Managing Anxiety in Anesthesiology and Intensive Care Providers during the Covid-19 Pandemic: An Analysis of the Psychosocial Response of a Front-Line Department

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Vol. No. | July 8, 2020
DOI: 10.1056/CAT.20.0270

The Covid-19 pandemic is a source of anxiety for many clinicians. We studied the factors most related to front-line providers’ anxiety, and thereby developed effective responses, by surveying the clinical members of our department to better understand the effect of providing care during the pandemic on their self-reported levels of anxiety. While the strongest predictor of anxiety during the pandemic is a clinician's general tendency to feel anxious, another strong predictor is the culture of anxiety they observed in their colleagues around them related to the pandemic. Feeling like one’s work during the pandemic is valued by one’s immediate supervisor was associated with lower anxiety. Also, feeling like one has the necessary PPE to maintain safety and that one is in a psychologically safe environment were both related to a lower culture of anxiety, and as such indirectly related to lower state anxiety. In this paper, we provide a number of suggestions for reducing the anxiety felt during this anxiety-inducing crisis, as well as promoting the emotional well-being and effectiveness of our front-line providers in addressing the Covid-19 pandemic. While the study was conducted among anesthesia providers, we believe its results are applicable to any front-line providers working in the high-stress Covid-19 environment.
operating room, intensive care units, and wards of the hospital. Intubation and extubation, during which the SARS-CoV-2 virus can be aerosolized, present particular danger. In a Washington Post article, anesthesiologist Cory Deburghgraeve described his work during the pandemic in stark terms: “You’re basically right next to the nuclear reactor.”

In early March 2020, our department’s leadership was already well aware of the Covid-19 outbreaks in Seattle and New York and their dramatic impact on the hospitals there. Shortly after Penn admitted its first Covid-19 patient, we established a Covid-19 Task Force for development of care protocols, including simulation training in how to use personal protective equipment (PPE) during high-risk procedures. The department also began a process of near-daily Covid-19-related communication.

During weekly town halls, which began at the onset of the pandemic, it quickly became clear that providers were experiencing heightened anxiety and fear associated with continuing to carry out their roles. The Covid-19 pandemic is distinct from other recent outbreaks that have put healthcare providers at risk. Ebola, for example, is more lethal, but its prevalence in the developed world has been low and exposure thus limited to volunteers in selected centers. In contrast, SARS-CoV-2 is prevalent worldwide, causing critical care needs to outstrip current resources and resulting in the potential need to compel large segments of the healthcare workforce to provide care. This is especially true in anesthesiology departments and particularly those with critical care capability. The situation is further complicated because infected but asymptomatic individuals can transmit the virus, posing additional risk to clinicians and those with whom they live.

Anxiety among clinicians is widespread during the current pandemic. A study of healthcare workers in Wuhan, for example, reported high prevalence of anxiety (44.6%) (along with a high prevalence of depression, insomnia and general distress), and heightened levels of anxiety have been found among healthcare providers around the globe. High levels of anxiety have been shown to cause cognitive interference with processing task-related goals, and anxiety can negatively influence decision-making capabilities and performance. Higher anxiety can also increase burnout, which is associated with depression and other mental illness. Therefore, managing anxiety is critical for healthcare workers for their own health and their performance on complex and high-risk tasks.

Identifying the roots of anxiety

What factors are most related to providers’ anxiety during the pandemic? We surveyed the clinical members of our department to better understand the effect of providing care during the pandemic on their self-reported levels of anxiety. All attending anesthesiologists, nurse anesthetists, fellows, residents, and interns were invited, via email and a discussion at the weekly town hall, to participate in an online survey between April 9 and 14, 2020. A total of 242 out of 365 clinicians completed the survey for a response rate of 66%. Of the 242 respondents, 179 provided written answers to one or more of the survey’s open-ended questions. These rates are higher than usually observed in our departmental surveys, likely reflecting clinicians’ desire to express their feelings and concerns. We assessed a set of factors that prior research indicated could influence "state anxiety”—the degree to which the clinicians felt anxious (including feeling worried, tense and
upset) over the week leading up to the survey during the COVID-19 pandemic time period. These factors included:

- individual differences in trait anxiety, that is, one’s general tendency towards feeling anxious\(^7\)
- the culture of anxiety developed around the pandemic specifically\(^8\)
- psychological safety, the feeling of being in an environment where it is safe to take interpersonal risk and to speak up\(^9\)
- burnout in the form of emotional exhaustion, that is, feeling used up at the end of the workday, and emotionally drained and fatigued from work\(^10\)
- demographics such as gender, role in the organization, age, and type of subspecialty training.

We also assessed a set of more specifically Covid-19-related variables, which we chose based on concerns that were being expressed by clinicians in our department and elsewhere in our organization:

- level of certainty that there was access to necessary PPE and training to ensure provider safety
- estimated likelihood of contracting Covid-19
- predicted severity of illness if one were to contract Covid-19
- living situation (i.e. with roommates, children, parents, etc.)
- any special arrangements during the pandemic (e.g. sleeping in a different room, or not sleeping at home at all)
- clinicians feeling that their work during this pandemic was being valued by various stakeholders inside the organization, such as immediate supervisors, senior leaders, colleagues and the general public.

(See Appendix for detailed information about the variables and scales).

It was interesting to observe that 48% of surveyed clinicians thought they would be likely to contract Covid-19 at work. When asked on a 1-5 scale what they predicted their severity of illness would be if they did become symptomatic, we saw a mean of 2.07, indicating that they thought they would be ill, but with minor symptoms.

To understand the current anxiety level of departmental clinicians, we asked about their state anxiety level over the course of the past week using the short form of the widely cited STAI inventory,\(^7\) and found a mean of 3.14, on a 1 (Not at all) to 5 (Extremely) scale, which corresponded to being moderately anxious.
We found a constellation of factors (see Figure 1, also shown with more detail in Appendix) that inclusively explained 68% of the variance in state anxiety over the previous week, with the strongest factor being the clinician’s trait anxiety. The next strongest predictor was the "culture of anxiety" related to the pandemic. We assessed this factor by taking an informant approach, with clinicians reporting the frequency with which they had seen the other employees in their department express anxiety during this Covid-19 crisis.11 Interestingly, clinicians’ informant culture-of-anxiety ratings were significantly higher than ratings of their own state anxiety, with a mean level of 3.55. Thus, while respondents reported they were feeling moderately anxious, they perceived even greater anxiety being displayed by their colleagues.

**FIGURE 1**

**Constellation of Factors Related to Clinician State Anxiety**

*P = .052; †P = .012, ‖p = .000
Red lines indicate a negative relationship between the variables.
Standardized Beta Coefficients reported. Higher beta coefficient = stronger relationship.
Indirect effect for Enough PPE through Culture of Anxiety: b = -.068, 95% CI [-.107, -.029]; p=.001
Indirect effect for Psychological Safety through Culture of Anxiety: b = -.043, 95% CI [-.077, -.009]; p=.013.
See full model and confidence intervals in Appendix X.

Source: Perelman School of Medicine and The Wharton School, University of Pennsylvania
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We also found a significant interaction between trait anxiety and a culture of anxiety: clinicians who scored lower in trait anxiety showed a greater increase in anxiety related to the culture of anxiety of those around them (See Figure 2 and Appendix). The next two variables related to state anxiety were the role of CRNA (as compared with attendings, residents, and others) and feeling like one’s work specific to the pandemic is valued by one’s immediate supervisor.

### FIGURE 2

**The Interaction of Clinician Trait Anxiety with an Emotional Culture of Anxiety**

Last, greater psychological safety, and having the necessary PPE to maintain safety were related to a lower culture of anxiety, which then was related to less state anxiety among clinicians. Other demographic variables that we also assessed within the model, such as gender, age, ethnicity and anesthesia subspecialty (or not), were not significant.

**How to help reduce clinician anxiety during the Covid-19 crisis**

We review below each of the factors we found related to state anxiety, and offer evidence-based recommendations on how to reduce them, derived from the fields of organizational behavior and psychology, as well from the experience of our department (Table 1).
Individual differences: Freeing people to do what will keep them calm

While trait anxiety was the strongest predictor of anxiety, this does not mean that highly anxious people are always anxious across every situation. Rather, they are likely to be more anxious than other people in the same situation. As such, there is room for lowering state anxiety for everyone in this crisis, including those with higher trait anxiety. At the end of the survey we asked a set of open-ended questions, one of which focused on what the clinicians were doing to help themselves function at their best during the Covid-19 situation. We coded their responses, and found that the following strategies were those most commonly mentioned:

- Spending as much time with families as possible
- Making sure to regularly exercise and eat well
- Engaging in therapy
- Meditation
- Moderating media consumption and attention to e-mail in order to avoid being overwhelmed by anxiety-inducing stimuli.

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To reduce state anxiety, the department encouraged the clinicians to continue their own personal methods of stress reduction and supported them in doing so. As providers promoted their physical

| Trait Anxiety                          | Promoting physical & mental health  |
|---------------------------------------|-------------------------------------|
|                                       | Exercising, staying active, eating well |
|                                       | Continuing mental health care (therapy, psychiatry) |
|                                       | Meditation |
|                                       | Connecting with friends and family |

| Culture of Anxiety about Covid-19      | Acknowledging clinician anxiety |
|---------------------------------------| Role modeling of calmness |
| Addressing PPE                       | Providing supervisors access to coaching, including for emotion management |
| Psychological Safety                 | Offering information about negative emotional contagion and its outcomes, as well as how to increase positive emotional contagion |
|                                       | Advocating for additional PPE |
|                                       | Providing necessary training for correct use of PPE |
|                                       | Creating open forums to express questions or concerns, both in person and anonymously |
|                                       | Improving communication |
|                                       | Increasing departmental transparency, especially regarding PPE |

| Supervisors Valuing Clinicians’ Work during the Pandemic | Consistent appreciation and recognition from Chair at departmental events of clinicians’ work during the Covid-19 pandemic |
|---------------------------------------------------------| Encouraging and supporting other members of the leadership team, and any direct supervisors, to show they value clinicians’ work during the pandemic |

Source: Perelman School of Medicine, The Wharton School, University of Pennsylvania
and mental health through activities such as exercise and meditation, the Chair protected their restorative time by consolidating departmental Covid-related communications to a maximum of one daily email and ensuring that no emails were sent on weekends unless absolutely necessary. The goal was to lower anxiety for everyone regardless of baseline disposition.

A culture of anxiety: addressing collective anxiety

As part of preparation for the town halls, we discussed the question of whether to recognize the department members’ anxiety. We decided that it was important to acknowledge the anxiety and fear of the clinical staff, as naming emotions is an important first step in being able to regulate them. As such, the leadership team decided to specifically call out “anxiety” and “fear” rather than use the more neutral term of “concern” in an effort to affirm and validate the highly charged emotion of the situation. In addition, the department sought to raise awareness and knowledge regarding the complex emotional interplay between colleagues in the workplace. Clinicians were presented with a reading about the role of emotional contagion during the Covid-19 pandemic. Emotional contagion involves people “catching” emotions from one another, largely automatically, as a result of behavioral mimicry and physiological and neurological processes that then lead people to actually feel the emotions they have mimicked.

Most people don’t realize they have caught an emotion from others through emotional contagion. They think they generated the emotion themselves from their own feelings or appraisal of the situation, which can lead them to have more anxiety than they would have had otherwise. Explaining emotional contagion was meant to promote reflection among clinicians regarding the source and nature of emotions felt during the crisis, and to give guidance about combatting negative emotional contagion and encouraging the introduction of positive emotions and expression. Emotional contagion is a primary delivery mechanism for spreading emotional culture in a group. Indeed, the interaction effect between trait anxiety and emotional culture of anxiety that we mentioned earlier (Figure 2) offers support for clinicians catching the emotions of others away from their trait anxiety baseline.

In addition to emotional awareness and education to help lessen the culture of anxiety, department leadership also moved towards modeling emotions that would be helpful during times of crisis, working to exude calmness while also assuring transparency. This role modeling from leaders is critical to the creation and reinforcement of workplace culture.

Projecting a sense of calmness and control among those on the Covid-19 Task Force became increasingly important as a means of limiting anxiety among the members of the Department. Additionally, the Department had been working with an executive coaching firm, made up of organizational psychologists, who offered assistance to the members of the leadership team during
the pandemic. The chair encouraged team members to reach out to the coaches when he observed increased anxiety. Most of the leadership team chose to take advantage of the coaching and were able to stem the anxiety before it spread throughout the department.

Given the indirect contributions of having necessary PPE and psychological safety, because of their relationship to the culture of anxiety (see Figure 1), both factors were also leveraged as helpful points of intervention. Many survey respondents expressed desire for more information regarding health system access to PPE and wanted to know what to expect as far as PPE supply in the weeks to come. In response, we were transparent about the available PPE and insisted that all intubations occur with N95 masks or other appropriate protection. We also ensured that there were multiple simulation sessions in the use of PPE.

Finally, to increase psychological safety, we cultivated a safe environment for raising questions or concerns by providing multiple conduits, including the ability to send in anonymous questions to be addressed during town halls, resident-only meetings led by the chief residents, and CRNA meetings led by the chief CRNA. Any recurring concerns were then discussed by departmental leadership during the town halls and included in emails from the Chair’s office. The Chair also held daily calls with this leadership group and emphasized the importance of honest, transparent, and consistent messaging.

**Supervisor appreciation: valuing and recognizing people’s work goes a long way**

Even prior to the survey results, the Chair acknowledged the contributions of all of the members of the team, making it clear that they were valued and thanking them for their continued dedication in the town meetings. Our model indicated that this acknowledgement would be helpful, since we found clinicians were less anxious when they felt their work in the pandemic was valued by their direct supervisor. Since the Covid-19 Departmental Task Force included all clinicians who were in supervisory roles, the Chair encouraged the entire team to continue to notice and express to their direct reports that their work in this pandemic was greatly valued. Interestingly, supervisors’ valuing of clinicians’ pandemic related work was the most strongly related in the model to a reduction of state anxiety as compared with feeling valued by any of the other internal, or external, stakeholders.

**The Long Game: Preventing Burnout**

It will be important to sustain these actions to reduce anxiety and avert burnout as the pandemic continues. In our model, consistent with other studies, we found that clinicians’ state anxiety directly influenced their emotional exhaustion. Prior to the survey, we had already made scheduling changes designed to reduce physical and emotional burnout in response to information obtained from colleagues in New York and Seattle. Specifically, we limited the highest risk assignments to 12 hours and limited the number of continuous days assigned to Covid-19 units. We believe that these measures allowed our clinicians to operate at their highest level, and we had few episodes of viral exposure due to improper use of PPE. Limiting shift length also helped free our clinicians to pursue activities important to the maintenance of their mental health. Given
the results of our study, we realized the importance of directly trying to lower the anxiety of our clinicians so as to lower their emotional exhaustion as well.

There is likely an understanding among clinicians that higher levels of state anxiety, a natural outcome of the Covid-19 crisis, can have negative effects on mental health, feelings of emotional exhaustion and performance effectiveness. However, there has been limited examination of the factors related to state anxiety during this Covid-19 crisis and how to deal with them. We hope that our empirical examination of the clinicians’ perceptions, and the suggestions for reducing the constellation of factors we found related to greater state anxiety, will provide a roadmap leading to less state anxiety, more emotional well-being and greater performance effectiveness of our frontline providers in addressing the Covid-19 pandemic, and perhaps other crises as well.

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Acknowledgements

Dr. Fleisher wants to acknowledge Vector Group Consulting for providing the coaches for the leadership team during the Covid-19 pandemic.

Disclosures: Lee A. Fleisher, Rachel Sweeney, Justin Clapp and Sigal G. Barsade have nothing to disclose.

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