Simulation-Based Team Training in Healthcare

Introduction: Simulation-based team training (SBTT) in healthcare is gaining acceptance. Guidelines for appropriate use of SBTT exist, but the evidence base remains limited. Insights from other academic disciplines with sophisticated models of team working may point to opportunities to build on current frameworks applied to team training in healthcare. The purpose of this consensus statement is threefold: (1) to highlight current best practices in designing SBTT in healthcare and to identify gaps in current implementation; (2) to explore validated concepts and principles from relevant academic disciplines and industries; and (3) to identify potential high-yield areas for future research and development.

Methods: We performed a selective review and critical synthesis of literature in healthcare simulation related to team learning as well as from other relevant disciplines such as psychology, business, and organizational behavior. We discuss appropriate use of SBTT and identify gaps in the literature.

Results: Healthcare educators should apply rigorous curriculum development processes and generate learning opportunities that address the interrelated conceptual levels of team working by addressing learning needs at the level of the individual, the team, the organization, and the healthcare system. The interplay between these conceptual levels and their relative importance to team-based learning should be explored and described. Instructional design factors and contextual features that impact the effect of SBTT should be studied. Further development of validated assessment tools of team performance relevant to professional practice is a high priority and is essential to provide formative, summative, and diagnostic feedback and evaluation of SBTT. Standardized reporting of curriculum design and debriefing approaches, although difficult, would help move the field forward by allowing educators to characterize effective SBTT instruction.

Conclusions: Much work is needed to establish a robust and defensible evidence base for SBTT. The complexity and expense of SBTT require that specific programs or interventions are appropriately designed, implemented, and evaluated. The healthcare sector needs to understand how team performance can be optimized through appropriate training methods. The specific role of simulation in team training needs to be more clearly articulated, and the training conditions that make SBTT in healthcare effective need to be better characterized.

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Key Words: Simulation, Team training, Curriculum development.

Simulation-based team training (SBTT) has been increasingly adopted in healthcare. Despite its widespread acceptance, the evidence base underpinning the efficacy of SBTT in healthcare remains limited. Currently, SBTT focuses largely upon intra-/interprofessional team working, highlighting patient safety, human factors, crisis resource management (CRM), and team-based behaviors. Other academic disciplines such as psychology, organizational behavior, and management have generated sophisticated models of team working in a wide range of professional contexts. Further exploration of these generic principles may highlight potential opportunities to optimize the current conceptual and educational paradigms applied to healthcare team training.

In preparing this consensus statement, we have endeavored to capture and conceptualize current approaches to SBTT in healthcare and incorporate input from attendees of the Society for Simulation in Healthcare (SSH) Research Summit. We performed a selective review of the healthcare SBTT literature and drew from other disciplines with the aim of critically synthesizing this diverse literature.1,2 From this wider context, we strove to distill the current best practices in SBTT in healthcare and challenge current thinking on how to use SBTT to prepare healthcare teams to deliver safe effective care. This approach has highlighted areas of congruence with other disciplines and identified potential areas of relevance to the design and development of SBTT. The purpose of this consensus statement is therefore threefold: (1) to highlight current best practices in designing and implementing simulation-based educa-

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tional interventions for healthcare teams and to identify gaps in the literature; (2) to explore validated concepts and principles from relevant academic disciplines and industries; and (3) to identify potential high-yield areas for future research and development.

TEAMS AND TEAMWORK

The definition of team is similar across domains. Baker et al define a team as two or more individuals with specialized knowledge and skills who perform specific roles, and complete interdependent tasks, to achieve a common outcome or goal. The constantly changing membership and power hierarchies of “ad hoc” healthcare teams complicate team processes in dynamic, complex clinical environments. Indeed, healthcare teams even within a given institution have diverse typologies across various healthcare settings in terms of stability and variability of both role and personnel.

Teamwork is comprised of the individual team members’ interrelated thoughts, actions, and feelings which allow them to function as a team and promote coordinated, adaptive performance that leads to value-added outcomes. Key features of teamwork have been distilled to the “Big Five”: (1) team leadership; (2) performance monitoring; (3) backup behavior; (4) adaptability; and (5) team orientation. Shared mental models, “closed loop” communication, and mutual trust support the coordination of these team processes. Team processes such as effective communication and coordination promote team cognition, a multilevel phenomenon influenced by individual mental models and environmental cues; for a discussion of team cognition and shared mental models, see the article by Salas et al.

Gaba et al introduced anesthesia CRM into healthcare and prompted a paradigm shift that continues to evolve to the present day. Several research groups have responded to the growing evidence supporting the need for communication and team training in healthcare.

Early efforts by the MedTeams group and in emergency medicine (EM) showed promise and led to work that demonstrated the benefit of linking simulation to didactic instruction. The Agency for Healthcare Quality and Research and the United States Department of Defense Patient Safety Program developed TeamSTEPPS. TeamSTEPPS incorporates four competencies of effective team training, namely team leadership, situation monitoring, mutual support, and communication, but until recently lacked a simulation component.

Several research groups augmented the TeamSTEPPS training program with SBTT; positive training outcomes were reported. As the progression of these efforts illustrates, the critical issue is how to build on information and demonstration-based training to design and integrate practice-based approaches such as simulation-based educational strategies into team training curricula.

Table 1. Eight Evidence-Based Principles for Team Training in Healthcare (Modified After Salas et al)

<table>
<thead>
<tr>
<th>Principle</th>
<th>Description</th>
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<tr>
<td>1. Focus training content on critical teamwork competencies</td>
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<td>2. Emphasize teamwork and team processes over task work</td>
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<td>3. Guide training based on desired team-based learning outcomes and organizational resources</td>
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<td>4. Incorporate hands-on, guided practice</td>
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<td>5. Match similar on-the-job mental processes and simulation-based training content to augment training relevance and transfer to practice</td>
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<td>6. Provide both outcome- and behavior-based feedback</td>
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<td>7. Evaluate training impact through clinical outcomes and work behaviors</td>
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<td>8. Reinforce desired teamwork behaviors through coaching and performance evaluation</td>
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CURRENT STATUS OF SBTT AND GAPS IN THE LITERATURE

In our selective review and synthesis of the healthcare simulation literature, several recurring themes emerged. Although evidence-based principles for healthcare team training exist (see Table 1), adherence to many of these best practice recommendations is inconsistent. Multiple authors emphasize rigorous educational design processes for the development of SBTT curricula, including robust needs assessment. Too few studies of SBTT, however, provide sufficient information on how training needs were determined. A clear needs analysis to guide curriculum development and choice of target team competencies is even more essential in healthcare, given the various team typologies. SBTT often occurs with personnel known to one another despite the fact that, especially in emergency healthcare settings, teams may form in an ad hoc manner.

Effective team working requires alignment of insight and skills at three interrelated, interdependent, and complex levels of practice, including not only the team but also the individual and organizational levels. As such, the tripartite contribution of the individual, the team, and the organization must fundamentally inform any educational strategy aimed at producing effective, functional teams. At an individual level, team performance is influenced by psychologic and behavioral factors; insight and self-awareness in this domain likely mediate functioning within a team. Established psychometric tools from other domains heighten individual self-awareness about teamwork (Belbin Preferred Team Roles: http://www.belbin.com/, Aston Team Performance Inventory (ATPI): http://www.astonod.com/atpiView.php?page=1; Hogan Assessments: http://www.hoganassessments.com/assessments-hogan-development-survey. Accessed January 17, 2011); such insights may better support individual learning and self-efficacy in team-based activities and contexts. While such tools were not specifically designed with short-lived healthcare teams in mind, they highlight the potential value in exploring how an individual’s personal insights form team participation and reflection during SBTT activities. Organizational culture is also of critical importance and influences team functioning. Organizational factors influence the ultimate effectiveness of team training interventions, can considerably impact the learning climate, and significantly undermine or promote team training activ-

Vol. 6, No. 7, August 2011 Supplement © 2011 Society for Simulation in Healthcare 515
Simulation-Based Team Training

Table 2. Event-Based Approach to Training (EBAT): Specific Considerations for Scenario Design (From Rosen et al)33

1. Focus on a subset of teamwork competencies
2. Define specific learning objectives rooted in teamwork competencies
3. Choose a clinical context to frame the scenario development
4. Develop a targeted set of knowledge, skills, and attitudes to capture the predefined objectives and competencies
5. Craft the scenario to ensure team members have the opportunity to display the targeted knowledge, skills, and attitudes—define the critical events
6. Define a set of targeted responses
7. Create diagnostic measurement tools
8. Create scenario script

...
SBTT and key areas of future research have been identified. Team performance measurement that yields specific diagnostic information helps correct team processes. It is important to note here that rigorous process and outcomes assessment also help identify training needs that lead to curriculum modification and improved implementation; as such, assessment is part of the ongoing needs analysis we emphasized previously.

Several authors report patient-centered outcomes of simulation-based team interventions in a variety of domains, including pediatrics74 and obstetrics.75–77 A discussion about simulation-based training as translational science is the focus of another Research Summit working group.

PRACTICE RECOMMENDATIONS FOR APPROPRIATE USE OF SBTT AND FUTURE DIRECTIONS

Through selective review and critical synthesis of literature from healthcare simulation and other disciplines and with moderating input from attendees of the SSH Research Summit, several recommendations for appropriate use of SBTT and key areas of future research have been identified.

1. Healthcare educators should perform thorough needs assessments and address the three dynamic and interrelated levels of team working (individual, team, and organization). Studies reported in the healthcare simulation literature should clearly indicate how training needs were determined. Further clarification about the contribution of an individual learner’s teamwork skills and approach to teamwork will likely inform the future SBTT design and implementation. Similarly, we recommend future work to define the relative impact of organizational culture on SBTT and the transfer of skills to the clinical arena. Ongoing partnerships with cognitive and behavioral psychologists and other related disciplines involved in team training will likely yield further beneficial insights.

2. Well-designed scenarios are a core component of SBTT. Event-based approaches to scenario design are recommended as the gold standard for team training. In addition, other instructional design factors that likely impact the implementation of SBTT scenarios should be characterized, including the role of pretraining preparatory work; the use of role-play and confederate actors during SBTT; and key contextual features that augment relevant degrees of realism and psychologic fidelity. Finally, the relative influence and merit of training site, such as point of care/in situ, established simulation center, or distributed simulation, on desired outcomes should be further explored.

3. Feedback and debriefing are key elements of SBTT. Further performance assessment tools that yield both specific individual and team level process feedback linked to clear behavioral triggers need to be developed. Moreover, a thorough understanding of SBTT instructor characterics such as skill set and background (clinical vs. nonclinical, physician vs. nonphysician) remain to be elucidated as a variable influencing outcome of SBTT that have programmatic implications in terms of resource allocation and faculty development.

4. Reporting standards on specific training conditions that are deliberately manipulated during simulation-based team interventions would help to advance the field. Standards should relate to adherence to curriculum development frameworks, scenario descriptions, clear definitions of training concepts, contextual features of the training environment, and factors related to the debriefing. Reporting standards would allow replication of same intervention team training studies and improve our ability to describe, synthesize, and assess specific team behaviors.

5. Teamwork training in healthcare is context-dependent and standardized training programs may not fit the needs of all stakeholders in an organization. Although it appears that SBTT should be anchored in relevant clinical contexts (eg, resuscitation, obstetrical emergencies), the relationship between SBTT and clinically relevant task work needs more precise definition. In addition, the relative merits of interprofessional team training compared with discipline-specific team training should be further studied. For example, the evidence related to SBTT in nursing practice is sparse especially in light of their critical role in a wide range of healthcare settings.

6. To advance the field, we must describe the effectiveness of SBTT in healthcare at various levels. To this end, SBTT will have greater impact if assessment tools allow us to provide better feedback to individuals and teams. Finally, SBTT in healthcare will only be fully validated in the context of improved patient and institutional outcomes. Given the difficulty of reliably attributing patient outcome to SBTT, risk mitigation as a marker of good team working should also be explored.

CONCLUSIONS

Effective team working is a complex, challenging, adaptive social phenomenon and requires the alignment of many capabilities and attributes at the level of the individual, the group, and the organization. The complexity and expense of SBTT requires that meaningful outcome measures be used to design, implement, and monitor appropriately resourced educational interventions. Further research in this field will promote SBTT interventions that are fit for purpose and yield meaningful educational, organizational, and patient-based outcomes.

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