skills and improved patient outcomes. Variables that affect this process are complex and patient outcomes may not be the best benchmark to investigate the effectiveness of communication training.</p> <p>The review also suggests that rapport-building, agenda setting and acknowledging social and emotional concerns are avenues to building communication skills. However, given that many health professionals may already have adequate communication skills, large improvements in future trials are unlikely to be seen with additional training.</p>	2015	8/11 (AMSTAR rating from McMaster Health Forum)	0/19	1/19	1/19	

Taking a Step Towards Achieving Worry-free Surgery in Ontario

<p>Examining the effectiveness of interventions in reducing adverse events in surgery (123)</p>	<p>This review examined interventions used to reduce adverse events in surgery, and demonstrated a measurable decrease in morbidity and mortality.</p> <p>Only 17 of 42 medium- to high-quality studies reported interventions that produced significant decreases in morbidity and mortality. These interventions included improving nurse-to-patient ratios and intensive care unit physician involvement in post-operative care. Sub-specialization in surgical care reduced technical complications in these studies, and use of safety checklists, adherence to care pathways and team training all had positive effects on patient outcomes.</p> <p>Four studies examining staffing factors reported that increasing nurse-to-patient ratios reduced failure-to-rescue scenarios, and that employing nursing staff with bachelor degrees significantly decreased rates of adverse events. Increasing the number of junior surgeons did not have a significant effect on adverse events based on these medium-quality evidence studies.</p> <p>Hospital enrolment in the American College of Surgeons National Surgical Quality Improvement Program demonstrated reductions in all adverse events. Adherence to the WHO theatre checklist was found to significantly reduce adverse events in three cohort studies. Other checklists featured in numerous studies were deemed low quality and were not analyzed.</p>	<p>2012</p>	<p>7/10 (AMSTAR rating from McMaster Health Forum)</p>	<p>6/91</p>	<p>1/91</p>	<p>91/91</p>
<p>Examining the effects of checklist use in surgery on complication rates (141)</p>	<p>This review and meta-analysis focused on the effects of surgical safety checklists on post-operative complications.</p> <p>Results indicate that the use of checklists in surgery compared with standard practices demonstrated a reduction in any post-operative complications, including wound infection and blood loss. Six of seven studies used the WHO Surgical Safety Checklist, whereas one study used the Association of Peri-Operative Registered Nurses Comprehensive Surgical Checklist, which includes items based on the WHO Surgical Safety Checklist and the Joint Commission Universal Protocol. Five studies demonstrated that one less surgical site infection may be prevented for every 34 patients when checklists are used. However, the results from the review failed to demonstrate any reductions in mortality, pneumonia or unplanned returns to the operating theatre.</p> <p>Overall, although the review lacks evidence from randomized controlled trails, the reviewed cohort studies suggest a relationship</p>	<p>2013</p>	<p>8/11 (AMSTAR rating from McMaster Health Forum)</p>	<p>0/7</p>	<p>0/7</p>	<p>7/7</p>

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		between the use of checklists and fewer post-operative complications.					
Examining the application and effectiveness of these QI methodologies to the field of surgery (142)		<p>This review focused on evaluating the application and effectiveness of quality improvement (QI) methodologies from the manufacturing industry to the field of surgery.</p> <p>Three studies demonstrated significantly reduced rates of surgical infection, two studies indicated reduced complications from colorectal procedures, and three studies indicated reduced waiting times before the start of surgery and other non-operative times. Furthermore, four studies reported an increase in the administration of antibiotics before surgery and two studies demonstrated reduced lengths of stay for surgical patients. Two studies reduced medication replacement costs and surgical costs, however, the review emphasizes that these studies in particular are more than 10 years old and are based in the American healthcare system, thereby making future recommendations difficult.</p> <p>The review suggests that the gathered evidence is of sub-optimal quality, largely because of a lack of randomized multi-centre studies and substantial variation in the application of QI methodologies to surgical care.</p>	2010	5/10 (AMSTAR rating from McMaster Health Forum)	0/34	1/34	34/34
Examining the effects of the World Health Organization surgical safety checklist (143)		<p>This review and meta-analysis examined evidence regarding the effectiveness of the World Health Organization Surgical Safety Checklist (WHO SSC) in reducing post-operative complications.</p> <p>Six studies reported on any complications within 30 days following surgery. Five studies reported decreasing complications with adherence to the SSC, and one study did not demonstrate significant differences between evaluation intervals. The review suggests the evidence from these studies is sub-optimal and that the analysis provided is affected by significant heterogeneity. Significant decreases in mortality following SSC implementation were observed in two of five studies that examined mortality; this was found to be strongly related to checklist compliance. Furthermore, surgical site infections were shown to decrease significantly in three out of six studies, with significant heterogeneity accounting for the lack of consistency in results.</p> <p>Overall, the review found a strong correlation between a significant decrease in post-operative complications and adherence to aspects of care embedded in the WHO SSC. However, the review warns that this cannot be regarded as definitive in the absence of higher quality evidence and with highly heterogeneous data.</p>	2013	4/10 (AMSTAR rating from McMaster Health Forum)	0/7	0/7	7/7

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	<p>Assessing the impact of surgical safety checklists on the quality of teamwork and communication in the operating room (127)</p>	<p>This review focused on the impact of surgical safety checklists (SSC) on the quality of teamwork and communication in operating theatres.</p> <p>There was great variation in the methods of assessing teamwork and communication, which included surveys, observations and interviews. Only four of the 13 retrieved assessment instruments were shown to demonstrate some supporting psychometric evidence. Ten studies out of 13 which employed surveys reported a positive impact of the checklist on teamwork, including strengthened “team feelings” within the operating theatre, and improved perceptions of communication relating to pre- and post-operative checks.</p> <p>Although the review suggests a good degree of concordance between the results of individual studies, the articles were heterogeneous in terms of the methods used to assess the impact of checklists. In 12 studies, self-perceptions of teamwork and communication improved following SSC implementation. Three studies showed that operating room nursing personnel received maximum benefits in teamwork as a result of checklists. However, four studies reported mixed results, with evidence affected by small sample sizes and a lack of generalizability. Overall, the use of SSC for teamwork and communication were shown to be one mechanism through which outcomes may be improved, however, the review indicates more consistent methodological approaches should be established.</p>	<p>2012</p>	<p>4/10 (AMSTAR rating from McMaster Health Forum)</p>	<p>4/20</p>	<p>0/20</p>	<p>20/20</p>
	<p>Examining the effectiveness of surgical safety checklists on teamwork, communication, morbidity, mortality, and compliance with safety measures (128)</p>	<p>This meta-analysis focused on the effects of surgical safety checklists (SSC) on teamwork, communication, morbidity, mortality and compliance with safety measures.</p> <p>The analysis revealed the strongest effect of checklist implementation was improved communication between surgical team members. It also found significant improvements in compliance with safety measures, an effect that was largely attributable to the checklists providing visual reminders of recommended safety measures and emphasizing a reduced reliance on memory.</p> <p>Although morbidity and mortality were also found to be significantly reduced upon SSC implementation, these findings were significantly heterogeneous, mainly due to the varied units of analysis of the studies involved.</p>	<p>Not available</p>	<p>3/11 (AMSTAR rating from McMaster Health Forum)</p>	<p>0/19</p>	<p>0/19</p>	<p>19/19</p>



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