1. Introduction

Scientific research in pain will only help patients if it can be effectively disseminated and implemented. Much attention has been devoted in recent years to the insufficient progress made in translating laboratory research in pain into clinical practice. This discussion, however, is typically focused on the challenge of moving findings from basic science studies to human clinical research studies. There is a second, equally important, and challenging translational step in the research continuum that is often overlooked: the process whereby evidence from clinical research is moved into clinical practice. As noted in Figure 1, there are 2 gaps along the translational continuum, referred to as the “Valleys of Death,” with valley 1 representing the first gap (ie, the gap between basic science and clinical science) and valley 2 representing the second gap (ie, the gap between clinical science and clinical practice). With an estimated 2.5 million scientific articles published each year, and global scientific output doubling every 9 years, it cannot be assumed that this vast research knowledge will automatically result in improvements in clinical practice that will benefit patients. Various estimates show that it can take 17 years on average for research findings to be adopted into practice. Moreover, as shown in Figure 2, it is a leaky pipeline; only 14% of clinical research ever finds its way to practice. Across health settings, it is estimated that one-third of patients do not benefit from evidence-based treatments; one-quarter of patients receive care that is not needed or is potentially harmful; up to three-quarters of patients, and over half of physicians, report not having the information they need for decision making.

Gaps between evidence and practice are also evident in pain research and management. In the area of pediatric pain, a recent review of the scientific literature published from 1975 to 2010 demonstrated exponential growth in the field. Yet, despite the availability of high-quality evidence and clinical practice guidelines for effective management, best available evidence is rarely used in practice for managing children’s pain. Stevens et al. collected data on procedural pain assessment and management practices at 8 Canadian children’s hospitals and showed that approximately 80% of the hospitalized children whose medical records were reviewed experienced at least 1 painful procedure over 24 hours (the average was 6 procedures per child). More than two-thirds of these children had no documented pain management intervention for their procedures. This result is concerning, given significant research evidence in support of a variety of effective procedure pain management strategies that have been reported in randomized clinical trials (eg, breastfeeding and sucrose for infants, positioning, topical anesthetic creams, and distraction), summarized in systematic reviews and clinical practice guidelines, and recommended for global health implementation. Similar knowledge to action gaps have been reported for children’s pain in the emergency department (with most procedures being performed without any analgesia), after surgery (with many children having proper postoperative pain management withheld or diminished because of concerns about addiction), in the Neonatal Intensive Care Unit (NICU) (with many babies not receiving pain management for procedures), and in the management of children experiencing chronic pain (with limited accessibility to multidisciplinary pain clinics and long waiting times). These gaps are alarming because poorly managed pain in children is associated with a range of negative short- and long-term effects, including delayed healing, altered brain development, pain sensitization, and health care avoidance.

The reason for these knowledge to action gaps is underpinned by the typical approach to moving scientific discoveries into practice that has largely been haphazard, driven primarily by initiatives such as continuing medical education and clinical practice guideline development. These efforts, while important, have been insufficient on their own to ensure improvements in clinical practice and health outcomes. Most clinical practice guidelines are never used in practice, and the amount and frequency of continuing medical education activities have been found to be unrelated to improvements in health professional practice change. A broader approach is urgently needed to ensure that scientific research in pain is effectively disseminated and implemented to help patients with pain.

The objective of this article is to inform pain researchers and clinicians regarding the rapidly developing field of dissemination and implementation research and its potential to be applied to pain. The article provides an overview of the science and practice of dissemination and implementation including key terms, theoretical frameworks, research designs, and outcomes used in implementation and dissemination research. Different strategies for dissemination and implementation are presented, including examples from the area of pediatric pain.
2. Dissemination and implementation science

The field of dissemination and implementation research has evolved to reduce the gap between research and practice by sharing research evidence that is understandable to different knowledge users (ie, those who will use research results to inform decisions, including patients, caregivers, health professionals, administrators, policy makers, and/or the public-at-large) and using this evidence to improve health outcomes, quality of care, and the health care system. Dissemination is defined as the sharing and spreading of scientific findings, while implementation is defined as the use of strategies to adopt and integrate science-based intervention to change practice and improve care. It is important to note the distinction between the practice and the science of dissemination and implementation. Practice focuses primarily on distribution or spread of information (in the case of dissemination) or use of strategies to adopt and integrate evidence-based interventions to improve practice (in the case of implementation), whereas science refers to the scientific study of processes and variables that influence sharing or spread (for dissemination) or methods to promote research uptake in different contexts (for implementation).

Dissemination and implementation of scientific knowledge are increasingly being recognized as important by funding agencies (eg, the Canadian Institutes of Health Research [CIHR] and the National Institutes of Health Research [NIH]). There are a range of different terms used to refer to dissemination and implementation, with some better recognized in certain geographical regions (eg, “knowledge translation” in Canada) than others. In Canada, all grants submitted to CIHR must include some form of a written plan for knowledge translation. Resources for knowledge translation training and tools for scientists are available at: http://www.cihr-irsc.gc.ca/e/45321.html and http://www.melaniebarwick.com/training.php. A study by Tetroe et al. listed 29 different terms to refer to aspects of dissemination and implementation around the world, while others have identified more than 100 terms (Table 1).

The large number of terms for dissemination and implementation are matched by the large number of available theories, frameworks, and models that provide a conceptual basis for dissemination and implementation research. The different theories vary on a number of dimensions and serve different purposes; for example, deterministic theories can be used to examine contextual variables, while process theories can be used to guide the process of implementation. Tabak et al. provide a comprehensive review of this topic. For the purposes of this article, I highlight some of the more well-known theories. These include the RE-AIM framework, which emerged out of the field of public health and emphasizes 5 dimensions that together determine impact (reach, effectiveness, adoption, implementation, and maintenance), and the Consolidated Framework for Implementation Research (CFIR) which emerged out of the field of health services as a pragmatic framework based on 19 implementation theories and 39 constructs (and subconstructs) that are organized under 5 major domains thought to be important in effective implementation (ie, intervention characteristics, outer setting, inner setting, individual characteristics, and implementation process) that help to elucidate what works and why in different contexts. The Knowledge-to-Action Cycle developed by Graham is a framework that has been particularly influential in Canadian dissemination and implementation practice and research. As shown in Figure 3, the Knowledge-to-Action Cycle is centered around a “knowledge funnel” that represents the typical scientific process of knowledge creation (ie, knowledge inquiry, synthesis, and products) whereby research questions are asked, studies are designed and conducted, and results shared in the form of research publications, presentations, and systematic reviews. The “action cycle” of the Knowledge-to-Action Cycle builds on this typical research process by depicting the different phases of activities that are necessary for scientific research to influence practice, including (1) identifying knowledge-to-action gaps; (2) adapting existing knowledge to contexts; (3) assessing barriers and facilitators to knowledge use; (4) selecting, tailoring, and implementing interventions; and
Moreover, the cycle acknowledges the potential for the process whereby disseminating and implementing knowledge into practice can, in turn, influence the process of scientific knowledge creation. Although the Knowledge-to-Action Cycle is categorical in nature (ie, it does not acknowledge context, process, or implementation outcomes) and does not offer specifics regarding what is meant by tailoring and how one would approach this task, this theory has been highly influential in drawing attention to how researchers can think more broadly about the importance of moving scientific knowledge into practice.

Traditionally, the aim of clinical research has been to study the performance of an intervention on clinical outcomes (in the case of pain research, this is most often patient or caregiver-reported pain and/or function) under ideal and tightly controlled conditions (ie, efficacy research) or determine the performance of an intervention under "real-world" circumstances (ie, effectiveness research and pragmatic trials) both using traditional quantitative methods such as the "gold standard" randomized controlled trial. Conversely, implementation research capitalizes on different types of research designs, outcomes, and methods. For example, an implementation study of a new pain management intervention would not focus on clinical outcomes alone (eg, reduced pain) but rather would focus on implementation outcomes, such as acceptability, adoption, appropriateness, cost, feasibility, fidelity, penetration, and sustainability. Implementation studies can also include an examination of service outcomes (eg, efficiency, safety, effectiveness, equity, patient-centeredness, and timeliness) and patient outcomes (eg, satisfaction and function). Moreover, implementation studies, while at times also drawing from traditional randomized designs, often capitalize on nonrandomized designs (eg, within and between site designs, and cohort designs) as well as a range of emerging pragmatic and hybrid research designs. Of these, effectiveness-implementation hybrid designs are gaining momentum because they allow for simultaneous testing of interventions on relevant clinical outcomes while also observing and gathering data on implementation. This type of design has been successfully used to study delivery of evidence-based treatments for a range of mental health disorders (eg, anxiety disorders and schizophrenia) and health promotion strategies (eg, osteoporosis prevention) but, to date, have yet to be applied in the area of pain management. In relation to a pain management intervention, an effectiveness-implementation hybrid design would permit a researcher to examine the impact of a new intervention on clinical outcomes (eg, children’s self-reported pain during a painful procedure, and parent and health professional use of pain management strategies) at the same time offering data on implementation outcomes (eg, acceptability, adoption, and sustainability), service outcomes (eg, safety and timeliness), and patient and caregiver satisfaction related to that intervention. In addition to these new research designs, implementation studies are more likely to incorporate mixed-methods evaluations, where both quantitative (eg, surveys) and qualitative data (eg, interviews and focus groups) are collected and reported, and together provide evidence in support of the implementation effectiveness of a particular intervention. To advance our understanding of how research evidence about pain can be effectively disseminated and implemented, it is imperative that the field of pain research and
Although there is also evidence that use of patient-mediated interview, interactive small group, include press release, patent license, art-based strategies, social media, networks, communities of practice, and webinars. It is important that the characteristics of the targeted knowledge user be considered (i.e., for individuals, factors such as role and education, and for organizations, factors such as motivation for change) when deciding on a dissemination and implementation strategy. A variety of dissemination and implementation approaches to improve management of children's pain have recently been explored. Stevens et al. examined the effect of a multidimensional intervention on procedural pain practices and clinical outcomes for hospitalized children in a national multisite study. The intervention integrated research evidence, tailored implementation strategies (eg, individualized pain management goals and support materials), and continuous quality improvement methods facilitated by a research nurse. Hospital units that received the intervention showed significant improvements in pain assessment and management and had children at lower risk for experiencing pain than units who did not receive the intervention. The intervention was resources intensive and only partially sustained over time. There is a need to better understand factors that impact intervention implementation and how outcomes can be sustained over time.

Health professionals are just 1 target for dissemination and implementation of evidence about pain. Patients, caregivers, administrators, policy makers, and the public-at-large are all knowledge users engaged in pain care with unique informational needs and opportunities to influence practice change. Previous dissemination and implementation interventions to improve children’s pain management have primarily targeted health professionals, yet there is evidence from other health areas (eg, cancer) that interventions directed to patients and caregivers are more effective at improving care delivery and health outcomes than those directed at health professionals alone. Given what is known about the role of parents in pediatric pain management, patients, caregivers, professionals, companies, and networks through web-based platforms such as Twitter, Facebook, YouTube, and Instagram. Use of social media is growing exponentially for communication on health topics among patients, health professionals, researchers, and the public at large. Use of social media is growing exponentially for communication on health topics among patients, health professionals, researchers, and the public at large.

### 3. Strategies for dissemination and implementation

Achieving effective practice change is complex and requires a multifaceted approach targeting multiple knowledge users. A range of different dissemination and implementation strategies have been used and evaluated across various health areas, with some more effective than others. It is noted that much of what is known about these strategies is dated and methodologically weak, as studies have rarely considered individual and organizational context, factors, processes, or implementation outcomes. In general, multicomponent strategies (eg, those that target both health professionals and patients, or those that include combined interventions) have been found to be more effective than use of single strategies alone, although there is also evidence that use of single strategies are effective, and that the number of intervention components do not necessarily increase intervention effectiveness. Dissemination and implementation strategies that have been found to be most effective to date across health areas include interactive small group, educational outreach, reminders, opinion leaders, internet decision support, interdisciplinary collaboration, and mass media campaigns. Those strategies found to have mixed effects include combined interventions, financial incentives, didactic conferences.

<table>
<thead>
<tr>
<th>Implementation outcome</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Acceptability</td>
<td>“…the perception among implementation stakeholders that a given treatment, service, practice, or innovation is agreeable, palatable, or satisfactory.”</td>
</tr>
<tr>
<td>Adoption</td>
<td>“…the intention, initial decision, or action to try or use an innovation or evidence-based practice. Adoption also may be referred to as uptake.”</td>
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<tr>
<td>Appropriateness</td>
<td>“…the perceived fit, relevance, or compatibility of the innovation or evidence-based practice for a given practice setting, provider, or consumer; and/or perceived fit of the innovation to address a particular issue or problem. Appropriateness is conceptually similar to ‘acceptability,’ and the literature reflects overlapping and sometimes inconsistent terms when discussing these constructs.”</td>
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<tr>
<td>Feasibility</td>
<td>“…the extent to which a new treatment, or an innovation, can be successfully used or performed within a given agency or setting.”</td>
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<tr>
<td>Fidelity</td>
<td>“…the degree to which an intervention was implemented as it was prescribed in the original protocol or as it was intended by the program developers.”</td>
</tr>
<tr>
<td>Implementation cost</td>
<td>“…the cost impact of an implementation effort…The cost of implementing a treatment…depends on the costs of the particular intervention, the implementation strategy used, and the location of service delivery.”</td>
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<tr>
<td>Penetration</td>
<td>“…the integration of a practice within a service setting and its subsystems.”</td>
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<tr>
<td>Sustainability</td>
<td>“…the extent to which a newly implemented treatment is maintained or institutionalized within a service setting’s ongoing, stable operations.”</td>
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management be more flexible in selection of research designs and incorporate different and more creative designs and methods to increase the likelihood of evidence uptake and our understanding of that process.

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As a dissemination example, we developed and evaluated a brief (2:17 minutes) YouTube video for parents titled “Strategies for Helping Children with Shots and Needles.”27 In the video, a child tells parents what they can do to help with pain, promoting evidence-based strategies such as deep breathing, distraction, and use of topical anesthetics. Since the video’s release in November 2013, the video has had a wide reach, with >230,000 views in >180 countries and showed excellent implementation success with parents. Data collected through an online survey showed strong acceptance of the video and improved parent awareness and plans to adopt evidence about children’s pain management into practice.25,35 For example, the number of parents reporting they would use a topical anesthetic cream grew from 18% to 63% after watching the video. The video also generated considerable public interest (eg, blog posts)25,26,40 and high-profile media stories (eg, The Globe and Mail,84 The New York Times35). A second video in the series, “The Power of a Parent’s Touch in Reducing Baby’s Pain During Medical Procedures” (led by Dr Campbell-Yeo),16 was released in December 2014 and focused on pain management for infants using skin-to-skin care and was found to have a similar reach and impact on parents as well as health professionals.17 Others have also used YouTube as a strategy for dissemination of evidence-based information about children’s pain management.14,34,55,98

Despite our success, we learned 2 important lessons with the videos: (1) researchers are not necessarily well-equipped to create compelling content for parents, and (2) researchers often do not have the skills, resources, or capacity to ensure that their content reaches those who need it (ie, if you build it, they will not necessarily come). These are major barriers to effective dissemination and implementation. These observations led to a CIHR-funded grant (2015-2017) to increase parent awareness and use of evidence-based information about children’s pain, through a science–media partnership with an award winning online publisher, YummyMummyClub.ca (YMC), which was launched over a decade ago by Erica Ehmm, a former national television host. YummyMummyClub.ca is an industry leader in working with bloggers and partners to create compelling, integrated, multiphormat digital and social media content and has a reach of over 6 million Canadian mothers per month. Capitalizing on this expertise, #ItDoesntHaveToHurt spanned 12 months of sharing and discussion of content about children’s pain through blog posts, YouTube videos, Twitter parties, Facebook polls, and Instagram images all posted and promoted on the YMC website and social media (see Fig. 4 for content examples) and used the Knowledge-To-Action cycle as a guiding framework. The initiative embedded best practices in patient engagement and patient-oriented research22,85, an advisory panel of 10 parent partners (7 mothers and 3 fathers) was actively engaged in all aspects of the initiative. Over a 12-month period, #ItDoesntHaveToHurt generated >130 million content views worldwide and, on several occasions, became a trending topic on social media, once causing a children’s hospital server to crash under the load of parents attempting to access-linked resources.18,20 #ItDoesntHaveToHurt has also been recognized broadly using multiple awards from the science and digital marketing industries.23,78,108 Evaluation of the initiative included various implementation outcomes, including penetration (eg, indicators of reach and engagement), various measures of acceptability and adoption (eg, parent-reported awareness and plans to use research evidence about children’s pain management through online surveys and telephone interviews), and assessments of the cost, feasibility, and sustainability of the initiative (eg, using a 1-year follow-up with parents). Our experience with this initiative raised a number of issues and challenges related to balancing traditional scientific rigour (as evidenced in traditional randomized clinical trials) with the more nuanced need to develop partnerships and show impact in more varied ways.

### 4. The role of partnerships and patient engagement in dissemination and implementation

Partnerships are critical to promote effective dissemination and implementation. Efforts at dissemination and implementation that are driven by researchers alone are unlikely to be effective, in that they tend to be only “push” strategies that do not consider the motivations and needs of knowledge users (the “pull”) who are in the position to influence practice and policy changes. This “push–pull” metaphor in dissemination and implementation is addressed by an approach referred to as “integrated knowledge translation” and is defined as a collaboration between researchers and knowledge users with the goal of increasing the relevance, applicability, and impact of research.46 Importantly, in integrated knowledge translation, knowledge users work with researchers at all steps in the research process, from identifying the research question to dissemination of the research findings. This integrated approach is believed to generate faster and greater impact, by ensuring those who may use the findings are engaged in the entire research process, rather than simply reaching out to knowledge users at the conclusion of the research to share findings, which is the typical approach of most researchers. More research is needed to support best approaches for engaging knowledge users as partners in dissemination and implementation.46

In addition, there is a growing international effort toward patient-oriented research, where patients (a type of knowledge user) are engaged across all stages of the research process, with the aim of enhancing the quality, appropriateness, and relevance of research, as well as its subsequent outcomes.5 Although the ultimate goal of pain research is to reduce pain and improve functioning in patients, researchers have historically selected the research questions and outcomes they consider to be most important, with limited or no input from patients and caregivers. The failure of research to focus on issues that are meaningful to patients and their caregivers has been identified as a barrier to uptake of research findings and a contributor to research waste.1,41,59,60 Although there is an increased focus on patient-reported outcome measures for pain, only recently have efforts been made to engage patients with pain in identifying research priorities.85 A recent study, guided by the James Lind Alliance method61 (a formal process whereby patients, caregivers, and health professionals work together to identify research priorities, usually in the form of a Top 10 list), led to the identification of 4 research area themes of high relevance to Canadian patients with chronic pain, including (1) improving knowledge and competencies in chronic pain, (2) improving patient-centered chronic pain care, (3) preventing chronic pain and reducing associated symptoms, and (4) improving access to and coordination of patient-centered chronic pain care. Engaging patients in identifying priorities for research and in the research process itself can help ensure that scientific research meets patient needs and increases likelihood of uptake.

### 5. A cautionary note on the role of evolving information and communication technologies

The ever-growing field of eHealth, defined as the use of information and communications technology for health,115...
boasts potential benefits for patients including improved accessibility and cost effectiveness of interventions. A wide range of eHealth tools (eg, mobile applications and online interventions) have been developed for acute and chronic pain with the rationale that they will improve access to care, and many show promising results regarding efficacy and effectiveness. That said, there is evidence that very few of these eHealth tools ever become available to patients. For example, a systematic review identified 47 articles describing 34 pain-related mobile applications (apps), none of which were publicly available in app stores. eHealth research is equally vulnerable to dissemination and implementation failures as any other kind of intervention research and is of particular concern because many researcher-developed eHealth interventions are out of date in terms of technology by the time they are published and do not typically apply user-centered design principles in their development. The use of these technologies in and of themselves offers no guarantee that an intervention will be made available to patients unless issues related to dissemination and implementation are also considered.

6. Conclusions

Never has dissemination and implementation of scientific knowledge been more important. The current unacceptable state of affairs for patients experiencing pain requires deliberate consideration of how research can be better translated into improvements in pain management practices. Inadequacies in our current knowledge of effective pain management strategies remain and further discovery-based science is critical. However, the advances we seek and our current public investment in science will be rendered moot unless pain researchers and clinicians simultaneously identify and prioritize more effective and efficient ways to disseminate and implement scientific knowledge and improve outcomes for patients in pain.

Conflict of interest statement

The author has no conflict of interest to declare.

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References
[14] Campbell-Yeo M, Chambers CT, Taddio A, Stinson J, Harrison D, Hewitt B, Jangaard K, Totten A, Orr T. The power of a parent’s touch in reducing baby’s pain during medical procedures; it doesn’t have to hurt. Canada: MK Health Centre, 2014. Available at: https://www.youtube.com/watch?v=CMm6cSWh5o.


