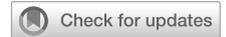


# Stress and Fear: Clinical Implications for Providers and Patients (in the Time of COVID-19 and Beyond)



Lioudmila V. Kamatovskaia, MD; Margaret M. Johnson, MD; Katalin Varga, PhD; Julie A. Highfield, DClinPsy; Brent D. Wolfrom, MD; Kemuel L. Philbrick, MD; E. Wesley Ely, MD, MPH; James C. Jackson, PsyD; Ognjen Gajic, MD; Sumera R. Ahmad, MD; and Alexander S. Niven, MD

## Abstract

In light of the coronavirus disease 2019 pandemic, we explore the role of stress, fear, and the impact of positive and negative emotions on health and disease. We then introduce strategies to help mitigate stress within the health care team, and provide a rationale for their efficacy. Additionally, we identify strategies to optimize patient care and explain their heightened importance in today's environment.

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“With that many sick people, what are we supposed to do? ...if we stop working, we're classified as traitors. Right now we're just waiting to die....working like this, we're tired to exhaustion.... infection is much more horrible than it's reported on TV.... we have 10 doctors here, and each doctor has treated more than 100 infected patients in just one day....the patients were begging us desperately, but we couldn't do anything. They're dying right in front of our eyes.”

Staff at Wuhan Hospital, Wuhan, China<sup>1</sup>

“There have been so many deaths, and this is destroying us because we think we aren't able to do what we are here for. The reality is, we see them dying, and we die inside, too.... I go home for a few hours at night and just collapse on the sofa. I am sleeping but not sleeping because I wake up every hour with nightmares. My husband and daughter wait for me at home. They try to talk to me, but I can't even hear them. They ask me if

I'm listening to them...but I can't.”

Carla Maestrini, Intensive Care Coordinator, Cremona, Italy<sup>2</sup>

“A medical war zone.... Every day I come, what I see on a daily basis, is pain, despair, suffering and health care disparities.... We need gowns, we need gloves we need masks we need more vents.... We need psychological support as well. It's not easy coming here when you know what you're getting ready to face.... Certainly no physician wants to be put in a position where they have to triage treatments based on resource availability.... I don't really sleep that well at night.... I'm worried about my family, I worry about my safety. I worry about my colleagues. I worry about how the shift is going to be the next time I come. I worry about if a family member is going to come and be patient as well.”

Arabia Mollette, Emergency Physician at Brookdale University Hospital, New York City<sup>3</sup>



From the Department of Medicine (L.V.K., O.G., S.R.A., A.S.N.) and the Department of Psychiatry and Psychology (K.L.P.), Mayo Clinic, MN; the Department of Medicine, Mayo Clinic, FL (M.M.J.); the Affective Psychology Department, Eötvös Loránd University, Budapest, Hungary (K.V.); the Department of Clinical Psychology in Critical Care, University Hospital Wales, Cardiff, UK (J.A.H.); the Department of Family Medicine, Queen's University, Kingston, Canada (B.D.W.); the Department of Medicine (E.W.E., J.C.J.) and the Critical Illness, Brain Dysfunction, and Survivorship (CIBS) Center (E.W.E.), Vanderbilt University Medical Center, Nashville, TN; and the Geriatric Research, Education and Clinical Center (GRECC), Tennessee Valley Veterans Affairs Healthcare System, Nashville, TN (E.W.E.).

The worldwide coronavirus disease 2019 (COVID-19) pandemic has presented extraordinary challenges. The sheer volume of admissions has placed unprecedented strain on provider teams working in underprepared health systems. Inadequate supplies, including mechanical ventilators and personal protective equipment (PPE)<sup>4</sup> coupled with insufficient staff create a Sisyphean task for these teams. These challenges have profound physical and psychological health implications. Providers have died from COVID-19 in the face of inadequate PPE, and have had to confront the ethical dilemma of rationing resources.<sup>5</sup> Unique stressors include fear of infecting others<sup>6,7</sup> eviction by landlords for fear of contamination<sup>8,9</sup>; and workplace disruptions.<sup>10</sup> Post-traumatic stress disorder (PTSD) was reported in 72% of COVID-19 health care workers in China.<sup>11</sup> This is occurring within a profession where providers are encouraged to “choke down emotions”<sup>12</sup>; and where nearly half report burnout manifested as compassion fatigue and decreased quality of care.<sup>13</sup>

Both acute and chronic stress has measurable physiologic effects, and greater awareness of this relationship is critically important in the current pandemic. The importance of the relationship between stress and health is magnified during critical illness when many patients are already terrified<sup>14</sup> and vulnerable.<sup>15</sup> Patient isolation, although necessary, may further exacerbate this distress. Advancing our understanding of the psychologic and physiologic effects of stress and identifying effective mitigating strategies are critically important as we confront this challenge. This paper identifies strategies to maximize performance and resilience while retaining focus on the psychological and emotional needs of our patients.

#### PHYSIOLOGICAL EFFECTS OF STRESS ON HEALTH AND DISEASE

Acute and chronic stress can have marked effects on cognition, decision-making, memory, technical performance, and teamwork, leading to impaired judgment and an

increase in medical errors.<sup>16</sup> It is vital to recognize that “healthcare workers, unlike ventilators, cannot run at 100% function for prolonged periods.”<sup>17</sup>

The autonomic nervous system is under the control of the limbic system. Persistent stress leads to the activation of the hypothalamic-pituitary-adrenal axis (HPA) and cortisol release.

Increased glucocorticoid levels inhibit salivary lysozyme secretion<sup>18</sup> and immunoglobulin A antibody production,<sup>19</sup> which increases risk for acute infectious respiratory illness including those caused by coronavirus.<sup>20</sup> Stress-mediated suppression of pulmonary interleukin (IL)-1 alpha may also contribute to increased viral pathogenesis.<sup>21</sup> Chronic stress attenuates the immune response to influenza vaccination<sup>22</sup> and inhibits the immunoglobulin G antibody response to pneumococcal antigen following vaccination.<sup>23</sup>

Elevated stress and norepinephrine levels correlate with decreased effectiveness of antiretroviral drugs and more rapid disease progression in HIV-infected individuals,<sup>24</sup> with serum cortisol exerting an independent effect.<sup>25</sup> Stress is known to induce reactivation of latent herpes simplex virus,<sup>26</sup> and to decrease cytomegalovirus antibody titers.<sup>27</sup> Individuals with PTSD show a higher rate of a variety of infections.<sup>28</sup> The term “brain-gut axis” has been coined to acknowledge the role of stress in the pathogenesis of many chronic gastrointestinal diseases.<sup>29</sup> Cortisol is inversely correlated with melatonin levels, potentially impeding restorative sleep.<sup>30</sup> Chronic stress may also lead to changes in the prefrontal cortex, hippocampus, and amygdala which diminish cognition, decision-making, and memory, and increase emotional responses. For example, high levels of norepinephrine release during stress impair prefrontal abilities that are needed for higher cognition and regulation of a positive mental state, while strengthening the emotional responses of the amygdala.<sup>31</sup>

The relationship between stress and immune function potentially heightens the risk to health care teams in prolonged close

contact with COVID-19 patients.<sup>32</sup> For patients, stress can increase susceptibility to a viral infection and impede recovery through slower wound healing.<sup>33,34</sup> These observations suggest the stress of our current environment is deleterious to both caregivers and patients.

### PHYSIOLOGIC AND CLINICAL IMPACT OF EMOTIONS

The role of the limbic system on our health extends beyond the HPA axis. Individuals with greater positive self-perceptions of aging lived 7.5 years longer than a matched group<sup>35</sup> and tended to practice more preventive health behaviors.<sup>36</sup> Markers of positive psychological well-being, such as optimism, are prospectively associated with metrics of cardiovascular health and improved cardiovascular and rheumatologic outcomes.<sup>37</sup> Laughing therapy, operationalized by viewing humorous films, upregulated natural killer cell activity and decreased IL-4 and IL-6 levels.<sup>38,39</sup>

Non-noxious stimuli, integrated by oxytocin, activate a psycho-physiological pattern opposite to the fight-or-flight response and are associated with relaxation and growth. Oxytocin has a known anti-stress effect and may explain why relationships, social contact, and touch may have health promoting and disease preventing effects.<sup>40</sup> Use of relaxation, hypnosis, and guided imagery techniques has been associated with increased oxytocin levels and fewer viral infections, increase in natural killer cell activity to herpes simplex virus, and decreased white blood cell count and cortisol.<sup>41-44</sup> Massage therapy and tai chi have been associated with improved immune function, enhanced vaccination response, and increased circulating myeloid dendritic cells.<sup>45-49</sup> Compelling evidence in the emerging field of affective immunology suggests a multitude of pathways linking emotion and immune function.<sup>50</sup>

Excessive cognitive load can increase our propensity to form negative thoughts.<sup>51</sup> The term “moral injury” has been suggested to describe the distress that health care workers

experience from unachievable demands on one’s energy, strength, and resources needed for their patients.<sup>52</sup> Moral distress can manifest as malaise, fatigue, frustration, and cynicism. Although often viewed as signs of “burnout,” this term fails to capture the similarities of this syndrome with PTSD and its associated psychological morbidity.<sup>53</sup>

The impact of medical errors or untoward outcomes on providers is just beginning to be explored. Negative ruminations and perseveration are common after these events, and providers are now recognized to be at risk for becoming “second victims” as they struggle with subsequent feelings of anxiety, fear, guilt, or anger, leading to social withdrawal, troubling memories, depression, and insomnia.<sup>54</sup> The basis for negative auto-suggestion that accelerates and prolongs stress in these circumstances is uncertain. However, it is conceivable that the hostility of the historical medical training environment<sup>55-57</sup> perpetuates a negative self-assessment which is exacerbated in times of stress.

Although a negative bias may have conferred protective evolutionary benefits, there are detrimental physiologic consequences. Higher prefrontal cortical regions regulate the activity of the subgenual cingulate “visceral-motor output center” that regulates our autonomic nervous system<sup>58</sup> and is activated during rumination and depression.<sup>59,60</sup> Repetitive negative thinking was recently linked to subsequent cognitive decline, as well as the deposition of harmful brain proteins linked to Alzheimer disease.<sup>61</sup> A 30-year longitudinal follow-up of a cohort of 839 general medical patients showed a 19% increase in mortality risk among those with a pessimistic outlook.<sup>62</sup> Negative emotions such as anger and depression, via activation of pro-inflammatory response, have been implicated in the pathophysiology of many chronic conditions.<sup>63,64</sup> Depression is linked with impaired T cell function,<sup>65</sup> chronic graft rejection, and increased mortality among solid organ transplant recipients.<sup>66,67</sup>

TABLE 1. Strategies for Staff

Resilience techniques	<p>Take advantage of diaphragmatic breathing between patient interactions. Diaphragmatic breathing involves contraction of the diaphragm, expansion of the belly, and deepening of inhalation and exhalation, which decreases the respiration frequency.<sup>91</sup> Breathe this way until your stress level can come down to 4/10 on a 1-10 scale with 10 being the highest.<sup>92</sup> Diaphragmatic breathing triggers body relaxation by reversing the frontal lobes when in deep HPA activation, and normalizing noradrenergic activity in the locus coeruleus, which is increased during stress.<sup>93</sup></p> <p>Meditate to improve sleep quality,<sup>94</sup> mediate physiological markers of stress,<sup>95</sup> improve a sense of well-being,<sup>96</sup> and reduce anxiety, depression,<sup>97</sup> and negative affectivity.<sup>98</sup> There are many readily available public resources to help you start your own journey in this area.</p> <p>Practice self-care: Little steps are more important than “fixing” everything at once. Adequate sleep restores immune system function and can reduce infection risk/improve infection outcome.<sup>99</sup> Nutrition also plays a key role in multiple immune system pathways.<sup>100</sup> Exercise improves cognitive function and memory, psychological functioning, and benefits the immune system.<sup>101-103</sup></p> <p>Look at green plants. It helps to restore cognitive skills, especially attention. Nature and green for most of us — especially those who are working in highly technical environment — means being away from work stress and reminds us of pleasant, relaxed times.<sup>104</sup></p> <p>Use the APPLE technique to manage uncertainty. Healthy coping approaches involve “leaning into”, rather than “running from” anxiety. The APPLE technique stands for:</p> <p>Acknowledge — Notice the uncertainty as it comes to mind.</p> <p>Pause — Don't react as you normally do. Don't react at all. Just pause, and breathe.</p> <p>Pull back — Tell yourself this is just the anxiety or depression talking, and this thought or feeling is only a thought or feeling. Don't believe everything you think! Thoughts are not statements of fact.</p> <p>Let go — Let go of the thought or feeling. It will pass. You don't have to respond to them. You might imagine them floating away in a bubble or cloud.</p> <p>Explore — Explore the present moment, because right now, in this moment, all is well. Notice your breathing, and the sensations of breathing. Notice the ground beneath you. Look around and notice what you see, what you hear, what you can touch, what you can smell. Right now. Then, shift your focus of attention to something else — on what you need to do, on what you were doing before you noticed the worry, or do something else — mindfully, with your full attention.”<sup>105</sup></p> <p>Recognize that it is likely that at some point we will transition from an acute to chronic crisis mentality. This can be a difficult transition because it can feel like defeat. It's not.</p> <p>Remind yourself daily that you are the one who is the best trained to deal with this situation, even if the challenge sometimes seems bigger than your coping potential.</p> <p>Schedule “worry time” — write down all the things you worry about. Then decide on when you're going to address each of the items. If you notice yourself worrying, remind yourself that you will address it at that time. Recognize that many of these anxieties are chronic in nature and will still exist after the current pandemic is over — they can be addressed again then.</p> <p>Stay connected with your loved ones, including digital methods if necessary. Turn to your colleagues, friends, or team leader for social support — your colleagues may be having similar experiences to you. If you need help and support from others, be very clear and specific about what your needs are.</p> <p>Zentensivism — Focus on what is relevant and important. Born in social media as a parody opposite for the professional role of the intensivist, #zentensivist has touted a voice of reason highlighting multiple iatrogenic threats that have emerged due to fear during the pandemic, and advocating for a measured, compassionate, best supportive care. In the absence of clearly effective treatments, delivery of best evidence-based resuscitation, supportive critical care practices with early de-escalation, prevention of iatrogenic</p>
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TABLE 1. Continued

	<p>complications, and appropriate palliative care approaches remain the key tools to achieve best possible outcome.</p> <p>Brush up now on the skills you consider outside, but proximal to, your normal scope of practice. You don't know where you may be needed.</p> <p>Remember your bandwidth — Our working memory is only able to hold in mind 7±2 pieces of information, and so much right now is preoccupied with COVID-19. Take your time with big decisions. It might take longer to think things through if you are feeling overwhelmed. Also, consider your psychological energy levels — you will need to “fill up” with rest, rewards, and positive experiences after “emptying the tank” at work.</p> <p>Seek information updates at specific times during the day once or twice. The sudden and near-constant stream of news reports can cause anyone to feel worried. Get the facts.</p>
Maintain a positive mindset	<p>Reflect on positive aspects of what you experienced — Actively find positive moments (teamwork, collegiality, patient not dying, supportive tweets, etc). Positive self-reflection can reduce stress,<sup>106</sup> whereas negative rumination (repetitive focus on symptoms of distress and the causes and consequences of one's predicament without improving the ability to solve the problem at hand) exacerbates feelings of distress.<sup>107</sup></p> <p>Use positive self-suggestions such as “I am able and will manage it,” “I have strong reserves,” “I am strong and quiet deep inside,” — this can increase problem solving under stress.<sup>108</sup> Do this particularly when you feel like being critical of yourself.</p> <p>Have a positive future image that represents what the future holds when we are over this difficult time. Recall this image in moments of especially high tension (eg, when you are back home, sitting in an armchair, drinking wine/whisky, etc).</p> <p>Recall moments of “love” and “being loved” and treasure the times of human connection throughout the day. This may lead to an increase in central oxytocin, which reduces stress, tension, pain, and anxiety.<sup>109</sup> “Hearty laughter is a good way to jog internally without having to go outdoors” — Norman Cousins.<sup>110</sup></p> <p>Be proud of yourself. You are providing very important service for mankind. There is a great meaning in the work you do. As Nietzsche said, if we have our own “why” of life, we shall get along with almost any “how.”<sup>110</sup> The act of helping and sharing your resources can buffer the effect of stress<sup>111</sup> and increase central oxytocin.<sup>112,113</sup></p>
Practice the golden rule	<p>Praise your colleagues for their assistance, use the word “thank you” and “please” as frequently as you can. Lack of appreciation exacerbates work-related stress, and feeling recognized decreases psychological strain at work.<sup>114,115</sup> Feelings of gratitude can also decrease the levels of stress and burnout, improving a sense of well-being.<sup>116,117</sup></p> <p>Say “sorry” if you were rude or aggressive with someone (colleague, patient). Briefly, simply. This way we can prevent the accumulation of tension, resolve any potential interpersonal conflict, and replace negative unforgiving emotions with positive other-oriented emotion.<sup>118</sup></p>

<sup>a</sup>COVID-19 = coronavirus disease 2019; HPA = hypothalamic-pituitary-adrenal axis.

### UNINTENDED NOCEBO EFFECT

There is another major negative emotion that pervades our current reality: fear. The WHO appropriately observed “The 2019-nCoV2 outbreak and response has been accompanied by a massive ‘infodemic’ — an over-abundance of information — some accurate and some not.”<sup>68</sup> This is particularly relevant today, as negative expectations can impact outcomes. The nocebo effect

describes heightened negative consequences of a treatment when a patient holds negative expectations.<sup>69</sup> Overwhelming media coverage emphasizing the lack of proven efficacious therapy for COVID-19 and the potential harm of other interventions places patients at risk of the nocebo effect. An example of this phenomenon is the enthusiastic advocacy for treatment with hydroxychloroquine and azithromycin, despite only

**TABLE 2. Strategies for Mindful Patient Interactions<sup>a</sup>**

Techniques to reduce patient distress	<ol style="list-style-type: none"> <li>1. Practice mental hygiene in parallel with physical one (during hand washing, donning/doffing). The concept of “mental hygiene” is a historically “loaded” term that refers to the mismanagement of patients,<sup>119</sup> but it can have a different application in the context of critical care. Clearing your mind of previous patient interactions before entering a new patient’s room is important, recognizing that a patient’s perception is primarily affect-based<sup>15</sup> and they may be more in tune to your emotional state than to the medical terms you use to communicate what is happening.</li> <li>2. Promote sleep and movement within the constraints of the environment. Physical therapy can and should still happen.</li> <li>3. Limit television news reports in patient rooms — Excessive information, and the risk for (mis)information can heighten fear or fight or flight response.</li> <li>4. Do not cease the most basic forms of human contact and touch despite PPE.</li> <li>5. Ask about how the patient is feeling when you can, and don’t rush to make them feel better — acknowledge the validity of difficult feelings. As Martin Gabel put it, “Don’t just do something; stand there.” And we might add, “...and listen.”</li> <li>6. Acknowledge normalcy of their fear — try to understand the drivers of fear/anxiety.</li> <li>7. Maintain authentic dialogue with the patient. It is still ok to talk to them, particularly about non-medical topics, their interests, or families.</li> <li>8. Thank the patient for bearing with their isolation, honoring their altruism as we express how grateful we are for their helping others remain safe.</li> <li>9. Understand that you may become a confidante — in select circumstances, a patient may have no one else in the twilight of life.</li> </ol>
(Positive) communication	<ol style="list-style-type: none"> <li>10. Use “Get to Know Me” board. Adapted from palliative care medicine,<sup>120</sup> it is a poster that introduces information about the patient’s routine life, including hobbies, activities, accomplishments, favorite books, movies, food, and other information (Figure 1). Even without the pandemic, vulnerability of the critically ill to the loss of respect, dignity, and anonymity is heightened<sup>121</sup> and can result in erosion of trust in providers, communication breakdown and feeling violated.<sup>122</sup> This simple tool can aid providers in seeing the human in the patient, someone valuable, unique, and an individual.</li> <li>11. Tell one thing about the patient as a person on rounds daily.</li> <li>12. Positive communication and awareness of language — Say “good morning,” “sleep well,” or parting with the words, “have a nice day.” There is a sharp negative connotation if we stop saying these routine phrases to a human being who is alive (even without active contact with their surroundings, such when comatose or sedated). Use the words “please” and “thank you” as frequently as you can (eg, “Open your mouth, please...”).</li> <li>13. Reassure when able. For the patient who is feeling lonely or fearful in COVID-19 isolation, provide communication either at necessary interval visits, or at other times via digital devices. Reassure that we are prepared to help and take care of them. Explain, even if the patient is sedated, each time a procedure or intervention is being done to help them, such as performing a nebulizer treatment, bronchoscopy, or even just turning or cleaning them. Reassure that they are safe. Reassure that they are not alone in this process.</li> </ol>
Connect with team, family and friends	<ol style="list-style-type: none"> <li>14. Post printed pictures of the team caring for the patient with descriptions of who they are so patients can see faces, not just the masks, and know who their team members are.<sup>123</sup></li> </ol>

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TABLE 2. Continued

15. Communicate messages by families to patients, even if the patient is sedated. It's a "delirium factory" out there due to isolation, lack of family presence and PPE; do not forget the ABCDEF bundle<sup>124</sup> and the importance of environment and family on patient's mental health outcomes.
16. Hello, my name is... — Emergency physicians have recently designed a simple poster that can help connect with the patient and their family (Figure 2).<sup>125</sup>

<sup>a</sup>ABCDEF bundle = **A**ssess, prevent, and manage pain, **B**oth spontaneous awakening trials and spontaneous breathing trials, **C**hoice of analgesia and sedation, **D**elirium: assess, prevent, and manage, **E**arly mobility and exercise, and **F**amily engagement and empowerment; COVID-19 = coronavirus disease 2019; PPE = personal protective equipment.

a single publication suggesting benefit.<sup>70</sup> This article was subsequently retracted,<sup>71</sup> but not before overdoses with chloroquine and the fatal ingestion of a chloroquine-containing pool cleaning substance.<sup>72,73</sup>

Robert Hyzy, a COVID-19—team intensive care unit director at the University of Michigan, discussed the role of fear: "Doctors have a fear of exposing nurses and ourselves to the virus. This is driving a willingness to deviate from established practices. It is easier to induce a medical coma with propofol than to do what is right, turning off the sedation every day with A2Fs (ie, ABCDEF bundle). Ultimately, it backfires because nurses end up getting more exposure because of longer patient stays."<sup>74</sup>

This fear can cross from health care providers to patients, creating untoward emotional stress in both groups. Darin Portnoy, a physician with COVID-19 teams at Montefiore and past-president of Médecins Sans Frontières said, "What I'm seeing in the Bronx is eerily similar to Ebola in West Africa [in 2014]. Both diseases have had confusing and dissonant public health messaging at the start, growing levels of community mistrust, and patients separated from their families when they seek care. Patients see us dressed in unfamiliar and threatening gear and they struggle to hear our muffled voices through masks. They sense our uncertainty when we can't tell them exactly what to expect with their illness, and we have no cure to offer. At death in both diseases, families are unable to be with patients at their bedside or come together to mourn their death later."<sup>74</sup>

Fear is not merely an emotion or state of mind. In 1942, Cannon's research into "Voodoo death" — a sudden, unexplained death resulting from a Voodoo curse — formed the basis for much of our modern understanding of the physiological response

**Get to know me**  
during my stay at Mayo Clinic

Name \_\_\_\_\_

I like to be called Leo

**Favorite**

Movie Any James Bond Movies

TV Show Perry Mason, Mutt, Pylon, Big Bang Theory

Book Westerns

Music Country - Rock & Roll - Blue Grass

Sport Golf

Food Steak - Grilled Veggies

Pet Cole our dog

**Activities/Hobbies**  
Family activities - Camping -

**Achievements** - Family - 4 Children - Shawn, Gabe, Sheila + Lisa  
10 grandchildren

**Things that Stress Me Out** - people not taking the time to listen

**Things that Cheer Me Up** - joking around -

**Other Things I'd Like You to Know About Me**

**At Home I Use**

FIGURE 1. Example of a Get-to-Know-Me Board.

**Hello my name is**

Thank you for caring for me and being a major part in my healing and peace.

People who are most concerned about me right now are:

It would mean a lot to me and my loved ones to keep them informed about my progress by:

sending a photo of me even if I look scary     live video / audio so I can hear their voice     sending a text message to give them an update

at this phone number:

Even if I appear unconscious, it will lift my spirits (& yours) if you say **my name** and:

tell me something funny     tell me a story     see me as in my photo  
 sing a song or play music     tell me about you     recite poetry     say a prayer

My favourite photo of myself goes here



Thanks for everything you're doing for me and my loved ones.

Please take care of yourself too.

**FIGURE 2.** "Hello, my name is..."

fight-or-flight systems linking emotions, such as fear, with illness.<sup>75</sup> Sympathetic activation and the subsequent catecholamine release brought on by emotional distress is implicated in the pathophysiology of the "broken heart syndrome."<sup>76</sup> Thus, a state of fear and panic can potentially worsen clinical outcomes through sympathetic activation, the HPA axis, or other, yet unexplained mechanisms.

### IMPLICATIONS OF PSYCHOLOGICAL MILIEU FOR CRITICALLY ILL PATIENTS AND THEIR PROVIDERS

Awareness of the nocebo effect is particularly relevant in the intensive care unit. During critical illness, cognitive processes change, becoming literal and overly sensitive to both direct and covert meanings of communicated messages.<sup>15,77</sup> In such altered states, people may accept suggestions with minimal critical appraisal of the content.<sup>15</sup> Although rarely appreciated, provider expectations of an intervention may be non-verbally communicated to the patients and impact outcome.<sup>78,79</sup> Semantic processing continues in an altered state of consciousness,<sup>80,81</sup> with some patients later recalling things said to them while comatose<sup>82</sup> that may lead to an unintended potential for harm. Although a call for the mindful choice of words with the critically ill dates back to 1969,<sup>15</sup> clinical adoption

has been limited. Patients may perceive staff performing painful interventions as hostile adversaries, which can further complicate care and outcomes.<sup>82-84</sup> Personal protective equipment requirements, combined with fatigue, fear, and isolation from family<sup>85</sup> may further limit healing human interactions and exacerbate patient vulnerability to negative suggestion. Given patients' heightened suggestibility, Varga et al<sup>86</sup> have developed a therapeutic system of psychological support based on positive suggestions which hastened ventilator weaning and decreased the need for sedatives and analgesics.<sup>87-89</sup>

Given the sustained and uncertain nature of the ongoing pandemic, how can health care providers best prepare themselves to stay human?<sup>17</sup> How can we preserve human-patient interaction and make it mindful and positive? Without life support, our critically ill would die, but without humanity they may die in different ways. This is why it is so important to us all to remain human, now more than ever. Effective strategies to prevent moral injury include workplace modifications to streamline workflow and minimize clerical work, mindset training, and fostering resilience through restorative scheduling practices, structured opportunities to debrief after critical events, and ongoing opportunities to promote community, connectedness, and

meaning.<sup>90</sup> The suggestions presented in Tables 1 and 2 offer a structured approach for health care teams based on available evidence.<sup>91-125</sup>

## CONCLUSION

The physiological and psychological consequences of the worldwide COVID-19 pandemic on both patients and caregivers are well documented, but the link between physiology, pathophysiology, and psychology in this milieu is underappreciated. We have provided a brief overview of the physiologic consequences of stress and fear; better understanding of these relationships can inform care of both patients and providers. Diligent attention to stress management and human interactions can have a rapid and positive influence on patient outcomes. The approaches recommended in this paper can be implemented immediately to reduce suffering imposed by this pandemic and beyond.

**Abbreviations and Acronyms:** COVID-19 = corona virus disease; HPA = hypothalamic–pituitary–adrenal axis; IL = interleukin; PPE = personal protective equipment; PTSD = post-traumatic stress disorder

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**Correspondence:** Address to Lioudmila V. Kamatovskaia, MD, Division of Pulmonary and Critical Care Medicine, Mayo Clinic, 200 First St SW, Rochester, MN 55905 (Kamatovskaia.lioudmila@mayo.edu).

## ORCID

Lioudmila V. Kamatovskaia:  <https://orcid.org/0000-0002-9689-3792>; Ognjen Gajic:  <https://orcid.org/0000-0003-4218-0890>

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