

Education Special Communication

Cite this article: Greilich PE, Kilcullen M, Paquette S, Lazzara EH, Scielzo S, Hernandez J, Preble R, Michael M, Sadighi M, Tannenbaum S, Phelps E, Krumwiede KH, Sendelbach D, Rege R, and Salas E. Team FIRST framework: Identifying core teamwork competencies critical to interprofessional healthcare curricula. *Journal of Clinical and Translational Science* 7: e106, 1–7. doi: [10.1017/cts.2023.27](https://doi.org/10.1017/cts.2023.27)

Received: 10 November 2022

Revised: 9 February 2023

Accepted: 14 February 2023

Keywords:

Teamwork competency; interprofessional; medical education; communication; curriculum


Address for correspondence:

P.E. Greilich, MD, MSc, Professor; Department of Anesthesiology and Pain Management, Director, Quality Enhancement Plan: Team FIRST; Office of Medical Education, UT Southwestern Medical Center, E02.314, 5323 Harry Hines Blvd, Dallas, TX 75390-9063, USA. Email: philip.greilich@utsouthwestern.edu

© University of Texas Southwestern Medical Center, 2023. This is a work of the US Government and is not subject to copyright protection within the United States. Published by Cambridge University Press on behalf of The Association for Clinical and Translational Science. This is an Open Access article, distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives licence (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided that no alterations are made and the original article is properly cited. The written permission of Cambridge University Press must be obtained prior to any commercial use and/or adaptation of the article.



Team FIRST framework: Identifying core teamwork competencies critical to interprofessional healthcare curricula

Philip E. Greilich¹, Molly Kilcullen², Shannon Paquette³ , Elizabeth H. Lazzara⁴, Shannon Scielzo⁵, Jessica Hernandez⁶, Richard Preble³, Meghan Michael⁷, Mozhddeh Sadighi³, Scott Tannenbaum⁸, Eleanor Phelps⁹, Kimberly Hoggatt Krumwiede¹⁰, Dorothy Sendelbach¹¹, Robert Rege¹² and Eduardo Salas²

¹UT Southwestern Medical Center, Department of Anesthesiology and Pain Management, Office of Undergraduate Medical Education, Health System Chief Quality Office, Dallas, TX, USA; ²Rice University, Department of Psychological Sciences, Houston, TX, USA; ³UT Southwestern Medical Center, Office of Undergraduate Medical Education, Dallas, TX, USA; ⁴Embry-Riddle Aeronautical University, Department of Human Factors and Behavioral Neurobiology, Daytona Beach, FL, USA; ⁵UT Southwestern Medical Center, Department of Internal Medicine, Dallas, TX, USA; ⁶UT Southwestern Medical Center, Department of Emergency Medicine, Dallas, TX, USA; ⁷UT Southwestern Medical Center, Department of Anesthesiology and Pain Management, Dallas, TX, USA; ⁸The Group for Organizational Effectiveness, Inc., Albany, NY, USA; ⁹Office of Quality, Safety and Outcomes Education, Dallas, TX, USA; ¹⁰UT Southwestern Medical Center, Department of Pediatrics, School of Health Professions, Dallas, TX, USA; ¹¹UT Southwestern Medical Center, Department of Pediatrics, Office of Undergraduate Medical Education, Dallas, TX, USA and ¹²UT Southwestern Medical Center, Department of Surgery, Office of Undergraduate Medical Education, Dallas, TX, USA

Abstract

Interprofessional healthcare team function is critical to the effective delivery of patient care. Team members must possess teamwork competencies, as team function impacts patient, staff, team, and healthcare organizational outcomes. There is evidence that team training is beneficial; however, consensus on the optimal training content, methods, and evaluation is lacking. This manuscript will focus on training content. Team science and training research indicates that an effective team training program must be founded upon teamwork competencies. The Team FIRST framework asserts there are 10 teamwork competencies essential for healthcare providers: recognizing criticality of teamwork, creating a psychologically safe environment, structured communication, closed-loop communication, asking clarifying questions, sharing unique information, optimizing team mental models, mutual trust, mutual performance monitoring, and reflection/debriefing. The Team FIRST framework was conceptualized to instill these evidence-based teamwork competencies in healthcare professionals to improve interprofessional collaboration. This framework is founded in validated team science research and serves future efforts to develop and pilot educational strategies that educate healthcare workers on these competencies.

Introduction

The medical system is an extensive network of teams that work together to deliver care. This system is complex; interprofessional team members hold unique qualifications and education, and the membership of teams frequently fluctuates. Such complexity can cause issues with teamwork; collaboration can be hindered by the use of unfamiliar jargon, as well as differing knowledge, procedures, and work norms [1]. While selecting providers based on their individual competence (e.g., education, test scores) is common, team science researchers caution that a team of experts does not necessarily make an expert team [2]. Though technical skills and knowledge are important, healthcare providers that work as part of a team must also have non-technical skills (e.g., communication, coordination) to develop and execute patient care plans effectively. Without the ability to work together, even a team consisting of leading experts in their field can fail [2]. Research has shown that teamwork impacts patient (e.g., morbidity, mortality), staff (e.g., well-being), and healthcare organizational outcomes [1]. Clinician perceptions and attitudes towards teamwork are related to staff well-being, which can impact clinicians' ability to provide safe care [3].

In addition to considering teamwork skills in provider/trainee selection, teamwork training is recommended to improve performance. Healthcare team training is effective and has a significant impact on attitudes, learning, transfer, and results [4,5]. Both classroom and simulation-based team training interventions improve teamwork processes and patient safety outcomes [5].

	Teamwork Competency	Definition
TEAMWORK CHALLENGES	Recognizing Criticality of Teamwork	Recognizing the central role that teamwork plays in the provision of quality healthcare. Knowing the different interprofessional roles and appreciating how they contribute to patient care.
	Creating a Psychologically Safe Environment	Creating an environment cognizant of team members' comfort level to participate in decision-making and taking actions that help team members feel comfortable speaking up, asking questions, seeking help, admitting a mistake, or offering an alternative perspective.
COMMUNICATION SKILLS	Structured Communication	Using mutually agreed upon communication protocols and terminology to convey information succinctly and ensure that others receive the information they need.
	Closed-Loop Communication	Using techniques to ensure that messages are received and confirmed to avoid misunderstandings.
	Asking Clarifying Questions	Posing questions that help others share what they know or clarify what they intended.
	Sharing Unique Information	Providing information that other team members or healthcare providers may not have. It involves recognizing when others may benefit from information they possess.
COORDINATION SKILLS	Optimizing Team Mental Models	Contributing to the development and maintenance of a shared understanding among team members. For example, the shared understanding could be about patient history, next steps, priorities, how to handle a situation (or contingency planning), and responsibilities.
	Mutual Trust	Taking actions that help develop and maintain trust with team members and other healthcare providers.
	Mutual Performance Monitoring	Monitoring team members and providing constructive feedback, assistance, and back up to ensure quality care. Receiving and using feedback from others constructively.
	Reflection/Debriefing	Reflecting on recent experiences and actively participating in debrief discussions to identify what is working and where improvement may be possible. Using reflection and debriefing skills to accelerate learning from experience.

Fig. 1. Defining the 10 Team FIRST teamwork competencies.

These interventions are even more effective when accompanied by tools and organizational change that support the sustained transfer of teamwork competencies to practice [5]. The dynamic nature of healthcare teams underscores the need for as many team members as possible to possess sound teamwork competencies.

Although there is evidence that team knowledge, skills, and attitudes are important and training is beneficial, consensus on the optimal training content, methods, and evaluation is lacking [1,4,6]. The TeamSTEPPS™ training program provides a strong foundation for team training efforts. In the area of training content, the proposed framework adds instructional value to this foundation by integrating newer teamwork concepts, which have been identified in recent literature (e.g., creating a psychologically safe environment, team orientation) [7,8,9]. Existing evidence indicates that there is a need to: 1) develop teamwork interventions that are rooted in the science of teamwork, 2) implement educational interventions meaningfully, such that evidence-based best practices for training implementation are followed to the greatest extent possible given practical restrictions (i.e., resources available), and 3) rigorously evaluate education initiatives to establish training efficacy, identify areas for improvement in implementation efforts, and guide continual training refinement. This paper will primarily address the first need, establishing the content for an interprofessional, preclinical teamwork training program. This program is derived from team science, building beyond the TeamSTEPPS™ program with complimentary elements. Considerations for training implementation and rigorous evaluation will also be briefly overviewed. While an in-depth discussion of implementation strategies and best practices (e.g., implementation methods, evaluation) is crucial, it is beyond the scope of the current paper and will be the focus of future work.

Teamwork Competencies

To optimize team performance in a complicated multidisciplinary healthcare environment, team training must address learners of all levels, teams working in various settings, and teams of teams, from cognitive- to procedural-based teams. We worked with team scientists to identify critical teamwork competencies for healthcare professionals and design a curriculum around these competencies. These experts drew from their experiences studying teams not only in healthcare, but also in aviation, aeronautics, engineering, and the military. This complimented the contextual knowledge of clinical educators to establish the most important competencies for healthcare-specific team challenges. Through this combined effort, the Team FIRST (Feedback, Interprofessional, Reliable, Safe for Synthesis, and Team Training) framework was developed. This framework asserts that there are 10 requisite teamwork competencies that are essential for healthcare providers. Research suggests that to create an effective team training program, critical teamwork competencies must be used as a foundation for focusing training content [10]. These competencies are clustered under three overarching themes: handling teamwork challenges, communication skills, and coordination skills. Each of the 10 competencies and their rationale for selection are discussed below, as well as the risks to their effective execution and practical implications for healthcare education. The competencies are defined in Fig. 1.

Fig. 2 depicts our conceptual model of all 10 Team FIRST competencies, their interaction, and the process by which they impact performance. The framework begins with the competencies that teams must have to effectively work together and handle challenges to teamwork.

When individuals recognize the criticality of teamwork and the team is psychologically safe, an environment exists in which

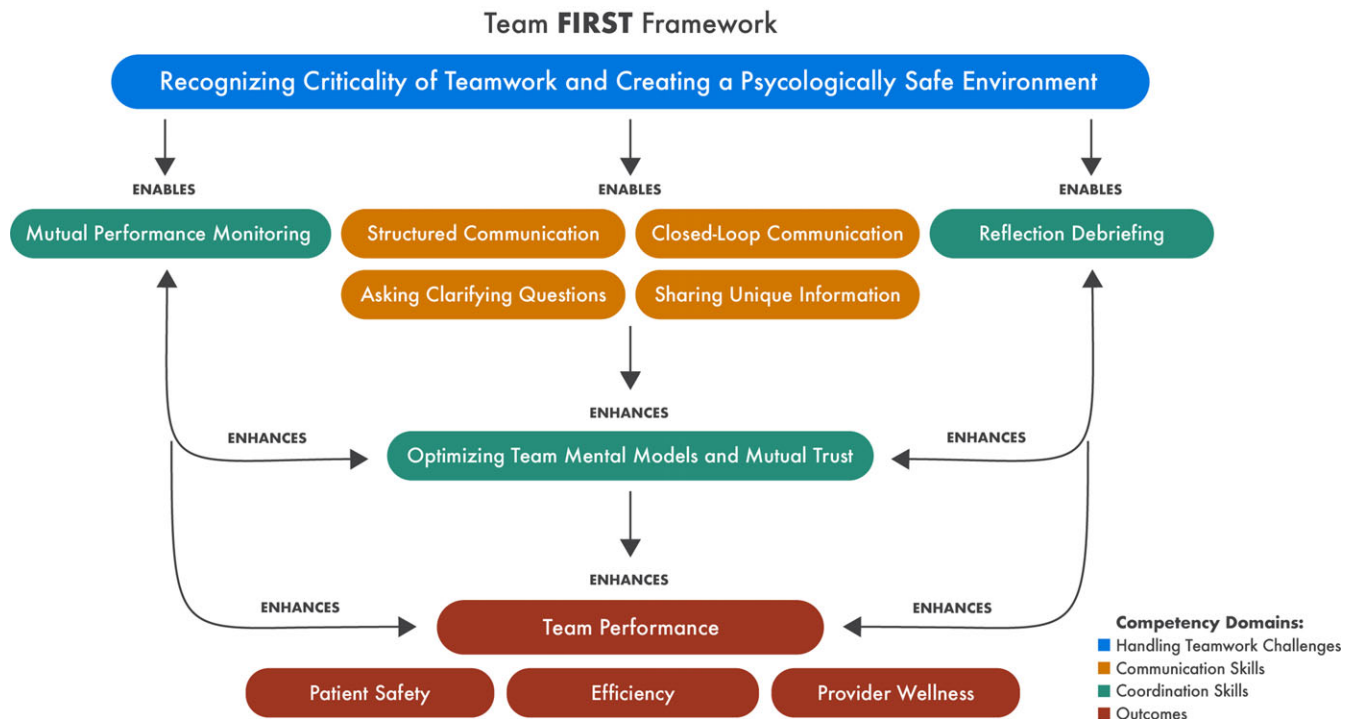


Fig. 2. The Team FIRST framework.

teams can engage in functional competencies including mutual performance monitoring, reflection/debriefing, and effective communication (i.e., structured communication, closed-loop communication, asking clarifying questions, and sharing unique information). Mutual performance monitoring, reflection/debriefing, and communication skills help develop effective team mental models (TMMs) and mutual trust, which ultimately impact team performance (e.g., patient safety, efficiency, provider wellness) [1]. We believe that providing learners with an understanding of how these competencies enable or enhance each other is key to developing a deeper comprehension of the inherent challenges of teamwork, while also providing guidance on how to approach addressing them. For example, teams are unlikely to learn and apply new communication skills if they do not have an appreciation for the criticality of teamwork or a psychologically safe environment in which to practice these skills.

Handling Teamwork Challenges

Handling teamwork challenges enables the effective development of teamwork competencies and involves anticipating, recognizing, and overcoming common challenges to teamwork. This requires team members to acknowledge the criticality of teamwork, instill a psychologically safe climate, and proactively identify potential obstacles to teamwork. This may include actions such as actively managing distractions (e.g., noise), acknowledging the competing responsibilities of team members (caused by environmental factors like scheduling conflicts), inviting readback/feedback, addressing anticipated obstacles while forming treatment plans, and utilizing huddles and debriefs to discuss concerns.

Recognizing criticality of teamwork. For healthcare providers to engage in effective teamwork, each team member must recognize its importance and place team goals ahead of their own (e.g., Team FIRST), otherwise known as team orientation [9]. Teams need to

understand how different interprofessional roles contribute to patient care and affect one's ability to complete their own tasks. Without recognizing the criticality of teamwork, team members may not engage in effective back-up behaviors or care coordination, such as recognizing and addressing a medication error before it causes patient harm. Past research indicates that higher levels of team orientation are associated with higher performance [9]. Team orientation has traditionally been viewed as a relatively stable, intrinsic construct [11]. However, there is evidence to suggest that team orientation is related to cooperative team behaviors and can change over time through experience [11]. By providing healthcare professionals with team training, education on the importance of teamwork, and positive team experiences, it is possible to increase team orientation [9,11,12]. Providers should learn to recognize that their effectiveness as a clinician is dependent on more than their clinical knowledge and skills; teamwork skills are critical to high performance and must also be developed [1].

Creating a psychologically safe environment. Psychological safety is the collective perception shared among team members that the team is safe for interpersonal risk-taking [13], including actions such as speaking up, asking questions, admitting mistakes, seeking help, and offering alternative perspectives during group discussions. Creating a psychologically safe environment is critical to ensure healthcare team members feel empowered to voice concerns to prevent patient safety incidents. Supporting this, psychological safety is present in several recent healthcare teamwork frameworks [10,14]. Research indicates that teams with higher psychological safety tend to outperform other teams [8]. Maintaining the balance between psychological safety and accountability can be difficult in environments with a hierarchical structure, as is present in healthcare. Providers may feel reluctant to speak up or admit concern in the presence of people with authority or greater expertise [8]. Perceived status within a team

has been shown to affect psychological safety [8]. If leaders are unnecessarily harsh, team members can become embarrassed, adversely impacting psychological safety throughout the team [13]. Research suggests that psychological safety is most effectively propagated through the example of team leaders; team members will reciprocate the support they receive. Therefore, it is critical for team leaders to create a psychologically safe environment by consistently encouraging team members to voice concerns and ensuring members do not suffer repercussions for speaking up. This will in turn lead team members to emulate this example towards their leaders and coworkers [8].

Communication Skills

Communication can be defined as an exchange of information between two or more team members [15]. Communication is a fundamental competency present in numerous existing healthcare teamwork frameworks and training initiatives [1,3,10,12,14,16]. Communication is considered a transportable teamwork competency; it is important regardless of the context in which the team works [2]. Ineffective communication has been identified as a causal factor in medical errors and patient harm [17]. Therefore, it is critical to advance providers' understanding of communication competencies and provide them with opportunities to practice and receive feedback in the context of ubiquitous communication events, such as handovers. Four subcomponents of communication that healthcare organizations should focus on developing include: structured communication, closed-loop communication, asking clarifying questions, and sharing unique information. Mastering these communication skills is also critical to developing coordination competencies like optimizing TMMs and mutual trust.

Structured communication. To communicate efficiently and effectively, it is critical that teams establish structured communication patterns. When the communicator and the recipient in a communication event share a common understanding of mutually established communication protocols and use consistent terminology, communication content and clarity improve [18], and cognitive load (the work required to process information) decreases [19]. Structured communication is prevalent during patient handoffs, where communication protocols are commonly used. However, it is also useful in other interactions, such as care planning and problem-solving sessions. Results from the implementation of a commonly used structured communication strategy, SBAR (Situation, Background, Assessment, and Recommendations), have shown improved communication competence in interprofessional collaboration [20]. Organizations should be mindful that utilizing several different communication protocols (e.g., different mnemonics) may increase the risk of misunderstandings. Healthcare professionals should keep in mind that when speaking with individuals outside of their team (e.g., patient, physician in a different discipline), that they should avoid using jargon and speak in a way that is both clear and understandable to the recipient [21].

Closed-loop communication. Closed-loop communication uses a three-step process: 1) a provider communicates a message to the receiver, 2) the receiver acknowledges that they received the information by paraphrasing and seeks clarification if required, and 3) the original provider verifies that the information was received and accurately interpreted [22,23]. This teamwork competency is important for team performance as it provides the sender with opportunities to correct potential misunderstandings before they

escalate and result in incorrect actions [24]. Providers should be skilled in closed-loop communication as both an information provider and receiver and understand its importance when interacting with individuals from different disciplines/professions who may have different communication behaviors. Instilling this in providers will help prevent breakdowns in communication and avoid unnecessary medical errors [22].

Asking clarifying questions. This competency involves posing questions that help others share what they know and clarify what they intended. A clarifying question can operationally be defined as a question or request that is designed to seek clarification of another's preceding utterance [25]. It is essential that providers are able and willing to ask clarifying questions of coworkers and patients to avoid errors that may result in patient safety incidents [16]. Providers should be encouraged to ask follow-up questions when the original question did not yield all the information that they needed and ask "why" questions to clarify what another person is thinking. Existing work on teamwork training in trauma contexts includes asking clarifying questions as a targeted communication behavior [26]. As previously described, it is critical to establish psychological safety to enable team members to ask clarifying questions with confidence.

Sharing unique information. Finally, providing information that other team members or healthcare providers do not already possess is critical to effective teamwork communication. Past research indicates that communication quality is more important than communication quantity [15]. Failure to share unique information has been shown to result in medical errors and negative patient outcomes [27]. However, sharing too much information, particularly information that is not important for providing care, may create increased cognitive demands on the receiver due to information overload. This information overload can impede provider performance, as it causes the information receiver to spend a prohibitively long time seeking the appropriate information and managing knowledge contributions [28]. Previous work has found that psychological safety enables information sharing in teams [29], reinforcing the need to have psychological safety as a foundational competency for healthcare teamwork.

Coordination Skills

Coordination skills involve demonstrating effective team behaviors and understanding team dynamics. Coordination is a prominent teamwork theme that is present in several existing teamwork frameworks in healthcare [3,14]. For providers to effectively coordinate within a clinical team, they must understand and appreciate the concepts of optimizing TMMs, mutual trust, mutual performance monitoring, and reflection/debriefing is essential.

Optimizing team mental models (TMM). When healthcare teams possess a TMM, all team members have a shared understanding about the patient, urgency, treatment, and next steps. Establishing a shared mental model, or having all team members on the same page, has been identified as a transportable skill integral to forming a TMM [2]. This shared cognition has been deemed a critical driver of team performance and is present in various established teamwork frameworks and training interventions for healthcare contexts [3,10,12,14,30]. For healthcare teams to be effective, members must consciously optimize the TMM regarding team roles and responsibilities, care plans and contingencies, as well as system protocols and procedures. These areas should be discussed amongst the team during key coordination events such as interdisciplinary rounds, handoffs, and huddles. A strong TMM

also affords teams the ability to anticipate and mitigate complications in a timely manner. When team members possess a shared awareness and common expectations, they are better able to coordinate their actions, engage in team back-up behaviors, monitor each other's needs, and form a sense of trust.

Mutual trust. Mutual trust is the shared belief that team members will perform their roles and protect the team's interests [10]. It is commonly listed in teamwork models and interventions, particularly in healthcare [10,12,14]. Existing evidence indicates that teams with higher levels of intrateam trust and trust in their leader perform more effectively [31]. Additionally, previous research provides evidence that mutual trust is positively associated with provider and patient satisfaction [32,33]. When members of the team feel valued and acknowledged for their work, mutual trust within the team can form [23]. When members of the team are unsure if they can rely on the character or ability of other members, trust erodes as well as team success [34]. Providers should be taught to demonstrate reliability while avoiding unrealistic commitments and acknowledge others' contributions. For example, providers should honestly communicate their limitations (related to time, expertise, etc.) and offer alternatives while acknowledging the effect this may have on other team members' ability to complete their own tasks. This establishes trust they can draw upon when they need a team member's help, improving long-term functionality.

Mutual performance monitoring. Mutual performance monitoring is the ability to observe the actions of fellow team members, monitor team progress towards shared goals, and skillfully intervene by providing constructive feedback or offering assistance when needed [35]. For example, if a team member notices that another member is overwhelmed or struggling with a particular task, they can engage in back-up behaviors and offer assistance. If team members are not engaging in mutual performance monitoring, they may not be situationally aware enough to recognize that a team member needs help. A strong TMM, mutual trust, and mutual performance monitoring compliment and strengthen one another. Teams that effectively engage in mutual performance monitoring demonstrate consistently higher levels of performance [36]. Performance monitoring is a prevalent element in healthcare teamwork frameworks and is present in existing healthcare teamwork interventions [10,12,14,16]. Mutual performance monitoring is less effective in healthcare teams when team members' individual workloads are too cognitively demanding to monitor and provide support to other team members. Stressful work episodes tend to increase team members narrowing their focus to their own work, resulting in declines in vigilance towards monitoring others' activities [37]. Additionally, mutual performance monitoring may decline if team members are considered ineffective because others had to help them. Education on this competency will help reinforce that team members must rely on one another to deliver care and normalize the essential skills of both giving and receiving feedback or assistance.

Reflection/debriefing. Debriefs are interactive, bidirectional, and reflective conversations that healthcare teams engage in, typically after an event (e.g., post-surgery) [38]. Debriefs help team members to better understand their situation, reflect on past events, and adapt their strategies as necessary [39]. Evidence suggests that individuals and teams that participate in periodic, structured debriefs outperform (by over 20%) counterparts who do not [40]. A significant portion of provider learning takes place during on-the-job experience, and reflection during debriefs helps to accelerate learning from experience [41]. For example, conducting a debrief immediately after a code can help the team to recognize

that they did not use closed-loop communication when discussing medication administration and make a plan to ensure they do so in the future. Teams can maximize the effectiveness of debriefs by applying the general guidelines outlined by current literature [42]. Teams should minimize the time between performance and feedback, structure the debrief (i.e., structured communication), ensure a psychologically safe environment, and focus on key events and learning objectives [2,39]. When conducting a debrief, teams should consider several elements, including conversation facilitation (i.e., facilitator-guided vs. self-guided), conversation structure (i.e., event/performance-focused, cognitive aid driven), and process elements (i.e., conversational techniques, strategies) [38].

Discussion

The Team FIRST framework advocates for the incorporation of 10 teamwork competencies in healthcare organizations. These evidence-based competencies provide a foundation from which providers can utilize teamwork skills in any team. Team FIRST draws from the strengths identified in the TeamSTEPPS™ program, particularly its base in team science and demonstrated impact on teamwork attitudes, knowledge, and outcomes [7,43]. Team FIRST adds instructional value by integrating crucial teamwork concepts, such as creating a psychologically safe environment and team orientation, which are not included in the TeamSTEPPS™ training program [7]. This expansion of the TeamSTEPPS™ framework is based on recent literature. Team FIRST integrates previous work with recent evidence to present the requisite teamwork competencies that should be emphasized in an effective teamwork training program.

Another significant obstacle impacting team training within healthcare systems is gender and racial biases. The effects of these biases in healthcare continue to be unveiled and must be considered when creating training content. Such biases affect training climate and the way healthcare team members interact with one another [44,45]. Providing interprofessional teamwork training has been proposed as a means of combating these biases in the literature [46]. Concepts present in the Team FIRST framework (i.e., team orientation) have been found to neutralize the negative effects of surface-level diversity (i.e., gender, race) on team conflict [47]. Overall, while the Team FIRST program content is theorized to reduce racial and gender biases, these biases should be rigorously evaluated throughout program implementation.

Considerations for Implementing a Team FIRST Curriculum

There are opportunities for improvement in current teamwork training interventions, such as TeamSTEPPS™, relating to training design, training climate, and training evaluation in addition to training content. Though an in-depth discussion of the Team FIRST educational strategy is beyond the scope of this paper, it is important to briefly acknowledge considerations for future efforts. Teamwork training should be provided early, during the most formative stages of clinical training. Teaching new skills later requires providers to engage in unlearning, in which they must acknowledge and release prior learning to accommodate new information and behaviors, which can be difficult and mentally demanding [48]. The mentally demanding task of unlearning may cause providers to feel overwhelmed with their job demands, which has been shown to increase burnout [49]. Therefore, we recommend that it is optimal to

incorporate teamwork competency training during preclinical education to instill a foundation in team skills.

Efforts to train individuals on the Team FIRST framework should consider the benefits of different training types (e.g., information, demonstration, practice, feedback) while taking into account practical constraints, such as resource availability (e.g., time, space, funding). Additionally, existing evidence suggests that training programs should be longitudinal (i.e., spaced sessions), interprofessional, multimodal, and, facilitated [50,51,52]. For training initiatives to be successful, organizational conditions must create a system and training climate for sustaining learned teamwork behaviors on-the-job [53]. To foster transfer of learned skills and behaviors from training and promote sustainment over time, teamwork should be incorporated into performance evaluations of more senior team members, integrating teamwork into the organizational culture [10]. Finally, the impact of team training on team performance and relevant outcomes must be rigorously evaluated [53]. Kirkpatrick's (1956) framework for assessing preclinical and clinical teamwork training initiatives is recommended, which asserts there are four levels of assessing impact: reactions, learning, transfer, and results [54]. The most meaningful impact is found in assessing results, which translates to team performance (e.g. patient safety, efficiency, and provider wellness) in the case of a team training program [1]. If learned skills transfer to the clinical environment, this should result in improved team performance. To date, transfer of teamwork competencies into the clinical environment remains elusive. The Team FIRST curricula will aim to build on previous work to address this critical gap in healthcare.

Conclusion

There is a growing call to instill teamwork competencies in healthcare professionals. The Team FIRST framework was conceptualized as a foundation for such a training program, targeting 10 evidence-based teamwork competencies for improving interprofessional collaboration in healthcare using ubiquitous teaming contexts, such as handoffs and care transitions. The educational strategy needed to effectively deliver the Team FIRST framework will be described in future works. This will include a detailed discussion of the training design, training climate, and rigorous evaluation methods. Implementation of a team training program based on the Team FIRST framework bodes the exciting possibility of improving healthcare teams to make the medical system safer for both patients and providers.

Acknowledgments. We would like to acknowledge the contributions of the Quality Enhancement Plan (QEP) Development Steering Committee including the special contributions of Gary Reed, MD, MS, and David Klocko, MPAS, DMSc, for interprofessional integration of the curriculum, Aditee Ambardekar, MD, MSED, Logan Gisick, PhD, and Andrew Griggs, PhD, for their mapping of teamwork competencies to learning outcomes, and William Daniel, MD, MBA, Vice President and Chief Quality Officer for UT Southwestern Medical Center, for the identification of competencies critical to health system quality and operational excellence.

The QEP is an internally funded 5-year program at UT Southwestern Medical Center for the fulfillment of an accreditation requirement of the Southern Association of Colleges and Schools.

Disclosures. There are no conflicts of interest to disclose.

The following authors served as paid consultants for the QEP: Dr Scott Tannenbaum, President of the Group for Organizational Effectiveness, Inc., Dr Elizabeth H. Lazzara, Associate Professor of Human Factors, Embry-Riddle Aeronautical University, and Dr Eduardo Salas, Chair of Psychological Sciences, Rice University.

References

- Rosen MA, DiazGranados D, Dietz AS, et al. Teamwork in healthcare: Key discoveries enabling safer, high-quality care. *American Psychologist* 2018; **73**(4): 433–450.
- Salas E, Reyes DL, McDaniel SH. The science of teamwork: Progress, reflections, and the road ahead. *American Psychologist* 2018; **73**(4): 593–600.
- Manser T. Teamwork and patient safety in dynamic domains of healthcare: A review of the literature. *Acta Anaesthesiologica Scandinavica* 2009; **53**(2): 143–151.
- Hughes AM, Gregory ME, Joseph DL, et al. Saving lives: A meta-analysis of team training in healthcare. *Journal of Applied Psychology* 2016; **101**(9): 1266–1304.
- Weaver SJ, Dy SM, Rosen MA. Team-training in healthcare: A narrative synthesis of the literature. *BMJ Quality & Safety* 2014; **23**(5): 359–372.
- Buljac-Samadzic M, Doekhie KD, van Wijngaarden JDH. Interventions to improve team effectiveness within health care: A systematic review of the past decade. *Human Resources for Health* 2020; **18**(2).
- King HB, Battles J, Baker DP, et al. TeamSTEPPS™: Team Strategies and Tools to Enhance Performance and Patient Safety. In: Henriksen K, Battles JB, Keyes MA, et al., eds. *Advances in Patient Safety: New Directions and Alternative Approaches (Vol. 3: Performance and Tools)*. Rockville (MD): Agency for Healthcare Research and Quality (US); 2008.
- Newman A, Donohue R, Eva N. Psychological safety: A systematic review of the literature. *Human Resource Management Review* 2017; **27**(3): 521–535.
- Rahman UU, Rehman CA, Imran MK, Aslam U. Does team orientation matter? Linking work engagement and relational psychological contract with performance. *Journal of Management Development* 2017; **36**(9): 1–12.
- Salas E, DiazGranados D, Weaver SJ, King H. Does team training work? Principles for health care. *Academic Emergency Medicine* 2008; **15**(11): 1002–1009.
- Eby LT, Dobbins GH. Collectivistic orientation in teams: An individual and group-level analysis. *Journal of Organizational Behavior* 1997; **18**(3): 275–295.
- Chakraborti C, Boonyasai RT, Wright SM, Kern DE. A systematic review of teamwork training interventions in medical student and resident education. *Journal of General Internal Medicine* 2008; **23**(6): 846–853.
- Edmondson A. Psychological safety and learning behavior in work teams. *Administrative Science Quarterly* 1999; **44**(2): 350–383.
- Zajac S, Woods A, Tannenbaum S, Salas E, Holladay CL. Overcoming challenges to teamwork in healthcare: A team effectiveness framework and evidence-based guidance. *Frontiers in Communication* 2021; **6**: 6.
- Marlow SL, Lacerenza CN, Paoletti J, Burke CS, Salas E. Does team communication represent a one-size-fits-all approach?: A meta-analysis of team communication and performance. *Organizational Behavior and Human Decision Processes* 2018; **144**: 145–170.
- Clay-Williams R, Braithwaite J. Determination of health-care teamwork training competencies: A Delphi study. *International Journal for Quality in Health Care* 2009; **21**(6): 433–440.
- Morath JM, Turnbull JE. *To do no harm: Ensuring patient safety in health care organizations*. John Wiley & Sons, 2005.
- Marshall S, Harrison J, Flanagan B. The teaching of a structured tool improves the clarity and content of interprofessional clinical communication. *BMJ Quality and Safety in Health Care* 2009; **18**(2): 137–140.
- Young JQ, Ten Cate O, O'Sullivan PS, Irby DM. Unpacking the complexity of patient handoffs through the lens of cognitive load theory. *Teaching and Learning in Medicine* 2016; **28**(1): 88–96.
- Randmaa M, Mårtensson G, Swenne CL, Engström M. SBAR improves communication and safety climate and decreases incident reports due to communication errors in an anaesthetic clinic: A prospective intervention study. *BMJ Open* 2014; **4**(1): e004268.
- Ervin JN, Kahn JM, Cohen TR, Weingart LR. Teamwork in the intensive care unit. *American Psychologist* 2018; **73**(4): 468–477.
- Salik I, Ashurst JV. *Closed loop communication training in medical simulation*. Treasure Island, FL: StatPearls Publishing; 2019.

23. **Weller J, Boyd M, Cumin D.** Teams, tribes and patient safety: Overcoming barriers to effective teamwork in healthcare. *Postgraduate Medical Journal* 2014; **90**(1061): 149–154.
24. **McIntyre RM, Salas E.** Measuring and managing for team performance: Emerging principles from complex environments. In: Guzzo RA, Salas E, eds. *Team effectiveness and decision making in organizations*. San Francisco: Jossey-Bass; 1995. 9–45.
25. **Apker J, Mallak LA, Applegate EB III, et al.** Exploring emergency physician-hospitalist handoff interactions: Development of the handoff communication assessment. *Annals of Emergency Medicine* 2010; **55**(2): 161–170.
26. **Roberts NK, Williams RG, Schwind CJ, et al.** The impact of brief team communication, leadership and team behavior training on ad hoc team performance in trauma care settings. *American Journal of Surgery* 2014; **207**(2): 170–178.
27. **Page JS, Lederman L, Kelly J, Barry MM, James TA.** Teams and teamwork in cancer care delivery: Shared mental models to improve planning for discharge and coordination of follow-up care. *Journal of Oncology Practice*. 2016; **12**(11): 1053–1058.
28. **Bock GW, Mahmood M, Sharma S, Kang YJ.** The impact of information overload and contribution overload on continued usage of electronic knowledge repositories. *Journal of Organizational Computing and Electronic Commerce*. 2010; **20**(3): 257–278.
29. **Frazier ML, Fainshmidt S, Klinger RL, Pezeshkan A, Vranceva V.** Psychological safety: A meta-analytic review and extension. *Personnel Psychology* 2017; **70**(1): 113–165.
30. **Salas EE, Fiore SM.** *Team cognition: Understanding the factors that drive process and performance*. American Psychological Association, 2004.
31. **De Jong BA, Dirks KT, Gillespie N.** Trust and team performance: A meta-analysis of main effects, moderators, and covariates. *Journal of Applied Psychology* 2016; **101**(8): 1134–1150.
32. **Hovlin L, Gillsjö C, Dahl Aslan AK, Hallgren J.** Mutual trust is a prerequisite for nurses' sense of safety and work satisfaction-Mobile Integrated Care Model: A qualitative interview study. *Nordic Journal of Nursing Research* 2021; **1**: 2057–2058.
33. **Shan L, Li Y, Ding D, Wu Q, et al.** Patient satisfaction with hospital inpatient care: Effects of trust, medical insurance and perceived quality of care. *PloS One* 2016; **11**(10): e0164366.
34. **Varpio L, Bader KS, Meyer HS, Durning SJ, Artino AR, Hamwey MK.** Interprofessional healthcare teams in the military: A scoping literature review. *Military Medicine* 2018; **183**(11–12): e448–e454.
35. **Albon R, Jewels T.** *Mutual performance monitoring: Elaborating the development of a team learning theory*, vol. 23. Group Decis Negot, 2014, 149–164.
36. **Fransen J, Kirschner PA, Erkens G.** Mediating team effectiveness in the context of collaborative learning: The importance of team and task awareness. *Computers in Human Behavior* 2011; **27**(3): 1103–1113.
37. **Shaw TH, Matthews G, Warm JS, Finomore VS, Silverman L, Costa PT Jr.** Individual differences in vigilance: Personality, ability and states of stress. *Journal of Research in Personality* 2010; **44**(3): 297–308.
38. **Sawyer T, Eppich W, Brett-Fleegler M, Grant V, Cheng A.** More than one way to debrief: A critical review of healthcare simulation debriefing methods. *Simulation in Healthcare* 2016; **11**(3): 209–217.
39. **Allen JA, Reiter-Palmon R, Crowe J, Scott C.** Debriefs: Teams learning from doing in context. *American Psychologist* 2018; **73**(4): 504–516.
40. **Reyes DL, Tannenbaum SI, Salas E.** Team development: The power of debriefing. *People & Strateg.* 2018; **41**(2): 46–52.
41. **Couper K, Salman B, Soar J, Finn J, Perkins GD.** Debriefing to improve outcomes from critical illness: A systematic review and meta-analysis. *Intensive Care Medicine*. 2013; **39**(9): 1513–1523.
42. **Tannenbaum SI, Greulich PE.** The debrief imperative: Building teaming competencies and team effectiveness. *BMJ Quality & Safety* 2022; **32**(3): 125–128. doi: [10.1136/bmjqs-2022-015259](https://doi.org/10.1136/bmjqs-2022-015259).
43. **Parker AL, Forsythe LL, Kohlmorgen IK.** TeamSTEPS®: An evidence-based approach to reduce clinical errors threatening safety in outpatient settings: An integrative review. *Journal of Healthcare Risk Management* 2019; **38**(4): 19–31.
44. **Salles A, Awad M, Goldin L, et al.** Estimating implicit and explicit gender bias among health care professionals and surgeons. *JAMA Network Open* 2019; **2**(7): e196545. doi: [10.1001/jamanetworkopen.2019.6545](https://doi.org/10.1001/jamanetworkopen.2019.6545).
45. **Serafini K, Coyer C, Brown Speights J, et al.** Racism as experienced by physicians of color in the health care setting. *Family Medicine* 2020; **52**(4): 282–287.
46. **Stephany Sanchez E, Tran-Reina M, Ackerman-Barger K, Phung K, Molla M, Ton H.** Implicit biases, interprofessional communication, and power dynamics. agency for healthcare research and quality 2020. Accessed January 24, 2023. Available at: <https://psnet.ahrq.gov/web-mm/implicit-biases-interprofessional-communication-and-power-dynamics>
47. **Mohammed S, Angell LC.** Surface- and deep-level diversity in workgroups: Examining the moderating effects of team orientation and team process on relationship conflict. *Journal of Organizational Behavior* 2004; **25**: 1015–1039.
48. **Becker K.** Individual and organisational unlearning: Directions for future research. *Journal of Organizational Behavior* 2005; **9**(7): 659–670.
49. **Abraham CM, Zheng K, Poghosyan L.** Predictors and outcomes of burn-out among primary care providers in the United States: A systematic review. *Medical Care Research and Review* 2020; **77**(5): 387–401.
50. **Weaver SJ, Lyons R, DiazGranados D, et al.** The anatomy of healthcare team training and the state of practice: A critical review. *Academic Medicine* 2010; **85**(11): 1746–1760.
51. **Lacerenza CN, Reyes DL, Marlow SL, Joseph DL, Salas E.** Leadership training design, delivery, and implementation: A meta-analysis. *Journal of Applied Psychology* 2017; **102**(12): 1686–1718.
52. **Fox L, Onders R, Hermansen-Kobulnicky CJ, et al.** Teaching interprofessional teamwork skills to health professional students: A scoping review. *Journal of Interprofessional Care* 2018; **32**(2): 127–135.
53. **Bisbey TM, Reyes DL, Traylor AM, Salas E.** Teams of psychologists helping teams: The evolution of the science of team training. *American Psychologist* 2019; **74**(3): 278–289.
54. **Vuurberg G, Vos JAM, Christoph LH, De Vos R.** The effectiveness of interprofessional classroom-based education in medical curricula: A systematic review. *Journal of Interprofessional Education & Practice*. 2019; **15**: 157–167.