2014

Case Studies in Pediatric Team Science

R. Amin

S. Malcolm

S. Bedwell

Gaetano R. Lotrecchiano
George Washington University

Recommended Citation

Amin, R, Malcolm, S, Bedwell, J, Lotrecchiano, GR (2014) Case Studies in Pediatric Team Science. Journal of Translational Medicine and Epidemiology 2(2), 1030.

SciMedCentral

Journal of
Translational Medicine &
Epidemiology

Special Issue on
Collaboration Science and Translational Medicine

Edited by:
Gaetano R. Lotrecchiano, EdD, PhD
Assistant professor of Clinical Research and Leadership and of Pediatrics at the George Washington University School of Medicine and Health Sciences, USA

Case Report

Case Studies in Pediatric Team Science

Rasheda Z Amin[1], Sharyn Malcolm[2], Joshua Bedwell[3] and Gaetano R Lotrecchiano[4]*

[1]*Division of Pediatric Nephrology, Children's National Health System, George Washington University, USA*
[2]*Division of Adolescent and Young Adult Medicine, Children's National Health System, George Washington University, USA*
[3]*Division of Pediatric Otolaryngology, Children's National Health System, George Washington University, USA*
[4]*Department of Clinical Research and Leadership and of Pediatrics, George Washington University, USA*

***Corresponding author**
Gaetano R. Lotrecchiano, Department of Clinical Research and Leadership and of Pediatrics, George Washington University, 2100 Pennsylvania Avenue, NW, Room 364 Washington, DC, USA, 20037 Tel: 202-994-9855; Email: glotrecc@gwu.edu

Submitted: 23 May 2014
Accepted: 31 July 2014
Published: 02 August 2014
ISSN: 2333-7125

Keywords
- Collaboration; Readiness; Problem solving; Leadership

Abstract

The science-of-team-science is the study of collaborative processes involved in team science initiatives and how these inform and improve team dynamics. Evidence suggests that teams perform more effectively, especially when tackling complex problems, and are more productive over single investigator attempts at scientific endeavors. Collaboration has become necessary for large-scale research centers and complex biomedical issues in order to maximize outcomes and resources and maintain innovation.

We assessed the effectiveness of medical teams by analyzing three case studies: 1) assessing collaboration readiness in a pediatric subspecialty, 2) exploring problem-solving in a surgical perioperative, and 3) exploring leadership readiness amongst a team of pediatricians. Three distinct 10-item questionnaires were distributed to diverse teams representing three pediatric disciplines. The surveys investigated key aspects of team science, and the results were analyzed by three individual investigators. Survey analysis of the collaboration readiness assessment from the pediatric subspecialty group revealed that the majority of respondents valued collaboration and agreed on sharing data and credit for work, 60 % agreed to share leadership, and more than half agreed their institution meaningfully supported collaborative research. Navigation of problem-solving within the surgical perioperative revealed that while members valued the team in concept and in practice, factors such as lack of institutional support and clear administrative leadership led to challenges. Exploration of leadership readiness amongst a team of pediatricians revealed that while there was no designated team leader, being the team leader was only important for less than half of the respondents.

This case study research has demonstrated that a simple survey assessment of collaborative team science principles could potentially enhance team collaborative process. This exercise could be a time and cost-effective step in the construction of medical research teams.

ABBREVIATIONS

TREC: Transdisciplinary Research on Energetics and Cancer; PI: Principal Investigator

CASE PRESENTATION

Over the past two decades, scientific inquiry has seen a shift away from individual investigatorship to teams of individuals

working together on varying levels of collaboration [1]. Such collaborations range from multidisciplinary initiatives, where team members contribute individually representing the tradition of their own discipline, staying well within their own areas of expertise, to transdisciplinary interactions, where team members work together to cross disciplinary boundaries, to devise new conceptual frameworks for understanding and investigating questions with the goal of producing new knowledge [2].

The science-of-team-science is the study of the collaborative processes involved in initiatives grounded in scientific collaborations and how these processes can inform and improve team dynamics [2]. There is evidence to suggest that teams typically perform more effectively, and are more productive than single investigators or service providers [1]. Large scale research centers are shifting their focus towards collaborative research efforts in order to study complex issues, maximize outcomes and resources and maintain innovation. This necessitates a better understanding of team science by individual scientists and teams striving to thrive in this new environment [3,4].

READINESS, DYNAMICS, AND LEADERSHIP IN TEAMS

In this age of scientific advancement, collaborative research over individual specialty research is receiving more attention and increased funding opportunities due to the desire for more effective problem solving that results from teams of scientists. For many individuals and teams, this is an experience that can be challenging and risky as success is often dependent on the readiness, effective dynamics, and leadership within groups [5]. Many teams or individuals work successfully in isolation, but perform poorly in joint ventures with others or in larger teams.

Studies have been done to assess the level of readiness among prospective teams intending to collaborate conceptually and organizationally [6] in light of transdisciplinary endeavors [2,7,8] and scientific productivity [5,9]. Contextual factors including the number of scientists, diversity of disciplines, and organizational scope were found to either help or hinder team performance and the collaborative process [2]. Bennett and Gadlin identified factors affecting scientific collaboration such as personal and leadership characteristics, relational dynamics and organizational complexity and support [5]. Qualitative evaluation measures of team readiness, capacity, and tangible deliverables should be used for team science projects while they are still in the plenary stages [6].

New tools for assessing readiness for collaboration among researchers in the early stages of research have developed and a study found that scientists who ranked higher on the multidisciplinary and interdisciplinary/transdisciplinary factors reported more collaborative activities [7]. The assessment of team and individual member readiness for collaboration is important to the potential success of large-scale collaborations [9]. Interpersonal factors take into account members' social cohesiveness, diversity, flexibility to adapt to changing requirements of the project, and effective communication skills to sustain a shared vision and respect for other team members [2]. These vital individual characteristics enable team members to break through the confines of their individual disciplines towards developing new perspectives for addressing problems in a transdisciplinary manner [11].

Collaborative enterprises are not only confined to the research arena but also in the practice of medicine. The day-to-day treatment of patients, the running of a practice, and the management of a hospital department all depend on the interactions of individuals from diverse disciplines. Moving forward successfully in today's medical environment requires at the very least an acknowledgement of what the science-of-team-science can offer practitioners who strive to address and model team dynamics that ensure higher levels of collective effectiveness. Bennet and Gadlin posit that a major aspect of preparation for team science is leadership readiness. They argue that leadership is a key component to be addressed by all team members before considering the value of team leaders amidst its members [5]. A deeper understanding of team dynamics, leadership theories, and other aspects of teams of collaborating professionals is gained by understanding how professionals perceive their own interactions.

Transformational leadership theory was originally developed by Burns and later revised by many authors. A transformational leader as described by Burns focuses efforts to explore the impact of his/her leadership style on interpersonal and organizational outcomes [17]. Transformational leadership may well be an important model to consider in practice teams where individual leaders must exercise their own leadership skills and behaviors while motivating and developing contributors to act as a team. The major tenets of this concept encompass a leader's ability to motivate his/her team members to accomplish above and beyond their own expectations and "occurs when one or more persons engage with others in such a way that leaders and followers raise one another to higher levels of motivation and morality" [18]. The components of transformational leadership include: idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration [19].

Three cases are offered in this paper that investigate collaboration readiness, team dynamics and team leadership in the context of research and medical teams. Three hospital based teams were surveyed using three distinct survey tools, each designed exclusively to focus on what the particular investigator is studying (Table 1-3). Results of each survey are compiled and analyzed by the individual investigators separately.

The first case assesses collaboration readiness of two teams, one working in a clinical setting and the other involved in basic research. A survey grounded in the Transdisciplinary Research on Energetics and Cancer (TREC) model is developed and administered to a clinical and basic science team to assess their readiness for a collaborative research effort [7]. The questions are designed to invoke insight by self-evaluation of intrapersonal and interpersonal factors including the team members' willingness to share data, responsibility and credit. The survey inquires about organizational support as an environmental factor that affects team preparedness and aims to illicit information that could play an integral part in determining the collaborative readiness of both teams.

The second case describes a diverse team of medical

Table 1: Collaboration Readiness Survey Results.

Question	Agree/ Strongly Agree	Neutral	Disagree/ Strongly Disagree
Intrapersonal Characteristics			
1) I feel I am more productive doing my own research than working as a member of a collaborative team.	10%	20%	70%
2) The research questions I have generally do not require collaboration with other disciplines.		10%	90%
3) While working on a research project within my discipline, I have sometimes sought the perspective of other disciplines when trying to answer parts of my research question/	90%	10%	
4) I usually work interactively with my colleagues from other disciplines to address a research problem	80%	10%	10%
Interpersonal Factors			
5) I believe the benefits of collaboration with other teams outweigh the costs and inconveniences of this type of work.	80%	10%	10%
6) I feel that in a collaborative setting, the teams should meet regularly to discuss team goals, individual objectives and future direction.	100%		
7) In a collaborative setting, the teams should share leadership responsibility and decision making capacity.	60%	20%	20%
8) I feel that in a collaborative research setting there should be sharing of data between the teams	90%	10%	
9) I feel that in a collaborative research setting, the teams should share credit.	90%	10%	
Environmental Factors			
10) I feel that my institution is supportive of collaborative research initiatives in a meaningful way	60%	40%	

Table 2: Team Dynamics Survey Results.

Questions Requiring Quantitative and Qualitative Responses	Agree/ Strongly Agree	Neutral	Disagree/ Strongly Disagree
1) All team members are working to accomplish the same objective. State the primary objective for the team.	83.4%		16.6%
2) I trust that my colleagues are committed to the team, and will follow through in their individual roles and responsibilities	83.4%	8.3%	8.3%
3) The institution and administration provide sufficient support for the team to function optimally.What is one important way in which the team has received (or would benefit from) support from the institution?	41.7%	41.7%	16.6%
4) Is there a recognized team leader (or co-leaders)?	75%		25%
5) Team meetings are productive.	75%		25%
6) How would you rate the amount of time required to work with this team? Just right, too much or too little.	75% (Just Right)		8% (Too much) 17% (Too Little)
7) Team members are open-minded about considering perspectives and suggestions from disciplines/ departments other than their own.	58.3%	25%	16.7%
8) A diverse multidisciplinary team leads to better recommendations and/ or outcomes than individuals working within their respective departments.	100%		
Qualitative Responses Required			
9) What is the biggest barrier to accomplishing the primary objective?	· Logistical problems related to convening people from different departments · Lack of buy-in from the institutional leadership		
10) Has working as part of this team changed your perception of the problems being addressed? How so?	· ~50% Yes "a new appreciation for the complexity of the issues at hand" · ~50% No		

professionals tasked with analyzing and improving the perioperative process at a tertiary children's hospital. While this taskforce is not a research team, it does fit well into the description of a highly integrated team described in the National Institutes of Health Collaboration and Team Science Field Guide [5]. The study group represents all operating room stakeholders. The survey design was partially inspired by a model that considers satisfaction with collaboration, impact of collaboration, trust and attitudes regarding transdisciplinary integration [10].

Table 3: Team Leadership Survey Results.

Metric Questions	Very important	Somewhat important	Neutral	Not important	Irrelevant
1) How important is it for you to be the team leader in your group?	40%		60%		
2) How important do you think it is to have a biostatistician as a part of your team?	100%				
3.a) How important do you think it is to discuss authorship at the *beginning* of a team project?	80%	20%			
3.b) How important do you think it is to discuss authorship at the *end* of a team project?	60%	20%	20%		
4) How important are in-person meetings (vs. other communication modalities) for group assignments/ discussions?	60%	20%		20%	

The third case focuses more on leadership within teams. It reviews a team of physicians collaborating with a project consultant and their training supervisor for a quality improvement initiative. The survey questions used in this case focus on group perceptions of team science, willingness to serve on teams, and reflection on the role of leaders within the team.

CASE 1: COLLABORATION READINESS IN A CLINICAL AND TRANSLATIONAL TEAM

The pediatric subspecialty group in this first case includes attending physicians, clinical fellows, a nurse practitioner, nurses, a dietician and a social worker. The translational research team represents the Principal Investigator (PI), lab manager, graduate student, postdoctoral fellows and lab technicians. The translational science team studies the genetic and molecular aspects of diseases in the lab and the clinical team manages pediatric patients affected with the same diseases amongst others. Both teams have areas of overlapping clinical and translational interests, however team members do not interact with each other on a frequent basis, with the exception of the PI and a clinical research fellow. The PI meets the physicians of the clinical team occasionally for teaching sessions. The clinical research fellow interacts regularly with the translational team in the course of laboratory meetings. These teams have not previously collaborated with each other on a research project, so there is no precedent of how well they have performed mutually in such a setting.

A ten question survey using a 5-point scale ranging from *strongly disagree* to *strongly agree* was administered to both teams using electronic mail (Table 1). Ten out of fifteen recipients responded to the survey administered. All respondents completed the survey in its entirety. Table 1 outlines the questions of the survey and results.

Intrapersonal factors have been described by Stokols et al. as members' attitudes, values and experiences which could affect their readiness to be a part of a collaborative team [2]. The ability to recognize the value of collaboration and being open to the ideas of other disciplines is essential. The team member should have the personality traits to deal with the complexities associated with transdisciplinary research. Prior collaborative experience is also an asset [2]. Responses testing the intrapersonal factors show majority of the respondents disagree with feeling more productive doing individual research. An overwhelming majority disagree that their research does not require collaboration with other disciplines and a similar proportion indicated it had sought the perspective of other disciplines while answering their research questions. Overall, the majority of respondents demonstrate the intrapersonal characteristics outlined in Hall et al. [7] and Bennett et al. [5] as being vital to collaborative readiness: having the right attitude towards and being open to cross- disciplinary collaboration.

Based on survey responses, a majority agree that the benefits of collaboration with other teams outweigh the costs and inconveniences involved in such research. All agree that in a collaborative setting, the teams should meet regularly to discuss team goals. There is a consensus of opinion regarding sharing of data and credit amongst teams. More than half of the group agreed with sharing leadership responsibility and decision-making capacity between teams, whereas the remaining respondents either disagree or are neutral. This raises the question whether in a single, small collocated research initiative such as the one surveyed, a centralized leader may be sufficient to provide the charisma and coordination functions to promote effective collaboration within a transdisciplinary team [12].

Provision of an environment that is conducive to transdisciplinary research is vital to the future success of this type of venture [2]. The environment constitutes the physical surroundings such as workplace and meeting space, technologic infrastructure, organizational and institutional support, and the political and societal culture [2]. If there are expectations for the individual researchers to collaborate with other disciplines, the administration of the organization must comprehend the demands and infrastructural needs and be prepared to offer support. Appropriate workspace, meeting space and technologic infrastructure and training must be made accessible. A culture of participatory decision-making should be fostered. Moreover, organizational incentives and support for training of future scientists in transdisciplinary research is vital [2]. Funding agencies and policy makers also need to show commitment to this cause through ensuring continued funding opportunities.

The survey addresses environmental factors from an organizational support perspective only. There seems to be a lack of a clear consensus amongst the participants, with more than half agreeing that their institution meaningfully supports collaborative research initiatives. This identifies a need for increasing focus of research priorities, identifying competencies

not already existing, and taking steps to fill these gaps on the part of the institution to promote transdisciplinary research [13].

CASE 2: PERIOPERATIVE IMPROVEMENT TEAM DYNAMICS

The group task force discussed in this case convened to identify problems with the efficient flow of patients from surgeon's office to operating room at a tertiary children's hospital. The team members came from varied departments, including nursing, scheduling, legal, medical records, and physicians representing multiple specialties. Within each of these broad categories are people representing different roles. For instance, physicians in the group come from four different departments: anesthesiology, otolaryngology, urology, and orthopedics. The nurses involved represent distinct roles, including pre-operative clearance and processing, operating room nurses, recovery nurses, and nursing administration.

A survey given was based on assessment strategies described by Mâsse and Bennett [5,10]. The questions attempt to investigate team members' satisfaction with the team, their trust in the team, what impact they feel they have on the team and vice versa, their overall view of the value of transdisciplinary work, and finally their view on the productivity of the team, and impediments to progress [5,10]. While the survey was anonymous, in that no names were given, respondents did indicate their role on the team (e.g. anesthesiologist, scheduler, pre-operative nurse).

Twelve team members completed the survey. Table 2 outlines the questions of the survey and results.

A shared vision is necessary (though not sufficient) to establish a productive team [5]. If a member does not feel that there is a common goal (or that there is, but other members are not working in good faith toward it), they are unlikely to be satisfied with the collaboration. Nearly all team members agreed or strongly agreed that their colleagues are working toward the same goal identified as improving and streamlining the preoperative preparation process. Of equal importance, everyone is consistent in describing what they believe the objective of the team to be. Given the similar descriptions of the team objective, one is left to assume the dissenters feel that although the group has an established goal, not all members are working to achieve it.

Stokols et al. refers to "antecedent factors" such as institutional support that are important in initiating transdisciplinary work [11]. Responses from the surveyed team with respect to essential antecedent factors were much less enthusiastic. Nearly all note a lack of senior administration support or presence and many felt that the team was hampered by a lack of institutional support. Finally, many team members note logistical problems related to convening people from different departments. Two observations stem from these perceived barriers. First, it seems that in a rigidly structured hierarchical institution such as hospitals, people look for the presence of "administrative leaders" to lend legitimacy to an effort [14]. Secondly, the lack of this administrative leadership leads to problems with scheduling, task assignment, and accountability.

In spite of this, a majority of team members felt there was a defined team leader. Given that respondents indicate their team role in the surveys, it is readily apparent which responses originate from the individual identified as the leader. Interestingly, this group-designated team leader is among the minority who did not agree that all members of the team are committed to a shared objective. Perhaps the disillusionment stems from running up against the rigidity of the existing bureaucracy without having the "position power" (defined by Northouse as the amount of authority a leader has to reward or reprimand followers) to fulfill the role the team leader inherited [15]. In the hospital hierarchy, someone with the administrative authority is needed to create the space (or in Uhl-Bien's terminology, provide "enabling leadership") for new ideas and solutions to emerge [14]. This style of leadership enables conditions for productive interactions, experimentation and information exchange among team members within complex systems, rather than trying to control outcomes.

Mâsse found that one's perception of meeting productivity correlates with one's view of a team's overall progress [10]. One participant agreed that meetings were productive. Based on one of the author's experience of attending the team meetings, each meeting has a clear agenda, and starts with a brief review of the last meeting's minutes, and brief updates on interim progress. Even with the structured agenda, the meetings still felt quite open, with almost everyone contributing constructively to the discussion. Despite concerns with institutional support, team members were overall quite pleased with the amount of time they spend on the project, and the progress made during that time. Relating back to the prior question about meeting productivity, once the managerial issues had been worked out and a meeting could be held with a critical mass of stakeholders, the environment was ripe for instances of adaptive leadership [14].

Team members were split as to whether their colleagues were open-minded about perspectives and suggestions from disciplines outside their own. One interpretation of these responses was that people worry that others are working in the team only insofar as it furthers their own personal or departmental goals. Working in this mode could lead to a tendency to meet perspectives from other disciplines with a closed-mind. Indeed, members are also split when asked whether experience working as part of this team has changed their perspective on the problem being addressed. This may indicate that this team has not yet embrassed transdisciplinary ideals, and is instead working solidly in the multidisciplinary arena.

There was unanimous agreement that diverse teams have more potential for innovation than unidisciplinary ones. Furthermore, those that did have a change in perception uniformly mention a new appreciation for the complexity of the issues at hand. This should be interpreted as a positive editorial on the primacy of multidisciplinarity over unidisciplinarity. Seeing a problem from perspectives outside your own is a necessary first step to developing innovative solutions, or generating new knowledge [5].

CASE 3: TEAM LEADERSHIP IN AN INTERDISCIPLINARY TEAM

This case looks at team leadership in a group of pediatricians interested in adolescent health involved in a time-motion

study of workflow efficiency. Many layers of team science were explored through a 10-part questionnaire comprised of metrical (Likert scale) and open-ended questions (Table 3 and Appendix A). Surprisingly, most participants were able to define some key aspects of team science including: "knowledge around working in a team," "science that occurs collaboratively," "a collaborative team approach from various scientific disciplines to solving a scientific problem, issue or hypothesis," "the study of team interactions and methodology that assists in how to have effective teamwork," and "a group of scientists who work together to research and analyze data Table 3."

The group structure under study was an interdisciplinary team tasked to address issues of workflow efficiency and balancing of educational goals in a subspecialty training program. Some background about the team include that the project is presented as "a great idea that you should do given that some of you have raised some issues about the educational opportunities and emphasis of your training program" essentially leaving little room for dissention and all participants being "drafted" for participation. There was no formal process for designation of a team leader," and discussion on issues regarding authorship are pending— questions about these two topics are specifically assessed in the team questionnaire.

Parallel to the notion that a single scientist may be more efficient and possibly be more productive working independently rather than collaboratively, more than half of the team surveyed prefered to work alone [16]. This likely relates to their frustrations with team work which include (Appendix A) : a) "dealing with team members who are inflexible in ideas or contentious," b) "having to rely on other people to pull their weight or dealing with those who want to have control over everything," c) "lack of interest of members and overbearing/ attention seeking individuals," d) "lackadaisical team members and inefficiency of teams with opposing views or lack of ideas from team members," and e) "personality clashes and someone not contributing to the group project." These sentiments perhaps reflect the need for team leaders to be cognizant of these potential issues and to regularly 'check-in' individually as well as collectively with team members to ensure their productivity.

In order to become a transformational leader, one must be able to understand nuances of one's group members. Tangible aspects of the team that can help understand their functioning come from questions about their dislikes (depicted in Appendix A, each numbered letter representing a different group member's perspective). Evaluating likes and dislikes (so that we can minimize team operations that would frustrate the team and decrease their productivity) is a very important aspect gleaned from the survey. It provides information that can be used by the team leader to ensure that the team environment is conducive to the free flow of ideas and inclusivity of all member's ideas and contributions to the common goal. Team responses to what they like most about teamwork also provided tangible aspects to understand their functioning within the team. Themes related to working in teams allowing quick feedback on ideas and allowing new ideas and knowledge to be generated while problem solving emerged. In addition, effective use of different skills and sharing of the work burden also emerged as aspects valued for teamwork highlighting the ability for individuals to provide input and bring diversity to the group.

The rapid completion of research projects was also valued in teamwork, contrary to the theoretical concept that while teams may have greater knowledge based on different expert components, they may at times be negatively affected by size leading to a lack of coordination among the component parts and hence decreased overall impact [1]. This concept most likely does not come into play for the team as the membership is smaller. However, we cannot presume that tensions of "interpersonal processes" do not affect this team as it continues to work together assuring successful and expediaent outcomes [16].

While teams collaborate within a discipline or across disciplines, there still is leadership oversight and accountability to the parent-patient organization for the team to produce deliverables. One team member comments that working a team brings out the unique aspect of accountability as a positive to working in a team.

The team described areas that they wished they knew prior to engaging in teaming: a) "learning about team members' backgrounds, strengths, style of working" and b) "learning how to manage other personalities and related conflicts." Additionally, the rating of importance of team dynamics is also revealing of how this group prefers to function and what they prioritize when they are operating in a team. There was a high level of importance placed on discussion of authorship both in the beginning and at the end of the project. According to Bennett and Gadlin shared recognition and credit should be discussed as early as possible [5]. This sets the stage for early delegation of tasks (including designation of a team leader) and the formulation of a plan that assigns roles and responsibilities from the onset of the teamwork to potentially avoid future problems. The team members believed that discussing this issue beforehand and also at the end of the project, would have been most beneficial and could potentially decrease issues surrounding appropriate allocation of credit.

Finally, despite the lack of a designated team leader and rather 'shared' leadership based on volunteering for different tasks, being a team leader was important for less than half of the group members whereas the rest were neutral as to whether or not they held this designation. Interestingly, the entire group preferred to choose their team members suggesting that they felt having control of who is in the team will garner a more positive and effective collaboration.

DISCUSSION

These collective case studies have demonstrated that a simple survey assessment of collaborative team science principles could inform and potentially enhance team processes. Assessing collaboration readiness, exploring how to navigate problem solving within a team dynamic and leadership readiness are tools that teams can utilize at any stage of the iterative team collaborative process in order to prepare and adapt to the tasks at hand.

Collaborative research is valued over individual research by a majority of the team members surveyed in Case 1, despite the cost and inconvenience. Most felt that tangibles such as meetings, credit and data sharing are important aspects of a team initiative. There appeared to be less of a consensus of opinion over shared leadership and decision-making. Further studies are suggested to evaluate perceptions of teams regarding organizational support as an area that might need improvement. It may be suggested that the respondents who consistently expressed no opinion are not sensitized to the idea of team science, and future endeavors by institutions to promote a transdisciplinary approach should aim to raise awareness in this population. The survey in Case 1 skims the surface of environmental factors and in future studies these should be dissected more meticulously. Drawing from the results of this study, it appears the future for collaborative research is bright if team members have the requisite intrapersonal traits and interpersonal skills, and are provided with environmental and organizational support.

Case 2 provided a fascinating window into a group that on the surface, appeared to be working well within the multi- to interdisciplinary mode. While on a micro level, members clearly value the team in both concept and in practice, antecedent factors such as institutional support and the lack of clear administrative leadership leads to some dissatisfaction. This is especially notable in the responses of the consensus group leader.

This highlights that while distributed networks and adaptive leadership are excellent for fostering innovation and creating knowledge, the existing hierarchy (those with "position power") must create a suitable environment for the emergence of adaptive leadership, that is to say, they must exhibit "enabling leadership" [14]. It is also clear that someone in the group must take on (and be given the authority to take on) the managerial tasks of scheduling and follow-up. A survey prior to the first meeting of the group gauging the availability of members may help in establishing a formal schedule that includes the majority of stakeholders.

Having well-organized and smartly-run meetings fosters a perception that the time spent in the meetings is productive and worthwhile. This team has a clear understanding of the group objective, and while many in the group feel that their colleagues are somewhat blinded to outside perspectives, many also feel that their view is widened by participating in the team.

Case 3 demonstrates that a few salient points related to teamwork must be considered at the forefront of team interactions. Firstly, while some people inherently considered themselves to be leaders and valued organization, structure and consistency, others should be allowed to develop their leadership skills within the team. Instead of one individual's ideas (which may be perfectly valid and aligned to the project at hand) leading the team, the art of melding one's ideas with those of others should be taught and learned by team members. With that stated the designation of a team leader is a vital first step in the assembly of a team and cannot be ignored or substituted for too long, lest the team risks losing a sense of direction and accountability for the project at hand. Secondly, assessing the team member's background is also important so that all can become familiar with the strengths and assets of the team. Thirdly, collaborations have the potential to become contentious especially where recognition is concerned. The onus is on each member (from the first encounter) to discuss authorship and sharing of accolades. While each might have his or her own scholastic reputation to uphold, all at some point have to be "satisfied" with shared recognition.

CONCLUSION

This case-study project begins to scratch the surface as it seeks to comprehend the antecedents, concurrent processes and end-results of collaborative work [16]. While the field of team science can sometimes be primarily focused on large-scale collaboratives, the concepts can be applied to any team to further understand how team members view their work within a team and how they best think their team would be most productive. Data from the first two cases suggest that further studies are needed to evaluate perceptions of teams regarding organizational support. The third case underscores the need for future research in transformational leadership.

REFERENCES

1. Wuchty S, Jones BF, Uzzi B. The increasing dominance of teams in production of knowledge. Science. 2007; 316: 1036-1039.
2. Stokols D, Misra S, Moser RP, Hall KL, Taylor BK. The ecology of team science: understanding contextual influences on transdisciplinary collaboration. Am J Prev Med. 2008; 35: S96-115.
3. Zucker D. Developing your career in an age of team science. J Investig Med. 2012; 60: 779-784.
4. Hall KL, Stokols D, Stipelman BA, Vogel AL, Feng A, Masimore B, et al. Assessing the value of team science: a study comparing center- and investigator-initiated grants. Am J Prev Med. 2012; 42: 157-163.
5. Bennett LM, Gadlin H, Levine-Finley S. Collaboration & team science: A field guide: NIH Office of the Ombudsman, Center for Cooperative Resolution. 2010.
6. Armstrong A, Jackson-Smith D. Forms and Levels of Integration: Evaluation of an Interdisciplinary Team-Building Project. Journal of Research Practice. 2013; 9.
7. Hall KL, Stokols D, Moser RP, Taylor BK, Thornquist MD, Nebeling LC, et al. The collaboration readiness of transdisciplinary research teams and centers findings from the National Cancer Institute's TREC Year-One evaluation study. Am J Prev Med. 2008; 35: S161-172.
8. Klein JT. Evaluation of interdisciplinary and transdisciplinary research: a literature review. Am J Prev Med. 2008; 35: S116-123.
9. Stipelman B, Feng A, Hall K, Moser R, Stokols D, Nebeling L, et al. The relationship between collaborative readiness and scientific productivity in the Transdisciplinary Research on Energetics and Cancer (TREC) Centers. Annals of Behavioral Medicine; 2010: Springer.
10. Mâsse LC, Moser RP, Stokols D, Taylor BK, Marcus SE, Morgan GD, et al. Measuring collaboration and transdisciplinary integration in team science. Am J Prev Med. 2008; 35: S151-160.
11. Stokols D, Harvey R, Gress J, Fuqua J, Phillips K. In vivo studies of transdisciplinary scientific collaboration Lessons learned and implications for active living research. Am J Prev Med. 2005; 28: 202-213.
12. Shamir B, House RJ, Arthur MB. The motivational effects of charismatic

leadership: A self-concept based theory. Organization science. 1993; 4: 577-594.

13. Nchinda TC. Research capacity strengthening in the South. Soc Sci Med. 2002; 54: 1699-1711.

14. Uhl-Bien M, Marion R, McKelvey B. Complexity leadership theory: Shifting leadership from the industrial age to the knowledge era. The Leadership Quarterly. 2007; 18: 298-318.

15. Northouse PG. Leadership: Theory and practice: Sage Publications. 2012.

16. 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: S77-89.

17. Givens RJ. Transformational leadership: The impact on organizational and personal outcomes. Emerging Leadership Journeys. 2008; 1: 4-24.

18. Burns JM. Leadership. NY. 1st edn. Harper & Row. 1978.

19. Bass BM. Leadership and performance beyond expectations: Collier Macmillan. 1985; 231-245.

Appendix A: Team Leadership Survey Results (Qualitative Responses).

Qualitative Questions and Responses
1. What is your best guess for the definition of the term "team science?"
"knowledge around working in a team," "science that occurs collaboratively," "a collaborative team approach from various scientific disciplines to solving a scientific problem, issue or hypothesis," "the study of team interactions and methodology that assists in how to have effective team work," and "a group of scientists who work together to research and analyze data."
2. Personally, do you prefer to work primarily 1) alone=60% of respondents 2) in a team=40% of respondents
3. List things you like about working in a team:
"Accountability to other team members," "allowing quick feedback on ideas and allowing new ideas and knowledge to be generated while problem solving," "effective use of different skills," "sharing of the work burden," "each person in the team is able to provide input and bring diversity to the group."
4. List things you dislike about working in a team:
a) "Dealing with team members who are inflexible in ideas or contentious," b) "having to rely on other people to pull their weight or dealing with those who want to have control over everything," c) "lack of interest of members and overbearing/attention seeking individuals" d) "lackadaisical team members" and "inefficiency of team members with opposing views or lack of ideas from team members" e) "personality clashes and someone not contributing to the group project."
5. What is one thing you wish you knew about working in a team before you started working in one?
Two main themes emerged 1) learning about team members' backgrounds, strengths, style of working and 2) learning how to manage other personalities and related conflicts
6. Do you prefer to 1) choose your own team members 100% 2) have them assigned to you 0%

[1]This project was completed as part of the course requirements for HSci 6261 Foundations in Clinical and Translational Research and Team Science for the MSHS in Clinical and Translational Research at the George Washington University. All oversight of this case project and analyses was vetted by the instructor of the course.

Cite this article

Amin RZ, Malcolm S, Bedwell J, Lotrecchiano GR (2014) Case Studies in Pediatric Team Science. J Transl Med Epidemiol 2(2): 1030.