Implementation, Policy and Community Engagement Perspective

Address for correspondence:
K. R. Stevens, RN, EdD, ANEF, FAAN, Castella Endowed Distinguished Professor, School of Nursing and Institute for Integration of Medicine & Science, University of Texas Health Science Center San Antonio, MSC 7949, 7703 Floyd Curl Drive, San Antonio, TX 78229-3900, USA. Email: stevensk@uthscsa.edu

Responding to new NCATS requirements for D&I in CTSAs: *JCTS* articles that pave the way

Kathleen R. Stevens[1] and Jonathan N. Tobin[2,3]

[1]School of Nursing and Institute for Integration of Medicine & Science, University of Texas Health Science Center San Antonio, San Antonio, TX, USA; [2]Clinical Directors Network, Inc, New York, NY, USA and [3]Center for Clinical and Translational Science, The Rockefeller University, New York, NY, USA

Introduction

This perspective provides a collection of *JCTS* articles that investigators and trainees may find helpful for not only developing funding proposals but also for designing CTSA applications that are responsive to new requirements from National Clinical and Translational Science (NCATS) for incorporating Dissemination & Implementation (D&I) activities in their hubs.

The recently released (July 31, 2021) NCATS PAR-21-293 requires that CTSAs include D&I (see Box 1).

Leveraging the expertise of the NCATS Advancing Dissemination & Implementation Working Group,[1] *JCTS* published a Special Issue with a compendium of articles reflecting the current collective wisdom of D&I thought leaders. Many of the articles were included in the *JCTS* themed issue on D&I sciences [1]. Other *JCTS* articles also advance D&I research, sciences, and activities.

The following is an annotated mini review of selected articles that point to essentials in any D&I infrastructure and provide principles, best practices, helpful frameworks, examples, and ideas that have worked. Key points from each article are noted. Taken together, these articles provide a snapshot of the current state of D&I sciences as practiced across the CTSA consortium. Each paper identifies potential next steps for enhancing D&I science as a critical and key part of translational research.

Because each article is a trove of expert guidance and resources, deeper reading is urged; all articles are open access.

Annotated Bibliography of Recent *JCTS* Articles by D&I Topic

Implementation Research in CTSAs

Dolor R, Proctor E, Stevens K, Boone L, Meissner P, Baldwin L. Dissemination and implementation science activities across the Clinical Translational Science Award (CTSA) Consortium: Report from a survey of CTSA leaders. *Journal of Clinical and Translational Science* 2020; **4**(3): 188–194. DOI 10.1017/cts.2019.422.

Prior to release of NCATS PAR-21-293 in July 2021, inclusion of Dissemination and Implementation (D&I) activities in CTSAs was optional. The value of D&I activities was acknowledged and often included in the "collaboration/community engagement" cores across the CTSA Consortium. This 2019 survey captures the nascence of D&I sciences as of 2019 by sharing a report from CTSAs about their various D&I activities. These authors note that the most significant finding of this assessment was the reported lack of understanding of D&I sciences across the CTSA Consortium. At the time of this survey, D&I activities were not a formalized element of the CTSA program. Many responding PIs reported that the CTSA Consortium could play a critical role in supporting D&I science efforts in training and workforce development, provision of D&I science resources and tools, and mentorship. This survey provided a baseline for recommendations that followed from the D&I working group.

[1]A brief history of the NCATS Working Group on Advancing D&I in CTSAs:
- D&I subgroup 2017–2019
  - Led by Laura-Mae Baldwin, Rowena Dolor, and Paul Meissner
  - Major Deliverable: Multiple articles in themed issue of JCTS: D&I Landscape [1]
- Conducted an online high-level introductory training to D&I Research "Dissemination and Implementation Science: What is it and Why is it Critical to Translational Science?" for CTSA PIs and others less familiar with D&I science (available on demand at https://www.CDNetwork.org/library/dissemination-implementation-science-critical-translational-science).
- D&I subgroup reauthorized 2020–2022
  - Led by Andrew Quanbeck, Aaron Leppin (deceased), Tara Mehta, Jane Mahoney
  - Continuing to publish consensus guidance manuscripts
  - Identify additional collaborative training resources that could be developed and disseminated across the CTSA consortium

D&I Across the Translational Spectrum

Leppin A, Mahoney J, Stevens K, *et al.* Situating dissemination and implementation sciences within and across the translational research spectrum. *Journal of Clinical and Translational Science* 2020; **4**(3): 152–158. DOI 10.1017/cts.2019.392.

Because Dissemination & implementation (D&I) sciences have rapidly matured over the last 15 years, gaps and overlaps have resulted. In response to a 2016 charter from NCATS, the D&I Science Workgroup explored the role of D&I sciences across the translational research spectrum, from early stage discovery to policy implementation. The resulting consensus articulates distinctions across concepts and purposes of dissemination, implementation, and translational sciences. The sciences share the goal of moving research from one stage to the next, to move research products into real-world settings. A key point is that Translation, Dissemination, and Implementation are 3 overlapping sciences that are bidirectional and at each stage of translation, D&I principles can be applied. To support this assertion, the group described an integrated framework and real-world examples for articulating the role of D&I sciences within and across each of the stages of the translational research spectrum. The Integrative Framework for Dissemination, Implementation, and Translation (IFDIT) provides a common structure for further developing strategies to advance D&I in CTSAs.

Teaching and Workforce Training in Implementation

Leppin A, Baumann A, Fernandez M, *et al.* Teaching for implementation: A framework for building implementation research and practice capacity within the translational science workforce. *Journal of Clinical and Translational Science* 2021; **5**(1): E147. DOI 10.1017/cts.2021.809.

Workforce development in the new fields of D&I is critical to moving the fields forward. The authors provide a novel framework that defines "new" D&I competencies that are requisite for both the implementation researcher and the implementation practitioner. Operationalizing the Teaching for Implementation (TFI) Framework, consensus is offered for competencies for implementation researchers, competencies for implementation practitioners, and points out what and how to teach as well as co-learning opportunities. Critical workforce skills include stakeholder engagement; pragmatic studies; and team science. Discussion includes the educational infrastructure and resources needed to further this approach to building workforce.

Stevens K, De la Rosa E, Ferrer R, *et al.* Bootstrapping implementation research training: A successful approach for academic health centers. *Journal of Clinical and Translational Science* 2021; **5**(1): E168. DOI 10.1017/cts.2021.827.

Despite the agreed-upon value of implementation research, there is a notable and unmet need for training opportunities to expand the scientific workforce in this field. These authors describe an Implementation Research training program that can be replicated in CTSAs with basic Implementation Research (IR) capacity. The four Texas Clinical & Translational Science Awards (CTSAs) augmented limited internal IR experts with widely supported external training resources to increase IR capacity through a novel 2-day training for faculty scientists. The workshop objectives and content were aligned with nationally established D&I standards and competencies. The report provides links to workshop resources such as videos and project design checklists that could be useful to other training initiatives.

Research Designs in Implementation Research

Hwang S, Birken S, Melvin C, Rohweder C, Smith J. Designs and methods for implementation research: Advancing the mission of the CTSA program. *Journal of Clinical and Translational Science* 2020; **4**(3): 159–167. DOI 10.1017/cts.2020.16.

These experts point out that, "Much in the same way that inclusion criteria for patients are often relaxed in an effectiveness study of an EBI [evidence-based intervention] to better represent real-world populations, implementation research includes delivery systems and clinicians or stakeholders that are representative of typical practices or communities that will ultimately implement an EBI." This paradigm shift requires attendant evolution of research designs. To highlight the differences between RCTs and Implementation Research, authors include helpful definitions of key terms in Implementation Research. Reflecting the evolution of designs, authors provide an overview of major research designs such as Hybrid Types 1, 2, 3 and stepped wedge.

Recommendations to CTSA Leaders

Mehta T, Mahoney J, Leppin A, *et al.* Integrating dissemination and implementation sciences within Clinical and Translational Science Award programs to advance translational research: Recommendations to national and local leaders. *Journal of Clinical and Translational Science* 2021; **5**(1): E151. DOI 10.1017/cts.2021.815

In this article, the CTSA consortium cross-domain D&I working group discusses consensus recommendations from experiences and points to common strategies used to integrate D&I in CTSAs. "We propose a set of recommendations for NCATS national and local leaders that are intended to move D&I sciences out of a position of unfamiliarity and ancillary value and into the core identity of who CTSAs are, how they think, and what they do, to advance translation and health." The article was published just prior to new NCATS FOA (7-31-21) requirements for D&I. With 4 years of collaboration, this NCATS working group made recommendations to CTSAs for (1) D&I methods and processes, (2) D&I workforce development, and (3) D&I evaluation components. These recommendations are in close alignment with the new NCATS FOA (PAR-21-293; 7-31-21) requirements.

Health Equity

Yousefi Nooraie R, Kwan B, Cohn E, *et al.* Advancing health equity through CTSA programs: Opportunities for interaction between health equity, dissemination and implementation, and translational science. *Journal of Clinical and Translational Science* 2020; **4**(3): 168–175. DOI 10.1017/cts.2020.10.

These authors emphasize that, "Implementation science is an area of research with high potential to accelerate progress toward achieving health equity goals in both public health and healthcare." They highlight interaction and opportunities between health equity and D&I sciences. This article shows how CTSAs can support and facilitate sharper focus on equitable D&I in translational research and matches the new FOA emphasis on health equity.

Learning Health Systems

Bennett N, Orlando E, Meissner P. Linking dissemination and implementation science to Learning Health Systems: Opportunities for Clinical and Translational Science Award institutions. *Journal of Clinical and Translational Science* 2020; **4**(3): 176–179. DOI 10.1017/cts.2020.15.

These authors discuss opportunities for CTSAs to leverage Learning Health Systems (LHS). Such systems use health IT and data from real-world care-delivery to promote improvement, innovation, and health system change. They conclude that D&I sciences are rarely fully integrated with LHS efforts. In addition, research integration in LHS is an opportunity for CTSAs to grow data-driven quality improvement culture and clinical partnership and informatics capacity and analytic resources.

A recent example of a Learning Health System project is **Bokov A, Espinoza S, Tripathy C, Stevens K**. 74123 A Learning Health Systems approach using health record data to construct patient frailty scores and predict safety events. *Journal of Clinical and Translational Science* 2021; **5**(S1): 48–48. DOI 10.1017/cts. 2021.528.

Technology Transfer Infrastructure

Quanbeck A, Mahoney J, Kies K, Judge K, Smith M. Building capacity for dissemination and implementation to maximize research impact in a CTSA: The University of Wisconsin story. *Journal of Clinical and Translational Science* 2020; **4**(3): 209–215. DOI 10.1017/cts.2020.3.

Operationalization of new models is essential to moving research into general use. These authors describe how one CTSA created a technology transfer model suitable for Implementation Science. They describe these key elements in The Wisconsin D&I Launchpad: Facilitation of D&I of research results between investigators and their community partners; identification of business strategies (marketing, pricing, and sales forecasting); creation of a sustainable business model for scaling programs to new adopters; and pilot funding. Such models can be connected to technology transfer efforts.

Stakeholder Engagement: Community and Practice Based Research Networks (PBRNs)

Vasquez K, Chatterjee S, Khalida C, et al. Using attendance data for social network analysis of a community-engaged research partnership. *Journal of Clinical and Translational Science* 2021; **5**(1): E75. DOI 10.1017/cts.2020.571.

The authors examined the evolution of community-engaged research partnerships conducted with a practice-based research network over a series of consecutive studies that examined the prevalence and outcomes of patients presenting with drug-resistant skin and soft tissue infections. A novel application of social network analysis enabled them to document and analyze data on collaboration in community-engaged translational research and evaluate their approach to building community-academic partnership.

This approach can offer a view of stakeholder interactions as part of the engagement goals of the partnership.

Meissner P, Cottler L, Eder M, Michener J. Engagement science: The core of dissemination, implementation, and translational research science. *Journal of Clinical and Translational Science* 2020; **4**(3): 216–218. DOI 10.1017/cts.2020.8.

Partnering with CTSA clinical and community entities is critical in successful D&I efforts. These authors identify the science underlying successful stakeholder engagement. Stakeholder engagement is acknowledged as central to dissemination and implementation (D&I) of research that generates and answers new clinical and health service research questions. This recognized science provides principles to enhance success of stakeholder engagement.

Riley-Behringer M, Davis M, Werner J, Fagnan L, Stange K. The evolving collaborative relationship between Practice-Based Research Networks (PBRNs) and Clinical and Translational Science Awardees (CTSAs). *Journal of Clinical and Translational Science* 2017; **1**(5): 301–309. DOI 10.1017/cts. 2017.305.

The Practice-Based Research Networks (PBRNs) paradigm is well established and has been incorporated into CTSA infrastructure for stakeholder engagement. The authors point to these strategies for leveraging PBRNs in CTSA: (1) Include clinicians as CTSA stakeholders and community partners; (2) use PBRNs to organize clinicians as community stakeholders, and (3) disseminate and implement research findings through community clinicians and their teams.

Team Science

Vaughan R, Romanick M, Brassil D, et al. The Rockefeller Team Science Leadership training program: Curriculum, standardized assessment of competencies, and impact of returning assessments. *Journal of Clinical and Translational Science* 2021; **5**(1): E165. DOI 10.1017/cts.2021.838.

Advancement of translational science is predicated on team science leadership that promotes interdisciplinary investigative team functioning. These authors proposed a systematic approach to identifying and assessing Team Science competencies among clinical scholars training within CTSAs. They describe a Team Science Leadership curriculum, consensus on related competencies, and a quantitative evaluation survey to track progress in acquisition of leadership competencies. This Team Science Leadership curriculum combined with periodic assessment of attained competencies can inform individual career development and guide further curriculum development.

Aarons G, Reeder K, Miller C, Stadnick N. Identifying strategies to promote team science in dissemination and implementation research. *Journal of Clinical and Translational Science* 2020; **4**(3): 180–187. DOI 10.1017/cts.2019.413.

Interprofessional investigative teams strengthen D&I studies and at the same time require strategies to support the success of investigative teams in completing studies. These authors lay the groundwork for the rationale behind team science to keep such teams operating smoothly. Two key points are that (1) D&I research necessitates the use of team science and (2) top strategies are in line with those found to be effective for teams in other fields.

Bisbey T, Wooten K, Salazar Campo M, Lant T, Salas E. Implementing an evidence-based competency model for science team training and evaluation: TeamMAPPS. *Journal of Clinical and Translational Science* 2021; **5**(1): E142. DOI 10.1017/cts. 2021.795.

The science of team science provides guidance on keeping a wide range of members focused on mutual gain. These authors describe a program to implement team support that includes the following: (1) A competency model and an implementation plan for a team training program specific to science teams and (2) description of TeamMAPPS (Team Methods to Advance Processes and Performance in Science), an evidence-based teaming program.

Conclusion

It is exciting to imagine a future where all CTSA researchers and trainees develop basic competencies in D&I and begin to embed rigorous D&I research methods into their studies. These selected papers could form a bibliographic foundation that supports development of such an initiative and paves the way for further expansion. These papers also identify critical translational science questions that need to be examined.

Of course, the ultimate impact of efforts to move basic discoveries through clinical testing, dissemination, clinical implementation, and scale-up will be judged by improvements in care, reductions in health disparities, and enhancements in overall population health. Accordingly, the next frontier is to design new and leverage existing valid, reliable, and ongoing data systems to capture and monitor the impact of our collective research endeavors on the health of communities and quality of care, while ensuring health equity through the intentional and documented elimination of health disparities.

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Reference

1. **Stevens KR, Tobin JN.** Introduction to the JCTS special issue on Dissemination and Implementation Sciences. *Journal of Clinical and Translational Science* 2020; **4**(3): 149–151. DOI 10.1017/cts.2020.488.