Harnessing the Synergy Between Improvement Science and Implementation Science in Cancer: A Call to Action

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Introduction

Scientific progress in cancer has brought unprecedented growth in knowledge, which has challenged health care providers and researchers to ensure that clinical practice matches the best available evidence. But adoption of evidence into clinical cancer practice remains slow and uneven across geographic regions and care settings, which has led to unwarranted variations and deficiencies in quality of care.[1] In 2013, the Institute of Medicine declared cancer care as a system in crisis and called for explicit efforts to improve its quality.[2] Similar concerns have been raised by others who argue that globally, especially in low- and middle-income countries, what is needed to improve outcomes and save lives is not more technology but better care, including standards, systems, and social development.[3]

As the cancer community grapples with the challenge of how to improve cancer care, the change process in health care has been driven by two approaches that operate mostly in isolation from each other: (quality) improvement science and implementation science. Broadly, improvement science refers to systems-level work to improve the quality, safety, and value of health care, whereas implementation science refers to work to promote the systematic uptake of evidence-based interventions into practice and policy. The two fields arose from different philosophical underpinnings: Improvement science from industry, mostly automotive, takes a pragmatic approach to the reduction of poor performance in health,[4] whereas implementation science from behavioral science focuses on a need to adopt new evidence into practice.[5] These two disciplines fit well into two aspects of the high-quality care delivery system, as depicted in the Institute of Medicine report[2] (Fig 1): implementation science through focusing on timely and appropriate uptake of evidence and improvement science through measuring performance to achieve improvement. Although the goals of the two fields seem complementary, they interact only sporadically and superficially, often at odds, and remain isolated from each other not only through their distinct methodology but also through their effect on and engagement with the health care system. As such, neither field has fully realized its potential to improve cancer care.

The objective of this editorial is to consider how the integration of these two approaches can contribute to improvement in cancer care. We argue that it is time for the two approaches to become more closely aligned so that health care providers and researchers can harness the full power of a synergistic approach that is greater than its parts.

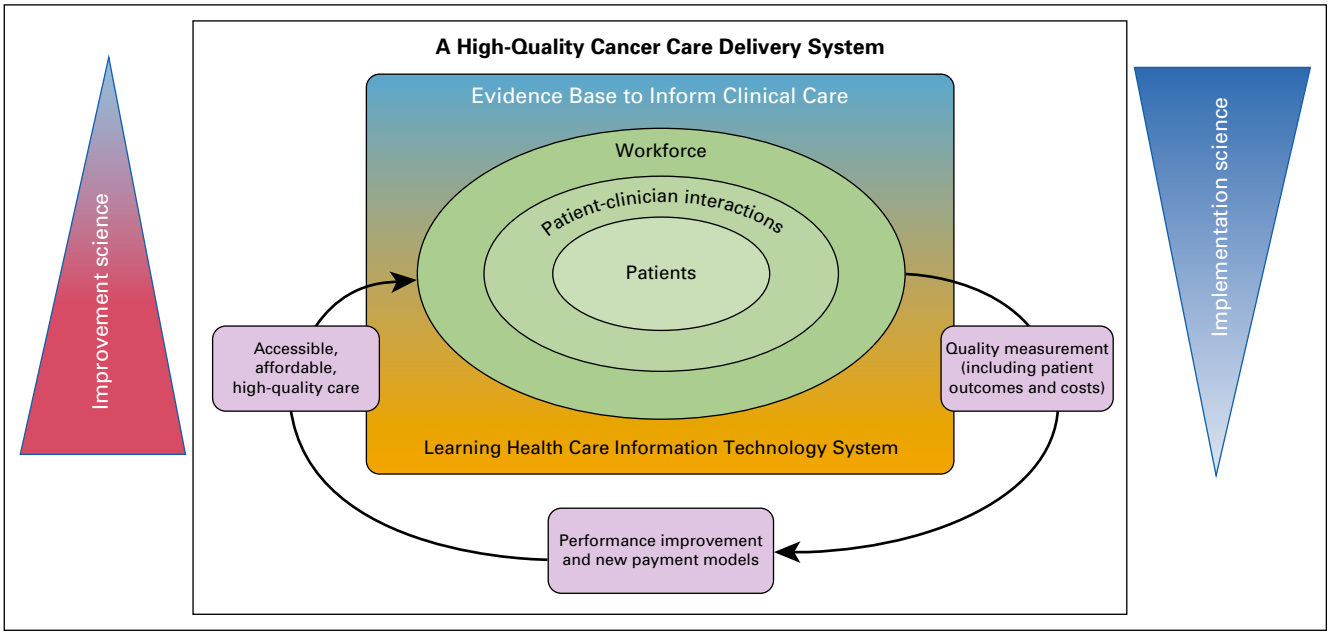

Fig 1. Conceptual representation of the quality cancer care system. Adapted with permission from the Institute of Medicine.[2]

Similar Goals, Different Terminology

Table 1 lists some of the concepts, approaches, and terminologies used in improvement science and implementation science. Both disciplines share a common focus on a systems-level approach to improving care. Both consider similar concepts when making decisions on modifications to care delivery, including the context of the setting, the organization or system itself, the stakeholders (providers, staff, patients, and administrators), the process being examined, and health outcome enhancements for patients. However, the two fields use different terms for similar ideas (or sometimes the same term to indicate different ideas). For example, approaches to improvement are called interventions by improvement scientists and strategies by implementation scientists, who use the term intervention to describe the practice, program, or process to be implemented rather than the approach taken to implement it. Each field has separate guiding frameworks, theories, and methodologies and have expended little effort to date to harmonize them. These challenges in language and approaches have emerged in part because the two disciplines operate separately from each other, with distinct professional societies, journals, funding, and training streams. Even their geographic location within clinical and academic institutions are detached; improvement science is typically hospital based, and implementation science tends to reside within research units.

Both disciplines continue to evolve, of course. Historically, in improvement science, the outcomes of interest were changes in indicators of clinical care processes or quality with more limited explorations of why or how an intervention worked. Implementation science has experienced a similar evolution and initially used changes in treatment outcomes to measure implementation success, but more recently, it has recognized that treatment outcomes are distinct from implementation outcomes.[6] Both fields are now calling for, in their own settings, a clearer definition and emphasis of ideas, such as acceptability to and effect on stakeholders, adoption/uptake, appropriateness for the setting, feasibility, and sustainability.[7-9] This parallel convergence of ideas is promising, but it is not enough.

Closer alignment between improvement science and implementation science may not only reduce duplication but also, more importantly, introduce synergies. Implementation science offers insights into the mechanisms of practice change and how to assess contextual factors, which supports the assessment of how these mechanisms differ according to context,[10] whereas improvement science informs the development of interventions through grassroots engagement and organizational leadership and the use of rapid-cycle learning processes informed by measuring actions and behaviors.[11] The combination of the two approaches ensures richness as well as expediency and maintains focus on not only reactivity,

Table 1. Concepts, Approaches, and Terminologies Used in Improvement Science and Implementation Science

Improvement Science	Shared by Both Disciplines	Implementation Science
Definition Systems-level work to improve the quality, safety, and value of health care		Definition Work to promote the systematic uptake of evidence-based interventions into practice and policy
The problem Meaningful disruption, failure, inadequacy, distress, confusion, or other dysfunction in the health care system that adversely affects patients, staff, or the system as a whole and prevents it from realizing its full potential	Shared definitions and scope System: interrelated structures, people, processes, and activities that together create health care service delivery Context: physical and sociocultural make-up of the local environment Focus: systems level	The problem Evidence slow to be adopted in clinical practice, and uptake may be uneven across settings, with variable quality of care
Unique principles Improving reliability Managing demand, capacity, and flow Location specific	Shared principles Data and measurement Understanding the process Involving and engaging staff Involving patients Systems-level change	Unique principles Behavior change through focusing on mediating variables Generalizable mechanisms of change across locations
Rationale Informal or formal frameworks, models, concepts, and/or theories used to explain the problem; any reasons or assumptions that were used to develop the interventions; and reasons why the interventions were expected to work		Theory An existing framework or model chosen to guide an implementation process
Common approaches (usually referred to as interventions)* Business process re-engineering Experience-based codesign Lean methodology Model for improvement Six Sigma Statistical process control Theory of constraints Total quality management	Shared concepts Improve workflow and other activities through which health care services are delivered Stakeholder engagement	Common approaches (usually referred to as implementation strategies)* Evaluative/iterative Assistance giving/facilitation/coaching Audit and feedback Adaptation and tailoring Education and training Supporting clinicians Engaging consumers Financial consequences Changing infrastructure
Outcomes of interest Efficiency Safety Timeliness Patient centeredness	Common outcomes Effect on people, processes, and systems Cost Feasibility Sustainability	Outcomes of interest Acceptability Adoption/uptake Appropriateness for the setting

NOTE. Terms that are used in both disciplines are listed in the second column; terms that seem to be distinct are listed in the first and third columns.
*In implementation science, intervention refers to the evidence-based practice, program, policy, process, or guideline recommendation being implemented. In quality improvement, it refers to specific activities and tools introduced into the health care system with the aim of changing its performance for the better. These are described as strategies in implementation science.

solving the problem of low quality, but also proactivity, gleaning generalizable lessons from the work to prevent future problems. The strategic alignment of the two fields would support emergent learning and refinement of theories of change on the basis of real-time discoveries. These areas of complementary expertise are just the two that we have identified so far. There are likely to be others, but at present they are hidden by the differences in language and the lack of interaction between the two fields. Bringing the fields closer together to take advantage of the complementary expertise

Table 2. Selected Training Opportunities in Quality Improvement and Implementation Science

Training Program	Eligibility	Duration	In-Person or Web-Based Format	Fee	Description
ASCO Quality Training Program[12]	ASCO members, physician-led multidisciplinary teams, usually of three to four people from same practice	6 months	Mixed 5 in-person learning days with 6 months of on-demand, remote coaching sessions	Program fees, travel, lodging, and incidentals for three in-person sessions	Data-driven course in quality improvement where participant proposes a problem to solve in their practice Teams assisted by improvement coach throughout project
Mentored Training for Dissemination & Implementation Research in Cancer[13]	PhD or MD interested in implementation science research in cancer	2 years	Mixed face-to-face weeklong summer course (twice) with remote mentoring	Free to trainee, including program fees, travel, and lodging	Focus on implementation science across cancer control continuum
Training Institute in Dissemination and Implementation Research in Cancer[14]	PhD or MD interested in implementation science research in cancer	5 months	Mixed in 2018: 4-month online course (six modules with assignments) and 2-day in-person training over summer	Program fees covered by program; trainee covers travel and lodging	The NCI Division of Cancer Control and Population Sciences hosts this training institute to provide a thorough grounding in conducting dissemination and implementation research across the cancer control continuum
Institute for Health Improvement Open School[15]	Any professional interested in quality improvement	Varies	Web	Annual fee for access to online courses	Online, educational community offers certificate in quality and safety (13 webinars that last approximately 1.5 hours)
Quality Enhancement Research Initiative Implementation Guide[16]	Any professional interested in quality improvement	Downloadable manual	Web	Free to download guide	Downloadable implementation manual focused on implementation science and specifically facilitation within VA
Agency for Healthcare Research and Quality EvidenceNOW[17]	Any professional interested in quality improvement	1 hour	Web	Free	Webinars, infographics, fact sheets
National VA Quality Scholars Program[18]	Physician and nurse scholars affiliated with the VA	2 years	In-person: eight US sites and one affiliated site in Toronto, Ontario, Canada	Free to trainee	Fellowship program focused on developing and applying new quality improvement skills at the VA
Knowledge Translation Canada Summer Institute[19]	Graduate students, postdoctoral researchers, clinical fellows, junior faculty from a wide variety of disciplines	3 days	In-person (Toronto)	Fee dependent on rank	Understanding of knowledge translation research, opportunities and challenges, networking

Abbreviations: NCI, National Cancer Institute; VA, Department of Veterans Affairs.

without compromising their unique strength requires the fulfillment of key requirements outlined below.

Communication

Effective communication between the two disciplines and their external stakeholders requires common milieus (ie, journals, meetings that welcome both methodologies), shared language, and consistency and rigor of communication. Additional mapping of the terminology to clarify areas of difference and promote harmonization of common terms is needed, as is promotion of agreed publication standards.[9] The publication of research results in both disciplines is critical to wider recognition of their relative contributions. Fundamentally, both fields strive to provide data that support improvement in access, quality, and outcomes of cancer care. Recent efforts of mainstream journals to encourage contributions in this area (eg, *Journal of Oncology Practice* section Focus on Quality) exemplify this approach.

Collaboration

Initiatives that promote collaboration in research design, conduct, and funding support and that encourage joint leadership of projects can facilitate the bringing of the fields together. Cross-fertilization across the fields could be achieved by creating structures that reward academics for partnering with cancer clinics to implement improvement projects and by allowing clinics to use and engage implementation science researchers. A learning health system, as envisioned by the Institute of Medicine, is a model where such cross-fertilization would be realized. An example of a potential benefit of such collaboration is in medical homes and accountable care organizations, which although offer opportunities to improve quality through the learning health system approach, pose significant implementation challenges.

Champions

Senior and junior faculty/professionals who are familiar with both fields, appreciate the potential of the two disciplines, and span the boundaries between these disciplines is needed. Additional research that explores how to train, support, and incentivize professionals to work across both fields is needed.

Curriculum

Both fields have a growing number of training programs (Table 2). These programs may be strengthened by greater inclusion of common content and by illustrations of unique strengths and differences between the fields.

Clarity of regulatory obligations

In contrast to implementation science, an improvement science intervention frequently is exempt from institutional review board approval. A need exists for a consistent approach to regulatory oversight that fits the needs of proposed studies, irrespective of the methodologies used. A systematic approach that uses a checklist that considers intent, methodology, benefits, risks, applicability of results, and sharing and dissemination of findings has been proposed by Ogrinc et al[20] and warrants broader uptake.

In conclusion, as learning health care system approaches are more commonly adopted in cancer, closer integration between improvement science and implementation science will be necessary to achieve goals of better care. Focus on quality is not only about reducing poor quality but also about implementing evidence to improve quality. Implementation of new evidence cannot occur without consideration about how it effects quality of care. To optimize the quality of cancer care, the two fields perhaps should be seen as not only complementary but also interdependent. As cancer researchers, improvement scientists, health care providers, and potential future users of cancer services, we have an opportunity as well as a responsibility to use our scientific capital wisely. Let us not allow for silos when synergy can flourish. JOP

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Collection and assembly of data: All authors
Data analysis and interpretation: All authors
Manuscript writing: All authors
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