Nontechnical Skill Countermeasures for Pandemic Response

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COVID-19 represents a rare situation that poses significant potential risks to both staff and patients, and has the potential to compromise healthcare systems. During a pandemic response, surgeons are likely to work in large and dynamic teams, often with people they have never met before and in high demand, variable-resource settings. Optimizing team performance via enhanced nontechnical skills can result in improved decision making, increased efficiency, higher adherence to safety standards, greater resilience, and better outcomes.[1] In this Surgical Perspective, we describe the specific behavioral and nontechnical skills for medical event management that have been shown to reduce performance errors and save lives in healthcare settings, and suggest best practices for surgeons with specific reference to a pandemic response. Nontechnical skills are important both during a pandemic response and in rebuilding capacity for surgical care after the acute phase has passed.

NONTECHNICAL SKILLS

Nontechnical skills are the cognitive and social skills that characterize high performing individuals and teams. They enable team members to exchange information about their perceptions of ongoing situations (mental models) to support error detection, share critical information, and generate a team-level, shared mental model of understanding. Specific frameworks for crisis management[2] and nontechnical skills[3] exist in the literature. Arguably, the greatest magnitude of impact that is available to surgeons during a pandemic is due to their nontechnical skills; how they gather and use information, leverage shared experience at critical moments, galvanize team members to act, and inspire others to question and speak up when they feel something is not safe. In surgery, the nontechnical skills for surgeons system delineates the essential nontechnical competencies for effective team dynamics to handle medical scenarios that present danger to patients and staff.[4] These skills are broadly defined as situation awareness, decision making, team communication, and leadership.

SITUATION AWARENESS

Arguably the most critical nontechnical skill, situation awareness, is required for accurate decision-making, timely communication, and appropriate leadership. For the operative environment, situation awareness is defined as: ''Developing and maintaining a dynamic awareness of the situation in the operating room (OR), based on assembling data from the environment (patient, team, time, displays, equipment); understanding what they mean, and thinking ahead about what may happen next.''[5] Situation awareness comprises three distinct levels:

1. Gathering information
2. Interpreting the information (based on experience); and
3. Projecting and anticipating future states

During the COVID-19 crisis, a surgeon may be asked to evaluate a patient with an acute abdomen, and a fever and cough. In addition to diagnosing the patient's surgical disease, the surgeon will need to be aware of the incidence of disease in their region and the COVID-19 testing available at their hospital. They will need to work with emergency physicians and surgical team members to gather the relevant clinical information, interpret the test results and symptoms, and project how the patient will tolerate operative or nonoperative management.

Best Practices for Situation Awareness

- Check back important information
- Provide periodic status updates
- Share what will likely happen in the near future so others can plan
- Engage the team in ''mental simulations'' regarding what may happen in the future

DECISION MAKING

Surgical decision making can be defined as ''Skills for diagnosing a situation and reaching a judgement to choose an appropriate course of action.'' Classical models of decision-making propose that this is an analytical process: the relative features of options are compared in turn and an optimal course of action is selected; however, this is an effortful process, requiring both experience and time to come to an acceptable solution. Rule-based decision making may be helpful during pandemic response and used effectively by novices and experts alike; once a situation has been detected, a relevant rule can be applied, either by following national guidelines or local protocols. Deciding what personal protective equipment (PPE) to wear during an aerosol-generating procedure to reduce the risk of staff exposure is one example, in which the surgeon follows the rules developed at their institution. Experts however, tend to use a more heuristic-based style called recognition-primed decision-making[6]; a type of pattern matching used to make satisfactory decisions under times of high stress or time-pressure. As pandemic situations are rapidly changing and uncertain, there are not always prior experiences to work from so surgeons may use creative decision making when a totally novel solution is required to treat patients, protect staff, or develop new processes of care.

Best Practices for Decision Making

- Gather sufficient data to make decisions
- Do not delay to have the complete picture
- Offer potential solutions
- Apply rule-based decision making where appropriate. When not practical, recognition-primed decision-making works well for experts

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TABLE 1. Nontechnical Skills Countermeasures During a Pandemic

Contextual Challenges of a Pandemic	Nontechnical Skill Countermeasures
Resource variability *Refers to variable availability of equipment and materials that are essential for the delivery of surgical services*	• Knowing what options are available • Maintaining an up-to-date understanding of available resources • Finding alternatives
Staff Variability *Refers to occasional deficiency in both number of available staff and sufficiency of provider training and skill mix*	• Knowing your team and their skill mix • Predicting staff availability and potential changes during a case • Being flexible
Communication variability *Refers to multiple languages spoken in the operating room, variation in degrees of proficiency, and communication styles of different providers*	• Anticipating communication needs of team members • Identifying preferred language of team members • Using closed loop communication and monitoring response
Systems variability *Refers to Infrastructure, referral systems, and facility responsiveness to care delivery needs*	• Anticipating competing demands on the entire system of care delivery • Knowing concurrent system demands • Accessing the chain of command to resolve system problems

Adapted from Scott JW, et al. *Ann Surg*. 2018;267:461–467.

TEAM COMMUNICATION

Effective team dynamics are essential for rapid diagnosis, concurrent treatment, and containment of risk. Medical emergencies are time sensitive and require quick action. Communication and teamwork are the skills required for working in a team context to ensure that the team has an acceptable shared picture of the situation and can complete tasks effectively. What is essential is that each member of the team has a ''shared mental model'' of both what is happening and the planned outcome. There are many barriers to communication, which can be both internal and external. Closed loop communication[7] can reduce communication errors by making certain that all members of the care team clearly and effectively share information with one another. Closed loop communication is particularly important in the hospital incident command structure, to which surgeons often contribute. A member of the team is encouraged to raise an issue clearly and concisely through incident command. This concern should be received with authentic curiosity, and ultimately the decision should come back to the individual who raised the concern so they know it has been addressed.

Best Practices for Team Communication

- Introduce yourself and role to other team members
- Be clear and concise
- Express authentic curiosity
- Use names if you can and eye contact if culturally acceptable

LEADERSHIP

In organizations exposed to hazards, there is widespread recognition that leadership is essential for efficient and safe team performance. During a pandemic response, surgeons who are usually leaders may need to work in teams alongside or under direction of their critical care colleagues. Those who would normally be used to autonomous practice can contribute by demonstrating shared leadership or assuming followership[8] in certain situations, skills that are also explicit in astronaut training. A core function of leadership is demonstrating the standards that are expected from other team members. A key failing of leaders is to emphasize the importance of safety but then implicitly undermine those sentiments by breaking rules and not adhering to high standards of ethical and professional conduct themselves. For surgeons, examples of this are adhering to guidelines regarding antibiotic use, respecting sterility protocols, and being transparent regarding errors, even during non-normal situations such as pandemic response. Advocating for PPE and vital equipment for team members and adhering to local guidelines are essential. In addition, surgeons exert leadership by coping with pressure and by keeping composure even in the most difficult of times.

Best Practices for Leadership

- Set expectations on roles, culture, and norms of team behavior to unite the team
- Listen to concerns of others and validate them
- Be aware of nonverbal communication
- Actively engage in conflict resolution

CONTEXTUAL CHALLENGES OF A PANDEMIC

Resource limitations may affect team dynamics and complicate medical management in a pandemic. Teams will need to operate autonomously and make effective medical decisions based on ambiguous information, variable medical knowledge, and limited resources. Typically, most surgeons are accustomed to practicing with ample resources. In a pandemic response, however, resources such as PPE, ventilators, hospital staff, ORs, and inpatient beds may be restricted. Supplies of these resources may fluctuate by day or within hospitals in the same system or region. Surgeons can benefit from work in limited-resource settings to understand how to deliver safe and effective care in those situations.[9] In Rwanda, a number of contextual challenges to safe surgery have been identified that surgeons and OR teams have developed adaptive responses to, including variability of resources, staff, communications, and systems. Table 1 shows these challenges and the nontechnical skill countermeasures that may be useful to deploy during a pandemic response.

CONCLUSIONS

COVID-19 has presented as an acute global health emergency, with an unimaginable toll of human suffering and downstream economic and social impact that will likely last for many years. Behavioral and psychological science plays an important role in supporting the performance, health, and safety of healthcare teams.[10] The contextual challenges that pandemics bring, including constraints on resource, staff, communications, and systems at a time of most acute need highlights the importance of effective team dynamics and nontechnical skills. In this perspective, we offered specific behaviors and best practices that could be useful countermeasures for surgeons and all frontline workers both during a

pandemic response and in the rebuilding of surgical capacity afterward.

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