

Concepts for Developing Expert Surgical Teams Using Simulation



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KEYWORDS

• Team training • Teamwork • Simulation • Surgical teams

KEY POINTS

- Surgical education research has shown the value of incorporating simulation into training programs.
- Simulation-based team training programs need to have a firm foundation in the science of team performance and effectiveness.
- Characteristics of expert teams have been identified by researchers in other domains and can be applied to simulation-based training programs for surgical teams.

Historically, simulation-based training among surgical trainees has focused on technical skills,¹ perpetuating a model in which team members practice their tasks separately rather than as an interdependent unit.² However, it is not sufficient that team members be solely technical experts; they must also be experts in social interactions that lead to adaptive and coordinated action. Indeed, more than 2 decades of research in numerous domains has demonstrated that it takes more than a set of experts to make an expert team.^{3–5} Recently, research in surgical education has pointed to the critical nature of team dynamics, suggesting that adverse events in surgery may often derive from an aspect of team system design.^{6–8} These and other reports have prompted educators to explore and develop simulation-based team training strategies that will sculpt trainees into well-rounded and competent surgeons.

This article investigates how simulation-based training can enhance the effectiveness of surgical teams. First, a description of team training in surgical settings is provided. Then, empirical work from a variety of fields is introduced to describe common characteristics of expert teams, with a specific focus on application to training surgical teams within simulated settings. Finally, methods and suggestions for evaluation of simulation-based team training are discussed.

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WHAT IS TEAM TRAINING?

Although team training has been recognized and embraced as a critical component for the preparation of effective health care teams,^{9,10} ambiguity regarding what is meant by team training still exists. Even terms such as teams, teamwork, and team effectiveness mean different things to different specialties.¹ Not only are there subtle distinctions across different care environments for each of these but variation also exists within specialties. Within surgical settings, for example, trauma resuscitation teams differ from procedure-based surgical teams, which differ from transplant teams. Similarly, the competencies required for effective teamwork and performance vary based on the settings and goals. Thus, a short clarification of the terms is warranted so that a better understanding of team training can be achieved.

Traditionally, teams are defined as identifiable groups of 2 or more individuals working independently toward a shared goal that requires coordination of effort and resources to achieve mutually desired outcomes.¹¹ An important characteristic of teams is that they consider themselves and are seen by others as distinct social entities working within a larger organization and are, therefore, differentiated from groups.¹² In surgical settings, for example, interprofessional trauma teams would comprise a team, whereas the trauma nurses would be a group.

Teamwork, on the other hand, describes the actual cognitions, behaviors, and attitudes that make interdependent performance possible.¹³ For example, teams must appropriately and successfully exhibit essential knowledge (cognitions), skills (behaviors), and feelings (attitudes) in a dynamic environment. These are the processes that are synergistically combined to yield successful team performance.

Finally, team effectiveness refers to the evaluative judgments regarding the results of performance relevant to set criteria. These can be subjective (eg, self-report assessments, observer opinion) or objective (eg, time to intubation, adverse events). The criteria and tools to assess effectiveness must be valid and appropriate for the team level of measurement (see later discussion).

In sum, a team provides the input, teamwork is the process, and team effectiveness is the outcome. Simulation-based training, therefore, is the mechanism by which appropriate teamwork processes can be identified and instigated, and by which team effectiveness can be measured and improved. Fortunately for surgical educators, empirical work has shown commonalities in how expert teams think, feel, and act (ie, the process), even when working on seemingly dissimilar tasks within diverse contexts. See later discussion for a summary of these commonalities within the context of surgical teams, followed by the development of an overarching model capturing the key components and mechanisms that can inform simulation-based training endeavors for surgical trainees. Simulation designers can capitalize on these findings to better understand how to create surgical team training scenarios, what processes to assess and when, and what outcomes to measure.

TEAM-BASED THEORIES AND PRINCIPLES AND/OR CHARACTERISTICS OF EXPERT TEAMS

Research on team effectiveness from domains outside of surgery can inform the understanding and ability to purposefully design simulation-based team training programs. Expert teams have distinct patterns in how they think, act, and feel. See later discussion for an overview of each of these characteristics of expert teams and recommendations for the design and evaluation of simulation-based training programs in surgical settings.

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