Prologue

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In May 2018, oncologist and author Siddhartha Mukherjee published an article in the *New York Times Magazine* called ‘Surgical checklists save lives – but once in a while, they don’t. Why?’ In the article, Mukherjee described how surgical checklists intended to limit human errors during surgery drastically reduced death and complication rates in diverse contexts; however, when similar checklists were developed to reduce infant and maternal death rates, effects were minimal. Why?

Mukherjee asserted that the childbirth checklists were not inherently less effective than the surgical checklists. Instead, Mukherjee argued, limited effectiveness of the childbirth checklists could be attributed to implementation failure. Mukherjee said that although birth attendants’ practices changed, they had not changed sufficiently. For example, attendants without the checklist only washed their hands 0.6 per cent of the time, whereas attendants with the checklist washed their hands 35 per cent of the time. This is an improvement, to be sure, but failing to wash hands 65 per cent of the time is likely to maintain rates of avoidable infant and maternal deaths.

The challenge of implementation that Mukherjee described is likely to be familiar to observers of practice in diverse sectors, such as health care, education and social services. Implementation challenges are well documented. An often-cited statistic suggests that it takes 17 years for evidence of just 14 per cent of interventions with demonstrated effectiveness to be translated into practice. This sweeping statistic, as well as a growing number of studies documenting the challenge, and countless anecdotes such as Mukherjee’s, attest to the critical importance of implementation.

The word ‘implement’ is derived from the Latin *implere*, meaning to fulfil or to carry into effect. This provides a basis for a broad definition of implementation science as the scientific inquiry into questions concerning how to carry intentions into effect. The intentions may be formulated in policies, clinical guidelines or other recommendations; they can be manifested in specific innovations; and they can relate to the use of research in decisions by individuals and organizations.

The birth of the field of implementation science is usually linked to the emergence of the evidence-based movement in the 1990s. Evidence-based medicine was first described in 1992 by the Evidence-Based

Medicine Working Group as a new educational and practice paradigm for closing the gap between research and practice. A paper by Sackett et al. (1996) introduced the broader concept of evidence-based practice, which was defined as ‘the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients’.

The evidence-based movement has popularized the notion that research findings and empirically supported (‘evidence-based’) practices (for example, preventive, diagnostic or therapeutic interventions, services, programmes, methods, techniques and routines) should be more widely spread and applied in various settings to achieve improved health and welfare of populations. The spread of the evidence-based movement has been facilitated by developments in information technology, especially electronic databases and the Internet, which have enabled practitioners, policy-makers, researchers and others to readily identify, collate, disseminate and access research on a global scale. The movement also resonates with many contemporary societal issues and concerns, including the progress of New Public Management, which has highlighted issues of effectiveness, quality, accountability and transparency.

The evidence-based movement’s argument that practice should be based on the most up-to-date, valid and reliable research findings has an instant intuitive appeal and is so rational that it is difficult to resist. However, it was soon evident that implementation of an evidence-based practice would face many challenges, as evidence rarely spreads by itself. Thus, the birth of the field of implementation science is usually linked to the emergence and growth of the evidence-based movement; implementation is intended to fill the metaphorical gap between what has been proven or is believed to be an effective solution and what is actually practiced or used in various areas of society. It is generally assumed that research into implementation can generate knowledge to close or reduce the gap between evidence and practice.

Implementation science is commonly defined as the scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices into routine practice and, hence, to improve the quality and effectiveness of health services and care. The term ‘implementation research’ is often used interchangeably with ‘implementation science’. Other terms in circulation to describe essentially similar research concerning putting various forms of knowledge to use include ‘knowledge translation’, ‘knowledge transfer’, ‘knowledge exchange’ and ‘knowledge integration’.

The field of implementation science has seen a surge in interest in the 2000s, as indicated by a near-exponential growth in the number of

Figure P.1 Number of publications in PubMed database with 'implementation science' in title or abstract

papers with 'implementation science' in the abstract in PubMed (Figure P.1). The first scientific journal with an explicit implementation focus, *Implementation Science*, was launched in 2006. Two further implementation-specific journals have since emerged, *Implementation Research and Practice* and *Implementation Science Communications*. Implementation studies are also published in a broad range of other journals.

Over time, implementation science has developed in different directions. One strand focuses on implementation in health care settings, and the other, commonly referred to as dissemination and implementation (D&I) research, looks more broadly at implementation in areas such as social welfare, mental health, public health and education. Implementation science and D&I research are similar in many ways and the two terms are not used with complete consistency. Two conceptualizations of evidence-based practice have emerged: (1) evidence-based practice in terms of a decision-making process comprising a number of steps to be undertaken by the practitioner to ascertain that research findings are integrated with clinical experience; and (2) evidence-based practice in terms of using specific evidence-based practices, that is, prevention, diagnosis, treatment and care practices with empirical support for their effectiveness.

Both health care-oriented implementation science and D&I research are

interdisciplinary and use a variety of research methodologies, including the use of both observational and researcher-controlled experimental studies. The cultural proximity to the evidence-based movement is evident in the emphasis on causality (determinants and outcomes) and experimental testing of implementation strategies to support implementation, preferably applying randomized controlled trial study designs. However, qualitative research is also widely used, often to identify and describe problems in achieving a more evidence-based practice.

Although implementation science is a young research field, research on the challenges associated with how intentions are translated into desired actions to address society's problems has a long history. Many elements of today's implementation science can be traced back to research on the spread and adoption of innovations, research on governmental policy implementation, and research investigating nurses' use of research in their everyday clinical practice. Concepts, theories, models and frameworks in implementation science are pragmatically borrowed from psychology, sociology, organizational theory and other disciplines to understand and explain implementation challenges.

Implementation science has been greatly influenced by innovation research concerning the spread of ideas, products and practices. This research originates in sociology and has been conducted since the early 1900s. Everett M. Rogers collated different traditions and presented a conceptual apparatus for the spread and adoption of innovations in his ground-breaking book *Diffusion of Innovations*, which was first published in 1962. The theory originated from his own experience as a farmer and then as an investigator of the spread of agricultural innovations.

According to the Diffusion of Innovations theory, innovations spread through diffusion, which is a passive, untargeted, unplanned and uncontrolled spread of innovations. The concept of diffusion is often contrasted with dissemination (which was not described by Rogers), which is a planned and active approach to achieve increased use of innovations. The difference between diffusion and dissemination is not sharp; in practice, many ideas are spread both through diffusion (for example, practitioners being interested in a new practice used by colleagues) and dissemination (for example, clinical guidelines produced by a health authority recommending the use of a specific practice). Diffusion and dissemination are part of the diffusion–dissemination–implementation continuum, where implementation is seen as the process of putting innovations to use within a setting.

Today's implementation science is also related to research on policy implementation; that is, the study of 'how governments put policies into effect' (Howlett and Ramesh, 2003). This research rose to prominence in the 1970s during a period of growing concern about the effective-

ness of public policy. A policy is a plan or course of action intended to influence and determine decisions and actions. This research emerged from the insight that political intentions seldom resulted in the planned changes, which encouraged researchers to investigate what occurred in the policy process and how it affected the results. The stage was set in 1973 by Pressman and Wildavsky with the publication of their book entitled *Implementation*, which investigated the implementation of a federal programme to increase employment among ethnic minority groups in Oakland, California. The study of policy implementation became a topic in public administration, a branch of political science that deals with the theory and practice of politics and political systems.

Implementation science also has many contact points with the study of research use (or research utilization). This research grew out of the social science research field of knowledge utilization in the 1970s, with Robert F. Rich and Carol H. Weiss being prominent scholars (note that the term 'knowledge utilization' has also been used as a collective name for all research relating to the use of knowledge). As early as 1975, nursing researchers were building on concepts and theories from knowledge utilization in research to understand how nurses used research in their clinical practice. Many of the researchers who were active in the field of research use have gone on to broader research within implementation science.

Implementation science has emerged as a field intended to identify and develop strategies to address the challenge of implementation; however, to date, a centralized resource to describe key concepts, theories, models, frameworks and methods to guide implementation research has been lacking. *Handbook on Implementation Science* addresses this need by compiling information regarding the most widely used theoretical approaches in implementation science; key concepts in the field, such as strategies, outcomes, context, fidelity, adaptation and sustainability; perspectives on implementation science, for example learning, habit and organizational perspectives, and comparisons of implementation science with policy implementation research and improvement science; and scientific methods for doing implementation research, including reflections on conducting this type of research from leaders in the field.

We have several goals for the book. In the near term, we hope that the book will facilitate teaching students of implementation science by consolidated knowledge of implementation science across clinical areas and geographic regions. In the longer term, we hope that the book will strengthen implementation research by exposing readers to many of the available concepts, perspectives, theories, models, frameworks and methods in the field. We hope for this book to contribute to strong research that improves processes and outcomes of care for populations globally.

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