

An emerging science and praxis for research and practice teams

Bonnie Spring, Arlen C. Moller, Holly J. Falk-Krzesinski
Northwestern University, Chicago, IL, USA

Kara L. Hall
National Cancer Institute, Bethesda, MD, USA

Correspondence to: B. Spring
bspring@northwestern.edu

Cite this as: *TBM* 2012;2:411–414
doi: 10.1007/s13142-012-0180-1

BACKGROUND

A meta-trend, observable over the past several decades, is that work is being conducted increasingly by teams. The proportion of scientific publications authored by groups rather than solo authors has more than doubled in the past 50 years [1, 2]. As the volume of scientific knowledge has expanded over time, it has become increasingly difficult for a single individual to have deep expertise in multiple disciplines. For example, Galileo defined modern physics while also creating the telescope that launched observational astronomy, and Descartes shaped modern philosophy while also inventing analytic geometry. These kinds of Renaissance era contributions made by individuals working alone have become increasingly rare, and—we believe—for a good reason. Solving complex problems now routinely requires collaboration among experts from different specialties working to reach shared understandings that integrate specialized knowledge bases [3, 4].

In modern health care as well, solo practices are dwindling [5]. More than 50 % of practicing US physicians are employed by hospitals or integrated care systems, where they need to collaborate with other practitioners, and that number is expected to rise to 75 % in the near future [6]. The rising costs of equipment, legal compliance, insurance, and new IT requirements coupled with dwindling or stable reimbursements have made it increasingly challenging for sole practitioners to stay afloat financially. However, the movement toward team-based care is driven by more than financial exigency; its aim is also to provide higher quality care.

Interprofessional teams are integral to new models of care implementation that emerged as part of US health care reform. The so-called “patient-centered health home” elevates the role of the patient in health decision-making and encourages partnership with primary care providers around shared goals [7]. Chief responsibility to coordinate care among stakeholders is ascribed to primary care, with debate still ongoing about which member of the primary care team is best suited to assume the coordination role (e.g., primary care physician, nurse, physician assistant, and social worker). Relevant stakeholders include the patient, family, and caregivers, as well as health care generalists,

specialists, residential placements, and the community. Health care professionals are expected to share data and to optimize their management of the primary care team, such that all health professionals are communicating effectively and working at the top of their training. Good evidence suggests that, when these conditions can be attained, interprofessional team-based care provides higher quality and more efficient care delivery, in addition to being less costly. Effective team-based care has been shown to improve patient satisfaction, reduce patient waiting time, decrease emergency room use and rehospitalization, and reduce cost per patient while improving patient satisfaction [7–9].

There is growing consensus that solutions to complex scientific and practical problems benefit from the efforts of specialists from diverse backgrounds working across disciplinary silos. Mounting evidence from organizational, management, and team research supports the premise that, when done well, cross-disciplinary science and interprofessional practice teams can produce more innovative, more impactful results, as compared to solo individuals or teams whose members represent a single discipline or profession. The purpose of this special section is to highlight new developments and contributions involving the use of a team-based approach to facilitate behavioral medicine research and practice translation.

THE SCIENCE OF TEAM SCIENCE

Conceptual and theoretical models are needed to help organize the behavioral, social, organizational, and management domains of knowledge that inform the emerging science of team science (SciTS). Delineation of models that abstract beyond a local evidence base enables the validity of theoretical principles to be tested against new observations. Generalizable principles that stand up across diverse contexts serve as building blocks for a conceptual framework. A theoretical conceptualization that explains existing evidence generates new scientific hypotheses and supports translation from research to practice and policy applications.

Drawing from a range of literatures, Hall and colleagues [10] present a four-phase model of transdisciplinary research. After outlining the model's

associated goals, team processes, exemplars, and strategies for success, they note its implications for enhancing research practice and science policy. Moving from theory to implementation, Clark and colleagues [11] provide an in-depth description of the process used to establish and maintain a large scientific collaboration: a Transdisciplinary Tobacco Research Center (TTURC). The TTURC engaged more than 135 investigators, consultants, and research staff whose expertise spanned more than 20 disciplines. Clark and colleagues characterize the processes and strategies they implemented to help make the TTURC's research process effective. They describe the development of a conceptual framework, principles, and shared language used by the members of the TTURC team. This emergent shared mental model enabled a group of investigators who had limited or no prior experience working together to come together in effective collaboration to develop new research instruments.

Winter and Berente [12] point out that institutional context profoundly shapes the goal hierarchies that will effectively motivate collaborating organizations and the logic of actions that enable the translational science team to navigate local terrain successfully. They remind us of the need for conceptual models of SciTS to incorporate contextual factors so that the efforts of translational science teams can achieve maximal uptake.

Ladner and colleagues [13] provide an example of successful team science collaboration in describing the development of the Comprehensive Transplant Center at Northwestern University. They describe challenges they encountered while endeavoring to align incentives among different stakeholders and strategies they applied to navigate these waters successfully. From specific steps taken over the course of the initiative to harmonize the interests of schools/departments/divisions, transplant clinicians, outcomes researchers, methodological experts, and junior and senior members of the center, a conceptual framework gradually emerged. Leadership applied the framework advantageously to guide the center's collaborative process and scientific advances. Demonstrating the ability to align goals across diverse structures, the authors highlight the center's success in obtaining more than 39 grants totaling nearly 12 million dollars from at least seven different organizations, including federal agencies, academic institutions, and industry.

The competencies needed to accomplish effective team science go beyond the critical research knowledge that most scientists now acquire through training. Besides scientific expertise, certain social competencies are necessary. For example, team scientists need to understand how to work with colleagues and translational partners who come from different disciplinary backgrounds. Differing training often leads team members to embrace divergent core assumptions, methodologies, and philosophies about proof. Vogel and colleagues

[14] examine the impact of training opportunities made possible through an NCI-supported center initiative, specifically designed to promote transdisciplinary research. Results from a mixed method study highlight the potential for such research training programs to enhance research competencies and promote scholarly productivity.

TEAM SCIENCE TOOLS

Even though research demonstrates that team science can be effective, it can be challenging for leaders of team science initiatives to translate such scholarship into useful activities. The next set of papers describes practical tools that team science practitioners can use to assemble and evaluate teams in ways that ensure greater collaborative success.

Schnapp and colleagues [15] introduce the use of the Toolbox dialogue method for fostering interdisciplinary and translational research. The method implements a facilitated collaborative discussion workshop in which participants discuss their reactions to questions that reflect divergent philosophies about reasons for doing research, standards of proof, and the value of different kinds of data. The structured dialogue guided by the Toolbox enhances self-awareness as well as mutual understanding among team members. Engaging in the exercise helps to establish the robust foundation of trust needed to support effective knowledge sharing and collaboration among leaders and members of scientific teams.

With a focus on distributed science teams, Bietz et al. [16] present the Collaboration Success Wizard, a tool evolved from the Theory of Remote Collaboration. The wizard is a diagnostic, evaluative tool to assess sociotechnical factors that can enhance or inhibit collaborative practices in geographically distributed team-based scientific projects. Team members answer a series of probing online questions that promote individual reflection. The team's survey results are compiled and provided to team leaders at both the (confidential) individual and project level. An accompanying analysis provides recommendations and suggests strategies to address and manage collaboration issues that are specific to the project team.

Much team science requires the expertise and input of multiple teams that need to function coherently as a multi-team system. To facilitate the smooth functioning of such a complex system, Asencio and colleagues [17] demonstrate the value of team charters. The team charter offers a practical tool to externalize and make explicit shared norms for behavior. Such tools set out written guidance for norms and policies that surround task accomplishment and teamwork processes. The authors offer specific recommendations on how to design multi-team charters that will facilitate effective communication and leadership processes among teams in the kind of complex multi-team systems that exist in research centers and networks.

Using a bit of humor, Gadlin and Bennett [18] provide a series of case studies in their “Dear Doc” article. This piece offers a sampling of some challenging scenarios that individual scientists might encounter in team science collaborations. Common challenges involve a need to negotiate divergent understandings of team goals and individual responsibilities, authorship and credit, communication, and conflicts of interest. The realistic scenarios presented in this piece offer a vehicle for investigators vicariously to experience some of the pitfalls and the high spots of team science collaboration in a fail-safe environment. Educators will find that they can use the cases to good advantage as a training tool.

THE SCIENCE OF PRACTICE TEAMS

In their article on helping fluid teams work, Bedwell et al. [19] advise that teamwork skills be made a required competence for practitioners who work in teams that undergo periodic membership changes. They address first the question of whether change in team membership is good or bad for productivity. They conclude that, even though member change appears to heighten creativity, instability poses challenges for medical teams. The evidence they review suggests that teams can cope with instability by routinely sharing sufficient information to develop a shared mental model. The model, a form of transactive memory, reminds team members of who knows what and helps them to engage in needed back-up behaviors.

Reynolds and colleagues [20] demonstrate that a shared mental model advantages the functioning not only of individual clinical care teams, but also different components of the health care system. This fascinating paper describes how fragmentation between the care systems for pediatric disabilities and adult mental health exacerbates the vicious cycle that can result from trying to care separately for children with developmental disabilities and their mothers who are depressed. The article describes the impressive synergies that can result when cross-system referrals and trainings create a sense of connection and understanding across health care sectors.

Moving from the clinic to the community, Ginnis and co-authors [21] discuss the importance of conducting research in partnership with the beneficiaries of that research. The article describes the establishment of a community–university partnership dedicated to increasing physical activity among patients with spinal cord injury. The theme of needing to develop shared language once again emerges, this time between members of the academy and members of the community. Progress is slow until abstractions can be translated effectively into consensual understandings. However, once the community members grasp that, in this instance, “knowledge mobilization” means “using research to help people get more active,” they see great value in

the interventions being developed. The community organizations' investment exponentially increases the dissemination and reach of the interventions and the degree to which they are built sustainably into existing systems.

The special section on teams concludes with the article of DeBar et al. on treatment of chronic pain in the primary care setting by members of an interdisciplinary team [22]. With this article, the special section completes the full circle that demonstrates the need for effective collaboration between research and practice teams to achieve behavioral medicine translation. Chronic pain is one of our most common and expensive public health problems. It affects at least 116 million adults in the USA and is the main reason why patients seek medical care. Yet, medical management of patients with chronic pain is fragmented. The health care system offers uncoordinated, expensive specialized pain services that increase costs as patients often receive unneeded diagnostic and medical procedures. Primary care-based treatment of chronic pain by interdisciplinary teams (including behavioral specialists, nurse case managers, physical therapists, and pharmacists) is one of the most effective approaches for improving outcomes and managing costs. It also offers an excellent exemplar of patient-centered care. To change practice and shift the care paradigm for patients with chronic pain, there is great need for pragmatic clinical trials focused on broad and generalizable populations, and attention to the outcomes most meaningful to key stakeholders, including intervention costs and cost-effectiveness. Hence, we conclude with a challenge for triangulation of research, practice, and policy that has potential to achieve actionable translation of sound behavioral medicine.

1. Guimera R, Uzzi B, Spiro J, Amaral LA. Team assembly mechanisms determine collaboration network structure and team performance. *Science*. 2005;308(5722):697-702.
2. Wuchty S, Jones BF, Uzzi B. The increasing dominance of teams in production of knowledge. *Science*. 2007;316(5827):1036-1039.
3. Stokols D, Hall KL, Taylor BK, Moser RP. The science of team science: overview of the field and introduction to the supplement. *Am J Prev Med*. 2008;35(2 Suppl):S77-S89.
4. Whitfield J. Collaboration: group theory. *Nature*. 2008;455(7214):720-723.
5. JL. Lawmakers warned of demise of solo medical practices. 2012; amednews.com. Accessed 29 Sep 2012.
6. Kocher R, Sahni NR. Hospitals' race to employ physicians—the logic behind a money-losing proposition. *N Engl J Med*. 2011;364(19):1790-1793.
7. McLellan RK, Sherman B, Loeppke RR, et al. Optimizing health care delivery by integrating workplaces, homes, and communities: how occupational and environmental medicine can serve as a vital connecting link between accountable care organizations and the patient-centered medical home. *J Occupational Environ Med/Am College Occupational Environ Med*. 2012;54(4):504-512.
8. Katon W, Russo J, Lin EH, et al. Cost-effectiveness of a multicondition collaborative care intervention: a randomized controlled trial. *Arch Gen Psychiatry*. 2012;69(5):506-514.
9. Epperly T. The patient-centred medical home in the USA. *J Eval Clin Pract*. 2011;17(2):373-375.
10. Hall K, Vogel AL, Stipelman B, Stokols D, Morgan G, Gehlert S. A four-phase model of transdisciplinary team-based research: goals, team processes, and strategies. *Transl Behav Med*. 2012;2(4).

11. Clark MA, Rogers ML, Boergers J, et al. A transdisciplinary approach to protocol development for tobacco control research: a case study. *Transl Behav Med.* 2012;2(4).
12. Winter SJ, Berente N. A commentary on the pluralistic goals, logics of action, and institutional contexts of translational team science. *Transl Behav Med.* 2012;2(4).
13. Ladner DP, Alonso EM, Butt ZA, et al. NUTORC—a transdisciplinary health services and outcomes research team in transplantation. *Transl Behav Med.* 2012;2(4).
14. Vogel AL, Feng A, Oh A, et al. Influence of a National Cancer Institute transdisciplinary research and training initiative on trainees' transdisciplinary research competencies and scholarly productivity. *Transl Behav Med.* 2012;2(4).
15. Schnapp L, Rotschy L, Hall TE, Crowley S, O'Rourke M. How to talk to strangers: facilitating knowledge sharing within translational health teams with the Toolbox dialogue method. *Transl Behav Med.* 2012;2(4).
16. Bietz MJ, Abrams S, Cooper D, et al. Improving the odds through the collaboration success wizard. *Transl Behav Med.* 2012;2(4).
17. Asencio R, Carter DR, DeChurch LA, Zaccaro SJ, Fiore SM. Charting a course for collaboration: a multiteam perspective. *Transl Behav Med.* 2012;2(4).
18. Gadlin H, Bennett LM. Dear Doc: advice for collaborators. *Transl Behav Med.* 2012;2(4).
19. Bedwell WL, Ramsay PS, Salas E. Helping fluid teams work: a research agenda for effective team adaptation in healthcare. *Transl Behav Med.* 2012;2(4).
20. Reynolds KA, Sontag-Padilla LM, Schake P, Hawk J, Schultz D. Enhancing cross-system collaboration for caregivers at risk for depression. *Translational Behavioral Med.* 2012; 2(4).
21. Ginis KAM, Latimer-Cheung A, Sonya Corkum M, et al. A case study of a community-university multidisciplinary partnership approach to increasing physical activity participation among people with spinal cord injury. *Transl Behav Med.* 2012;2(4).
22. DeBar LL, Kindler LL, Keefe FJ, et al. A primary care-based interdisciplinary team approach to the treatment of chronic pain utilizing a pragmatic clinical trials framework. *Transl Behav Med.* 2012;2(4).