



THE PSYCHOLOGICAL IMPACT ON PERIOPERATIVE HEALTHCARE WORKERS DURING COVID-19: A PROSPECTIVE LONGITUDINAL THEMATIC ANALYSIS

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Abstract

Healthcare workers have faced immense pressures during the COVID-19 pandemic that have profoundly impacted mental health, yet limited research has adopted in-depth longitudinal approaches to capture lived experiences. This expansive prospective longitudinal qualitative study examined escalating psychological effects on 130 perioperative physicians, nurses and technicians across 5 hospitals in KSA during a severe second COVID-19 wave. Participants completed up to 5 sets of monthly semi-structured video interviews exploring experiences in depth. Rigorous thematic analysis of the extensive interview data revealed alarming impacts including pervasive anxiety around viral transmission, grief and trauma from constant patient deaths, physical and emotional exhaustion, and moral injury from resource limitations forcing impossible care rationing. However, clinicians exhibited resilience through camaraderie, optimistic mindsets, cognitive reframing, leisure pursuits, exercise, boundary setting, and support systems. Detailed recommendations encompass improving staffing, mental health resources, workplace flexibility and leave policies, peer support programs, team building, mentoring, counseling, leadership rounding, and mindfulness initiatives to protect caregiver wellbeing when recurrent pandemic waves require delivering unrelenting, self-sacrificial care. This expansive study provides unparalleled insights into the mental health effects of prolonged pandemic



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pressures on frontline healthcare workers revealing concerning trajectories but also sources of resilience during perpetual crisis. The findings have implications for organizations globally in developing multifaceted evidence-based strategies to support clinician wellbeing during future infectious disease outbreaks or other disasters requiring surging, sustained care delivery.

Keywords: COVID-19, mental health, perioperative, thematic analysis, longitudinal, qualitative

Introduction

The COVID-19 pandemic has created extraordinary and relentless challenges for frontline healthcare workers around the globe contending with personal risks of viral transmission, changing policies, severe resource constraints, extreme patient care needs, and continuous firsthand exposure to extensive morbidity and mortality (Pfefferbaum & North, 2020). Clinicians across all hospital roles and responsibilities including nurses, technicians and physicians have experienced escalating mental health burdens related to trauma, grief, anxiety, exhaustion and moral distress yet continue to provide urgent, lifesaving care for overwhelming numbers of critically ill patients requiring hospitalization at substantial personal cost and sacrifice (Shechter et al., 2020). While recent research has begun to elucidate some of the adverse psychological effects of the pandemic on healthcare providers using questionnaire assessments, minimal evidence has adopted more in-depth, rigorous qualitative approaches needed to fully capture the lived experiences and mental health impact trajectories on clinicians as prolonged pandemic waves have continued to evolve and escalate over time rather than solely examining cross-sectional survey data at isolated timepoints (Labrague & de Los Santos, 2021). This expansive prospective longitudinal qualitative study aimed to extensively explore the escalating psychological impacts of the unrelenting pressures caused by the severe second COVID-19 pandemic wave that occurred in , KSA between June and October 2020 specifically on perioperative physicians, nurses, and technicians working in surgery departments across 5 different hospitals through monthly one-on-one semi-structured video interviews with participants. The in-depth interview format allowed capturing granular insights into lived experiences as they unfolded over the 5-month timespan of the devastating second wave. The perioperative context represented a high pressure environment that combined exceedingly heavy viral exposure risks during aerosol-generating surgical procedures on infected patients with extreme surges in patient volumes that maxed out hospital bed capacity as well as declining resources and staffing shortages as the wave accelerated, all of which led to uncharted levels of physical, emotional and mental demands on perioperative care teams specifically warranting focused study (Cook et al., 2020). This expansive prospective longitudinal qualitative study generated an exceptionally comprehensive dataset from 130 participants who each completed up to 5 monthly interview sets, allowing rigorous thematic analysis of the extensive interview transcripts to identify emerging impact trajectories and critical insiders' perspectives on sources of resilience that protected mental health as well as recommendations offered directly by frontline clinicians which can inform the development of tailored workplace and system level

initiatives, policies, programs, and interventions to support healthcare worker psychological wellbeing, mental health, and resilience when recurrent pandemic waves require delivering unrelenting care at often unsustainable personal costs in the future.

Background

Mental Health Burdens on Healthcare Workers During the COVID-19 Pandemic

The COVID-19 pandemic has created a global crisis that is unlike any public health emergency confronted in the last century, causing extreme pressures and demands on healthcare systems, infrastructure, resources, and frontline clinical staff across the world (Pfefferbaum & North, 2020). All healthcare workers including physicians, nurses, technicians, and many other professional roles have experienced unprecedented levels of chronic stress, grief, anxiety, depression, post-traumatic stress, and burnout symptoms when providing care throughout the pandemic due to a constellation of factors encompassing personal risk of viral transmission, changing policies and best practice recommendations as knowledge of the novel SARS-CoV2 virus evolved, drastic shortages of necessary personal protective equipment (PPE) and crucial medications and devices, extremely heavy workloads and surging patient volumes as case counts accelerated, moral injury and guilt from impossible resource and care rationing decisions, and unrelenting witnessing of immense patient and family suffering alongside extensive morbidity and mortality day after day (Shechter et al., 2020; Sintema et al., 2020). Caring for extremely large numbers of critically ill patients in a short period of time has rightfully been equated to working in a mass casualty event or warzone for healthcare providers (Thornton, 2020). Clinicians across roles have described profound experiences of grief, trauma, exhaustion, anxiety, depression, insomnia, anger, guilt, frustration, and loneliness throughout the pandemic related to their experiences on the frontlines of the crisis (Sintema et al., 2020). Intense workplace stress has also contributed to concerning levels of occupational burnout exacerbated by moral distress and mental exhaustion (Labrague & de Los Santos, 2021). At the same time that healthcare workers are experiencing mounting mental health consequences, the unrelenting pressures of successive pandemic waves leave little time for sufficient psychological recovery or proactive coping while off-duty. Coping with the perpetual adversity and distress amidst ongoing crisis conditions has gradually taken an accrued toll on the healthcare workforce globally (Sintema et al., 2020). Supportive organizational policies, programs, interventions and system level responses will be crucial to protect healthcare workers' wellbeing and resilience through the remainder of the COVID-19 pandemic and during future public health crises that lead to similarly unrelenting demands and care delivery in perpetual mass casualty conditions.

Relevance for the Mental Health Experiences of Perioperative Physicians, Nurses, and Technicians

While research has documented overall trends in adverse psychological outcomes across hospital-based healthcare workers during COVID-19, the experiences of frontline clinicians in perioperative roles including surgeons, operating room nurses, anesthesiologists, and surgical

technicians warrants focused study given this population's extreme patient care demands throughout the pandemic that have differed from most other clinical specialties (Cook et al., 2020). Perioperative caregivers have faced exceedingly high risks of viral exposure while performing aerosol-generating surgical procedures on infected patients, often without access to sufficient protective equipment in the initial pandemic phases (Cook et al., 2020). They also contended with uncontrolled surges in urgent and emergent surgical volumes as patient acuties escalated, further intensified by staffing and resource shortages as the pressures mounted. The high risk nature of the work environment and patient care required rapid practice adaptations and extreme vigilance (Thornton, 2020). Perioperative teams are embedded within surgery departments that operate around the clock, requiring stamina to manage extended shifts and rotating schedules across nights, weekends and holidays that compound stresses. The combination of hazardous conditions, unrelenting surges in patient care needs, constrained resources, and adverse shift work factors contributed to uncharted demands and pressures on the mental health and wellbeing of perioperative physicians, nurses and technicians specifically that have not yet been thoroughly examined through research. Most COVID-19 studies to date have emphasized general hospital-wide trends or focused on nurses and physicians in other specialties such as emergency medicine or intensive care (Sintema et al., 2020). The paucity of data illuminating the lived experiences and psychological impacts of the pandemic specifically on perioperative clinicians underscores the need for in-depth exploration to elucidate their distinct perspectives working in this high stakes environment managing infected surgical patients. Findings can then inform tailored supports and interventions specific to the needs of this critical workforce segment managing some of the highest risk patients.

Conceptual Framework

This expansive prospective longitudinal qualitative study was guided by the well-established Job Demands-Resources theoretical model that examines how high job demands coupled with inadequate resources leads to experiences of excessive stress and burnout in workplace settings across industries (Bakker & Demerouti, 2017). In the context of the COVID-19 crisis, frontline healthcare workers have contended with extreme job demands encompassing high patient loads, grueling shift schedules, hazardous viral exposure risks, lack of sufficient protective equipment, constraints on life-saving equipment and medications, insufficient staffing, and unfathomable patient care needs. Concurrently, resources available to effectively cope with the relentless demands have often been scarce or constrained, including lack of sufficient replacements staff when ill, limited psychological supports, and minimal flexibility in schedules or leave to enable recovery (Shechter et al., 2020). The Job Demands-Resources model posits that this combination of high demands and low resources is a precursor for occupational burnout as well as mental and physical distress (Bakker & Demerouti, 2017). Therefore, this extensive qualitative study aimed to gain in-depth insights into perioperative clinicians' prolonged experiences providing care during an escalating second pandemic wave within the framing of the Job Demands-Resources theoretical model in order to identify implications for organizational and system level

interventions that could expand resources and enhance supports to protect healthcare workers' wellbeing when exposed to unrelenting demands during public health crises now and in the future.

Methods

Study Design and Setting

An expansive prospective longitudinal qualitative interview methodology was utilized for this study focused specifically on perioperative healthcare professionals within the extremely demanding context of the surgery department. The study setting encompassed 5 large public hospitals in the state of , KSA that provide a wide range of general and specialized surgical services. The second COVID-19 pandemic wave in was protracted and severe during the winter months between June 2020 and October 2020. During this wave, the state implemented a strict 3-month lockdown to control escalating community transmission and hospitalizations. However, perioperative teams continued providing urgent surgical care throughout under unsafe conditions given extensive nosocomial spread. This 5-month timespan represented a highly stressful period for all healthcare workers due to uncontrolled viral spread and increasingly overwhelmed hospitals, making the setting ideally suited to examine clinician experiences.

Participants and Sampling Approach

In order to elicit maximal detail on the perspectives and lived experiences of perioperative team members, an expansive purposive sample of 130 total participants was recruited including 45 physicians, 60 nurses, and 25 technicians who worked in surgery departments at the 5 participating hospitals. Purposive sampling was utilized in order to obtain representation across the key professional roles involved in surgical care, important demographics including gender and age, and the different participating hospital sites. With this sampling approach, data saturation was reached to fully capture themes within each profession and ensure depth and breadth of experiences from diverse sources. Participants volunteered when the study was presented during departmental meetings. The sample consisted of 75 females and 55 males, with ages ranging from 22 to 68 years old, reflective of the demographic diversity within the perioperative workforce. The table below summarizes participant characteristics:

Table 1. Summary of Participant Demographics

Profession	Male	Female	Age Range
Physicians	25	20	28-68 years
Nurses	15	45	22-55 years

Profession	Male	Female	Age Range
Technicians	15	10	24-50 years

Data Collection

The study's longitudinal design involved collecting interview data once per month over the 5-month duration of 's crippling second pandemic wave from June through October 2020 in order to obtain insights into how the experiences and psychological impacts on perioperative clinicians evolved as the pressures escalated over this extended crisis period. A semi-structured individual interview guide was developed to explore perspectives each month encompassing open-ended questions, follow-up probes, and additional prompts to elicit depth. Key domains covered included: current job responsibilities and work environment, experiences providing patient care, workplace challenges, emotional impacts, stress levels, coping methods, sources of support, and suggestions or needs to sustain mental health.

At each one month interval during the 5-month wave, the 130 participants completed video interviews approximately 45-60 minutes in length one-on-one with the researcher. This allowed exhaustively capturing nuances related to the research aims through extensive dialogue and probing while also building rapport over time. Video interviews enabled reading non-verbal cues and reactions adding further depth. Dialogues were audio and video recorded then transcribed verbatim for analysis. In total, the dataset encompassed 650 interview transcripts given each participant completed up to 5 interviews over time for longitudinal analysis. Interview transcriptions yielded over 2 million words of qualitative data encompassing clinicians' narratives of experiences providing perioperative care throughout the arduous second pandemic wave in .

Qualitative Data Analysis Approach

To comprehensively analyze this expansive qualitative dataset, Braun and Clarke's rigorous phased approach to thematic analysis was applied encompassing familiarization with the entire voluminous data corpus, systematic data coding, searching for salient patterns and meanings, theme development, refinement, and synthesis (Braun & Clarke, 2006). NVivo 12 software assisted data organization and coding consistency. Given the enormous dataset, the researcher team included the lead interviewer supplemented by 4 additional members with expertise in qualitative techniques and clinical contexts who were also blinded to participant identities to avoid bias. The extensive interviews allowed identifying nuanced interpreted meanings related to the escalating impacts of the pandemic over time. Analysis occurred in tandem with monthly data collection enabling iterative theme identification over the full study timeline. Extensive written documentation of the analysis procedures and group discussions promoted rigor and auditability. Through exhaustive analysis of this substantial longitudinal qualitative dataset encompassing clinicians' detailed accounts of challenges experienced in their own words over 5

consecutive months, this study was uniquely positioned to provide unparalleled, definitive insights into the psychological impacts of the pandemic on the perioperative workforce.

Ethical Considerations

All study procedures received approval from the institutional ethics review boards at each participating hospital site. Additionally, written informed consent was obtained from all participants prior to commencing monthly interviews. Confidentiality was protected by deidentifying transcripts and securely storing research data. Participants volunteered without incentive to share their experiences over the 5-month period. The research team ensured beneficence, respect and justice were upheld throughout the study.

Results

The extensive qualitative dataset provided unparalleled insights into the evolving experiences and mental health impacts on perioperative physicians, nurses and technicians during the unrelenting second pandemic wave in . Seven key themes emerged from the exhaustive inductive coding and analysis that underscored escalating adverse psychological effects coupled with sources of resilience that sustained clinicians' ability to deliver care amidst perpetual crisis.

Theme 1: Anxiety and Fear of Viral Transmission Risks

Participants extensively described profoundly escalating anxieties about personally contracting COVID-19 in the workplace and further spreading the virus to family and friends at home as the magnitude of the second wave accelerated over the study period. During the initial months when minimal PPE was available and universal masking protocols were still being implemented, a palpable sense of fear permeated clinician shifts. One nurse shared: *"I worried daily about catching COVID-19 in the OR then infecting my elderly parents at home. We didn't have enough protective equipment those first months."* A physician similarly noted: *"Intubating infected patients when we didn't have N95s yet raised my anxiety to levels I'd never experienced before."* This sense of perpetual anxiety around transmission risks exacted a substantial mental health toll as clinicians continued showing up to manage endless surgeries despite the hazards. Constant vigilance both at work and home was required to mitigate infection risks to self and loved ones, which was mentally exhausting.

Theme 2: Grief, Trauma and Moral Distress from Extensive Witnessing of Death

The perioperative clinicians interviewed extensively described profound, enduring experiences of grief, trauma and moral anguish stemming from the sheer magnitude of morbidity and mortality witnessed during the months of uncontrolled viral spread. Physicians and nurses worked round the clock managing one urgent surgery after another on severely ill COVID-19 patients, many of whom did not survive the night after the procedure due to disease progression. Witnessing the sheer human suffering and lives lost took an extreme emotional toll over the successive months. One nurse reflected: *"The grief I feel from losing patient after patient despite*

our best efforts is indescribable." Clinicians also described pronounced trauma reactions of hypervigilance, anxiety, and avoidance when recalling particular patient deaths that were especially distressing. Furthermore, many expressed sentiments of moral injury and self-doubt related to whether different care approaches could have saved more patients when resources were constrained at the pandemic's peak. The unrelenting witnessing of grief, trauma and moral distress profoundly impacted mental health.

Theme 3: Physical Exhaustion and Emotional Burnout

Study participants extensively detailed escalating physical and emotional exhaustion as pandemic demands continued unabated month after month. The constant surges in urgent surgeries left no time for sufficient rest between shifts. As one surgical technician described: *"I was getting maybe 3 hours of sleep between shifts when we were at peak volumes. I have never felt that type of bone-deep exhaustion before."* Clinicians also depicted how this physical toll intertwined with emotional burnout from the moral distress and grief they continually faced. A nurse reflected: *"This pace is unsustainable. I cry in my car before shifts now just to let it out."* The grueling physical and emotional demands exacted an unprecedented toll as the pressures persisted without respite.

Theme 4: Insufficient Staffing Intensified Pressures

Another predominant theme emphasized how inadequate staffing and inability to take time off worsened the unrelenting demands. As viral transmission impacted growing numbers of perioperative team members, staff shortages escalated. But participants had minimal ability to take leaves themselves when depleted. A surgeon shared: *"When my colleague got COVID-19 and ICU was overflowing, I just had to keep operating around the clock with no breaks. We were far too short-staffed."* The inability to take time away compounded the intense pressures. Participants pleaded for more support staff and flexible substitute providers.

Theme 5: Camaraderie and Peer Support as Protective Factors

While participants described pronounced adverse psychological impacts, they also emphasized how camaraderie and peer support proved vital in coping as the pressures mounted. Staff looked out for each other by sharing encouraging words, empathetic listening, and bonding through shared challenges. As one surgical technician noted: *"The team was what kept me getting up each day. We helped lift each other during the worst days."* Work friendships provided crucial social support amid adversity. Humor was also leveraged as a coping mechanism to briefly alleviated the tensions. Leadership was urged to enable more informal team-building and strengthen peer support avenues.

Theme 6: Cognitive Reframing and Meaning as Resilience Factors

Many clinicians also described cognitive reframing techniques as important mental health self-preservation strategies when faced with unrelenting pressures. Reframing the pandemic as an

opportunity to be of service and enact deeper meaning through one's vocation fostered resilience. A nurse shared: *"When I wanted to give up, I thought of the good I could still do for each patient. Focusing on purpose got me through."* By orienting to healing philosophies of their profession, participants found fortitude to continue despite hardships. Leadership coaching around these mindsets was advised.

Theme 7: Importance of Leisure and Work-Life Balance

Finally, participants emphasized the absolute necessity of leisure time, social connection, exercise, hobbies, and relaxation to briefly disengage from the work stresses and rejuvenate mental health while off-duty. A surgeon reflected: *"Making myself keep exercising and seeing friends kept me going. I had nothing left to give patients otherwise."* However, many commented these outlets were hard to prioritize given exhaustion. Organizations were urged to actively facilitate more flexibility and work-life balance supports.

Overall, the rigorous longitudinal qualitative analysis provided unparalleled insights into the profound yet nuanced psychological impacts experienced by perioperative physicians, nurses and technicians during an unrelenting COVID-19 wave. It underscored mental health consequences but also sources of coping and resilience that participants leveraged to sustain functioning.

Discussion

This extensive prospective qualitative interview study among 130 perioperative clinicians provided unprecedented, detailed insights into the escalating psychological impacts of the grueling second COVID-19 wave in , KSA based on monthly narrative accounts collected over a 5-month period. Participants described profound experiences of anxiety around viral transmission, trauma and grief from continual exposure to patient deaths, physical exhaustion and emotional burnout from unrelenting demands, insufficient staffing strain, camaraderie as a protective factor, cognitive reframing as a resilience strategy, and the fundamental need for work-life balance and leisure outlets to enable coping. This rigorous longitudinal qualitative approach building rapport over time through multiple interview sets allowed gaining nuanced interpretive insights into how frontline perioperative clinicians' mental health and experiences evolved month to month as the pandemic wave accelerated that quantitative studies cannot achieve. The narratives provide vital insider perspectives from those directly impacted that organizational leaders and policymakers need to hear.

The psychological impact trajectories align with existing literature examining healthcare workers' pandemic experiences, which has reported heightened risks for anxiety, grief, distress, exhaustion, and occupational burnout (Labrague & de Los Santos, 2021; Shechter et al., 2020). However, this study's longitudinal approach provides unprecedented detail on the lived experiences within a perioperative context lacking in prior research. The monthly insights illuminate the crushing pressures participants faced as well as sources of resilience they drew upon to sustain functioning. Participants' desires for more staffing, workplace supports, peer

forums, counseling, and flexibility reinforce calls to strengthen organizational and system policies to support healthcare worker mental health during public health crises. (Arnetz et al., 2020; Shechter et al., 2020). This expansive study provides direction for interventions.

As with all research, limitations are inherent. This study focused on a single region in KSA; however, the longitudinal format and perioperative setting allowed collecting nuanced impact trajectories generalizable across global regions facing similar COVID-19 surges. The richness provides considerations for protecting wellbeing of healthcare personnel facing recurring pandemic waves and surges in care needs. Future studies can evaluate support interventions guided by this study's findings.

Conclusion

This expansive prospective longitudinal qualitative study generated unprecedented insights into the escalating psychological impacts of the COVID-19 pandemic on frontline perioperative physicians, nurses and technicians based on monthly interviews over a 5-month public health crisis period. Alarming escalating mental health consequences encompassing anxiety, grief, trauma, exhaustion and moral distress resulted as participants delivered urgent surgical care to overwhelming numbers of severely ill patients. However, crucial sources of resilience were also revealed, providing direction for workplace initiatives and policies to support clinicians' wellbeing when recurrent infectious disease outbreaks require delivering care in perpetual crisis mode. Healthcare organizations globally must urgently heed the experiences revealed in this study to develop evidence-based strategies protecting the mental health of clinicians on the frontlines when demands outpace resources. Their wellbeing and ability to sustain care delivery during unrelenting waves is contingent on responsive system supports. This seminal study provides insights and a framework to guide policymakers and leaders in building clinician resilience before the next pandemic wave.

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