

# The Mindset of the Resuscitator



Sara H. Gray, MD, FRCPC, MPH<sup>a,\*</sup>, Michael J. Lauria, MD, NRP, FP-C<sup>b</sup>,  
Christopher Hicks, MD, MEd, FRCPC<sup>a</sup>

## KEYWORDS

• Resuscitation • Performance • Psychology • Resilience • Communication

## KEY POINTS

- Expert resuscitation requires much more than just technical skill and knowledge: we must also understand and master our internal affective state and analyze the interplay between self and team.
- The Zero Point Survey provides a structured approach to self, team, and environmental preparation that should occur before the primary survey commences.
- Mental rehearsal and positive self-talk can realign subjective appraisal of a stressful event and facilitate performance. Specific techniques to improve communication and situation awareness help multimember teams to stay on task during dynamic events.
- Recovery is as important as preparation: reflection, self-compassion, and self-care can build resilience and prevent burnout.

## INTRODUCTION

Developing strategies to optimize performance during crisis is an essential component of resuscitation. It is possible to practice for excellence, even under acutely stressful conditions. This article reviews strategies for optimizing performance before crisis arrives, during resuscitation, and for recovery after difficult cases, so that one can effectively return to work.

## CASE SCENARIO

You are working your typical Saturday evening shift when you get a telephone call from a paramedic. A gunman has opened fire at a local concert where there are thousands of people in the audience. It is not clear how many people have been injured and there is chaos at the scene. You are the closest hospital. Patients will be arriving in 10 minutes. Are you prepared?

<sup>a</sup> St Michael's Hospital, Emergency Department Administration, 30 Bond Street, Toronto, ON M5B 1W8, Canada; <sup>b</sup> Department of Emergency Medicine, University of New Mexico School of Medicine, Albuquerque, NM, USA

\* Corresponding author.

E-mail address: [sara.gray@unityhealth.to](mailto:sara.gray@unityhealth.to)

Twitter: @EmICUcanada (S.H.G.)

## BEFORE THE CRISIS OCCURS

In an organized resuscitation, the primary survey should be preceded by a series of steps to ensure self, team, and environmental preparation. Ideally, effective teams start preparing to resuscitate before patients arrive.

The Zero Point Survey (ZPS) is a consensus-derived framework for organizing pre-primary survey discussions around self, team, and environmental preparation.<sup>1</sup> The ZPS is designed to create shared mental models, facilitate adaptive team coordination by direct team-based discussion and preparation before patient arrival, and is updated periodically once the resuscitation commences. The STEP-UP mnemonic is used to recall the elements of the ZPS (Fig. 1). Before patient arrival, team members are prompted to examine their own sense of psychological preparedness via I'M SAFE (illness, medication, stress, alcohol, fatigue, eating/elimination), followed by a focused examination of shared team roles, anticipated early priorities, and an environmental scan for equipment safety and logistics.

A preprimary survey accomplishes several key tasks relevant to coordination during chaotic and dynamic clinical events:

1. *Establishing clear and flexible shared mental models.* A mental model is a cognitive representation of current and anticipated features of an event or situation.<sup>2,3</sup> A mental model becomes shared when that same cognitive representation is mutually understood and acknowledged among team members.<sup>4</sup> Shared mental models

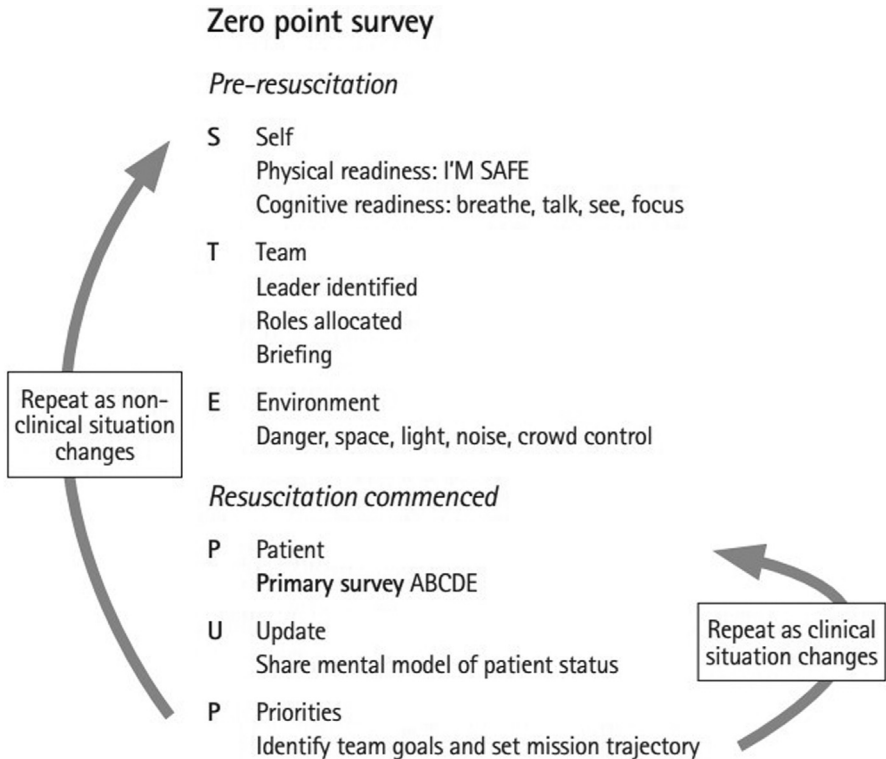


Fig. 1. Zero Point Survey and the STEP-UP mnemonic.

allow team members of varied backgrounds and clinical experience to create a common understanding of teamwork and task work relevant to the situation at hand.<sup>5</sup> As a dynamic event progresses, the mental model needs to be periodically updated to incorporate new data and changing priorities.<sup>6</sup> A structured preprimary survey can help to clarify elements of an ambiguous clinical event, allow for team input and challenge-response queries, and allow the team leaders to establish early goals and priorities.

2. *Creating a shared sense of psychological safety.* To function cohesively under stressful, time-pressured conditions, team members need to be reassured that they have the permission to ask questions, admit mistakes, or challenge the team leader. The key to facilitating positive social interactions within teams is establishing a sufficient sense of psychological safety: that is, that the team environment is safe for interpersonal risk-taking.<sup>7</sup> Psychological safety is correlated with improved safety behaviors, such as error reporting, and promotes knowledge and power sharing, cogeneration, and team learning.<sup>7</sup> Structured briefings can help create psychological safety by clarifying what is known, and by extension what remains unknown about a clinical scenario and provide an avenue for team members to ask questions and request clarification ahead of engaging in the hands-on work of the primary survey.
3. *Conducting a methodical environmental and safety scan.* The resuscitation environment is hazardous for providers, and in many situations team hazards are accepted as an unavoidable or unnoticed element of resuscitation practice. It is our contention that the clinical environment should not be unsafe for patient or provider, and a simple focused environmental and equipment scan can help identify and mitigate latent safety hazards before they can inflict harm.<sup>8</sup> This may include: the provision of adequate lighting, positioning and spacing of procedure trays and carts in relation to the provider, positioning the stretcher centrally to ensure 360° patient access, unencumbering monitoring wires and sterile equipment, and appointing a logistics and safety officer to monitor and mitigate emerging hazards as the case progresses.

## CASE SCENARIO

You have divided into teams, prebriefed, and assigned roles. You have selected rooms and thoughtfully arranged your equipment. The first patients arrive: a woman with a gunshot to her leg, and man with multiple gunshots to his torso. The paramedics describe the scene as chaotic and overwhelming. They say “countless” more patients are coming. You fear your resources will be overwhelmed, and your anxiety levels are rising. You want to focus on the patient in front of you but you feel distracted by thoughts of the impending disaster.

## DURING THE RESUSCITATION

Once the resuscitation is commenced, an ABCDE primary survey is undertaken and periodic updates are provided to ensure accurate and flexible shared mental models and set priorities dynamically. The STEP-UP process can be repeated throughout the resuscitation based on evolving clinical and nonclinical demands.

### ***Strategies to Facilitate the Zero Point Survey During Resuscitation***

1. *Use short, structured prebriefings.* In the authors resuscitation practice, we use four simple questions in a challenge-response format:
  - i. What do we *know*, based on limited prehospital notification?

- ii. What will we *do* based on what we know (Plan A)?
  - iii. What will we *change* based on changing information or failure of Plan A (Plan B)?
  - iv. What are the *roles* for all team members?
2. *Perform tactical pauses and 10-for-10 snap briefs.* As the resuscitation progresses, the mental model needs to be updated in an equally concise fashion. A tactical pause refers to a deliberate break in case action to summarize, reflect, and set priorities for next stages in care. During a tactical pause all nonessential clinical activity stops and all team members listen, reflect, and are asked to respond as needed. The 10-for-10 snap briefs involve 10-second updates provided by the team leader every 10 minutes, and include a brief recap of the case, clinical events happening now, anticipated next steps and priorities, and role allocation or clarification.

### ***Psychological Skills to Manage Stress and Improve Performance***

---

Psychological skills are discrete, trained interventions that leverage higher level thought processes and innate physiology to mitigate the sequelae of the human stress response.<sup>9</sup> These skills incorporate everything from breathing and relaxation techniques to cognitive restructuring interventions (the process of identifying and stopping negative or irrational thoughts).<sup>10</sup> They have been adapted to a host of different domains and shown benefit: musicians, business executives, and military personnel.<sup>11–15</sup> Psychological skills are used before and during resuscitation to optimize stress levels and performance.

Recently, the US military has specifically explored the applications of teaching psychological skills to medical personnel with the intention of improving their ability to provide emergency medical care under the most stressful of circumstances.<sup>16,17</sup> Outside the military, civilians have also demonstrated the benefit of developing these skills as it pertains to specific surgical procedures<sup>18</sup> or trauma resuscitation.<sup>19</sup> There are a handful of skills, in particular, that may be most helpful in emergency care.

1. *Controlled breathing.* There is a strong relationship between respiration and emotion.<sup>20–22</sup> Breathing techniques have been shown to increase an individual's ability to regulate emotion: decreasing anxiety, hyperarousal, and attention selectivity.<sup>23</sup> When a slow, deep, controlled respiratory cycle is used there are significant, measurable decreases in heart rate.<sup>20,24</sup> Perhaps the most practical method for using this in resuscitation is to use what many performance psychology experts refer to as “square breathing” or “box breathing.”<sup>25–27</sup> Inhale deeply for approximately 4 seconds, engaging your diaphragm and attempting to pull the breath down into your abdomen. Hold the breath for 4 seconds. Then, exhale slowly over the course of 4 seconds and hold the lungs empty for 4 seconds.
2. *Positive self-talk.* An individual's internal monologue is critical when it comes to how one assesses and responds to the challenges one is presented with.<sup>28,29</sup> Self-talk is used to enhance one's perception of the situation, which psychologists refer to as “cognitive reframing,” and increases the likelihood of successful task completion.<sup>30–32</sup> Psychologists have identified several types of self-talk that are helpful, two of which seem to be most helpful in emergency medical situations: instructional and motivational. Instructional self-talk entails walking yourself through the discrete steps or technical maneuvers of a procedure; for example, when placing a thoracostomy tube saying “now advance over the rib and into the pleural cavity.” Motivational self-talk, however, is affirmative statements that bolster confidence, such as “I can do this.”<sup>33–36</sup>

3. *Visualization or mental practice.* Visualizing is a specific technique that acts as a mental video of what successful execution should look like. Evidence suggests that just thinking through the steps of a task activates the same neural architecture needed to actually perform it.<sup>37,38</sup> Over the years, there has been significant data from athletics demonstrating the performance benefit of mental practice, also referred to as the use of “mental imagery.”<sup>39–42</sup> However, it was not until recently that mental practice has been used to enhance performance of specific surgical skills,<sup>43,44</sup> cardiac arrest resuscitation,<sup>45</sup> or trauma resuscitation.<sup>46</sup> Some authors have even characterized the most effective way to implement the use of mental imagery: imagine the physical nature of the task, the environment the task will be carried out in, the timing of critical steps, and the perspective of the person performing the task.<sup>47,48</sup>
4. *Trigger or cue words.* Using a trigger word can drive attention control. Cognitive science experts often explain attention, the concentration of mental effort on sensory inputs or executive processes, using the metaphor of a spotlight.<sup>49,50</sup> Selective attention on important resuscitation technical skills, such as laryngoscopy, is important and requires a clinician to keep their mental spotlight fixed for a period of time. Any internal or external stimulus that distracts attention can result in failure to accomplish a task or induce errors.<sup>51–55</sup> Attention, however, can be consciously controlled.<sup>9</sup> Specifically, in the presence of distractions a trigger or cue word, such as “focus” or “concentrate,” can be used to turn selective attention to a specific task.<sup>56,57</sup>

## Communication

---

Effective communication is essential to successful teamwork, particularly in stressful and dynamic situations. Failure of communication has been cited as a primary contributor to mishaps and accidents in several high-risk industries<sup>58,59</sup> including clinical medicine.<sup>60,61</sup> Therefore, in resuscitation, it is important to understand what constitutes good communication.

1. *Use clear and direct language.* First and foremost, the structure of our communication is critical. During emergency situations when time pressure exists and the cognitive load on individual participants is high, being explicit is important. It is best to avoid mitigating language (vague or noncommittal).<sup>62</sup> In combat aviation, language is structured such that the most important information comes first, followed by information that augments the most critical content. The mantra used in these circumstances is “directive, descriptive, informative.” An example during the resuscitation of a critically ill patient might be, “John, please place a right humoral introsseous access immediately [directive]. We have no other vascular access after several attempts [descriptive] and need to administer medications emergently [informative].” In the civilian world experts in communication and crew resource management refer to the “C’s of Communication”; two important characteristics being *clear* and *concise* communication.<sup>63,64</sup>
2. *Use standard terminology.* Standardizing language is also important. In general, team performance is more efficient when standardized terminology is used.<sup>65,66</sup> When people hear expected or predictable words or phrases they seem to be able to coordinate activities and perform critical tasks more effectively. This seems to hold true when validated team performance tools are used to compare the work of teams that use a standardized vernacular with teams that communicate in nonstandardized ways. It is also important to acknowledge that standardized communication does not mean inflexible or rigid communication. Some

authors have suggested that using standard phraseology is important, but when faced with an uncertain, time-sensitive situation more flexible communication is effective.<sup>67</sup>

3. *Time your communication effectively.* Knowing when to communicate is equally imperative. At times, team members are so focused on activities or busy completing other critical tasks, they may not be prepared to receive a message. Actually, under high-cognitive workload conditions, decreased (or limited) team communication correlated with better team performance.<sup>68</sup> Anticipating that a team member may need a key piece of information relayed is paramount. Studies demonstrate that an important characteristic of high-functioning teams is that members anticipate the needs of others and communicate important information before it is requested.<sup>69</sup>
4. *Use closed-loop communication.* One challenge when it comes to communication is ensuring that certain information is heard, acknowledged, and processed by those that may be in charge. Therefore, closed-loop communication is important. This means that instructions between team members are reinforced by verbal feedback.<sup>70,71</sup> The important aspect of this behavior is that information is provided to the message originator with positive confirmation that a task is complete.
5. *Use graded assertiveness.* At times, even though a message is received the communication may not be met with appropriate action. Problems with cognitive overload or challenge with authority gradients have been found to cause communication breakdown and untoward results.<sup>59,72,73</sup> As a result in many high-risk occupations, not only are team members taught to speak up, but they are also taught how to use increased grades of assertiveness to bring important information to light. One common method is using the four-step PACE communication method.<sup>74</sup> In this graded communication approach, one starts by asking a probing question, then escalates to an alert, followed by challenging statement, and ultimately and emergency warning if the concern is still not acknowledged.
6. *Align your body language with your words.* In addition to the actual words that are spoken, the body language that accompanies words is critical. Nonverbal communication is the deliberate or unintentional signaling of emotional state without words. In certain situations authors have suggested that in face-to-face communication most communication (up to 55%) is nonverbal.<sup>75</sup> Facial expressions, body posture, hand gestures, and eye movements are all critical accompaniments to the words we use.<sup>76</sup> For these reasons, it is important that body language also be directly aligned with verbal communication so that the verbal message is reinforced as opposed to contradicted.
7. *Facilitate psychological safety and encourage team input.* During a stressful event, team members are markedly responsive to verbal and nonverbal cues. Social contagion describes the process by which team members adopt the attitudes and behaviors of others around them. By viewing teams as tightly coupled social networks, psychological safety can spread outward, based on the phrasing and posture of the team leader, a process termed “contagion by cohesion.”<sup>77</sup> To that end, specific phrases can help to establish psychological safety by expressing, where appropriate, optimism, uncertainty, or the need for team input. Some examples include:
  - I’m glad I’m here, with you, to do our best.
  - What am I missing/What are we missing?
  - I really need your help and input with the following ...

## CASE SCENARIO

In the end, 50 patients arrived in your emergency department from the concert. You stayed at work hours late before you finally go home. Once there, you feel exhausted, but you cannot sleep. Your mind keeps returning to the images from the disaster. Six weeks later, you still are not sleeping. You are having flashbacks. You are irritable at work. You are wondering if you will ever recover.

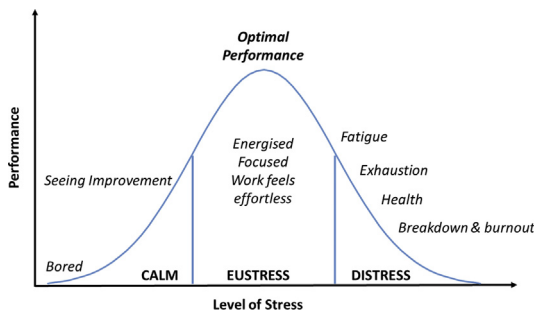
## AFTER THE CRISIS HAS ENDED

To enter a resuscitation fully prepared, with the optimized mindset, it is essential to have healed from previous difficult cases. Working as a first responder or in the emergency department is a challenging, high-stress workplace. Over time, these environments take a psychological toll on front-line health care providers.

This is evidenced by high rates of burnout. Burnout is characterized by emotional depletion, cynicism, and a low sense of personal accomplishment.<sup>78</sup> Burnout has garnered significant media attention lately, in addition to scientific investigations, which cite alarming rates of burnout among doctors. Emergency medicine physicians show the highest burnout rates among all specialties assessed.<sup>79</sup> Burnout is also highly prevalent in nurses, with 33% of in-hospital nurses showing burnout in a 2001 study.<sup>80</sup> Physician assistants' burnout rates are in the initial phases of investigation, but early reports suggest that their burnout rates may also be elevated.<sup>81</sup> This is not merely personally relevant; burnout has been associated with worsened patient outcomes across doctors, nurses, and medical students.<sup>82</sup> Burnout and stress also impact the ability to perform stressful procedures, and to resuscitate effectively (Fig. 2).<sup>83</sup>

Suicide rates for health care providers are similarly terrifying. In the United States, one physician commits suicide every day, and the rate of physician suicide (28–40 per 100,000) is more than double the rate in the general population (12.3 per 100,000).<sup>84</sup> For resident physicians, suicide is the second leading cause of death after malignancy.<sup>85</sup> Nurses are impacted similarly, with higher rates of nurse suicide than gender-matched control subjects.<sup>86</sup>

When providers experience exhaustion, fatigue, and burnout, they may struggle to optimize their resuscitation performance. Accordingly, embracing strategies for wellness and resilience become essential components of effective resuscitation.



**Fig. 2.** Performance efficacy varies with stress level. (Data from Yerkes RM, Dodson JD (1908). "The relation of strength of stimulus to rapidity of habit-formation". *Journal of Comparative Neurology and Psychology*. 18 (5): 459–482. <https://doi.org/10.1002/cne.920180503>.)

### ***Strategies for Recovery from Your Last Case***

1. *Do not stay silent.* One common strategy includes developing a supportive network for discussing difficult cases and sharing reactions and emotions. Providers may talk to colleagues, friends, or family. In recent commentary, these confidants have been termed “failure friends”; people selected for empathy, kindness, and listening skills.<sup>87</sup> Good social support is strongly associated with lower rates of burnout.<sup>88–90</sup>
2. *Practice self-compassion.* Practicing self-compassion is associated with healing after trauma. Self-compassion includes three main components: self-kindness, common humanity, and mindfulness.<sup>91</sup> Self-kindness includes the ability to treat ourselves kindly, even after failure. Common humanity is the concept that we are not alone and isolated, that other people have experienced similar emotions and reactions. Lastly, mindfulness allows us to hold emotions in a balanced perspective, rather than overidentifying with them.<sup>91</sup> Mindfulness can provide the difference between “it was all my fault” and “I played a small role in a large series of mishaps that led to an unfortunate outcome.” Readers who want to assess their own level of self-compassion can pursue a validated quiz at [www.selfcompassion.org](http://www.selfcompassion.org). It can also be valuable to simply listen to your own inner voice during moments of difficulty or stress, and to assess whether your inner voice is kind and supportive, or critical and judgmental. Self-compassion is a crucial component of recovering after a difficult case, and is also associated with lower rates of burnout, lower stress, and increased ability to provide compassionate care to patients.<sup>92</sup> Physicians who are higher in self-compassion are more engaged in work, less exhausted, and more satisfied with their work lives.<sup>93</sup> Medical students who are higher in self-compassion have lower rates of burnout and maladaptive perfectionism,<sup>94</sup> which raises the possibility of future interventions based on training and practice in self-compassion. Compassion fatigue is an important concept that can arise after secondary traumatic stress.<sup>95</sup> Health care providers may benefit from targeted strategies to reduce compassion fatigue including debriefing with colleagues, exercise, spiritual practices, and spending time with family.<sup>96</sup>
3. *Build resilience.* Resilience is the ability with bounce back after hardship or to maintain competency during prolonged stress.<sup>97–99</sup> Resilience is comprised of a combination of factors:
  - Internal (eg, genetics, optimism, self-regulation)<sup>98,99</sup>
  - External (eg, social supports, workplace characteristics, experience of trauma)<sup>98</sup>
  - Skill-based (eg, finding meaning, problem-solving, practicing mindfulness)<sup>97,100</sup>
 It is vital to recognize the skill-based nature of resilience. Health care providers can develop strategies for building their own personal resilience, based on their individual needs and strengths.<sup>100</sup> Different authors highlight the wide variety of available interventions, which are summarized in **Table 1**.<sup>83,101–104</sup>

Health care providers who choose to build their resilience can focus on developing the factors most relevant to them. It should also be noted that many strategies can be developed at the level of the workplace or organization, which can significantly impact the wellbeing of the workforce. The concept of professional coaching is gaining increasing traction in health care after a recent pilot study demonstrating that coaching reduced burnout and increased quality of life among a cohort of physicians.<sup>105</sup> One proposed mechanism is that professional coaching reduces burnout by increasing the client’s sense of control.<sup>101</sup> This can increase efficacy and self-determination, which have been associated



**Table 1**  
**Strategies to increase resilience and reduce burnout**

<b>Personal Strategies</b>	<b>Workplace Strategies</b>
Focus on optimism and gratitude	Develop supportive management
Keep a sense of humor	Encourage supportive professional relationships
Stay adaptable	Decrease workload/hours
Pursue a healthy lifestyle (nutrition, sleep, exercise)	Increase participation in decision-making
Spend time in mindfulness, prayer, or self-reflection	Develop supportive team culture and mentorship
Reduce stress where possible	Change evaluation of work goals
Spend time with supportive family and friends	Engage in professional coaching
Engage in hobbies	
Schedule time for self-care	
Choose work you are passionate about	

Data from Refs.<sup>83,101–104</sup>

with decreased rates of burnout.<sup>106,107</sup> Coaching is an option that either workplaces or individuals can pursue.

4. *Get professional help when you need it* After traumatic events, health care providers can develop post-traumatic stress symptoms or disorder. Many treatment options are available with documented evidence for efficacy.<sup>108</sup> Providers with ongoing symptoms should be encouraged to consider professional help and to reach out for support. Efforts to reduce stigma around this issue are vital. Encouraging a colleague to seek help can save a life. Providers in crisis in the United States can reach out to the National Suicide Prevention Lifeline at <https://suicidepreventionlifeline.org/> or call their 24/7 toll-free confidential number at 1-800-273-8255. In Canada, providers can get support from Crisis Services Canada at <https://www.crisisservicescanada.ca/en/> or call their 24/7 confidential number at 1-833-456-4566.

## CASE RESOLUTION

You talk to friends and colleagues about the disaster, and work to increase your resilience through exercise, nutrition, and a new mindfulness practice. Despite these valuable efforts, you remain traumatized by the disaster and feel your work is being impacted. With the support of your colleagues, you see a therapist who assists you in your recovery. In the end you regain your previous passion and motivation for work, and help your hospital design more robust protocols for mass casualty events.

## SUMMARY

Preparing for ideal resuscitation performance starts before the patients arrive, and extends long after they leave the emergency department. Maintaining a knowledge base and technical skills are important, but optimizing ones psychological skillset is also vital. Experts in resuscitation use preplanned approaches to resuscitation, discrete communication skills, psychological skills to manage stress and optimize performance, and resilience and self-compassion skills to recover after challenging cases. These skills are learned, honed and improved with time and attention.

Our job is not easy. We often feel challenged. But preparation for optimal resuscitation is worth the effort.

## DISCLOSURE

The authors have nothing to disclose.

## REFERENCES

1. Reid C, Brindley P, Hicks C, et al. Zero Point Survey: a multidisciplinary idea to STEP UP resuscitation effectiveness. *Clin Exp Emerg Med* 2018;5(3):139–43.
2. Wilson MH, Habig K, Wright C, et al. Pre-hospital emergency medicine. *Lancet* 2015;386(10012):2526–34.
3. Endsley M. Toward a theory of situation awareness in dynamic systems. *Hum Factors* 1995;37:32–64.
4. Shrestha L, Prince C, Baker D, et al. Understanding situation awareness: concepts, methods, training. *Hum Tech Interact Complex Sys* 1995;7:45–83. Available at: <https://www.air.org/resource/understanding-situational-awareness-concepts-methods-and-training>. Accessed July 15 2020.
5. Lim B-C, Klein KJ. Team mental models and team performance: a field study of the effects of team mental model similarity and accuracy. *J Organiz Behav* 2006; 27(4):403–18.
6. Gaba D, Howard S, Small S. Situation awareness in anesthesiology. *Hum Factors* 1995;37:20–31.
7. Edmonson A. Psychological safety and learning behavior in work teams. *Admin Sci Q* 1999;44(2):350–83.
8. Hicks C, Petrosoniak A. The human factor: optimizing trauma team performance in dynamic clinical environments. *Emerg Med Clin North Am* 2018;36(1):1–17.
9. Weinberg R, Gould D. *Foundations of sport and exercise psychology 6th edition with web study guide*. 6th edition. Champaign (IL): Human Kinetics; 2014.
10. Greenspan MJ, Feltz DL. Psychological interventions with athletes in competitive situations: a review. *Sports Psychol* 1989;3(3):219–36.
11. Osborne MS, Greene DJ, Immel DT. Managing performance anxiety and improving mental skills in conservatoire students through performance psychology training: a pilot study. *Psychol Well Being* 2014;4(1):1–17.
12. Fred Luthans, James BAvey, Jaime LPatera. Experimental Analysis of a Web-Based Training Intervention to Develop Positive Psychological Capital. *AMLE* 2008;7:209–21. <https://doi.org/10.5465/amle.2008.32712618>.
13. Luthans BC, Luthans KW, Avey JB. Building the leaders of tomorrow the development of academic psychological capital. *J Leadersh Organ Stud* 2014;21(2): 191–9.
14. Janelle C, Hatfield B. Visual attention and brain processes that underlie expert performance: implications for sport and military psychology. *Mil Psychol* 2008; 20(1):39.
15. Saunders T, Driskell JE, Johnston JH, et al. The effect of stress inoculation training on anxiety and performance. *J Occup Health Psychol* 1996;1(2): 170–86.
16. Herzog TP, Deuster PA. Performance psychology as a key component of human performance optimization. *J Spec Oper Med* 2014;14(4):99–105.
17. Deuster PA, Schoomaker E. Mindfulness: a fundamental skill for performance sustainment and enhancement. *J Spec Oper Med* 2015;15(1):93–9.

18. Immenroth M, Bürger T, Brenner J, et al. Mental training in surgical education. *Ann Surg* 2007;245(3):385–91.
19. Lorello GR, Hicks CM, Ahmed SA, et al. Mental practice: a simple tool to enhance team-based trauma resuscitation. *Can J Emerg Med* 2015;(suppl 1):1–7.
20. Arch JJ, Craske MG. Mechanisms of mindfulness: emotion regulation following a focused breathing induction. *Behav Res Ther* 2006;44(12):1849–58.
21. Philippot P, Chapelle G, Blairy S. Respiratory feedback in the generation of emotion. *Cogn Emot* 2002;16:605–27.
22. Boiten FA, Frijda NH, Wientjes CJ. Emotions and respiratory patterns: review and critical analysis. *Int J Psychophysiol* 1994;17(2):103–28.
23. Seppälä EM, Nitschke BJ, Tudorascu DL, et al. Breathing-based meditation decreases posttraumatic stress disorder symptoms in U.S. military veterans: a randomized controlled longitudinal study. *J Trauma Stress* 2014;27(4):397–405.
24. Openshaw P. Breathing and control of heart rate. *BMJ* 1978;2(6153):1663–4.
25. Whitelock KA, Asken MJ. Code calm on the streets: mental toughness skills for prehospital emergency personnel. Mechanicsburg (PA): Sunbury Press; 2012.
26. Grossman D. On combat: the psychology and physiology of deadly conflict in war and in peace. Mascoutah, IL: PPCT Research Publications; 2008.
27. Siddle BK. Sharpening the warrior's edge. Millstadt, IL: PPCT Management Systems; 1995.
28. Hardy L, Jones G, Gould D. Understanding psychological preparation for sport: theory and practice of elite performers. Chichester (NY): Wiley; 1996.
29. Bunker L, Williams JM, Zinsser N. Cognitive techniques for improving performance and self-confidence. In: Williams JM, Krane V, editors. *Applied sport psychology: personal growth to peak performance*. 7th edition. New York: McGraw Hill; 2015. p. 274–303.
30. Hatzigeorgiadis ZN. Investigating the functions of self-talk: the effects of motivational self-talk on self-efficacy and performance in young tennis players. *Sport Psychol* 2008;22:458–71.
31. Hatzigeorgiadis A, Zourbanos N, Goltsios C, et al. Self-talk and sports performance a meta-analysis. *Perspect Psychol Sci* 2011;6(4):348–56.
32. Tod D, Hardy J, Oliver E. Effects of self-talk: a systematic review. *J Sport Exerc Psychol* 2011;33(5):666.
33. Hatzigeorgiadis A, Theodorakis Y, Zourbanos N. Self-talk in the swimming pool: the effects of self-talk on thought content and performance on water-polo tasks. *J Appl Sport Psychol* 2004;16(2):138–50.
34. Hatzigeorgiadis A, Zourbanos N, Theodorakis Y. The moderating effects of self-talk content on self-talk functions. *J Appl Sport Psychol* 2007;19(2):240–51.
35. Perkos S, Theodorakis Y, Chroni S. Enhancing performance and skill acquisition in novice basketball players with instructional self-talk. *Sport Psychol* 2002;16(4):368–83.
36. Mikes J, Meyer R. *Basketball fundamentals: a complete mental training guide*. Champaign (Ill): Human Kinetics Publishers; 1991.
37. Weisinger H, Pawliw-Fry JP. *Performing under pressure: the science of doing your best when it matters most*. New York: Crown Business; 2015.
38. Olsson CJ, Jonsson B, Nyberg L. Learning by doing and learning by thinking: an fMRI study of combining motor and mental training. *Front Hum Neurosci* 2008;8(2):5.
39. Richardson A. *Mental imagery*. London: Routledge & Kegan Paul; 1969.

40. Martin KA, Moritz SE, Hall CR. Imagery use in sport: a literature review and applied model. *Sport Psychol* 1999;13(3):245–68.
41. Weinberg R. Does imagery work? Effects on performance and mental skills. *Journal of Imagery Research in Sport and Physical Activity* 2008;3(1), Article 1. <https://doi.org/10.2202/1932-0191.1025>.
42. Feltz DL, Landers DM. The effects of mental practice on motor skill learning and performance: a meta- analysis. *J Sport Psychol* 1983;5(1):25–57.
43. Hall JC. Imagery practice and the development of surgical skills. *Am J Surg* 2002;184(5):465–70.
44. Arora S, Aggarwal R, Sirimanna P, et al. Mental practice enhances surgical technical skills: a randomized controlled study. *Ann Surg* 2011;253(2):265–70.
45. Institute of Medicine. Hospital-based emergency care: at the breaking point. Washington, DC: National Academy of Sciences, National Academics Press; 2007.
46. Lorello GR, Hicks CM, Ahmed SA, et al. Mental practice: a simple tool to enhance team-based trauma resuscitation. *Can J Emerg Med* 2016;18(2): 136–42.
47. Smith D, Wright C, Allsopp A, et al. It's all in the mind: PETTLEP-based imagery and sports performance. *J Appl Sport Psychol* 2007;19(1):80–92.
48. Holmes PS, Collins DJ. The PETTLEP approach to motor imagery: a functional equivalence model for sport psychologists. *J Appl Sport Psychol* 2001;13(1): 60–83.
49. Moran AP. Attention, concentration and thought management. In: Brewer BW, editor. *Sport Psychol*. Hoboken (NJ): Wiley-Blackwell; 2009. p. 18–29.
50. Perry C. Concentration: focus under pressure. In: Murphy S, editor. *The sport psychology handbook*. Champaign (IL): Human Kinetics; 2005. p. 113–25.
51. Wegner DM, Giuliano T. Arousal-induced attention to self. *J Pers Soc Psychol* 1980;38(5):719–26.
52. Lazarus RS, Folkman S. *Stress, appraisal, and coping*. New York: Springer; 1984.
53. Bell JJ, Hardy J. Effects of attentional focus on skilled performance in golf. *J Appl Sport Psychol* 2009;21(2):163–77.
54. Wulf G. Attentional focus and motor learning: a review of 15 years. *Int Rev Sport Exerc Psychol* 2013;6(1):77–104.
55. Crichton M, O'Connor P, Flin R. *Safety at the sharp end: a guide to non-technical skills*. Burlington (VT): Ashgate Publishing, Ltd.; 2008.
56. Gucciardi DF, Dimmock JA. Choking under pressure in sensorimotor skills: conscious processing or depleted attentional resources? *Psychol Sport Exerc* 2008;9(1):45–59.
57. Lam WK, Maxwell JP, Masters R. Analogy learning and the performance of motor skills under pressure. *Psychol Sport Exerc* 2009;31(3):337–57.
58. HSE. *The contamination of the beach incident at British Nuclear Fuels Limited, Sellafield, November 1983*. London: HMSO; 1983.
59. NTSB. *Air Florida Inc. Boeing 737-222, N62AF, collision with 14th street bridge near Washington national airport, Washington, DC January 13, 1982*. (NTSB report number AAR-82/08). Washington, DC: National Transportation Safety Board; 1982.
60. JCAHO. *Sentinel event alert, issue No. 30*. Oak Brook (IL): Joint Commission for the Accreditation of Healthcare Organizations; 2004.

61. JCAHO. Medication errors related to potentially dangerous abbreviations. Sentinel event alert, Issue No. 23. Oak Brook (IL): Joint Commission for the Accreditation of Healthcare Organizations; 2001.
62. Gladwell M. The ethnic theory of plane crashes. In: Gladwell M, Patel VI, editors. *Outliers*. New York: Crown Publishers; 2008. p. 177–223.
63. Brindley PG. Patient safety and acute care medicine: lessons for the future, insights from the past. *Crit Care* 2010;14(2):217–22.
64. Nethercott D, Shelly M. Critical Care. In: Cyna AM, Andrew MI, Suyin GM, et al, editors. *Handbook of communications in anaesthesia and critical care: A practical guide to exploring the art*. Oxford (United Kingdom): Oxford University Press; 2010. p. 126–42.
65. Kanki BG, Lozito S, Foushee HC. Communication indices of crew coordination. *Aviat Space Environ Med* 1989;60:56–60.
66. Kanki BG, Smith GM. Training aviation communication skills. In: Salas E, Bowers CA, Edens E, editors. *Improving teamwork in organizations*. Mahwah (NJ): Lawrence Erlbaum; 2001. p. 95–127.
67. Tushman M. Special boundary roles in the innovation process. *Admin Sci Q* 1977;22:587–606.
68. Orasanu JM. Decision-making in the cockpit. In: Wiener EL, Kanki BG, Helmreich RL, editors. *Cockpit resource management*. San Diego (CA): Academic Press; 1993. p. 137–72.
69. Volpe CE, Cannon-Bowers JA, Salas E. The impact of cross-training on team functioning: an empirical investigation. *Hum Factors* 1996;38:87–100.
70. Gaba DM, Fish KJ, Howard SK. *Crisis management in anesthesiology*. New York: Churchill Livingstone; 1994.
71. Gaba DM. Dynamic decision-making in anesthesiology: cognitive models and training approaches. In: Evans DA, Patel VI, editors. *Advanced models of cognition for medical training and practice*. Berlin: Springer-Verlag; 1992. p. 123–47.
72. Jentsch F, Smith-Jentsch K. Assertiveness and team performance: more than “just say no”. In: Salas E, Bowers C, Edens E, editors. *Improving teamwork in organizations*. Mahwah (NJ): Lawrence Erlbaum; 2001. p. 73–94.
73. Foushee HC, Helmreich R. Group interaction and flightcrew performance. In: Wiener E, Nagel E, editors. *Human factors in aviation*. San Diego (CA): Academic Press; 1988. p. 189–227.
74. Besco RO. To intervene or not to intervene? The copilots “catch 22”: developing flight crew survival skills through the use of “P.A. C.E.”. 1994. Available at: <http://www.crm-devel.org/resources/paper/PACE.PDF>. Accessed Nov 19, 2019.
75. Mehrabian A, Ferris. Inference of attitudes from nonverbal communication in two channels. *J Consult Psychol* 1967;31:248–52.
76. Malandro L, Barker L, Barker D. *Nonverbal communication*. 2nd edition. Reading (MA): Addison-Wesley; 1989.
77. SOARES, André Escórcio; PEREIRA LOPES, Miguel. Social networks and psychological safety: A model of contagion. *Journal of Industrial Engineering and Management*, [S.l.], v. 7, n. 5, p. 995-1012, oct. 2014. ISSN 2013-0953. Available at: <https://www.jiem.org/index.php/jiem/article/view/1115> Accessed: July 15, 2020. <http://dx.doi.org/10.3926/jiem.1115>.
78. Patel RS, Bachu R, Adikey A, et al. Factors related to physician burnout and its consequences: a review. *Behav Sci (Basel)* 2018;8(11):98.
79. Shanafelt TD, West CP, Sinsky C, et al. Changes in burnout and satisfaction with work-life integration in physicians and the general US working population between 2011 and 2017. *Mayo Clin Proc* 2019;94(9):1681–94.

80. McHugh MD, Kutney-Lee A, Cimiotti JP, et al. Nurses' widespread job dissatisfaction, burnout, and frustration with health benefits signal problems for patient care. *Health Aff (Millwood)* 2011;30(2):202–10.
81. Benson MA, Peterson T, Salazar L, et al. Burnout in rural physician assistants: an initial study. *J Physician Assist Educ* 2016;27(2):81–3.
82. Reith TP. Burnout in United States healthcare professionals: a narrative review. *Cureus* 2018;10(12):e3681.
83. American Psychiatric Association. APA Wellbeing Ambassador Toolkit: physician burnout and depression: challenges and opportunities. 2018. Available at: <https://www.psychiatry.org/psychiatrists/practice/well-being-and-burnout/well-being-resources>. Accessed November 15, 2019.
84. Doctors suicide rate highest of any profession. WebMD. Available at: <https://www.webmd.com/mental-health/news/20180508/doctors-suicide-rate-highest-of-any-profession#1>. Accessed October 4 2019.
85. Yaghmour NA, Brigham TP, Richter T, et al. Causes of death of residents in ACGME-accredited programs 2000 through 2014: implications for the learning environment. *Acad Med* 2017;92:976–83.
86. Davidson JE, Proudfoot J, Lee K, et al. Nurse suicide in the United States: analysis of the Center for Disease Control 2014 National Violent Death Reporting System dataset. *Arch Psychiatr Nurs* 2019. <https://doi.org/10.1016/j.apnu.2019.04.006>.
87. Fail better with a failure friend. *Feminem*. Available at: <https://feminem.org/2017/12/05/fail-better-failure-friend/>. Accessed November 25 2019.
88. Ma H, Qiao H, Qu H, et al. Role stress, social support and occupational burnout among physicians in China: a path analysis approach. *Int Health* 2020. <https://doi.org/10.1093/inthealth/ihz054>. ihz054.
89. Kim B, Jee S, Lee J, et al. Relationships between social support and student burnout: a meta-analytic approach. *Stress Health* 2018;34:127–34. <https://doi.org/10.1002/smi.2771>.
90. Velando-Soriano A, Ortega-Campos E, Gómez-Urquiza JL, et al. Impact of social support in preventing burnout syndrome in nurses: a systematic review. *Jpn J Nurs Sci* 2020. <https://doi.org/10.1111/jjns.12269>.
91. Neff K. Self-compassion: an alternative conceptualization of a healthy attitude toward oneself. *Self Identity* 2003;2:85–101.
92. Kemper K, McClafferty H, Wilson P, et al, on behalf of the Pediatric Resident Burnout-Resilience Study Consortium. Do mindfulness and self-compassion predict burnout in pediatric residents? *Acad Med* 2019;94(6):876–84.
93. Babenko O, Mosewich AD, Lee A, et al. Association of physicians' self-compassion with work engagement, exhaustion, and professional life satisfaction. *Med Sci* 2019;7:29.
94. Jarrett A. Risk factors, self-compassion, and burnout in medical students: examining relationships through path analysis. [dissertation] ETD collection for University of Nebraska – Lincoln. 2018. AAI10842490. Available at: <https://digitalcommons.unl.edu/dissertations/AAI10842490>. Accessed November 15, 2019.
95. Cocker F, Joss N. Compassion fatigue among healthcare, emergency and community service workers: a systematic review. *Int J Environ Res Public Health* 2016;13(6):618.
96. Killian KD. Helping till it hurts? a multimethod study of compassion fatigue, burnout, and self-care in clinicians working with trauma survivors. *Traumatology* 2008;14(2):32–44.

97. Werner E. Protective Factors and Individual Resilience. In: Zigler (Author) E, Shonkoff J, Meisels S, editors. *Handbook of Early Childhood Intervention*. Cambridge: Cambridge University Press; 2000. p. 115–32. <https://doi.org/10.1017/CBO9780511529320.008>.
98. Southwick SM, Bonanno GA, Masten AS, et al. Resilience definitions, theory, and challenges: interdisciplinary perspectives. *Eur J Psychotraumatol* 2014;5. <https://doi.org/10.3402/ejpt.v5.25338>.
99. Back AL, Steinhauser KE, Kamal AF, et al. Building resilience for palliative care clinicians: an approach to burnout prevention based on individual skills and workplace factors. *J Pain Symptom Manage* 2016;52(2):284–91.
100. Jackson R, Watkin C. The resilience inventory: seven essential skills for overcoming life's obstacles and determining happiness. *Selection & Development Review* 2004;20(6):13–7. Available at: <https://da7648.approbty.com/m/84223279b0001e87.pdf>. Accessed July 15, 2020.
101. Patel RS, Sekhri S, Bhimanadham N, et al. A review on strategies to manage physician burnout. *Cureus* 2019;11(6):e4805.
102. Swetz KM, Harrington SE, Matsuyama RK, et al. Strategies for avoiding burnout in hospice and palliative medicine: peer advice for physicians on achieving longevity and fulfillment. *J Palliat Med* 2009;12(9):1–5.
103. Lee FJ, Stewart M, Brown JB. Stress, burnout, and strategies for reducing them. What's the situation among Canadian family physicians? *Can Fam Physician* 2008;54:234–5.e1-5.
104. Matheson C, Robertson HD, Elliott AM, et al. Resilience of primary healthcare professionals working in challenging environments: a focus group study. *Br J Gen Pract* 2016. <https://doi.org/10.3399/bjgp16X685285>.
105. Dyrbye LN, Shanafelt TD, Gill PR, et al. Effect of a professional coaching intervention on the well-being and distress of physicians: a pilot randomized clinical trial. *JAMA Intern Med* 2019;179(10):1406–14.
106. McIntyre TC. The relationship between locus of control and teacher burnout. *Br J Educ Psychol* 1984;54:235–8.
107. Schmitz N, Neumann W, Oppermann R. Stress, burnout and locus of control in German nurses. *Int J Nurs Stud* 2000;37(2):95–9.
108. Posttraumatic stress disorder prevention and treatment guidelines, International Society for Traumatic Stress Studies. Available at: [https://istss.org/getattachment/Treating-Trauma/New-ISTSS-Prevention-and-Treatment-Guidelines/ISTSS\\_PreventionTreatmentGuidelines\\_FNL-March-19-2019.pdf.aspx](https://istss.org/getattachment/Treating-Trauma/New-ISTSS-Prevention-and-Treatment-Guidelines/ISTSS_PreventionTreatmentGuidelines_FNL-March-19-2019.pdf.aspx). Accessed November 15, 2019.