

## PERSPECTIVE

# What Can Implementation Science Do for You? Key Success Stories from the Field

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## BACKGROUND

Implementation science evolved out of the need to reduce the persistent gap between research and practice by more effectively integrating evidence-based health interventions into routine care. As defined by NIH, implementation science is the “study of methods to promote the adoption and integration of evidence-based practices, interventions, and policies into routine health care and public health settings to improve the impact on population health.” Over the past 10 years, there has been a substantial increase in funding opportunities for implementation science in federal agencies including NIH, given the realization that it can take 17 years for research findings to be used in routine clinical practice, and even then, only one in five interventions make it to routine clinical care.<sup>1, 2</sup>

The field of implementation science is multidisciplinary—often involving teams of practitioners, researchers, and health care managers with backgrounds including medicine, psychology, nursing, public health, social work, social sciences, business, public policy, and engineering. The health interventions to be implemented are often complex as well, involving coordination across different care providers, logistics, technologies, and treatment settings. As with any multidisciplinary field, communicating scientific methods, models, and public health impacts can be challenging.

To this end, we describe implementation science success stories involving health interventions, programs, guidelines and policies (referred to broadly as “interventions” in this paper), where the role of implementation science<sup>3</sup> made a substantial, replicated, and sustained health impact across broad population groups. As our working definition, we assessed evidence of implementation success as achieving behavioral or clinical improvement in a population when interventions were implemented in multiple settings and scaled up and sustained after the original research on the intervention ended.

Our goal was to identify key examples (see Table 1) from different settings where there was a successful, deliberate, and active approach to ensure that evidence-based interventions were incorporated into routine practice settings. For some, these success stories occurred before the term “implementation science” was coined. Those who led these efforts may not have defined what they did as “implementation science” but rather as community-based outcomes research or quality improvement, but their processes and successes were replicated to inform the field of implementation science. By describing these implementation success stories, we also describe the common elements of these initiatives that led to their impact, including institutional or leadership buy-in, attention to end-user needs to ensure the interventions fit local settings, and use of implementation strategies that supported providers to enhance sustainment over time.

This paper is not an exhaustive list of the greatest impacts of implementation science, but meant to provide concrete examples of how implementation science can be applied across different settings and stakeholders to achieve broad and sustained impact. Moreover, as with any change, these examples also reflect situations requiring constant maintenance and additional work to ensure optimal adoption, adaptation, and sustainment over time.

## PATIENT EDUCATION IN CHRONIC DISEASE MANAGEMENT

More than half of Americans live with a chronic condition. Dr. Kate Lorig’s work in chronic disease management is based on over 30 years of research showing that self-management programs can be effective in improving outcomes for those with chronic conditions. The Stanford Chronic Disease Self-Management Program (CDSMP) began with arthritis and was adapted for different conditions (e.g., diabetes, chronic pain, HIV)<sup>4</sup> and subsequently tested across different modalities (e.g., internet), and across different racial/ethnic groups. Additional studies compared implementation strategies (e.g., different training, technology innovations to enhance provider uptake of the intervention) used to promote the uptake of CDSMP.<sup>5</sup> Implementation studies found that partnerships

Table 1 Common Elements of Implementation Success Stories

Common element (lesson learned)	Post hoc examples
Developing a shared agenda among researchers and multiple types of health care stakeholders Using a conceptual framework to guide implementation process	Lorig Chronic Disease Self-Management Program deployed to community-based settings, input from end-users Diabetes Prevention Program used RE-AIM to evaluate implementation success, notably in scale up and spread Replicating Effective Programs served as a framework for planning and deploying implementation of HIV prevention interventions
Evaluating the implementation process to make the business case Empowering operational experts (implementers) to deploy intervention to existing providers	Primary Care-Mental Health Integration evaluated facilitation implementation strategy Patient safety checklists garnered support from hospital executives and frontline providers, and included a “playbook” of implementation strategies (e.g., executive leadership involvement, performance monitoring, provider consultation)
Enabling and guiding adaptations to the intervention to promote end-user acceptance	Dissemination of Evidence-Based Interventions deployed the Replicating Effective Program’s packaging, implementation strategy that allowed providers to develop “menu options” to intervention delivery based on multi-stakeholder input
Building capacity for enterprise-wide implementation/ quality improvement	Primary Care-Mental Health Integration National Program established in VA to support implementation consultation, performance monitoring, and training CDC Diabetes Prevention Program Resource Guide and Disseminating Evidence-Based Intervention (DEBI) for HIV prevention

with community services organizations facilitated the program’s further spread.<sup>6</sup> These implementation approaches vastly increased CDSMP’s overall reach nationally in the USA,<sup>7</sup> though with mixed results internationally. Nonetheless, ongoing work on implementation and sustainment has the potential to ensure that self-management for chronic conditions becomes part of routine practice.

### PRIMARY CARE MENTAL HEALTH INTEGRATION FOR DEPRESSION TREATMENT

Depression is common and associated with significant functional impairment and increased risk of mortality including from suicide. Over the past two decades, the US Department of Veterans Affairs (VA) and other funders invested in research in collaborative care models (CCMs) for depression care, which integrate self-management support for patients with ongoing care management by a nurse or social worker and guideline-concordant pharmacotherapy informed by clinical information systems for the prescribing clinicians. Evidence from VA and other health settings<sup>8–11</sup> also suggested that CCMs were associated with improved patient health outcomes including reduced depressive symptoms, improved quality of life, and decreased suicide risk at little to no net increase in health care costs. Additional implementation research funded at the local, regional, and then national levels, notably through the VA Quality Enhancement Research Initiative (QUERI), also identified effective implementation strategies such as facilitation (e.g., provider strategic thinking and leadership skills development to help enhance implementation success) which helped to scale up CCMs. Other implementation strategies such as community engagement were used to promote the uptake of CCMs in lower-resourced settings.<sup>10</sup> To sustain CCM reach, VA leadership instituted Primary Care-Mental Health Integration,<sup>12</sup> a national program where facilities were required to support care managers to

improve mental health outcomes by locating these services in primary care where Veterans are most likely to seek mental health services. Other CCM sustainment initiatives such as the Improving Mood—Promoting Access to Collaborative Treatment (IMPACT) initiative<sup>9</sup> were created at the statewide and national levels to facilitate adoption of mental health CCMs. The impact of these implementation initiatives was shown in studies demonstrating, for example, that the overall quality of VA mental health care substantially outperforms care in the private sector.<sup>13</sup> Although speculative, this may have been because of the VA’s national commitment to studying and operationalizing implementation strategies<sup>14</sup> that optimized uptake through QUERI. VA, along with IMPACT, has collectively contributed to much research on how implementation strategies can be used to promote sustained uptake of effective interventions.

### DISSEMINATION OF EVIDENCE-BASED INTERVENTIONS FOR HIV PREVENTION

Faced with the rapid growth of HIV-positive infections, the Centers for Disease Control and Prevention (CDC) launched Disseminating Evidence-Based Interventions (DEBI) to rapidly deploy effective HIV prevention interventions to communities. DEBI used CDC’s Prevention Research Synthesis (PRS) program to identify effective interventions and EBIs and the Replicating Effective Programs (REP) implementation framework to systematically deploy evidence-based HIV prevention interventions. Since 2000, PRS identified over 90 effective interventions, 36 of which were further operationalized in lay language for use in routine care settings (“packaged”) by REP/DEBI, and 29 have been disseminated to more than 11,000 agencies including AIDS services organizations, community-based organizations, and community health clinics.<sup>15</sup> Implementation research<sup>16</sup> showed that the combination of REP implementation strategies including packaging,

provider training, and technical assistance led to more effective uptake of these HIV prevention interventions compared to package dissemination alone. In addition, federal agencies made funding for AIDS services organizations contingent on their adoption of these intervention packages using REP, thus institutionalizing the use of effective interventions. Nonetheless, some of the limitations of DEBI included local perceptions that the program was too “top-down” heavy, perceived competition with locally grown interventions, and limited community engagement prior to implementation.<sup>17, 18</sup> Nonetheless, several of the interventions through DEBI continue to be deployed with similar effectiveness outcomes compared with the original research findings.<sup>15</sup>

### PATIENT SAFETY CHECKLISTS

Hospital-acquired infections lead to a substantial number of patient deaths each year. Patient safety checklists were established by Peter Pronovost and his team at Johns Hopkins University in response to a patient death resulting from a catheter infection. The checklist helped ensure that health care workers were consistently following basic patient safety protocols to reduce risk of infection. The checklists helped with memory recall among busy clinicians and in crisis situations, and it also made the minimum necessary standards of care explicit so there was a way to pinpoint process improvements. To overcome barriers to implementation, Dr. Pronovost and colleagues studied the implementation process by working with providers to better understand how the implementation of the checklists improved safety, and had hospitals collect their own data on safety to see trends over time and invest in quality improvement support. The infection rate in the Michigan hospitals decreased 66% (NEJM) and saved over 150 million in costs.<sup>19–21</sup> Investigators realized that disseminating the checklist alone did not lead to sustained quality improvement,<sup>22</sup> but the checklist combined with other organization-level implementation strategies such as designation of a hospital executive lead responsible for its implementation, performance monitoring, financial incentives, and provider consultation/technical assistance led to its long-term uptake over time.<sup>23</sup>

### DIABETES PREVENTION PROGRAM

The landmark Diabetes Prevention Program (DPP)<sup>24, 25</sup> randomized clinical trial found that a year-long intensive lifestyle intervention involving healthy eating, physical activity, and stress reduction helped participants lose 5–7% of their body weight and reduce the risk of developing type 2 diabetes by 58% among high-risk adults.<sup>26</sup> Following this, many studies have explored ways to adapt and generalize the DPP into community and non-research settings including worksites. One series of studies<sup>25</sup> showed the effectiveness of DPP in YMCAs across the USA using both controlled and natural

experiments. Moreover, the CDC launched a program from 2012 to 2016 that funded 6 national organizations to scale and sustain the DPP across the nation and evaluated via the Reach, Effectiveness, Adoption, Implementation, and Maintenance (RE-AIM) framework.<sup>27–29</sup> The program was designed to facilitate broad adoption, implementation, and sustainment. These organizations conducted programs in 164 sites in 38 states and reached almost 15,000 participants. Many of these applications employed cultural adaptations and other implementation strategies while maintaining fidelity to the core elements specified by the CDC Diabetes Prevention Recognition Program. By 2016, of 34 sites that had discontinued the program, 30 had become self-sustaining through a variety of different public and private payers. Despite these impressive successes supported by CDC technical training and quality control resources, there were still challenges with reaching some groups (e.g., only 20% of participants were males) and a minority of sites reported implementation that was sufficient to receive full CDC recognition. Currently, CDC supports sustainment via a national program that provides implementation resources to communities.

### LESSONS LEARNED

First, there are limitations to this paper. We did not comprehensively search for or assess all possible implementation success stories. Moreover, key elements of these success stories (Table 1) were exclusively post hoc; and concurrent, multi-center site implementation trials may yield additional common elements of success as well as identify their relative importance in maintaining implementation success. The purpose of this article was to be illustrative and showcase examples of how implementation science led to public health impacts for diverse audiences. Future directions include systematic reviews on the contribution of implementation science, particularly the deployment of implementation strategies on large-scale, sustained public health impacts. The definition of implementation success can also be elusive. As our working definition, we looked for evidence of sustained implementation and behavioral or clinical improvement across multiple settings and scale up to broad populations. We hope that this paper serves as a start for implementation scientists to add to our initial list of success stories and to identify key strategies to success using rigorous mixed methods research.

Nonetheless, these examples, although not universally successful, provide actionable scientific and pragmatic insights that can be incorporated in other implementation initiatives (Table 1). First, having a *shared agenda among researchers and multiple types of health care stakeholders* was crucial. Change can be difficult without leadership or institutional support, and alignment with end-user (patient, provider, family member) values and priorities needs to occur to ensure ongoing support for implementation. Developmental work including garnering input from frontline providers—who are

often left out in intervention planning—and patients and family members was vital to identifying important adaptations to the interventions and implementation strategies that promoted sustainment and dissemination.

Second, the implementation process was generally guided by a *conceptual framework*. Notably, Replicating Effective Programs, based on social cognitive theory, was used to adapt, adopt, and spread HIV behavioral interventions, and was further tailored to implement evidence-based interventions in behavioral health care and other settings.<sup>14</sup> The Diabetes Prevention Program was evaluated in its scale up, spread, and maintenance using RE-AIM. Recently, QUERI established an overarching Roadmap<sup>30</sup> to help guide the use of different frameworks throughout the implementation process, from pre-implementation to implementation and sustainability, which were used to help identify contextual factors influencing implementation, potential strategies to overcome implementation barriers, and milestones in evaluating implementation impacts over time.

Third, careful attention to *evaluating the implementation process was crucial in order to make the business case* to health care leaders and policymakers in maintaining implementation and sustainment. Although not always formally including assessments of implementation costs or cost-effectiveness analysis, almost all these interventions were pragmatic and made efficient use of resources. Implementation science involves the testing of different strategies to improve acceptance and uptake of interventions across different contexts, with attention to the dynamic nature of most settings. It also involves flexibility in who does what, how it is funded, ongoing training of providers, and quality metrics, thereby making the business case for adapting and adopting interventions across different settings. Until recently, researchers were not funded to work on evaluation of different implementation strategies that could inform the implementation process and intervention sustainment. With the advent of implementation hybrid designs and a growing cadre of literature on scientifically supported implementation strategies,<sup>14</sup> VA and other funding agencies have grown their portfolio to include studies that develop and test different implementation strategies across diverse settings. Examples of implementation strategies that have been evaluated include performance-focused strategies such as audit and feedback, facilitation or other strategies that promote provider strategic thinking and leadership skills, and coalition-building with community partners.<sup>30</sup>

Fourth, to effectively sustain implementation of effective interventions, researchers needed to delegate implementation leadership to those who have experience in selecting, applying, and adapting implementation strategies across different settings. Researchers must *rely on these operational experts* to deploy the intervention to existing providers but also ensure that fidelity is maintained to both the intervention and implementation strategies, while also encouraging adaptations where needed. These implementation experts were also savvy in working and communicating with multi-level stakeholders

including frontline providers, consumers, mid-level managers, and clinical and system leaders. Key products that they were responsible for included not only intervention packages and training programs but also implementation “playbooks” that guide users at multiple levels in deployment of the intervention and implementation strategies.

Fifth, *guiding adaptations* was an area of identified importance in implementation science, and learning how these programs have accomplished this facilitated future advances. Interventions can become stronger and more sustainable when frontline providers are allowed to adapt without compromising the core elements. Core elements are the “active ingredients” of what makes the intervention effective. Implementation strategies such as the REP packaging component encouraged adaptations by defining the intervention core elements upfront. “Design for dissemination or implementation” is a similar process that employs user-centered design and other means to ensure ongoing end-user input into the development and adaptation of interventions. When given the opportunity, providers may have more intrinsic motivation to scale up and spread the intervention, in part because they “own” the process by which the intervention and implementation are improved over and across different populations and settings.

Finally, there are key recommendations that can be gleaned from these examples of implementation science impacts for health systems, agencies, and funders. Notably, health systems and agencies have the potential to “own” the implementation process and ensure that sustainable implementation strategies can be replicated and marketed by hiring *implementation or quality improvement experts* tasked with achieving sustainment. Broader capacities of funders to invest in implementation capacity-building are also important, such as through comparative effectiveness studies of different implementation strategies. These types of studies will also grow as more electronic health records have meaningful use data beyond clinical outcomes to assess implementation and sustainability impact in health systems.

## CONCLUSIONS

Implementation science has great potential to transform health care and improve the impact of interventions, policies, and guidelines. Future efforts should include measures of breadth, representativeness, equity, and sustainment of impact among implementation science studies of interventions that have been successfully implemented. We hope that this initial assessment of implementation success stories and the lessons garnered from these experiences, as well as other contributions in this special issue, will lead to even more impactful implementation research in the future.

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#### Compliance with Ethical Standards:

**Conflict of Interest:** The authors declare that they do not have a conflict of interest.

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