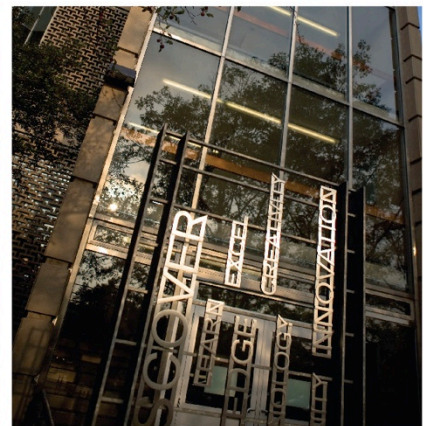


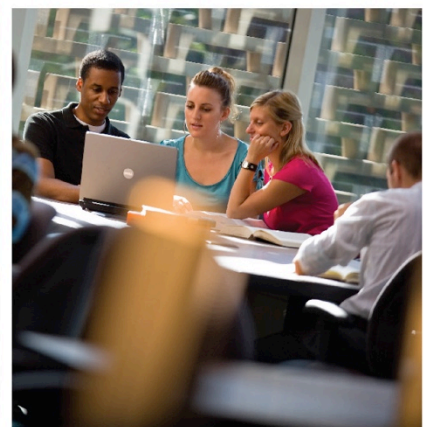


KEY FEATURES AND EFFECTS OF EDUCATIONAL APPROACHES TO IMPROVE CLINICAL PERFORMANCE

RAPID
SYNTHESIS
(30-DAY
RESPONSE)



24 MARCH 2016



EVIDENCE >> INSIGHT >> ACTION

**Rapid Synthesis:
Key Features and Effects of Educational Approaches to
Improve Clinical Performance**

24 March 2016

McMaster Health Forum

For concerned citizens and influential thinkers and doers, the McMaster Health Forum strives to be a leading hub for improving health outcomes through collective problem solving. Operating at regional/provincial levels and at national levels, the Forum harnesses information, convenes stakeholders, and prepares action-oriented leaders to meet pressing health issues creatively. The Forum acts as an agent of change by empowering stakeholders to set agendas, take well-considered actions, and communicate the rationale for actions effectively.

Authors

Michael G. Wilson, PhD, Assistant Director, McMaster Health Forum, and Assistant Professor, McMaster University

Adrian Guta, PhD, Co-Lead, Evidence Synthesis, McMaster Health Forum

Timeline

Rapid syntheses can be requested in a three-, 10- or 30-business day timeframe. This synthesis was prepared over a 30-business day timeframe. An overview of what can be provided and what cannot be provided in each of the different timelines is provided on McMaster Health Forum's Rapid Response program webpage (<http://www.mcmasterhealthforum.org/policymakers/rapid-response-program>).

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Conflict of interest

The authors declare that they have no professional or commercial interests relevant to the rapid synthesis. The funder played no role in the identification, selection, assessment, synthesis or presentation of the research evidence profiled in the rapid synthesis.

Merit review

The rapid synthesis 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

Question

- What are the key features and effects of educational approaches that could be used to improve clinical performance?

Why the issue is important

- The College of Physicians and Surgeons of Ontario (CPSO) and Cancer Care Ontario (CCO) have formed a partnership to support ongoing training, education and quality improvement in Ontario.
- This partnership will develop provincial quality-management programs for the service areas of colonoscopy, mammography and pathology, and aims to improve patient safety and increase the quality of care, the consistency with which quality of care is provided across facilities and public confidence, by enhancing accountability and transparency.
- These activities will be important for ensuring high-quality care is provided to patients living with cancer, which is essential for improving health outcomes and making the best use of health-system resources.
- To support their efforts in this area, the CPSO requested this rapid synthesis to identify the key features and effects of educational initiatives in general and specifically for cancer (especially for colonoscopy, mammography and pathology) to enhance clinical performance in screening and care.

What we found

- We found systematic/structured approaches for identifying the clinical practices to be optimized and theory-based approaches for identifying the underlying causes of problems in those practices (e.g., the Behaviour Change Wheel).
- Several high-quality reviews found beneficial effects on optimizing clinical practice for educational materials, educational meetings, educational outreach visits, local opinion leaders, audit and feedback, computerized reminders, and tailored interventions.
- The effect sizes found for each of these interventions are similar (between 2-12%), but have large variability, suggesting 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.
- Systematic reviews that we identified as relevant to the priority areas (or more generally on cancer):
 - included studies with heterogeneous interventions which limited pooling and strong conclusions; and
 - found that multi-modal interventions which used a range of learning components to appeal to different learning styles, and especially those with long-term follow-up and opportunities for individual feedback, have superior outcomes to traditional didactic approaches.
- Approximately half of the reviews we identified reported on key features of the interventions that were evaluated:
 - one medium-quality review found the most effective educational interventions to improve primary outcomes (e.g., cancer screening rates) used computerized reminder systems, and improving secondary outcomes (e.g., cancer knowledge) could be improved by using audit and feedback, interactive education, and educational outreach which are supported by practice-level interventions, and reminder systems;
 - one low-quality review from pediatric oncology found that formal workshop programs that engage the entire experiential learning cycle are predicted to lead to superior outcomes; and
 - one medium-quality review found that consolidation workshops after training improved retention for cancer communication-skills training.
- We also included 19 key primary studies focused on cancer education and training, which found mixed results for interventions to promote skills acquisition or behaviour change, and for improving communication skills for cancer-care providers.
- The studies also found that interventions developed using input from patients may increase care-provider's confidence when communicating with cancer patients, structured meeting evaluation tools provide useful feedback but may be burdensome, and formal peer review in radiology is growing in popularity across Canada.

QUESTION

What are the key features and effects of educational approaches that could be used to improve clinical performance?

WHY THE ISSUE IS IMPORTANT

The College of Physicians and Surgeons of Ontario (CPSO) and Cancer Care Ontario (CCO) have formed a partnership to support ongoing training, education and quality improvement across the province. This partnership will develop provincial quality-management programs for the service areas of colonoscopy, mammography and pathology, and aims to improve patient safety and increase the quality of care, the consistency with which quality of care is provided across facilities and public confidence, by enhancing accountability and transparency. The proposed quality-management program model will include clinical leads supporting change at the provincial, regional and facility level. These leads will:

- interpret data reports for the purposes of meaningful review;
- provide constructive feedback to peers;
- address quality concerns and apply quality-improvement skills and methods;
- provide continuous professional development coaching and referral to peers; and
- be familiar with and apply CPSO policy.

These activities will be important contributions for ensuring high-quality care is provided to patients living with cancer, which is essential for improving health outcomes and making the best use of health-system resources.(2) They are also aligned with an Institute of Medicine (IOM) report focused on providing high-quality cancer care that recommended greater quality measurement and performance improvement.

However, there are currently numerous national and international evidence-based guidelines for cancer screening, primary treatment, follow-up and palliative care.(3-6) The vast number of continuously revised guidelines, recommendations and decision-aids makes it difficult for physicians and other care providers to ensure they are always using current best practices. In response, there have been growing calls for the development of new quality-measurement approaches that include education, training and feedback opportunities to support care providers to deliver the highest quality cancer care, which the partnership between CPSO and CCO is focused on addressing. To support their efforts in this area to create a training program for the clinical leads, the CPSO requested this rapid synthesis to identify the key features and effects of educational initiatives to enhance clinical performance, with a focus on the three priority areas of colonoscopy, mammography and pathology.

Box 1: Background to the rapid synthesis

This rapid synthesis mobilizes both global and local research evidence about a question submitted to the McMaster Health Forum's Rapid Response program. Whenever possible, the rapid synthesis 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 rapid synthesis does not contain recommendations, which would have required the authors to make judgments based on their personal values and preferences.

Rapid syntheses can be requested in a three-, 10- or 30-business-day timeframe. An overview of what can be provided and what cannot be provided in each of these timelines is provided on the McMaster Health Forum's Rapid Response program webpage (<http://www.mcmasterhealthforum.org/policymakers/rapid-response-program>)

This rapid synthesis was prepared over a 30-business day timeframe and involved four steps:

- 1) submission of a question from a health system policymaker or stakeholder (in this case, College of Physicians and Surgeons of Ontario);
- 2) identifying, selecting, appraising and synthesizing relevant research evidence about the question;
- 3) drafting the rapid synthesis in such a way as to present concisely and in accessible language the research evidence; and
- 4) finalizing the rapid synthesis based on the input of at least two merit reviewers.

WHAT WE FOUND

Supporting improvements in clinical performance requires efforts to identify and diagnose the behaviours and practices that need to change, and then using one or more available strategies or techniques to optimize clinical practice. We summarize key frameworks and research evidence about approaches for each of these steps below. In the summary of research evidence about strategies and techniques for optimizing clinical practice, we also highlight any evidence identified specifically for their use in the three priority areas identified by the requestor (colonoscopy, mammography and pathology), and about key intervention and contextual features that influence success.

Identifying and diagnosing the behaviours and practices that need to change

As described in two recent evidence briefs,^(7;8) engaging in a process of identifying and diagnosing behaviours and parts of practices that need to change could be achieved by using a systematic/structured approach to identify the behaviours and practices to be changed, and by using iterative/theory-based approaches to identify the underlying causes of problems in those behaviours and practices.

As noted in these evidence briefs, one possible systematic procedure is to use a comprehensive, integrated checklist that was developed in a recent medium-quality review to identify factors that might prevent or enable improvements in clinical practice (or more generally, to identify the determinants of practice).⁽⁹⁾ Based on 12 checklists that were identified in the review, an integrated checklist with 57 potential determinants of practice was developed (many of which include theory-based elements). The determinants of practice were grouped into the following seven domains:

- guideline factors (e.g., whether recommendations are based on strong evidence, feasible and appropriate);
- individual health professional factors (e.g., knowledge/skills, attitudes and behaviours);
- patient factors (e.g., patient needs, beliefs, knowledge, preferences, motivation and behaviour);
- professional interactions (e.g., communication and influence, team processes, and referral processes);
- incentives and resources (e.g., availability of resources, financial and non-financial incentives and disincentives, information systems, quality and safety monitoring systems, continuing education, and availability of assistance for clinicians);
- capacity for organizational change (e.g., mandate, authority, accountability and leadership); and
- social, political and legal factors (e.g., economic constraints, contracts, legislation, payer or funder policies, and malpractice liability).

In addition to the checklist, five worksheets were developed as part of this review that are designed to support the development of tailored implementation strategies based on the areas identified as warranting targeted implementation efforts.⁽⁹⁾ This type of approach could also be complemented by practice variation studies and/or audit feedback to identify where intervention might be needed to improve clinical performance.

Box 2: Identification, selection and synthesis of research evidence

We identified research evidence (systematic reviews and primary studies) by searching (in March 2016) Health Systems Evidence (www.healthsystemsevidence.org). We searched Health Systems Evidence on 4 March 2016 for all of the provider-targeted strategies under the implementation strategy filter combined with the cancer filter. We also included several reviews of provider-targeted implementation strategies from a recent (non-systematic) review that identified the highest quality and most up-to-date systematic reviews produced by the Cochrane Effective Practice and Organizational Change (EPOC) group.⁽¹⁾

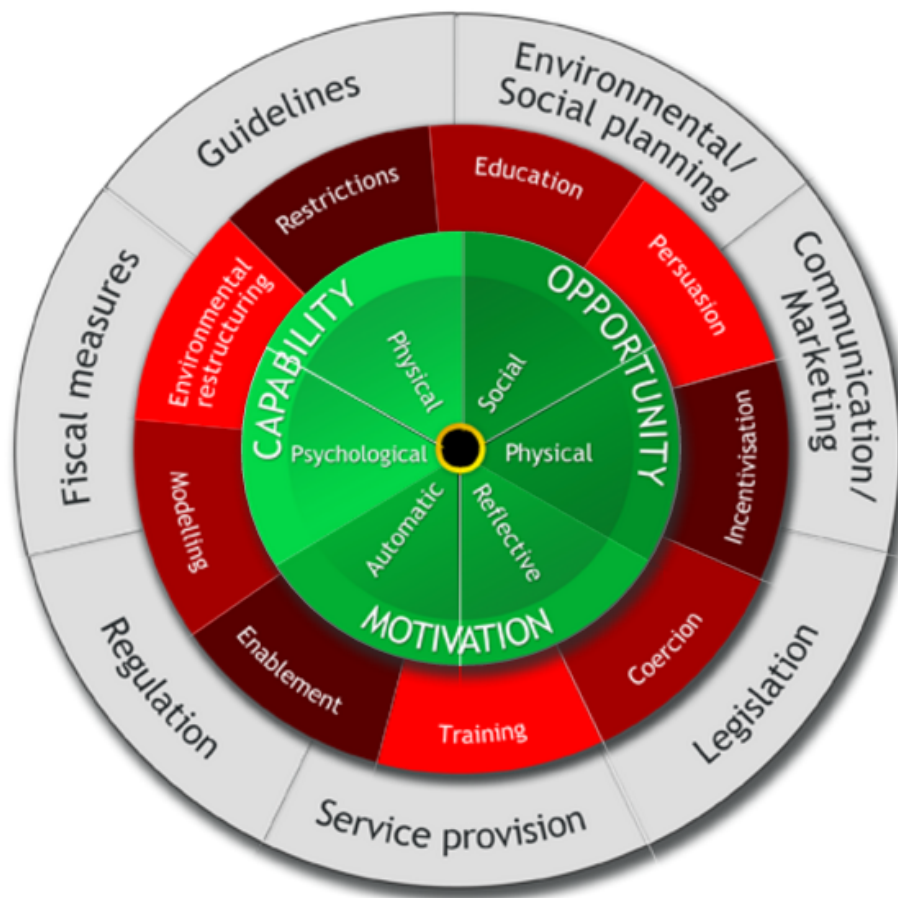
The results from the searches were assessed by one reviewer for inclusion. A document was included if it fit within the scope of the questions posed for the rapid synthesis.

For each review we included in the synthesis, we documented the focus of the review, key findings, last year the literature was searched (as an indicator of how recently it was conducted), methodological quality using the AMSTAR quality appraisal tool (see the Appendix for more detail), and the proportion of the included studies that were conducted in Canada. For primary research (if included), we documented the focus of the study, methods used, a description of the sample, the jurisdiction(s) studied, key features of the intervention, and key findings. We then used this extracted information to develop a synthesis of the key findings from the included reviews and primary studies.

Also outlined in the two recent evidence briefs, theory-based approaches are different in that they focus more on iteratively testing and refining an approach based on an existing theory (e.g., by drawing on theories related to behaviour change) to ensure it is attuned to the underlying causes of a problem. Several frameworks have been published related to the process of developing implementation interventions with the goal of changing behaviour. The Behaviour Change Wheel (10) and the Theoretical Domains Framework (11) are two well-known and extensively used frameworks in this area.

The Behaviour Change Wheel (see Figure 1 below) was developed through a recent medium-quality systematic review of 19 frameworks of behaviour change.(10) The Behaviour Change Wheel is centred around a “behaviour system” that includes three essential conditions: 1) capability (i.e., an individual's psychological and physical capacity to engage in a specified activity); 2) opportunity (social and physical factors that lie outside the individual that make a behaviour possible or prompt it); and 3) motivation (cognitive processes that energize and direct behaviour).(10) These three conditions of the behaviour system provide a basis for identifying underlying causes of a particular problem, and then for designing interventions that address areas where the need for behaviour change has been prioritized. Encircling this hub are nine groupings of interventions that could be used to address deficits in the three conditions, which are further encircled by seven policy activities that could be used to support the implementation of those interventions (see element 2 for more details about these activities).(10)

Figure 1: The Behaviour Change Wheel (figure from Michie et al. 2014)(12)



The Theoretical Domains Framework, which was developed through an expert consensus process and validation exercise, offers a process to identify relevant psychological and organizational theory to support clinical behaviour change at the individual level.(11;13) A recent application of this approach indicates that at the stage of identifying what needs to be changed, it is important to specify who needs to do what differently, and assess the barriers and enablers that need to be addressed (i.e., ascertain the causes of the problem). The tasks used for specifying who needs to do what differently include:

- 1) identifying gaps between evidence and practice (using explicit criteria and high-quality data and evidence);
- 2) identifying the types of behaviours that need to change in order to reduce or eliminate the evidence-to-practice gap; and
- 3) specifying the health professional groups that need to change behaviour.(11)

Specific groups of tasks involved for ascertaining the cause of the problem can be time-intensive and include selecting theories and frameworks to identify possible pathways to change, and likely barriers and enablers along the pathway, and then collecting data (quantitative and/or qualitative) to identify barriers and enablers. As another complementary framework outlines, causes of the problem could be at one or more of the following five levels:

- 1) motivation at the individual level (e.g., how knowledge, beliefs about capabilities and consequences, skills, memory, emotion and goals exert influence);
- 2) tasks at the individual or team level (e.g., how work routines and procedures function);
- 3) roles at the professional level (e.g., how responsibilities are assigned);
- 4) rules at the organizational level (e.g., how authority is allocated); and
- 5) strategies (e.g., how resources are allocated) at the system level (e.g., governance, financial and delivery arrangements, which include the financial incentives and complementary policy instruments being discussed here).(14)

Strategies and techniques to optimize clinical practice

Key findings from select reviews from the Cochrane Effective Practice and Organization of Care group

The same two evidence briefs referred to above outline that many candidate strategies and techniques (active ingredients), and methods for delivering them to optimize clinical practice (i.e., provider-targeted implementation strategies), have been evaluated, and as of March 2016 there were 1,032 systematic reviews evaluating provider-targeted implementation strategies in Health Systems Evidence (www.healthsystemsevidence.org). While assessing these reviews is beyond the scope of this rapid synthesis, 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.(1) In Table 1 we provide an overview of the key features identified for each of the eight strategies profiled in the review, which include their causal mechanisms (based on those identified in the Behaviour Change Wheel described in element 1), mode of delivery and intended targets.

As outlined in Table 2, this set of EPOC reviews found beneficial effects of optimizing clinical practice for educational materials,(15) educational meetings,(16) educational outreach visits,(17) local opinion leaders,(18) audit and feedback,(19) computerized reminders,(20) and tailored interventions.(21) Several of these reviews included a small number of studies related to colonoscopy, mammography, pathology or cancer more generally, which we highlight in the third column of Table 2.

Table 1: Key features of professional behaviour-change interventions (content for this table has been directly extracted from the summary of interventions presented in Grimshaw et al. 2012 (1) and the table reproduced two evidence briefs) (7;8)

Description of candidate strategy/technique (active ingredients)	Causal mechanisms*	Mode of delivery	Intended targets
Printed educational materials (15) <ul style="list-style-type: none"> • “Distribution of published or printed recommendations for clinical care, including clinical practice guidelines, audio-visual materials and electronic publications” • Commonly used, and relatively low cost and feasible 	<ul style="list-style-type: none"> • Education • Training 	<ul style="list-style-type: none"> • Delivered personally or through mass mailings 	<ul style="list-style-type: none"> • Knowledge and potential skill gaps of individual clinicians • Motivation (when written as a persuasive communication)
Educational meetings (16) <ul style="list-style-type: none"> • “Participation of healthcare providers in conferences, lectures, workshops or traineeships” • Commonly used, main cost is for the release time for healthcare professionals, and generally feasible 	<ul style="list-style-type: none"> • Education • Training • Persuasion 	<ul style="list-style-type: none"> • Didactic or interactive meetings 	<ul style="list-style-type: none"> • Knowledge (for didactic approach) or knowledge, attitudes and skills (for interactive approach) at the individual healthcare professional/peer group level
Educational outreach (17) <ul style="list-style-type: none"> • “Use of a trained person who meets with providers in their practice settings to give information with the intent of changing the providers’ practice. The information given may have included feedback on the performance of the provider(s)” • Used across a wide range of healthcare settings, especially to target prescribing behaviours, and require considerable resources (including the costs of detailers and preparation of materials) • The detailer will tailor their approach to the characteristics of the individual clinician, and typically use additional provider behaviour-change strategies to reinforce their message 	<ul style="list-style-type: none"> • Education • Training • Persuasion 	<ul style="list-style-type: none"> • The detailer aims to get a maximum of three messages across during a 10- to 15-minute meeting with a clinician 	<ul style="list-style-type: none"> • Knowledge and attitudes through a social-marketing approach (22) • Most studies of educational outreach have focused on changing relatively simple behaviours that are in the control of individual clinicians, such as the choice of drugs to prescribe
Local opinion leaders (18) <ul style="list-style-type: none"> • “Use of providers nominated by their colleagues as ‘educationally influential,’ and the investigators must have explicitly stated that their colleagues identified the opinion leaders” • Colleagues identify different opinion leaders for different clinical problems,(23) and opinion leaders were not stable over time (24) • Resources required include the costs of the identification method, training of opinion leaders, and additional service costs • Informal leadership is not a function of the individual’s formal position or status in the system; it is earned and maintained by the individual’s technical competence, social accessibility, and conformity to the system’s norms • As compared to their peers, opinion leaders have greater exposure to all forms of external communication, have somewhat higher 	<ul style="list-style-type: none"> • Education • Training • Persuasion 	<ul style="list-style-type: none"> • Opinion leadership is the degree to which an individual is able to influence other individuals’ attitudes or overt behaviour informally, in a desired way, and with relative frequency • Opinion leaders have a unique and influential position in their system’s communication structure; they are at the centre of interpersonal communication networks 	<ul style="list-style-type: none"> • Knowledge, attitudes and social norms of the opinion leader’s peer group, and the potential success is dependent upon the existence of intact social networks within professional communities

social status and are more innovative			
Audit and feedback (25;26) <ul style="list-style-type: none"> • “Any summary of clinical performance of healthcare over a specified period of time” to change health professional behaviour, as indexed by “objectively measured professional practice in a healthcare setting or healthcare outcomes” • The resources required to deliver audit and feedback include data abstraction, analysis and dissemination costs • Feasibility may depend on the availability of meaningful routine administrative data for feedback 	<ul style="list-style-type: none"> • Education • Persuasion • Enablement • Modelling 	<ul style="list-style-type: none"> • Information extracted from medical records, computerized databases, or observations from patients • Summary of performance may include recommendations for clinical action and action planning 	<ul style="list-style-type: none"> • Healthcare provider/peer groups’ perceptions of current performance levels • Create cognitive dissonance within healthcare professionals as a stimulus for behaviour change (e.g., Adams and colleagues observed that healthcare professionals often over-estimated their performance by around 20% to 30%) (27)
Reminders (20) <ul style="list-style-type: none"> • “Patient- or encounter-specific information, provided verbally, on paper or on a computer screen...” • The resources required vary across the delivery mechanism, and there is insufficient knowledge at present about how to prioritize and optimize reminders • The majority of early studies on computerized reminders were undertaken in highly computerized academic health science centres in the United States, and their generalizability to other settings is less certain (28) 	<ul style="list-style-type: none"> • Environmental restructuring 	<ul style="list-style-type: none"> • Provided on paper or on a computer screen (e.g., computer-aided decision support and drugs dosage) • Reminders may be encountered through general education, medical records and/or interactions with peers 	<ul style="list-style-type: none"> • Prompt health professionals to recall information and remind them to perform or avoid some action to aid individual patient care (29)
Tailored interventions (21) <ul style="list-style-type: none"> • “Strategies to improve professional practice that are planned taking account of prospectively identified barriers to change” 	<ul style="list-style-type: none"> • Dependent on the composition of the tailored strategy 	<ul style="list-style-type: none"> • Dependent on the composition of the tailored strategy 	<ul style="list-style-type: none"> • Professional practice based on prospectively identified barriers to change
Multifaceted interventions (30) <ul style="list-style-type: none"> • Any intervention including two or more components and that potentially targets different barriers in the system • Multifaceted interventions are likely to be more costly than single interventions, and when planning multifaceted interventions, it is important to carefully consider how components are likely to interact to maximize benefits 	<ul style="list-style-type: none"> • Dependent on the composition of the multifaceted strategy 	<ul style="list-style-type: none"> • Dependent on the composition of the multifaceted strategy • Few studies provide any explicit rationale or theoretical base for the choice of intervention, and it is therefore unclear whether an <i>a priori</i> rationale based on possible causal mechanisms or an ‘everything but the kitchen sink’ approach is used for the choice of components in multifaceted interventions 	<ul style="list-style-type: none"> • Professional practice (potentially based on prospectively identified barriers to change)

* Mechanisms listed in this column are based on those included in the Behaviour Change Wheel (10)

While each of these interventions has been found to have positive absolute effects ranging from 2-12% (see Table 2), an older medium-quality systematic review found that combining them in multifaceted interventions does not result in increased effects on optimizing practice.(30)

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.(1) This interpretation makes it even more essential to engage in the set of activities outlined above for diagnosing the underlying cause of the problem, and then selecting from the array of candidate strategies and iteratively refining and tailoring them to ensure the active ingredients, causal mechanisms, mode of delivery and intended targets are combined in a way that maximizes the impact.

This interpretation is further supported by the Behaviour Change Wheel outlined above, which indicates that “[a] given intervention might change one or more components in the behaviour system. The causal links within the system can work to reduce or amplify the effect of particular interventions by leading to changes elsewhere.”(10) Furthermore, efforts to tailor interventions need to draw on the broader categories of interventions outlined in Table 1, but for those working at the programmatic level (as opposed to those making decisions about the overall direction), it will be important to draw on a more detailed taxonomy of 93 behaviour change techniques.(31) Moreover, efforts to tailor these interventions for the three priority areas of colonoscopy, mammography and pathology can draw on the findings in the next sections about the effects of interventions in these areas, and about key intervention and contextual features that influence success.

Table 2: Effectiveness of professional behaviour-change strategies from selected EPOC systematic reviews (this table has been extracted from Grimshaw et al. 2013, updated with revised versions of some of the reviews originally summarized and modified from a previous rapid synthesis)(1)

Intervention	Number of studies/individuals	Number of studies focused on cancer and/or priority areas included	Effect sizes
Printed educational materials* (15)	14 randomized trials and 31 non-randomized studies	One on breast cancer care	Median absolute differences from randomized trials were: 2% (range from 0 to +11%) for categorical practice outcomes (e.g., X-ray requests, prescribing and smoking cessation activities); and 13% (range from -16% to +36%) for continuous professional practice outcomes. Only two randomized trials and two non-randomized studies reported patient outcomes. After the data were re-analyzed, significant improvements in patient outcomes were observed (but there is insufficient evidence to reliably estimate their effect on patient outcomes).
Educational meetings (16)	81 randomized trials (involving more than 11,000 health professionals)	One on breast and cervical cancer screening Four on cancer in general	Median absolute improvement in care of 6.0% (interquartile range +1.8% to 15.3%).
Educational outreach (17)	69 randomized trials (involving more than 15,000 health	Two on colorectal cancer screening	Median absolute improvements in: prescribing behaviours (17 comparisons) of 4.8% (interquartile

	professionals)		range +3.0% to + 6.5%); other behaviours (17 comparisons) of 6.0% (interquartile range +3.6% to +16.0%). The effects of educational outreach for changing more complex behaviours are less certain.
Local opinion leaders (18)	18 randomized trials (involving more than 296 hospitals and 318 primary-care physicians)	One each on cancer in general, breast cancer care and colon cancer care	Median absolute improvement of care of 12.0% across studies (interquartile range +6.0% to +14.5%).
Audit and feedback* (19)	140 randomized trials	None included	Median absolute improvement of 4.3% (interquartile range +0.5% to +16%). More than 16% absolute improvement is observed when baseline performance is low and/or when key intervention features are incorporated.
Computerized reminders (20)	28 randomized trials	None included	Median absolute improvement of care of 4.2% (interquartile range +0.8% to +18.8%).
Tailored interventions (21)	26 randomized trials	None included	Meta-regression using 12 randomized trials. Pooled odds ratio of 1.52 (95% CI, 1.27 to 1.82, $p < .001$).

*We have revised the findings for these interventions based on updated reviews that have been published since this table was published by Grimshaw et al. in 2013.

Key findings from select reviews focused on the priority areas (and more generally focused on cancer)

In addition to the EPOC systematic reviews, we searched for recent systematic reviews focused on quality improvement, training and education in cancer screening and care. We identified six relevant reviews, but none focused specifically on colonoscopy and mammography, or pathology. The cancer-focused reviews included studies which were very heterogeneous and few provided descriptions of the interventions.(32-37) A medium quality narrative review of “train-the-trainers” programs found that providing a manual was effective at improving clinical outcomes, but concluded that using a ‘blended’ approach that involves combining interactive, multifaceted methods and accompanying learning materials can help to effectively disseminate and implement guidelines and curricula.(33) Another low-quality review included studies addressing communication-skills training in pediatric oncology, but the authors cautioned that there is a lack of appropriate training during general and speciality training for physicians, and an over reliance on role modelling and apprenticeship.(37) The authors suggest:

- combining didactic material, active small group skills practice, formative feedback and reflection, and formal workshop programs that engage the entire experiential learning cycle;
 - using formal workshop programs because they have the strongest efficacy evidence for communication skill building;
 - providing education coaching, which can be helpful but requires trained coaches, buy-in from faculty coaches and fellow learners, and works best when the mentoring relationship can be maintained long-term; and
 - using conversation guides, which can be helpful for improving conversations in terms of appropriate structure, content and language (but they have not been found to improve general conversation skills).
- (37)

A medium-quality review of educational interventions for primary healthcare professionals to promote the early diagnosis of cancer found traditional didactic education methods like lectures had poor results compared to more interactive approaches that involved reminders, audits and academic detailing.(35) This was consistent with the results of a medium-quality review of the efficacy of communication-skills training courses in oncology, which found that adding consolidation workshops or supervision after a basic training helped to improve uptake and retention.(34) However, in a medium-quality review of quality-improvement interventions (QIIs) directed at cancer specialists, most involved audit and feedback, an educational session, and opinion leaders, but none of the three cluster randomized controlled trials reviewed showed a benefit.(32) Finally, a medium-quality review of communication-training interventions for health professionals (physicians, nurses, social workers) who care for patients with cancer found changing care providers' responses to emotionally charged situations to be the most difficult outcome to achieve.(36)

Key findings from primary studies focused on cancer education and training

We found 19 primary studies that examine various aspects of training and education for cancer-care providers (see Appendix 2 for details of the studies).(38-45) The studies were diverse in terms of their focus, samples and methods. Of the included studies five were randomized controlled trials,(39-43) five examined the effectiveness of interventions,(38;44;46-48) two used surveys,(49;50) three used qualitative interviews,(45) one used clinical audits,(51) and three used retrospective chart reviews.(52-54) All were cancer focused, but only four focused on breast cancer,(38;42;45) and one on colorectal cancer screening.(40) Notably, seven of the studies focused on aspects of radiology which has a growing evidence-base on education, training and clinical feedback and peer review. (45;50;54) Of the studies reviewed that collected data from participants (not chart data), three examined interdisciplinary teams,(38;45) five general practitioners,(39;40;42;43;49) two nurses,(44;47) two oncologists, (46;50) two medical students and residents,(41;48) and two patients.(39;55)

The majority of the primary studies evaluated an education or training intervention to promote skills acquisition or behaviour change.(39-44;46-48) A study that evaluated a comprehensive training program to promote safe sentinel lymph node biopsy (SLNB) for breast cancer care-provider teams consisted of a one-day training session followed by mentored operating sessions and a validation phase. The study found very positive results in terms of improved localization and reductions in false-negatives, which led the authors to conclude that the usual learning curve was nearly eliminated.(38) Other studies had more mixed results, with improvements on some targeted skills or behaviours, but not others. For example, a comprehensive 16-hour training program focused on improving oncology nurses' ability to care for patients showed improved confidence and knowledge, but did not influence their attitudes.(47) However, two other multifaceted interventions showed no difference between the intervention and control groups.(39;43)

One of the studies found differences between individual and group trainings, with slightly better scores for medical students who participated in group education and were actively involved in simulations.(41) Another study found that surgical oncology residents who participated in a multidisciplinary breast rotation, with formal and informal education activities, rated it higher for quality than those who received traditional training.(48)

Three of the studies provided education for care providers to improve their communication skills with patients to explore risk and encourage cancer screening, but they had mixed results.(39;40;42) One study found increased colorectal screening participation rates in the patients of physicians who had participated in a four-hour education training session.(40) Another study that used standardized patient feedback improved shared decision-making for colorectal cancer screening, but not cancer screening in general.(39) Finally, there was little uptake of a web-based genetics curriculum meant to improve breast cancer screening, and little difference between the intervention and control group.(42)

One of the studies examined care-provider communication from the patient perspective,(55) and three others used the patient perspective to develop an intervention for care providers.(44;46;52) The study which examined communication from the patient perspective used interviews with cancer patients who described their past interactions (some positive and some very negative), and found that provider education alone is not

adequate for addressing more serious communication issues, and instead may require changes to organizational culture.(55) In two studies using training programs developed with cancer patients' input, care providers self-reported having greater confidence delivering cancer care following the intervention.(44;46)

Seven studies examined the role of meetings to promote reflective practice and provide feedback.(45) (49;50;53;54;56) A qualitative study reported that radiologists value opportunities to share their experiences and self-report improvement in their work following feedback from colleagues in meetings.(45) These findings were consistent with results of a survey of physicians across the U.S. involved in radiology, with 83% reporting they were involved in peer review, 90% reporting having changed their care plans because of review, and 74% supporting the development of formal peer-review recommendations.(49) While not statistically significant, another study reported that clinical audits and meetings facilitated consensus and adoption of departmental clinical guidelines.(51) Another study focused on lung cancer reported that peer review resulted in significant changes in therapy plans.(52)

To support providing structured feedback, a study developed an evaluation tool to assess meetings, and while users agreed that it provided useful information, they had mixed views on whether they could easily integrate it into their existing workload.(56) A recent Ontario study found that all of the sampled cancer centres rated the importance of peer review highly, used it to some degree at various stages of care, and most planned to use it more in the future.(50) Most recently, peer review has been integrated into cancer quality metrics in Ontario, but there are still considerable differences in the rates and timing of peer review across the different centres.(54) The growing use of formal peer review reflects trends in other provinces, with peer review serving as a central component of quality assurance for radiation oncology in British Columbia where it is done during routine meetings, planning sessions, and through random audit.(53)

Key intervention and contextual features that influence success

We reviewed the previously discussed EPOC systematic reviews to determine the key features of each intervention (in addition to those described in Table 1) and the contextual variables that lead to their success (see Table 3). Overall, the heterogeneity of the studies within each systematic review prevented the respective authors from concluding which aspects of an intervention influenced its success. As well, few of the studies included in the reviews reported on any contextual features. An exception is a review on the use of printed educational materials delivered through various formats (e.g., materials on their own or with some form of meeting) which described both key intervention features and contextual features. In terms of key intervention features, the study found that:

- providing mixed interactive and didactic education meetings was more effective than didactic meetings or interactive meetings alone;
- education meetings had greater effects when moderately complex behaviours were targeted compared to high or low complexity behaviours; and
- the seriousness of the outcome associated with the target behaviour influenced the success of the intervention, with high and moderate severity outcomes associated with a greater effect than low severity.(16)

In terms of contextual factors that increased the effectiveness of education meetings, the authors identified the importance of organizational cultures that promote attendance.(16)

A second exception which also provided key intervention features is a review on audit and feedback in which the authors indicated feedback may be more effective when it is:

- provided by a supervisor or colleague;
- delivered more than once (at least monthly);
- delivered in both verbal and written formats; and
- includes both explicit targets and an action plan.(19)

The authors of this review warn that the perceived effectiveness of the supervisor or colleague delivering the feedback is mediated by whether they are respected in the organization. That is, the person providing feedback has to be considered competent.

Table 3: Key features of the intervention and contextual variables that lead to success from selected EPOC systematic reviews

Intervention	Key features of the intervention that lead to success	Contextual variables that lead to success
Printed educational materials* (15)	Based on the evidence the authors could not comment on which intervention characteristic influenced their effectiveness.	None identified
Educational meetings (16)	<p>Providing mixed interactive and didactic education meetings was more effective than didactic meetings or interactive meetings alone.</p> <p>Education meetings had greater effects when moderately complex behaviours were targeted compared to high- or low-complexity behaviours.</p> <p>The seriousness of the outcome associated with the target behaviour influenced the success of the intervention, with high- and moderate-severity outcomes associated with a greater effect than low severity.</p>	Strategies to increase attendance may increase the effectiveness of educational meetings.
Educational outreach (17)	Due to the heterogeneity of studies included in the review the authors were not able to conclude if differences are related to the interventions.	Due to the heterogeneity of studies included in the review the authors were not able to conclude if differences are related to the study contexts.
Local opinion leaders (18)	Due to the heterogeneity of studies included in terms of type of intervention, setting and outcomes measured, and the role of the opinion leader, the authors were unable to say what the best way is to optimize the effectiveness of opinion leaders.	None identified
Audit and feedback* (19)	Multivariable meta-regression indicated feedback may be more effective when the source is a supervisor or colleague, it is delivered more than once (at least monthly), it is delivered in both verbal and written formats, and when it includes both explicit targets and an action plan.	<p>Multivariable meta-regression indicated that feedback may be more effective when baseline performance is low.</p> <p>The effectiveness of the supervisor or colleague delivering the feedback is mediated by whether they are respected in the organization.</p>
Computerized reminders (20)	The authors were not able to establish whether a specific reminder feature was significantly associated with effect magnitude.	The authors were not able to establish whether a specific contextual feature was significantly associated with effect magnitude.
Tailored interventions (21)	The authors carried out a heterogeneity analysis to investigate sources of differences in the effectiveness of interventions, but found that no study attributes were significantly associated with effectiveness of the interventions.	None identified

In addition to extracting key findings from the reviews of educational interventions focused on the priority areas (and more generally focused on cancer), we also extracted information related to the key features of each intervention and the contextual variables that lead to their success (see Table 4). Three of the reviews were not able to conclude which factors led to success or provide information about the contextual variables.(32-34) Of the remaining three reviews, a medium-quality review that evaluated communication training for health professionals (including physicians, nurses and social workers) who care for patients with cancer, found that training programs that focused on skills showed significant improvements during the courses. However, these types of programs had little effect on their application in practice, and found that changing how care providers respond to emotionally-charged situations proved the most difficult to change.(36) Another medium-quality review of educational interventions targeted at primary-care professionals to promote early cancer diagnosis found that interventions which used interactive educational methods, computerized reminder systems, audit and feedback mechanisms, and educational outreach methods with academic detailing proved the most effective, whereas interventions which focused on more didactic educational methods like seminars, lectures or printed material had marginal to no effect.(35) Lastly, a low-quality review of pediatric oncology found that multi-modal learning (combining didactic material, active small group skills practice, formative feedback and reflection, etc.) that engages the entire experiential learning cycle leads to superior outcomes compared to traditional didactic approaches.(37)

Table 4: Key features of the intervention and contextual variables that lead to success from reviews focused on the priority areas (and more generally focused on cancer)

Intervention	Key features of the intervention that lead to success	Contextual variables that lead to success
Quality improvement interventions (QIIs) directed at cancer specialists (32)	Based on the evidence available, the authors could not comment on which intervention characteristics influenced its effectiveness.	None identified
Train-the-trainers programs (33)	Based on the evidence available, the authors could not comment on which intervention characteristic influenced its effectiveness.	None identified
Communication-skills training courses in oncology (34)	The authors found an additional benefit from providing consolidation workshops or supervision after a basic training in communication skills, and suggest adding this to core training components.	None identified
Educational interventions to promote early cancer diagnosis (35)	The most effective educational interventions to improve primary outcomes (e.g., screening rates for pap smear tests, mammography and fecal occult blood tests) used computerized reminder systems. The most effective educational interventions to improve secondary outcomes (e.g., performing health-checking manoeuvres, cancer knowledge, cancer-screening knowledge, recommending screening tests, and teaching or performing screening manoeuvres) used audit and feedback, interactive education, and educational outreach, followed by practice-level interventions and reminder systems.	None identified
Communication training for health professionals who care for patients with cancer (36)	Training programs that focused on skills showed significant improvements in the skills being taught during the courses, but had little effect on their application in practice.	None identified
Communication-skills training in pediatric oncology (37)	Combining didactic material, active small group skills practice, formative feedback and reflection, and formal workshop programs that engage the entire experiential learning cycle, are predicted to lead to superior outcomes compared to approaches that engage fewer of these components.	Education coaching can be helpful, but requires trained coaches, buy-in from faculty coaches and fellow learners, and works best when the mentoring relationship can be maintained over the long term.

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APPENDICES

The following tables provide detailed information about the systematic reviews and primary studies identified in the rapid synthesis. The ensuing information was extracted from the following sources:

- systematic reviews - the focus of the review, key findings, last year the literature was searched and the proportion of studies conducted in Canada; and
- primary studies - the focus of the study, methods used, study sample, jurisdiction studied, key features of the intervention and the study findings (based on the outcomes reported in the study).

For the appendix table providing details about the systematic reviews, the fourth column presents a rating of the overall quality of each 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).

All of the information provided in the appendix tables was taken into account by the authors in describing the findings in the rapid synthesis.

Appendix 1: Summary of findings from systematic reviews about key features and effects of educational approaches to improve clinical performance

Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
Development of a checklist for identifying determinants of practice (9)	<p>The review identified 12 checklists focused on identifying determinants of practice, but none were found to be comprehensive as compared to an aggregated list of determinants and domains.</p> <p>The identified checklists were used to develop a single checklist with 57 potential determinants of practice grouped in seven domains: guideline factors, individual health professional factors, patient factors, professional interactions, incentives and resources, capacity for organizational change, and social, political and legal factors.</p> <p>Five worksheets were also developed to facilitate the application of the checklists.</p>	Not reported	4/9 (AMSTAR rating from McMaster Health Forum)	0/12
Development of a method for characterizing and designing behaviour-change interventions (10)	<p>Nineteen frameworks of behaviour-change interventions were identified and used to develop a new framework called the Behaviour Change Wheel. Of the frameworks identified, none assessed the full spectrum of behaviour-change interventions.</p> <p>At the centre of the Behaviour Change Wheel is the 'behaviour system', which consists of three essential conditions: capability, opportunity and motivation. The behaviour change system is encircled by nine interventions that can be used to address deficits in one or more of the elements of the behaviour system, and around these are seven categories of policy that can be used to enable the implementation of these interventions.</p> <p>The Behaviour Change Wheel was successfully used to characterize interventions within the English Department of Health's 2010 tobacco control strategy, and the National Institute of Health and Clinical Excellence's guidance on reducing obesity.</p>	Not reported	6/8 (AMSTAR rating from McMaster Health Forum)	Not applicable – the review included frameworks of behaviour change and not single studies (19 papers describing frameworks were included)
Effects of printed educational materials on professional practice and healthcare outcomes (15)	<p>Printed educational materials are utilized to improve healthcare 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 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,</p>	2011	8/11 (AMSTAR rating from www.rxforchange.ca)	12/50

Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
	<p>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.</p> <p>The systematic review included 45 studies (31 of which were interrupted time series analyses and 14 randomized controlled trials), and nearly all included studies (44/45) aimed to compare the effectiveness of printed educational materials to no intervention. When used alone and compared to no intervention, the review found that printed educational materials have a small beneficial effect on professional practice outcomes. However, the review indicated that there is insufficient information to reliably estimate the effect of printed educational materials on patient outcomes.</p> <p>The authors also aimed to identify the influence of various characteristics of printed educational materials in determining the effectiveness of the intervention. It was noted that effectiveness may vary more according to 1) source of information, 2) tailoring, 3) purpose, 4) level of evidence, and 5) format, and that effectiveness may not vary much based on the frequency, mode or duration of delivery.</p>			
Effects of tailored interventions to address barriers to change in health professional performance (21)	<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</p>	2009	7/11 (AMSTAR rating from www.rxforchange.ca)	2/26

Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
	<p>approaches to tailoring, including how barriers should be identified and how interventions should be selected to address the barriers. There is also no evidence about the cost-effectiveness of tailored interventions compared to other interventions to change professional practice. As such, authors recommend that it is reasonable to employ low-cost tailored interventions in practice, but that evidence on the cost-effectiveness of the alternative methods of tailoring is needed to justify the use of costlier tailored approaches.</p> <p>In 13 studies, more than one method was used to identify barriers. These methods include 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. The depth of investigation of barriers was categorized as low in six studies, moderate in 13 and high in seven.</p> <p>Studies reported barriers in the following 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>			
Effects of local opinion leaders on professional practice and healthcare outcomes (18)	<p>Opinion leaders are individuals who are perceived as "likeable, trustworthy, and influential", and can aid and persuade healthcare providers to use evidence when treating and managing patients. The review found that local opinion leaders alone and local opinion leaders with audit and feedback were found to be generally effective for improving appropriate care behaviour (based on five randomized controlled trials (RCT) reporting on 40 outcomes).</p>	2009	10/10 (AMSTAR rating from McMaster Health Forum)	6/18

Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
	<p>Multifaceted interventions that included the use of opinion leaders in addition to one or more interventions had mixed results for improving appropriate care behaviour (based on 10 RCT comparisons). Moreover, the effectiveness of opinion leaders varies both between and within studies that have different types of interventions, settings and outcomes measured. In most studies included in this review, the role of the opinion leader was poorly defined, making it more difficult to optimize the effectiveness of these leaders.</p> <p>The use of a local opinion leader as the only intervention was evaluated in five studies. In 13 studies, local opinion leaders were supplemented by other interventions such as educational materials, outreach activities, audit and feedback, chart reminders, evidence summaries, seminars and lectures, and discussions. The time span of interventions ranged from one week up to 18 months. In most studies a description of the frequency of opinion leader involved was not provided. In most studies the opinion leader intervention was compared to no other intervention and therefore it is not possible to identify the best way to optimize the effectiveness of opinion leaders.</p>			
Effects of continuing education meetings and workshops on professional practice and healthcare outcomes (16)	<p>Educational meetings (e.g., courses, conferences, lectures, workshops, seminars and symposia) for physicians and other healthcare 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.</p> <p>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>	2006	10/11 (AMSTAR rating from McMaster Health Forum)	4/81
Effects of on-screen, point-of-care computer reminders on processes and outcomes of care (20)	Coordinating the use of genetic testing and related services in B.C. computer reminders led 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.	2008	9/11 (AMSTAR rating from McMaster Health Forum)	1/28

Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
	Generally, point-of-care computer reminders achieve small improvements in physician behaviour.			
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 clinicians to perform clinical actions, alters their effectiveness (17)	<p>Educational outreach visits allow trained persons to visit clinicians where they practice 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.</p> <p>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.</p> <p>Educational-outreach interventions used alone compared to a control group and compared to educational materials were found to be generally effective.</p> <p>There was insufficient evidence for comparisons of multifaceted versus educational meetings, educational outreach visits versus continuity of care, and multifaceted versus reminders.</p> <p>The authors concluded that educational-outreach visits alone or when combined with other interventions have relatively consistent and small effects on prescribing that are potentially important. The effects on other professional behaviours, however, appeared to be more variable. Additionally, the authors point out that while educational outreach visits may be costly, the savings may outweigh the costs if the intervention is targeted at inappropriate prescribing and its effects are enduring.</p>	2007	8/11 (AMSTAR rating from www.rxforchange.ca)	1/69
Effects of audit and feedback on professional practice and healthcare outcomes (25)	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	2010	8/11 (AMSTAR rating from www.rxforchange.ca)	11/49

Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
	<p>physicians, and some measured the effects on nurses or pharmacists.</p> <p>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.</p> <p>Using multivariable meta-regression, the authors indicated that the effectiveness of feedback may increase when baseline performance is low, when feedback is provided more than once, when it includes both explicit targets and an action plan, when the source of feedback is a supervisor or colleague, and when it is delivered both verbally and in a written format.</p>			
Effectiveness of quality improvement interventions (QIIs) directed at cancer specialists (32)	<p>Only 12 studies met the inclusion criteria to establish effectiveness of quality-improvement interventions (QIIs) for cancer specialists: three cluster randomized controlled trials (cRCTs), seven uncontrolled before-and-after comparisons, and two cross-sectional studies.</p> <p>Among the included studies the majority of interventions examined more than one type of QII and most commonly involved audit and feedback, an educational session, and the involvement of opinion leaders.</p> <p>The studies were heterogeneous which prevented pooling. None of the cRCTs showed a benefit of the QIIs tested. Some of the cross-sectional studies reported a benefit from the QII, but were difficult to interpret because of their lack of controls. Few of the studies included provided detailed descriptions of the interventions.</p>	Not stated	6/10 (AMSTAR rating from McMaster Health Forum)	3/12
Overall effectiveness and optimal delivery of train-the-trainers (T ² T) programs (33)	Eighteen studies which examined train-the-trainers (T ² T) programs for health and social care providers which met the inclusion criteria (having a follow-up measure collected over a week after the intervention) were included in the review.	2011	8/10 (AMSTAR rating from Program in Policy Decision-making)	0/14

Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
	<p>The studies were very heterogeneous which prevented pooling, and the authors were unable to calculate effect size despite attempting to contact the authors. They instead employed a narrative syntheses approach.</p> <p>The TTT interventions included in the studies were diverse in terms of their method (e.g., didactic presentations, individual feedback, group discussions, case studies and role-plays). The narrative review found that in 13 of the included studies the TTT programs improved outcome measures related to knowledge, clinical behaviour or patient outcomes. Only one of the studies included cancer prevention, and found a TTT manual was effective at improving clinical outcomes versus a control group. The authors report that the included studies had a moderate risk of bias because of the methods they used.</p> <p>The authors conclude that using a 'blended' learning approach to deliver TTT programs (combining different techniques such as interactive, multifaceted methods and accompanying learning materials) can help to effectively disseminate and implement guidelines and curricula. However, they call for further research to determine optimal blending.</p>			
Efficacy of communication-skills training courses in oncology (34)	<p>The review included 21 studies about communication-skills training (CST) in oncology, which consisted of training sessions on breaking bad news, dealing with emotional concerns of patients, and transition to palliative care. Studies had to have sufficient information to be included in a meta-analysis.</p> <p>The final sample included 13 trials - three non-randomised, and 10 with no specific intervention in the control group. The meta-analysis showed a moderate effect of CST on communication behaviour (ES = 0.54) where the control did not receive another specific intervention. Three trials compared basic training courses with more extensive training courses and showed a small additional effect on communication skills (ES = 0.37). Trials investigating participants' attitudes showed an ES = 0.35 and patient outcomes achieved an ES = 0.13. The effects of the training courses on improving communication skills were moderate, and the studies had a lot of variability, lack long-term data, and few addressed patient outcomes.</p>	2008	6/11 (AMSTAR rating from McMaster Health Forum)	?/12 (countries not reported)

Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
	The authors found an additional benefit across three studies from consolidation workshops or supervision after a basic training in communication skills, and suggest adding this to basic training. Interventions lasting less than three days showed consistently small effects.			
Educational interventions for primary healthcare professionals to promote the early diagnosis of cancer (35)	<p>This review included 21 studies: 18 RCTs of individual-level interventions and three practice-level interventions to increase the early diagnosis of various cancers (colon n = 8, breast n = 7, cervical n = 6, skin n = 4, ovarian n = 2, and prostate n = 2). The educational focus of the interventions was on the individual level (e.g., number of tests ordered) or practice-level (e.g., cancer-screening knowledge). Due to heterogeneity of the included studies, pooling was not possible.</p> <p>All of the individual-level education interventions targeting primary healthcare professionals showed an improvement in at least one aspect of an outcome related to early cancer detection (e.g., screening rates for pap smear tests, mammography, fecal occult blood tests). Effects based on pre- and post-intervention calculations reported had <i>P</i>-values ranging from modest to significant. The most effective interventions used interactive educational methods, computerized reminder systems, audit and feedback mechanisms, and educational outreach methods that involved academic detailing. Interventions which focused on more didactic educational methods like seminars, lectures or printed material, had only marginal or no effect.</p> <p>All of the practice-level interventions using a medical practice as the level of analysis showed an improvement in at least one aspect of the outcomes in the early detection of cancer (e.g., performing health-checking manoeuvres, improved cancer knowledge or cancer-screening knowledge, recommending screening tests, or teaching or performing screening manoeuvres). Practice-level interventions tended to be more intensive compared to the individual-level interventions and resulted in modest to significant effects.</p> <p>Amalgamating individual and practice-level interventions by primary and secondary outcomes, the authors found:</p> <ul style="list-style-type: none"> the most statistically significant <i>P</i>-values (<i>P</i>=0.05 or less) for 	2012	8/11 (AMSTAR rating from McMaster Health Forum)	1/18

Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
	<p>primary outcomes were found for educational interventions that used computerized reminder systems; and</p> <ul style="list-style-type: none"> the most statistically significant P-values ($P=0.05$ or less) for secondary outcomes were most predominant in educational interventions that used audit and feedback (39%), interactive education (35%), and educational outreach (13%), followed by practice-level interventions (9%) and reminder systems (4%). 			
Effectiveness of communication training for health professionals who care for patients with cancer (36)	<p>This review included 16 studies (13 interventions and four RTCs) that taught basic communication skills for health and social care professionals who work with patients with cancer. Eleven of the interventions trained health professionals (e.g., physicians, nurses, social workers, psychologists) and two trained medical students. The interventions provided training on combined communication skills, delivering bad news, assessment skills, and the use of skills in clinical practice. The authors report that all interventions demonstrated modest improvements (effect sizes ranged 0.15–2), with the exception of one which found deteriorations in the outcomes measured. However, due to the heterogeneity of studies, pooling was not possible.</p> <p>Training programs that focused on skills showed significant improvements in the skills being taught during the courses, but had little effect on their application in practice.</p> <p>Among the studies reviewed, behaviour change proved to be the most problematic in responding to emotionally charged situations.</p>	2003	7/11 (AMSTAR rating from McMaster Health Forum)	Not reported
Communication-skills training in pediatric	This narrative review includes evidence from observational	Not reported	2/11 (AMSTAR rating	Not reported

Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
oncology (37)	<p>studies, intervention studies, and expert commentary, summarizes about methods to enhance communication skills for pediatric oncologists with a focus on (i) healthcare communication skills and their measurement, (ii) deficits in communication practices and outcomes in pediatric oncology throughout the illness trajectory of childhood cancer, (iii) current approaches to communication skills training in pediatric oncology, and (iv) existing methods to foster communication skill growth. The authors identify the following key areas where tensions occur:</p> <ul style="list-style-type: none"> • due to the number of stakeholders (physician, child, parents) involved, there may be communication deficits during the diagnostic period; • there may be miscommunications between providers and patients during the active treatment period, with providers making assumptions about how much decision-making parents want; • there may be a lack of communication from providers at the therapy completion stage; and • communication barriers may be present at the end-of-life care and advance care planning phase, with physicians reporting they are unsure how to raise these issues. <p>The authors note that existing communication deficits may be the result of an insufficient focus on communication-skills building during both general pediatric and subspecialty training.</p> <p>The authors note an absence of available research about the quality of communication training among pediatric oncologists, and suggest there is an over-reliance on role modelling and informal apprenticeship in practice.</p> <p>Combining didactic material, active small group skills practice, formative feedback and reflection, and formal workshop programs that engage the entire experiential learning cycle are predicted to lead to superior outcomes compared to approaches that engage fewer of these components.</p> <p>Formal workshop programs have the strongest efficacy evidence for communication-skill building, making them the current best practice.</p>		from McMaster Health Forum)	

Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
	<p>Education coaching can be helpful, but requires trained coaches, buy-in from faculty coaches and fellow learners, and works best when the mentoring relationship can be maintained long term.</p> <p>Conversation guides can be helpful for improving conversations in terms of appropriate structure, content and language, but they do not improve general conversation skills.</p> <p>The authors conclude by noting the current underutilization of the best practice principles of multimodal education in pediatric oncology, and identify barriers to its uptake resulting from a shortage of qualified faculty teachers, costs of workshop attendance or organization, and lack of curricula tailored for the pediatric oncology context.</p>			

Appendix 2: Summary of findings from primary studies about educational initiatives to improve clinical performance related to the priority areas (colonoscopy, mammography, pathology and cancer more generally)

Focus of study	Study characteristics	Sample description	Key features of the intervention(s)	Key findings
Evaluating a training program to promote safe sentinel lymph node biopsy (SLNB) for breast cancer care-provider teams (38)	<p><i>Publication date:</i> 6 February 2013</p> <p><i>Jurisdiction studied:</i> U.K.</p> <p><i>Methods used:</i> Theory/skills laboratory course followed by a real-world audit and validation</p>	<p>The sample consisted of 133 teams (1,379 participants): 416 surgeons, 190 radiologists, 132 pathologists, 123 nuclear medicine physicians, 230 breast care nurses, 183 theatre nurses, and nine data or clerical staff.</p> <p>The patient sample consisted of 6,623 women sampled in 103 centres scheduled to undergo a wide local excision or mastectomy for clinically node-negative invasive breast cancer (6,685 performed).</p>	<p>The “New Start” (training-the-trainers course) consisted of three phases: 1) a one-day theory course attended by entire teams (education materials consisted of presentations, videos and a take-home DVD with videos and lectures, patient information leaflets, consent forms, and a business case for local adaptation, simulations and a troubleshooting seminar); 2) mentored operating sessions with an accredited trainer (consisting of 210 previously procedure-naïve surgeons conducting 30 consecutive sentinel lymph node biopsy procedures); and 3) the final validation phase with pathological examinations.</p>	<p>The program successfully trained a wide range of U.K. breast teams to perform safe sentinel lymph node biopsy with very high localization rates and low false-negative rates throughout their training series. Notably, the authors conclude that a standard injection protocol and structured multidisciplinary training “can abolish learning curves” in the training of safe sentinel lymph node biopsy.</p>
Understanding poor communication in cancer care from the patient perspective (55)	<p><i>Publication date:</i> 2013</p> <p><i>Jurisdiction studied:</i> Canada</p> <p><i>Methods used:</i> Longitudinal qualitative interviews</p>	<p>The sample consisted of 125 cancer patients, 34 males and 91 females, who were diverse in terms of age, ethnicity, residence, type of cancer and stage.</p>	N/A	<p>The study identified three types of poor care-provider communication styles based on patient accounts:</p> <ol style="list-style-type: none"> 1. “ordinary misses” are everyday miscomputations which may be addressed through time and socialization; 2. “systemic misunderstandings” are based on assumptions between patients and professionals, which may be addressed through qualitative research; and 3. “repeat offenders” are a subset of clinicians whose communication patterns become a particular source of patient distress. <p>The authors conclude that education is not adequate</p>

Focus of study	Study characteristics	Sample description	Key features of the intervention(s)	Key findings
				for addressing more serious communication issues, is not possible through voluntary education for “repeat offenders”, and may require changes to organizational culture and models of care.
Improve general practitioners’ ability to diagnose skin cancer following delivery of a multifaceted intervention (43)	<i>Publication date:</i> 2015 <i>Jurisdiction studied:</i> Switzerland <i>Methods used:</i> RCT, intervention with control and pre/post-test	The sample consisted of 78 general practitioners working at least 20 hours per week.	A randomized controlled trial was conducted using a multifaceted dermatological educational intervention. Measures were collected at three times: 1) three image scoring sessions were conducted at T0 with both the intervention and control group, after which the participants received a one-day training and magnifying glass; 2) at T1 both groups received a day-long training course which included 108 case vignettes with images of skin lesions with known histology, supplemented with short histories (36 were low and 36 were medium complexity); and 3) at T2 after the intervention group received a full year of continuing feedback.	There were no differences between the intervention and control group.
Evaluation of an innovative cancer curriculum delivered in undergraduate nursing education (44)	<i>Publication date:</i> 2016 <i>Jurisdiction studied:</i> U.K. <i>Methods used:</i> Intervention with pre-test post-test survey design with a comparison group	The sample consisted of 178 undergraduate nursing students: 84 enrolled in the intervention group and 91 in the comparison group.	The intervention cohort received a 3.5-day program of cancer education, co-produced with patients, carers and health professionals, which focused on cancer as a life-changing long-term condition. The comparison group received a two-day program produced by a lecturer.	<p>The intervention resulted in measured improvements in undergraduate student nurses’ attitudes, knowledge and confidence with delivering cancer care, who received the intervention compared to those who did not.</p> <p>Nursing students who received the intervention scored as “totally confident” across most confidence measures.</p>
Evaluation of a continuing medical education (CME) program to teach primary-care physicians (PCP) how to engage in cancer-risk communication and shared	<i>Publication date:</i> 2014 <i>Jurisdiction studied:</i> U.S. <i>Methods used:</i> Four-year cluster	The sample consisted of 18 primary-care physicians and 168 of their patients	Primary-care providers enrolled in the communication intervention group received skills training that included standardized patient (SP)	There were no group differences in standardized patient ratings of physician communication at baseline. At follow-up, primary-care physicians who received the communication intervention were rated higher in general communication about cancer risks and shared

Focus of study	Study characteristics	Sample description	Key features of the intervention(s)	Key findings
decision-making with patients who have limited health literacy (HL) (39)	randomized controlled trial	with limited health literacy who were overdue for colorectal/breast/cervical cancer screening.	<p>feedback on counselling behaviours. All primary-care providers received chart audits of patients' screening status semi-annually up to 24 months, and received two annual performance feedback reports.</p> <p>All primary-care providers received three unannounced standardized patient encounters during which their communication behaviours were rated. Between group differences in standardized patient ratings and patient's knowledge of cancer-screening guidelines were measured over 12 months and changes in patient cancer screening over 24 months.</p> <p>The control group primary-care providers only received performance feedback.</p>	<p>decision-making related to colorectal cancer screening.</p> <p>Screening rates increased among patients of providers in both groups. There were no between-group differences in screening rates except for mammography, but these need to be further explored in a larger sample.</p> <p>The communication intervention did not improve patient cancer-screening knowledge.</p>
Communication -kills training (CST) intervention for oncologists based on patient preferences (46)	<p><i>Publication date:</i> 2014</p> <p><i>Jurisdiction studied:</i> Japan</p> <p><i>Methods used:</i> Intervention with pre-post test (no control)</p>	The sample consisted of 16 oncologists.	A communication skills training program was developed based on survey results of patient preferences related to communication. The two-day communication skills training intervention consisted of a didactic lecture, role plays with simulated patients, discussions and an ice-breaker activity. Participants were assessed based on their communication during simulated consultation at the pre- and post-test, and self-rated their confidence communicating with patients at pre-, post-, and three-months after receiving communication skills training, and their burnout	A comparison of pre-post measures showed improvement in oncologists' communication performances, especially skills of emotional support and consideration for how to deliver information (p-values < .01). Their confidence in communicating bad news was rated higher post-test and continued at 3-months. Emotional exhaustion scores decreased at 3-months after the intervention (p-values = 0.04). In addition, oncologists rated high satisfaction with all components of the program.

Focus of study	Study characteristics	Sample description	Key features of the intervention(s)	Key findings
			at pre-test and three months after receiving communication skills training, and the helpfulness of the program at post-test.	
Evaluation of a novel training program to improve training for oncology nurses' ability to care for cancer patients (47)	<p><i>Publication date:</i> 2015</p> <p><i>Jurisdiction studied:</i> Japan</p> <p><i>Methods used:</i> Intervention with control group comparison with pre- and three-month post-test</p>	The sample consisted of 96 oncology nurses, with 50 assigned to the intervention and 46 to a control.	The intervention consisted of a 16-hour program delivered during one-day meetings held across two weeks. The intervention was focused on supportive communication and crises intervention. Each session involved didactic lectures on assessment (20 minutes), role-play exercises (90 minutes), group work to discuss the management of vignette cases (20 minutes), and lectures on management (20 minutes).	In the intervention group, confidence and knowledge (p-value <0.01) were significantly improved relative to the control group, but not attitudes. No significant intervention effects were found for job-related stress and burnout. A high percentage (98%) of participants considered the program useful in clinical practice, and 91% indicated they would recommend the program.
Evaluation of an intervention focused on improving communication skills among general practitioners to increase the delivery of gait fecal occult blood tests and increase colorectal cancer screening (40)	<p><i>Publication date:</i> 2016</p> <p><i>Jurisdiction studied:</i> France</p> <p><i>Methods used:</i> Cluster randomized trial with control</p>	The sample consisted of 142 general practitioners recruited from 100 practice sites. Following allocation and loss to follow-up the samples for analysis consisted of 16 practices and 17 general practitioners in intervention, and 19 practices and 28 general practitioners in the control.	The intervention consisted of a four-hour educational training based on previously collected qualitative data about colorectal cancer screening focused on doctor-patient communication, with a follow-up of seven months for both groups.	<p>The primary outcome measure was the patients' participation rate in the target population for each general practitioner's practice. The patients' participation rate in the intervention group were higher at 36.7% compared to the control group at 24.5% (p-value = 0.03).</p> <p>The authors state that the intervention based on patient-centred care and giving general practitioners' skills to motivate non-compliant patients appeared to increase their colorectal cancer screening.</p>
Evaluation of a web-based curriculum to improve screening and counselling for inherited breast cancer (42)	<p><i>Publication date:</i> 2015</p> <p><i>Jurisdiction studied:</i> U.S.</p> <p><i>Methods used:</i> RCT, intervention with control and post-test</p>	The sample consisted of 155 community physicians (121 after dropouts) with 60 in the intervention and 61 in the control.	The intervention consisted of web-based interactive genetics curriculum (covering information about genetic testing, risk assessment, practice behaviours, and communication skills), evaluated against a control group of physicians who	<p>Across both intervention and control groups there was incomplete history-taking, discussions of test result implications, and exploration of ethical and legal issues. Just over half of physicians offered a genetic counselling referral (54.6 %), and fewer (43.8%) recommended testing.</p> <p>Physicians in the intervention were more likely to explore genetic counselling benefits (78.3 % versus</p>

Focus of study	Study characteristics	Sample description	Key features of the intervention(s)	Key findings
			received genetics review articles. Following the education component, physicians interacted with an announced standardized patient (SP) at risk for inherited breast cancer.	60.7 %, P = 0.048), encourage genetic counselling before testing (38.3% versus 21.3 %, P =0.048), ask about a family history of prostate cancer (25.0 % versus 6.6 %, P = 0.006), and report that a positive result indicated an increased risk of prostate cancer for male relatives (20.0% versus 1.6%, p= 0 .001). Intervention-group physicians were less likely to ask about Ashkenazi heritage (13.3 % versus 34.4 %, P = 0.01) or to tell patients that they would get tested if asked, “What would you do?” (33.3 % versus 54.1 %, P = 0.03).
Evaluation of medical students’ perception of individual versus group training in breaking bad news (41)	<p><i>Publication date:</i> 2013</p> <p><i>Jurisdiction studied:</i> Switzerland</p> <p><i>Methods used:</i> RCT with two intervention groups with post-test</p>	The sample consisted of 124 master’s-level medical students.	Student were randomized into either individual or group interventions. Group training involved one or two students per group (14 students in total) conducting a simulated patient (SP) interview, which was observed by 61 other students and discussed collectively with the faculty. The remaining 49 students received individual training and conducted an SP interview which was discussed during individual supervision. The training was evaluated using questionnaires, and the videotaped interviews were rated using the Roter Interaction Analysis System. The gender split was 38 females and 25 males.	<p>Students were satisfied with the introduction to breaking bad news, but there were differences between the students who participated in the group simulation or the individual intervention, and those who just observed, in respect to several questions:</p> <ul style="list-style-type: none"> • question 2 (training allowed to reach objectives) was approved by 100% of the group students, 97% of the individual students, and 54% of the observers; • question 5 (training allowed to gain new knowledge and/or skills) was approved by 100% of the group students, 97% of the individual students, and 79% of the observers; • question 6 (prior knowledge was sufficient to follow training) was approved by 90% of the group students, 84% of the individual students, and 71% of the observers; • question 7 (possibility to have a sufficiently active role) was approved by 100% of the group students, 100% of the individual students, and 50% of the observers; and • question 9 (training allowed to improve in the domain of physician-patient communication) was approved by 100% of the group students, 97% of the individual students, and 71% of the observers. <p>The analysis considered the kinds of information participants exchanged during the simulation in terms of what they asked versus what they said. Students were more likely to provide information (42.86% of their total utterances) than gather information (7.63%).</p>

Focus of study	Study characteristics	Sample description	Key features of the intervention(s)	Key findings
				<p>In comparing across two scenarios, one with a curable and the other a palliative cancer, the students with the curative scenario gave more medical and therapeutic information versus those in the palliative scenario who showed more agreement or understanding and provided more orientation and instructions.</p> <p>There were gender differences observed across the palliative and curative scenario, with 16 female students providing more reassurances and medical and therapeutic counselling, whereas the 14 male students in the curative scenario asked more open questions related to psychosocial aspects and the experiences of the patients.</p>
Evaluating whether a multidisciplinary rotation increases deliberate practice for medical interns (48)	<p><i>Publication date:</i> 2016</p> <p><i>Jurisdiction studied:</i> U.S.</p> <p><i>Methods used:</i> Intervention with retrospective comparison</p>	The sample consisted of 32 interns in a hybrid multidisciplinary breast rotation, 73 university surgical oncology service residents, and 51 residents from a traditionally structured general surgery rotation.	<p>General surgery residents participated in either a hybrid multidisciplinary breast rotation, a university surgical oncology service, or a traditionally structured general surgery rotation.</p> <p>Interns completed a four-week multidisciplinary breast rotation. Three days a week were spent in surgery and surgical clinic. Half-days were spent in breast radiology, pathology, medical oncology and didactics. Interns operated with supervising faculty for four half-days. The option to participate in a half-day of radiation oncology clinic was also available to interns. In addition to clinical hours, interns spent two half-days on formal educational activities and attending residency-wide weekly didactic and simulation conferences. A further half-day was dedicated to self-paced review of seminal articles in breast surgery and preparation</p>	<p>The multidisciplinary breast rotation interns generally rated the hybrid rotation higher for quality of faculty teaching and educational materials, than the university surgical oncology service residents program or the traditionally structured general surgery rotation (p-value < 0.05).</p> <p>The authors conclude that the hybrid multidisciplinary breast rotation offered more opportunities for deliberate practice.</p>

Focus of study	Study characteristics	Sample description	Key features of the intervention(s)	Key findings
			of an hour-long teaching conference on breast pathology. The program was offered in addition to existing breast pathology training.	
Participation of radiologists in breast cancer multidisciplinary team meetings (45)	<i>Publication date:</i> 2014 <i>Jurisdiction studied:</i> Australia <i>Methods used:</i> Qualitative interviews and observations	The sample consisted of 10 radiologists (five female/five male).	Twenty-one breast cancer multidisciplinary team meetings were observed across five points (three pre- and two post-a first-line surgical intervention). The pre-interventional meetings were attended by radiologists, pathologist, surgeon, breast physicians, radiographers/sonographers and breast care nurses. The post-interventional meetings were attended by additional participants, including medical oncologists, radiation oncologists, chemotherapy staff and allied staff.	Radiologists discussed the importance of 'sharing experiences', the 'radiologist-pathologist relationship' and the value of 'continuing participation'. Radiologists self-reported improved confidence in their clinical decision-making following immediate feedback from pathologists. Radiologists self-reported improvements to patient care and workplace isolation by sharing experiences with other cancer care colleagues.
Evaluating the impact of weekly radiotherapy quality assurance meetings (51)	<i>Publication date:</i> 2014 <i>Jurisdiction studied:</i> U.K. <i>Methods used:</i> Clinical audits at two time points	The sample was comprised of chart data from 80 patients at time 1 (T1) and 72 patients at time 2 (T2).	The clinical target volume for all radical, adjuvant and palliative treatments longer than five fractions were reviewed during weekly one-hour departmental meetings for radiotherapy. The meetings were attended by all consultant clinical oncologists, specialist registrars, representatives from the therapy radiographer body and medical physicists. During these meetings therapy radiographers and medical physicists were encouraged to ask questions about planned treatments.	There was an absolute reduction in major alterations between the two time points: eight alterations in 80 patients (10%) at T1 compared to three alterations from 72 patients (4.2%) at T2. Although the results were not statistically significant (chi-squared test p-value = 0.17) the authors conclude the meetings facilitated consensus and adoption of departmental clinical guidelines.
Describing patterns of peer review in radiation oncology (50)	<i>Publication date:</i> 2013 <i>Jurisdiction studied:</i> Canada	The sample was comprised of 14 cancer centres in	N/A	One hundred per cent of centres responded and all rated the importance of peer review as at least 8/10 (10=extremely important), with detecting medical

Focus of study	Study characteristics	Sample description	Key features of the intervention(s)	Key findings
	<i>Methods used:</i> Survey	Ontario. The survey was completed by a delegate from each radiation oncology program based on input from their multidisciplinary team.		<p>errors and improving planning processes being the highest rated perceived benefits of peer review (each median 9/10). Existing peer review efforts are lacking, with:</p> <ul style="list-style-type: none"> only six centres (43%) having reviewed at least 50% of curative cases, but four of these centres (29%) reviewed more than 80% of curative cases; less than 20% of cases treated with palliative intent were reviewed in most centres; only five centres (36%) reported conducting peer review prior to the initiation of treatment, and the sample number recorded the outcomes of peer review on the medical record; and thirteen centres (93%) planned to expand their peer-review activities.
Effects of peer review in stereotactic body radiation therapy for lung cancer (52)	<p><i>Publication date:</i> 2014</p> <p><i>Jurisdiction studied:</i> Canada</p> <p><i>Methods used:</i> Retrospective chart review</p>	The sample was comprised of chart data for 40 stereotactic body radiation therapy for lung plans that were reviewed retrospectively.	Each lung plan was anonymized and independently reviewed by two to three radiation oncologists using established institutional guidelines. Reviewers recorded recommendations for “no change,” “minor change,” “major change,” or “missing contour”, and provided a modified or new contour as needed. Dose–volume histograms were analyzed for dosimetric violations.	<p>Peer review of 472 contoured structures resulted in recommendations for 107 major changes (23%), 176 minor changes (37%), 157 no change (33%), and 32 missing (7%).</p> <p>The authors conclude that peer review of structure contouring resulted in significant changes in lung stereotactic body radiation therapy plans.</p>
Establishing practice patterns for peer review in oncology (49)	<p><i>Publication date:</i> 2015</p> <p><i>Jurisdiction studied:</i> U.S.</p> <p><i>Methods used:</i> Web-based survey</p>	The sample consisted of 572 physicians (split between academic, private practice and other providers).	Not applicable	<p>Amongst the sample, 83% of respondents were involved in peer review and 75% were comfortable with their program.</p> <p>Of those involved in peer review, 65% report doing some review before radiation begins and 56% of these physicians had their own patients reviewed before treatment.</p> <p>Peer review elements used by responding physicians include overall treatment strategy (86%), dose and fractionation (89%), contouring (59%), and isodose or dose-volume histogram (75%).</p>

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				<p>Ninety per cent of physicians reported having changed their radiation plans because of peer review, and make changes in 7%-10% of cases.</p> <p>There was a high degree of support for the American Society for Radiation Oncology to make formal peer review recommendations (74%), with 7% in opposition.</p>
Assessing the quality of cancer multidisciplinary team meetings (56)	<p><i>Publication date:</i> 2014</p> <p><i>Jurisdiction studied:</i> U.K.</p> <p><i>Methods used:</i> Observational assessment and interviews</p>	The sample consisted of 20 cancer teams from four hospitals and interviews with 64 multidisciplinary team members (32 consultant physicians and 14 nursing, 15 administrative, and 3 allied health professionals) and 19 peer observers.	A 10-point scale (very poor to very good) with 10 sub-domains was developed based on national clinical consensus recommendation for best-practices in cancer multidisciplinary teams, and in consultation with an expert steering group. The scale was used by peer observers (managers or clinicians from the local workforce) to evaluate meetings.	<p>Two thirds (12/19) of the peer observers stated that it was feasible for them to undertake the assessments alongside their usual job, and the remainder said the main challenge was finding time due to other workload pressures.</p> <p>All observers felt that providing their observational feedback was useful to the multidisciplinary teams they observed as well as to themselves, and felt it could inform improvements in multidisciplinary team performance.</p>
To describe a quality assurance program (53)	<p><i>Publication date:</i> 2013</p> <p><i>Jurisdiction studied:</i> Canada</p> <p><i>Methods used:</i> Retrospective administrative database review</p>	British Columbia Cancer Agency provincial prostate brachytherapy quality-assurance program	A quality-assurance program was established in 1997 for the British Columbia Cancer Agency for prostate brachytherapy, which includes a large provincial prospective electronic database with records on all patients, including disease characteristics, risk stratification, pathology, pre-plan and post-implant dosimetric data, follow-up of prostate-specific antigen, and toxicity outcomes.	<p>Key components of the quality-assurance program include unified eligibility criteria and planning system, comprehensive database, physics and oncologist training and mentorship programs, peer review process, individual performance outcomes and feedback process, structured continuing education and routine assessment of the program's dosimetry, toxicity and prostate-specific antigen outcomes, and administration and program leadership that promotes a strong culture of patient safety.</p> <p>Peer review is accomplished through quality-assurance committee review, and regional centres have also developed strategies tailored to their organizational structure, for example:</p> <ul style="list-style-type: none"> • reviewing all cases during monthly quality-assurance rounds; • holding weekly physics/radiation oncology planning sessions; or • reviewing a random sample of five patients

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				<p>receiving care from an individual oncologist.</p> <p>Maintaining quality and managing change is done through communication with the head of the program and discussed during regular quality assurance meetings with other members.</p>
Evaluation of a peer-review initiative (54)	<p><i>Publication date:</i> 2016</p> <p><i>Jurisdiction studied:</i> Canada</p> <p><i>Methods used:</i> Statistical analysis of performance data</p>	Data were collected from 14 cancer centres across Ontario.	<p>A peer-review initiative of radiation treatment plans was launched in 2011. The initiative followed the “Kotter Eight-Step Process for Organizational Transformation.”</p> <p>The initiative involved site visits to promote and guide peer review, and the development of education and implementation processes in collaboration with the centres.</p> <p>Analysis of performance data was conducted to establish the percentage of radiation therapy courses which were peer-reviewed, and the timing of the peer review.</p>	<p>The proportion of radical-intent radiation treatment courses that were peer-reviewed across the province of Ontario increased from 43.5% to 68.0% from 2013-2015. This proportion has subsequently become a quality metric in Ontario and is publicly reported through the Cancer System Quality Index. The performance target for this metric of 60% (cases treated with radical intent) was exceeded across the province following the initiative. However, there was considerable variation in rates and timing of peer review between centres.</p> <p>The authors conclude that a change-management framework can be useful for planning and achieving substantial increases in peer review activities on a jurisdictional basis.</p>

>> Contact us

McMaster Health Forum
1280 Main St. West, MML-417
Hamilton, ON Canada L8S 4L6
Tel: +1.905.525.9140 x 22121
Email: mhf@mcmaster.ca

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