A Review of Effective Physician Leadership in High-Stakes Healthcare Settings

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Abstract

High-stakes medical scenarios require physician leaders to effectively organize and guide healthcare teams to deliver timely, precise, and coordinated patient care under stressful conditions. Effective physician leadership has been linked to improved technical performance of healthcare teams and better clinical metrics, including technical aspects of cardiopulmonary resuscitation and trauma management.[1-4,12] Simulation-based leadership training has been shown to benefit both medical students and physicians with statistically significant improvements in patient outcomes.[11,13-16,18] A multidisciplinary simulation can fulfill interprofessional practice and education requirements while benefiting student learners.[19-20] Other promising methods for improving leadership-based communication include instruction focused on setting standards, thinking aloud, encouraging collaboration, creating a welcoming environment, and nonverbal communication.[22-24] The addition of cognitive aids has also been linked to increased clinical performance.[25-26] These nontechnical skills should be incorporated into undergraduate and graduate medical education to promote high levels of clinical performance and provide physicians with a universal skill set to better serve their patients and colleagues.

Introduction

It is a physician's duty to provide high-quality care during medical emergencies, including acute myocardial infarction, traumatic injury, a sudden loss of consciousness, acute ischemic stroke, cardiac arrest requiring cardiopulmonary resuscitation, and iatrogenic causes. If the physician leader in these scenarios provides inadequate care, a patient may suffer sequelae or death. Although many factors in these situations are uncontrollable, one influential component is the physician's leadership, including skills such as effective communication, cognitive flexibility, situational awareness, and efficient resource management. Research demonstrates skilled team leadership is associated with technical performance of the healthcare team, which improves patient outcomes.[1-4,12] This analysis examines literature from 2001 to 2026 on physician leadership, specifically in urgent clinical settings, to identify features of effective leadership; to identify common shortcomings such as psychological stress, ineffective communication, and lack of effective training; and to determine the most suitable methods for training future physicians.

Background

Across various fields, acute stress has been documented to contribute to errors and poor performance.[5-8] This is also true for healthcare, as critical scenarios are stressful to all involved, including physician leaders. When emergency medicine and general surgery residents participated in simulated, high-stress trauma scenarios, they demonstrated reduced recall and poorer clinical performance.[5] Likewise, paramedics who participated in high-stress conditions exhibited an increase in medication dosage errors.[6] These impairments, combined with the

fragility of critically ill patients, may contribute to devastating consequences. High stress has also been linked to reduced verbal fluency, shown through increased pauses and repetitions.[7] This diminished verbal fluency may reduce clarity and hinder communication between team members. Because communication is an essential factor of effective leadership, communication breakdowns can impact efficacy of leadership. In high-stakes, time-sensitive clinical scenarios, a delay or breakdown in communication may worsen patient outcomes. Psychological stress also impacts decision-making by reducing the time spent seeking alternative solutions, often leading to clinicians adopting the first available solution.[8] During times of stress, providers may evaluate alternative solutions arbitrarily and decide on one solution prematurely, which may lead to suboptimal treatment. For physicians to lead effectively, they must be aware that psychological stress may impair their decision-making, decrease their recall, reduce their verbal fluency, and increase the likelihood of medication dosage errors.

Another aspect to consider is the training physicians receive for urgent clinical scenarios. In healthcare, technical competencies are typically prioritized, and leadership training is often overlooked. Across the United States, healthcare providers receive advanced cardiac life support (ACLS) or basic life support (BLS). These courses are required to be recertified every two years through the American Heart Association (AHA). ACLS preparation material often includes a portion of leadership training, but it is a relatively short section of the course, consisting of two pages of a 103-page handbook.[9] Clear communication between team leaders and team members is essential; however, the duties of team members and team leaders lack examples and use vague language. For example, the first responsibility of the team leader is “organize the group”. When 20 pediatric resuscitations were observed and analyzed for healthcare team performance and physician leadership during the first five minutes of pediatric CPR, researchers discovered a wide variation in team performance.[10] The main metrics analyzed during each resuscitation were a care summary provided by the team leader, pulse check, defibrillator pad placement, and assignment of clinical duties, such as airway management, intravenous access, or chest compressions. Most critical tasks were completed within five minutes, with the lowest metrics being in assigning intravenous access, assigning chest compressions, and placing defibrillator pads. Although the need for higher-quality leadership in CPR was identified, this idea can be extrapolated to other high-stakes clinical scenarios as well.

Communication is the cornerstone of effective leadership. There is a need for more effective communication, particularly during clinical emergencies and real-life multidisciplinary traumas.[11] Researchers examined 201 messages during a simulated CPR event and discovered 18% of the information communicated was inaccurate. Interestingly, quantitative information was often incorrect, such as the number and strength of defibrillations. Notably, when the information was spoken aloud, it was more likely to be repeated back correctly in later moments. This same study also placed groups of three physicians in a simulated penicillin-induced anaphylaxis scenario, in which the patient displayed signs and symptoms resembling a tension pneumothorax. Groups that openly communicated, rather than simply stating a diagnosis, demonstrated an increased probability of correctly diagnosing the patient, as did groups that thought aloud. This collaborative approach was valuable, as it allowed for multiple perspectives to be shared.

Although these high-stress environments pose challenges for healthcare teams, strong leadership skills help to mitigate the risks of poor clinical outcomes (Fig. These leadership behaviors, or nontechnical skills, include discussing team expectations, being decisive when determining appropriate actions, navigating follow-through of decisions, allocating tasks to team members, and maintaining a positive attitude.[12] Additionally, the study revealed a statistically significant association between positive leadership behaviors identified by simulation participants’ questionnaires and the overall technical performance of complex and simple skills during CPR. Improved performance of complex skills included increased hands-on compression time, decreased defibrillation pauses, and a shorter time to first defibrillation attempt, as well as improved overall performance in cardiac arrest scenarios. There was also an increase in simple skills such as compression rate, compression depth, and ventilation rate. Consequently, it is

critical to examine how a physician's leadership can be improved, as this would provide patients with a higher quality of care during these high-stakes scenarios.

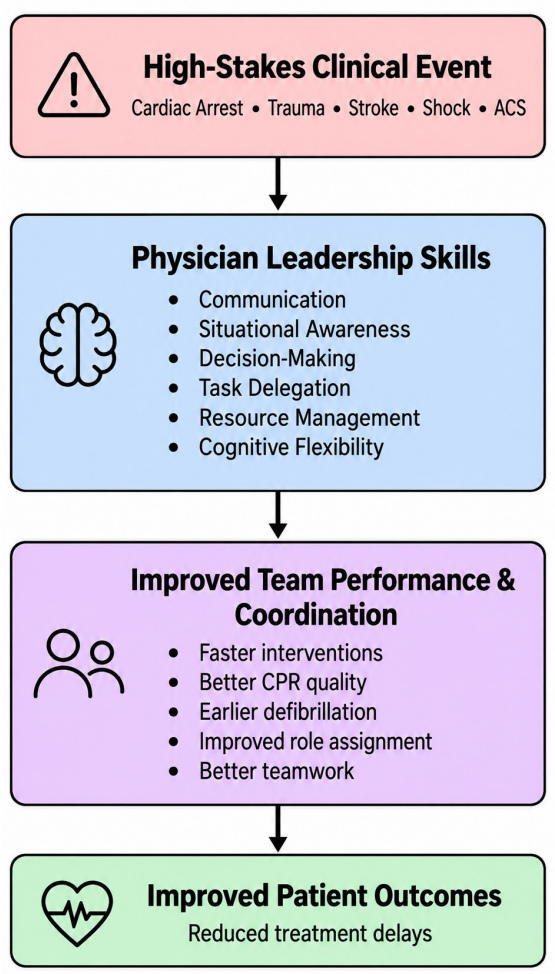

Figure 1. **Conceptual framework illustrating the role of physician leadership and its association with patient-based outcomes during high-stakes clinical events. Figure made in Biorender.**

DISCUSSION

Simulation-Based Training

As discussed above, effective leadership training is needed to reduce errors and prevent poor clinical performance. One approach to this training is simulation, which allows inexperienced providers to safely gain experience without the potential repercussions of poorly managing an acutely ill patient.[11] These opportunities are invaluable as they allow less experienced providers to create a foundation of skills they can build upon before being required to manage a critically ill patient. Simulations also allow examination of the earliest moments of a resuscitation, as they can be video recorded before the patient encounter begins, which can be challenging to study during real-life scenarios.[13] Another benefit of this video recording is that team performance can be analyzed rigorously, which may help identify problems that are not easily observed, such as delays in initiating life-saving measures and ineffective communication.[13] This makes simulation-based leadership training an attractive idea for medical students, as no critically ill patients are placed at risk, and it allows for a full evaluation of a student's performance from the time they step into the room until the encounter is complete.

Current literature demonstrates that simulation-based training is effective and leads to increased clinical performance.[14-15] Following a simulated one-hour leader-based training, pediatric emergency medicine residents and attending physicians displayed quicker transfer to the emergency department stretcher, primary assessment, and summary statement times in real pediatric resuscitations post-training.[14] Investigators enrolled 24 second-year emergency medicine residents in an initial simulation of a critically ill patient and then provided formal crisis management-based teaching.[15] They were then placed in four additional simulation-based practice cases, which resulted in an increase in overall leadership, problem-solving, situational awareness, resource utilization, and communication when compared to their initial encounter. The residents who participated also described the study as "high yield", "helpful", and reported that they felt more prepared to lead a resuscitation. These improvements highlight the benefits that practicing physicians may gain from simulation-based training and indicates that their use should be more widespread.

Additionally, these positive results are reproducible in medical students.[16] A randomized controlled trial placed 237 medical students into teams of three, where they performed a baseline cardiac arrest simulation and before receiving

standardized video-based instruction for 20 minutes. Depending on their group assignment, they received an additional 10 minutes of technical instruction or 10 minutes of leadership instruction focused on assigning roles, communicating clearly, decision-making, and adhering to the algorithm. Four months following instruction, participants were placed into a similar cardiac arrest simulation. Investigators discovered that both groups of medical students significantly increased their hands-on time during CPR. However, those who received the leadership training had a statistically significant increase in hands-on time, an earlier start of compressions, an earlier start of ventilation, and improved communication. The addition of 10 minutes of leadership training resulted in a statistically significant improvement in multiple technical aspects of resuscitation. These findings further support the need for adding a simulation-based leadership component to the medical school curriculum.

One critique of simulation-based training is that it is unrealistic, and its use does not translate into real-life scenarios. However, this does not seem to be the case.[17] Twenty-eight second-year internal medicine residents participated in 16 simulated emergencies, including myocardial infarction and ventricular tachycardia in need of immediate cardioversion. The same residents also managed real emergency scenarios, including shock, acute respiratory failure, decreased level of consciousness requiring intubation, cardiac arrest, and arrhythmias with hemodynamic instability. Following these real-life events and simulations, researchers measured blood pressure, heart rate, salivary α-amylase, salivary interleukin-1β, and a State-Trait Anxiety Inventory score. Results revealed simulated scenarios yielded similar levels of acute stress to actual emergencies. This similarity in acute stress levels between real-life emergencies and emergencies in simulation-based training supports the use of simulation-based leadership training. However, the study had limitations. Salivary α-amylase may be impacted by circadian rhythm, which could lead to falsely elevated measurements in both the real-life and simulated groups. Further research is needed to evaluate these findings.

Experience is regarded as a valuable commodity in medicine, and rightfully so, as providers who possess high levels of experience often provide high levels of patient care. Interestingly, a cohort study sought to determine if leadership experience trumps recent simulation-based training during in-hospital cardiac arrest.[18] When investigators examined 157 cases of in-hospital cardiac arrest, data regarding chest compressions and defibrillators revealed that cases with leaders who had completed simulation-based training within the past six months were associated with shorter chest compression pauses than those with more experienced leaders. This finding may suggest simulation-based training is more valuable than experience alone. Further research is needed to confirm this, as the sample size may not be robust enough to rule out confounding variables, but it does point to the potential value of simulation-based training.

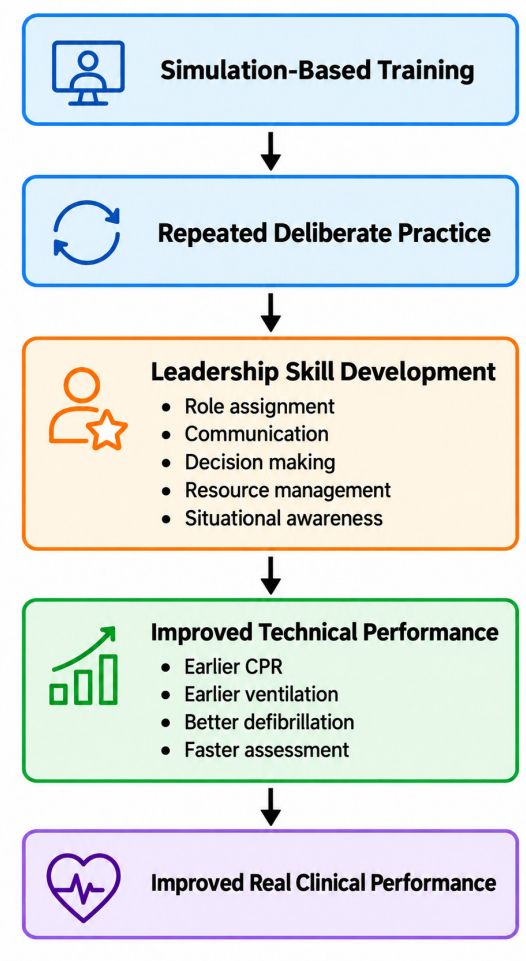

Figure 2. Conceptual framework displaying the effects of simulation-based training on leadership development and clinical performance. Figure made with Biorender.

Teamwork

Teamwork plays a monumental role in healthcare due to the collaborative nature that is required among multiple professionals, including physicians, nurses, technicians, pharmacists, and respiratory therapists. The need for synchrony is amplified in high-stakes scenarios, as poor teamwork can delay care and contribute to adverse patient outcomes in an already fragile patient population. In the United States, medical schools are required to include interprofessional practice and education curricula to promote teamwork across healthcare professions.[19-20] Including a high-stakes simulation within interprofessional practice and education learning may be advantageous because of its proven benefits in medical students.[16] If a simulation were to include a variety of student healthcare professionals who were assigned to their respective future roles, it may benefit the education of all students involved. This could provide valuable experience to learners while also appealing to schools and educators, as it satisfies the required interprofessional practice and education curricula. It may be beneficial to implement multidisciplinary simulations within clinical skills courses, as professionalism courses are often abstract and removed from the clinical setting, which may limit student motivation.[21] Incorporating multidisciplinary, high-stakes simulations into clinical skills courses can fulfill required interprofessional practice and education requirements while also preparing healthcare students for collaborative patient care.

Communication

Communication is an essential component of leadership in healthcare. It is the driving force of a well-functioning healthcare team, and its breakdown can result in disastrous outcomes, especially when an unstable patient is involved. Effective communication is often discussed during leadership training, yet this idea can be abstract and can be difficult to grasp without specific instruction. Firstly, speaking loudly and clearly is essential for good communication. This need is amplified in situations of acute stress, such as high-stakes healthcare scenarios. Team members may be focused on a task, managing their emotions, composing themselves, analyzing the situation, or simply unable to hear as the environmental background noise will be increased due to coordination of all necessary tasks. Limiting the number of professionals in the resuscitation room may be a useful approach to "control the room." A meta-analysis analyzed 60 papers to discover leadership factors that influence hospital cardiac arrest and discovered that team members preferred a collaborative, conversational approach over authoritarian communication.[22] Collaboration enables team dynamics, and if critical actions are overlooked, it increases the likelihood that the team will catch this mistake. It is important to speak in a loud and clear manner that is conversational rather than authoritarian, and to ensure that the number of team members present is enough to collaborate efficiently, while not having so many members that it causes the room to become overcrowded.

Twenty-seven simulated traumas were analyzed, and the data suggested that leaders must establish acceptable communication patterns and a warm team climate.[23] This was achieved through the encouragement of thinking aloud, support of team members, mutual performance monitoring, discussion of backup options, and remaining open-minded to ideas that differ from typical clinical algorithms. The study also found a positive correlation between leaders sharing information with team members and medical management, as well as a positive correlation between leaders providing supportive behavior towards team members and clinical management. When team members feel comfortable sharing information, they are more likely to do so and, as a result, enhance team dynamics. The study also discussed the need for leaders to update the shared mental model of patient status in these simulations, as the leader ideally has an overall perspective of the patient's condition in these scenarios. Leaders need to think aloud, as it ensures that all team members understand the current goals and tasks that need to be completed, all while encouraging a supportive team climate to foster collaboration.

Nonverbal cues and gestures are aspects of communication that are often overlooked. In one study, eighteen simulated traumas consisting of 36 physicians and 72 nurses were video recorded and analyzed. Researchers found trauma physicians who stood at the head of the hospital bed had easier access to the patient, easier

communication with other team members, and a clear view of the monitor.[24] This allowed other team members to be aware of each other's tasks and better coordinate patient care. Gestures, vocal nuances, and gaze direction were used to confirm verbal commands and decrease ambiguity. Investigators also found that leaders with ambiguous nonverbal communication, hesitant verbal commands, or no verbal commands caused other team members to take over the leader's tasks. Nonverbal cues and gestures are impactful in communication because they decrease ambiguity and, therefore, should be implemented in leadership training.

Use of Cognitive Aids

Another helpful tool in a high-stakes clinical scenario is the use of cognitive aids. As discussed previously, these situations are accompanied by high stress, which may induce errors. Cognitive aids, such as flowcharts, tables, algorithms, and diagrams, can reduce cognitive load and, as a result, lead to more complete patient care, reduce errors, and ensure that management steps are completed in the correct order.[25] In these situations, physician leaders are often stretched thin, due to a high mental load with the need to process large volumes of clinical data, followed by immediate critical thinking and synthesis to remedy the situation. Cognitive aids are a valuable resource that allow leaders to confirm relevant knowledge, such as dosing, review other possible diagnoses, and verify that nothing has been overlooked. One of the biggest challenges with cognitive aids is that they must be updated on a regular basis and easily accessible to healthcare leaders. Convenient accessibility can be achieved by placing appropriate cognitive aids in resuscitation bays, operating rooms, crash carts, and patients' charts. Interestingly, a randomized clinical trial found that cognitive aids designed for use in deteriorating surgical patients were only used approximately 90% of the time.[26] This may be due to the critical nature and time constraints associated with these patients, and further research is needed to understand this finding. It should also be noted that the main purpose of these aids is to reduce cognitive load. Consequently, if cognitive aids are too complex or numerous, they may become counterproductive, increasing the mental workload of the leading clinician. More studies are needed to determine the limit at which such information may become detrimental. Cognitive aids have the potential to improve patient care by reducing errors and ensuring that all aspects of care are completed in the correct order, but continued research is needed to understand why they are not widely used in critical scenarios and to determine the limit at which information may become cumbersome.

Obstacles Preventing Implementation of Simulation-Based Training

This author is unaware of any current research that addresses the limitations of implementing simulation-based leadership training into graduate and undergraduate medical education. This author is also unaware of any conflicting data that would indicate simulation-based leadership training does not improve patient outcomes. One potential obstacle is financial cost preventing medical schools and residency programs from implementing simulation-based leadership training. When the cost of a four-week dedicated simulation rotation was analyzed at the University of Pennsylvania's general surgery residency, an analysis found it cost $12,516 per resident excluding faculty compensation.[27] Although this is just one example, it may reflect a broader trend. More research is warranted to understand the cost of running simulation programs, as well as methods to make simulation-based training more financially feasible for both residency programs and medical schools.

Conclusion

Strong physician leadership is a critical component of ensuring optimal patient outcomes. Recent literature supports the idea that when physicians display high levels of nontechnical leadership skills during high-stakes healthcare scenarios, the technical skills of their team members increase.[1-4,12] As a result, clinical metrics also increase, benefiting patients. When simulation-based leadership training is used to prepare and educate physicians and medical students, the benefits have been shown to translate into real-life environments and reduce

clinical errors.[11,13-16,18] Therefore, it would be logical to include multidisciplinary simulations within medical schools' clinical skills courses, as it would meet requirements for interprofessional practice and education curricula[19-20] and provide experience for students.

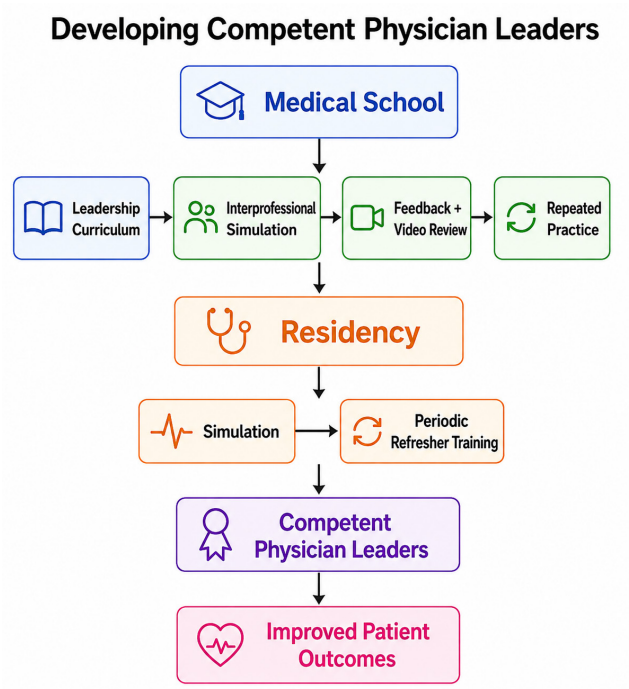

Figure 3. Developing competent physican leaders. Proposed example of a longitudinal framework for developing competent physician leaders. Figure made with Biorender.

Other promising methods of increasing physician leadership skills include teaching appropriate verbal and nonverbal communication[22-24] and the utilizing cognitive aids.[25-26] Valuing these nontechnical skills in healthcare will not only promote enhanced clinical performance but also function as a backbone for physicians to better serve their patients and healthcare teams when errors are unacceptable.

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References

1. Gabr AK. J R Coll Physicians Edinb. 2019;49(2):112-116.
2. Robinson PS, et al. Postgrad Med J. 2016;92(1094):715-720.
3. Pittman J, et al. Resuscitation. 2001;49(2):175-177.
4. Tschan F, et al. Trends Anaesth Crit Care. 2014;4(1):32-36.
5. Harvey A, et al. J Trauma Acute Care Surg. 2012;72(2):497-503.
6. LeBlanc VR, et al. Prehosp Emerg Care. 2005;9(4):439-444.
7. Buchanan TW, et al. Biol Psychol. 2014;97:60-66.
8. Keinan G. J Pers Soc Psychol. 1987;52(3):639.
9. Disque K. ACLS Advanced Cardiac Life Support Provider Handbook. 2026:50-51.
10. Grimsley EA, et al. Pediatr Emerg Care. 2021;37(12):1122-1127.
11. Hunziker S, et al. J Am Coll Cardiol. 2011;57(24):2381-2388.
12. Yeung JH, et al. Crit Care Med. 2012;40(9):2617-2621.
13. Hunziker S, et al. J Am Coll Cardiol. 2011;57(24):2381-2388.
14. Keilman A, et al. BMJ Simul Technol Enhanc Learn. 2020;7(1):44.
15. Gartland R, et al. MedEdPORTAL. 2022;18:11278.
16. Hunziker S, et al. Crit Care Med. 2010;38(4):1086-1091.
17. Dias RD, Neto AS. J Crit Care. 2016;33:8-13.
18. Wittig J, et al. Resuscitation. 2024;199:110217.
19. American Osteopathic Association.
20. Liaison Committee on Medical Education.
21. Goldstein EA, et al. Acad Med. 2006;81(10):871-876.
22. Jurd C, Barr J. J Clin Nurs. 2024;33(10):3844-3853.
23. Johnsen BH, et al. Scand J Trauma Resusc Emerg Med. 2017;25(1):109.
24. Härgestam M, et al. Scand J Trauma Resusc Emerg Med. 2016;24(1):37.
25. Greig PR, et al. Anaesthesia. 2023;78(3):343-355.
26. Koers L, et al. JAMA Surg. 2020;155(1):e194704.
27. Danzer E, et al. J Surg Educ. 2011;68(6):519-525.