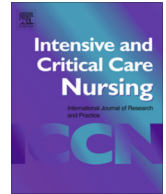




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Research article

The effect of COVID-19 pandemic on the mental health of Canadian critical care nurses providing patient care during the early phase pandemic: A mixed method study



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ABSTRACT

Background: Healthcare workers have historically experienced symptoms of post-traumatic stress disorder, depression and anxiety with previous infectious outbreaks. It is unknown if critical care nurses have similar experiences.

Objectives: The study aimed to examine the mental health of Critical Care Registered Nurses providing direct patient care during the initial phase of the COVID-19 pandemic in Canada.

Design: This was a convergent parallel mixed method study utilizing validated questionnaires and semi-structured qualitative interviews.

Setting: Critical care units in a single large 650 bed academic teaching hospital in western Canada. The critical care units serve a general mixed medical – surgical adult patient population.

Participants: Critical Care Registered Nurses providing direct patient care in the intensive care and high acuity units at the designated site.

Methods: 109 participants completed two self-reported validated surveys, the Impact of Events Scale – Revised and the Depression, Anxiety and Stress Scale. 15 participants completed one-on-one semi-structured interviews that were analyzed using inductive thematic analysis.

Results: In the surveys, the participants reported clinical concern for (23%), probable (13%) and significant (38%) symptoms of post-traumatic stress disorder, as well as mild to severe depression (57%), anxiety (67%) and stress (54%). In the interviews, psychological distress was described as anxiety, worry, distress and fear related to: 1) rapidly changing policy and information, 2) overwhelming and unclear communication, 3) meeting patient care needs in new ways while staying safe, and 4) managing home and personal commitments to self and family.

Conclusions: Critical care nurses experienced psychological distress associated with providing care to COVID-19 patients during the early phases of the pandemic.

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Implications for clinical practice

- This research demonstrated that Canadian Critical Care Registered Nurses experience a high degree of psychological distress when working within the early phases of the COVID-19 pandemic.
- All of the participants described feeling anxiety, worry, distress or fear, which was related to: 1) rapidly changing policy and information, 2) overwhelming and unclear communication, 3) meeting patient care needs in new ways while staying safe, and 4) managing home and personal commitments to self and family.
- There is a need to provide support for critical care nurses to build resilience and psychological well-being.

Background

The World Health Organization (WHO) proclaimed a global pandemic in response to the rapid worldwide spread of the novel coronavirus (COVID-19) at the end of January 2020 (Mahase, 2020; Wang et al., 2020). Despite previous pandemic experiences like SARS circa 2003 and H1N1 circa 2009, a preliminary search of peer reviewed literature specific to the experience of critical care nurses within these exceptional contexts of care yields a scarcity of responses. While both the SARS global alert and H1N1 global pandemic affected critical care resources, we know little about the experiences of the nurses who were providing life-saving care during these events. The few prior studies outlined the social, emotional and psychological impact of previous infectious disease outbreaks and other natural disasters on general healthcare workers providing direct patient care (Brooks, Dunn, Amlot, Rubin & Greenberg, 2018; Ives et al., 2009; Khalid et al., 2016; Lai et al., 2020; Matsuishi et al., 2012; McMahon et al., 2016; Pan American Health Organization, 2009). These studies identified significant psychological distress, inclusive of symptoms of post-traumatic stress disorder (PTSD), depression, anxiety and insomnia in healthcare workers (Khalid et al., 2016; United Nations, 2020; Brooks et al., 2018). Yet, comparable experiences specific to Critical Care Registered Nurses (CCRN) were not explored.

Although research on the current COVID-19 pandemic has emerged and is continuing to evolve, there is little exploring the impact of this pandemic on the CCRN providing direct care to patients admitted to Canadian critical care units. The critical care context is one that *under usual circumstances* is fraught with complexity and uncertainty (Vanderspank-Wright et al., 2011). Complexity stems from the nature of critical illness itself and also from the relational aspects of working in large multidisciplinary healthcare teams. Uncertainty is common with respect to prognostication and outcomes of critical care interventions. We know that despite the availability of tools like the APACHE-II that assists to predict acuity and outcomes, it is difficult to determine who will survive a critical care admission. Despite the availability of advanced treatment modalities and an abundance of technological interventions, intensive care unit (ICU) patients regularly succumb to their illness; and ICU mortality rates vary between 10 and 30% globally (Coombs, Addington-Hall, & Long-Sutehall, 2012; Sprung, Cohen, Sjobqvist et al., 2003). Further, given that end-of-life care in the ICU often coincides with deliberate and informed decisions around the withdrawal of life sustaining measures (Downar, Delaney, Hawryluck, & Kenny 2016), the critical care environment is one that regularly encounters complex moral and ethical dialogue and debate (Forozeiya, Vanderspank-Wright, Fothergill-Bourbonnais, Moreau, & Wright, 2019). As a result, critical care nurses regularly encounter complexity and uncertainty in their practice. Along with other ICU care providers, CCRNs are at high risk of moral distress and burnout (Jackson, Vandall-Walker, Vanderspank-Wright, Wishart, & Moore, 2018). Importantly, these *usual* experiences currently have real-time potential of being magnified within the context of the COVID-19 pandemic. An already

complex environment becomes even more complex when considering the impact that the COVID-19 pandemic is having on decision making, resource allocation, treatment planning, and ethical dilemmas. Uncertainty is brought to the forefront in managing a “novel” virus that is producing atypical symptomology and where our knowledge of how to care for these patients has evolved rapidly (Mittra et al., 2020).

In contrast to previous global alerts and pandemics, COVID-19 has entailed a public health response that is unparalleled in Canadian history. This has provided the opportunity to explore the potential impact on the mental health of the CCRNs as the providers who will spend a tremendous amount of time caring for critically ill COVID-19 patients. It is important that we learn from the experiences of CCRNs more generally, as well as explore the evolution of nursing narratives as they progress from initial pandemic warnings and preparedness, to a clinical reality. This research was initiated to provide needed information to better understand the impact of the pandemic on the mental health of Canadian CCRNs, provide an outlet for direct care nurses to share their experiences, offer needed information to continue supporting CCRNs as the COVID-19 pandemic evolves and in future pandemics, and ultimately improve nurse and patient outcomes.

Study aim

The study aim was to examine the mental health of CCRNs providing direct patient care during the initial phase of the COVID-19 pandemic in Canada.

Methodology

Study design

In this convergent parallel mixed method study, we collected both quantitative and qualitative data and then integrated this data in the interpretation of the overall results to provide a comprehensive view of how the current pandemic was impacting the mental health of CCRNs during May 2020 (Creswell, 2015). We collected and analyzed self-report validated questionnaires measuring psychological distress, as well as qualitative data through semi-structured interviews.

Setting and sample

This study was conducted in a large 650 bed tertiary level academic teaching hospital in Western Canada. The hospital critical care program is split between a 26 bed ICU and a 20 bed High Acuity Unit (HAU). The two units are a mix of general medical and surgical patients. This site was the original hospital within the health authority that cohorted COVID-19 positive patients at the beginning of the pandemic, and also cared for the largest percentage of critical care COVID-19 patients in the province. There are 240 CCRNs working in either the ICU or HAU. Participants were

recruited using purposive sampling through an email invitation sent to all eligible CCRNs. Eligible participants included any registered nurse working in the ICU or HAU at the identified site. Interested participants were directed to an online survey to complete the questionnaires and were also given instructions on how to contact the principle investigator if they were interested in participating in a one-on-one qualitative interview. All participants who indicated an interest were interviewed.

Data collection and analysis

The Impact of Event Scale – Revised (IES-R) and the Depression, Anxiety and Stress Scale (DASS-21) were used to collect the quantitative data, along with demographic data. The IES-R is a validated instrument that has been used to determine the psychological impact of a public health crisis (Wang et al., 2020; McAlonan et al., 2007; Weiss, 2007). The IES-R provides a snapshot in time of the impact experienced by staff in a response to crisis, and more specifically symptoms of post-traumatic stress disorder (PTSD) (Creamer, Bell & Falilla, 2002; McAlonan et al., 2007; Wang et al., 2020; Weiss, 2007). The IES-R is comprised of 22 items that are statements wherein the participant is asked to reflect on how difficult the statement was in the past seven days (Creamer et al., 2002). The statements are ranked from not at all (0 points), a little bit (1 point), moderately (2 points), quite a bit (3 points), to extremely (4 points). The scores for all items are then summed; a score of under 24 indicates no clinical concerns, 24 to 32 indicates the presence of some PTSD symptoms, 33–36 indicates a cut off for probable diagnosis of PTSD, and a score of more than 37 indicates significant symptoms (Creamer et al., 2002).

The DASS-21 is also a validated tool that has been previously used to measure symptoms of depression, anxiety and stress in response to other pandemics (McAlonan et al., 2007; Wang et al., 2020). This tool provides three separate scores for depression, anxiety and stress. The DASS-21 is comprised of 21 items that are statements wherein the participant is asked to reflect on how it applied to them over the past week. The statements are ranked from: did not apply to me (0 points), applied some of the time (1 point), applied a good part of the time (2 points), or applied most of the time (3) points (Lovibond & Lovibond, 1995). The depression statements are summed and interpreted as: normal (0–9), mild (10–13), moderate (14–20), severe (21–27), and extremely severe (over 28) (Lovibond & Lovibond, 1995). The anxiety statements are also summed and interpreted as: normal (0–7), mild (8–9), moderate (10–14), severe (15–19), and extremely severe (over 20) (Lovibond & Lovibond, 1995). The stress statements are summed and interpreted as: normal (0–14), mild (15–18), moderate (19–25), severe (26–33), and extremely severe (over 34) (Lovibond & Lovibond, 1995). Quantitative data were analyzed using descriptive statistics.

Face-to-face, semi-structured qualitative interviews were conducted by the principal investigator at a time and location that was identified as convenient to the participant. The interviews lasted between 15 and 40 min in duration. All interviews were audio-recorded and transcribed verbatim. Qualitative interview data were analyzed using inductive thematic analysis (Norwell, Norris, White & Moules, 2017). Inductive thematic analysis is an approach that articulates patterns and themes related to various clinical phenomena and was well suited for helping to create an understanding of the participants’ experiences (Norwell et al., 2017). Analysis and coding were completed by the larger research team to identify the themes. Members of the research team had expertise in critical care, critical care nursing as well as quantitative and qualitative research. All the transcripts were read by members of the research team who highlighted phrases, sentences and passages in the transcripts as the first step to generating

inductive codes. The team discussed the preliminary codes in detail and devised a coding scheme that was applied to all transcribed data. The coded data were then extracted and, for a second time, reviewed by research team members who discussed at length the grouping and regrouping of codes into categories according to similarities and differences in the data and then conceptually into higher-level themes. The themes evolved further throughout the process of describing the findings in written narrative form and with input from team members on the written findings. This process occurred until the team was confident and in agreement that one overarching theme and four main themes described the CCRNs’ perspectives of their mental health.

Ethical considerations

The study received ethical approval from the Fraser Health Authority Research Ethics Board prior to data collection being initiated (FHREB reference#: 2020-035). The survey tool included an implied consent form prior to starting the survey. The interview participants all provided written consent prior to the start of the interviews. All participant data was de-identified prior to analysis.

Results

Participant demographics

109 CCRNs working in the ICU or the HAU participated in the survey, a 45% response rate; and 15 participated in a semi-structured interview. Participant demographics can be found in Table 1. The participants who completed the surveys and the interviews represented demographic variability and represented a wide range of experiences.

Impact of event scale-revised (IES-R)

The overall findings of the IES-R demonstrated a significant burden of post traumatic stress disorder (PTSD) symptoms across all groups at the time of survey completion (See Table 2). More than 50% of participants experienced probable or significant PTSD symptoms. Analysis of the different subgroups (e.g. unit differences, marital status, etc.) demonstrated similar findings; overall there was not a single subgroup that experienced worse symptoms than others.

Table 1
Participant Demographic Data.

Demographic Data	Surveys N = 109	Interviews N = 15
Home Unit	ICU 63 (57.8%) HAU 46 (42.2%)	ICU 8 (53.3%) HAU 7 (46.7%)
Age	Average: 37.1 years Range: 24–64 Median: 36	Average: 38.8 years Range: 26–61 Median: 35
Years in Healthcare	Average: 12.5 Range: 2–44 Median: 11	Average: 15 Range: 2.5–35 Median: 14
Years in Current Position	Average: 6.1 years Range: 0.16–23 Median: 5	Average: 8.2 years Range: 1–25 Median: 5
Sex	Female: 98 (89.9%) Male: 11 (10.1%)	Female 15 (100%)
Marital Status	Married: 72 (66%) Single: 31 (28.5%) Other: 6 (5.5%)	Married: 9 (60%) Single: 6 (40%)
Dependents at home	Yes: 57 (52.3%) No: 52 (47.7%)	Yes: 5 (33.3%) No: 10 (66.7%)

Table 2
IES-R Scale.

IES-R Scale	Total Sample N = 109 (%)
Below cut off for clinical concerns for PTSD symptoms (less than 24 points)	28 (25.7)
A clinical concern for PTSD symptoms (24–32 points)	25 (23)
Probable symptoms of PTSD (33–36 points)	14 (12.8)
Significant symptoms of PTSD (37 or more points)	41 (37.6)
Did not complete IES-R	1 (0.9)

Depression, anxiety, stress scale (DASS-21)

The DASS-21 measures symptoms of depression, anxiety and stress (Lovibond & Lovibond, 1995). The overall findings of the DASS-21 demonstrated substantial symptoms across all domains, with higher overall levels of anxiety and stress (see Table 3). Analysis of subgroups revealed similar findings, with single participants experiencing slightly higher degrees of anxiety and stress.

Psychological distress: the most pressing challenge experienced by CCNRNs

The findings from the analysis of interview data provide insight into psychological distress as the most pressing challenge experienced by the nurses during the initial COVID-19 response. All of the participants described feeling anxiety, worry, distress or fear, which appeared to be related to: 1) rapidly changing policy and information, 2) overwhelming and unclear communication, 3) meeting patient care needs in new ways while staying safe, and 4) managing home and personal commitments to self and family (See Fig. 1).

Rapidly changing policy and information

As the pandemic evolved, the participants described a tremendous amount of change in multiple aspects of their work, particularly stemming from rapidly changing hospital and provincial policies. Provincial and hospital policies were constantly evolving in response to newly emerging information about COVID-19 transmission but also procedures to manage the risk of infection to staff while being cognizant of the supply of resources and equipment. Several participants commented that changes in infection control and personal protective equipment (PPE) policies occurred suddenly and frequently, even daily at times, during the initial weeks

Table 3
DASS-21 Scale.

		Total Sample N = 109 (%)
Depression Score	Normal (0–9 points)	46 (42.2)
	Mild (10–13 points)	16 (14.7)
	Moderate (14–20 points)	29 (26.6)
	Severe (21–27 points)	7 (6.4)
	Extreme Severe (over 28 points)	10 (9.2)
	Did not answer	1 (0.9)
Anxiety Score	Normal (0–7 points)	35 (32.1)
	Mild (8–9 points)	28 (25.7)
	Moderate (10–14 points)	16 (14.7)
	Severe (15–19 points)	6 (5.5)
	Extreme Severe (over 20 points)	23 (21.1)
	Did not answer	1 (0.9)
Stress Score	Normal (0–14 points)	49 (45)
	Mild (15–18 points)	18 (16.5)
	Moderate (19–25 points)	17 (15.6)
	Severe (26–33 points)	12 (11)
	Extreme Severe (over 34 points)	12 (11)
	Did not answer	1 (0.9)

of the pandemic. Participants described information that was rapidly changing as policies were updated, and the new versions often conflicted with earlier iterations. One participant illustrated this point by stating:

"I was just super stressed out about it all, I felt like everyone wanted to tell us stuff, but they kept changing their minds and there was a like a million emails about what we should and shouldn't be doing, . . . I'm so busy . . . caring for my patient, I don't have time to read all that stuff you're sending. I'm sure it's super important but I don't have time to read all that or go through my email and see what is the latest. And its super annoying that you finally have time to read something only to find out there's a new version or three or four, and I just want to know what I'm supposed to do, or who I'm supposed to listen to" (Participant 6).

Many participants expressed feeling overwhelmed by the sheer volume of policy and procedure changes and felt they were unable to keep up-to-date with the most current iterations. One participant described this as,

"I guess change is just hard. There's definitely been a lot of change and I guess it just gets hard to be constantly adapting and doing things different"

(Participant 8). Despite the volume of information to sort through, policies were often deemed irrelevant or unhelpful to the nurses, as one participant commented

"There was too much information coming out, but not the right information that we needed or wanted"

(Participant 2). Participants indicated that responding to the constantly changing and conflicting policies were particularly stressful and frustrating because it left them unsure of what practices and procedures to follow to reduce the risk of COVID-19 infection for themselves and their patients but also continue to meet patient and family physical and emotional needs.

Overwhelming and unclear communication

The participants commonly described a variety of sources of frustrations related to communication. Notably, they reported that the sheer volume of communication they were receiving was overwhelming. Many reported receiving multiple emails each day from a variety of sources, including their unit manager, site directors, and other specialties, such as infection control. This constant barrage of information was compounded by the amount of information also coming through provincial and federal government and health officials as well as news outlets. The participants feared that their inability to stay abreast of the latest practice changes resulted in sub-optimal patient care wherein they were also putting themselves and their colleagues at risk. One participant expressed frustration with communication and her fear of going into the patient room in the event she missed an important update:

"I would also like to see clearer communication, there were so many different people trying to tell us what to do that it was very frustrating. You never knew who had the actual truth and who didn't. It would be nice to have a set day or time for new communication to come out too, so you wouldn't be worried that as you're caring for a patient with COVID that there's a new email waiting with some important piece of information that you have no time to read or even know that it's there" (Participant 7).

The participants also reported attempting to make sense of inconsistent and at times, conflicting messages from numerous departments (e.g. infection control, critical care), personnel (e.g. clinical nurse educators, managers, directors, physicians), and various levels of management / government (e.g. unit, hospital, health



Fig. 1.

authority, provincial and federal). This led to the participants' general sense of frustration and lack of trust in knowing which information to follow, and what was best practice. This was highlighted by several participants:

"I feel like everyone is trying to tell us what to do and I just want one person who I can trust"

(Participant 6) "My biggest frustration has been the mixed messages" (Participant 13)

"The amount [of information] coming out at us. And I think trying to figure out what was the truth... What was the current information that was, what the pertinent information and what was current"

(Participant 15).

Meeting patient care needs in new ways while staying safe

The participants described their fears of the pandemic escalating to levels they had heard of elsewhere, such as New York and Italy, and questioned the capacity of the Canadian health care system to meet demands and their own ability to cope with the pandemic long term. The participants described unprecedented changes in their day-to-day work routines as they tried to meet the needs of their patients while remaining safe. They were required to arrive early and leave late from work to change their clothing and minimize the risk of COVID-19 transmission to

patients, staff as well as their own families. They also described multiple changes in their nursing practices as they began clustering care (grouping nursing care and tasks together) to minimize time spent in the patient rooms. Unnerving and disconcerting were changes to normal nursing practices, such as no longer listening to breath or abdominal sounds, that were taken up to minimize contact with the patients to prevent potential or personal exposure or contamination.

The availability of PPE to ensure staff were safe was a constant concern brought forth by participants. One participant described the anxiety surrounding PPE stating: "I have had moments of anxiousness when caring for patients because of the unknown and I've had to talk myself down, telling myself I'm using PPE. I've had many panicked moments of, am I protected enough with the PPE I'm using?" (Participant 7). They reported the focus on a possible PPE shortage, and needing to use different PPE. There was significant angst associated with changing to products that were unfamiliar, and a constant worry that there would not be enough. The discomfort associated with the PPE was also particularly stressful and compounded as days went on. One participant stated they wanted senior leadership to know: "... how difficult wearing masks and goggles throughout the shift is... I am not able to drink enough water because it would require removing my PPE and there is no time. I feel worried ... about how much PPE we have left" (Participant 4) another participant expressed:

"One of the most frustrating things was the donning and doffing of our PPE. It changed how we organized our day by trying to do more

cluster care. But there was some stress and anxiety around making sure everything was on correctly and taking off correctly. And the half mask respirators we used while making us feel secure were very uncomfortable to wear, especially for long periods of time" (Participant 12).

The nurses further described their challenges in providing patient- and family-centered care, an approach to care at the core of their nursing practice in this critical care context. A provincial mandate banning all nonessential visitors was put in place, and visitation was severely restricted to only those at the immediate end-of-life, and even then, only a select number of visitors were allowed. Staff were accustomed to providing patient – family centered care and were now unable to allow visitors despite the dire acuity of the patients. This was described by one participant "It's been really emotional communicating to family members who cannot be present with their loved ones" (Participant 3) and another stated "It has been emotionally draining to see the critical level of illness that some individuals have experienced, as well as the emotional roller coaster of the patients and families. It has been very troubling to observe patients go through this experience without the physical presence and emotional presence of their loved ones" (Participant 9). This produced heightened angst amongst the teams as they struggled to meet the physical, emotional and relational needs of their patients. Staff attempted to provide family updates via telephone and video chat; however, they considered this a poor substitution. Only allowing visitation at the end-of-life for some patients created much torment for nurses. The nurses witnessed the pain and suffering this caused patients and family. One participant described:

"Even the tight restrictions on visiting with non COVID patients has been hard, sometimes an elderly delirious patient would benefit from a familiar voice, but instead they're stuck trying to talk to me behind a mask, when really they're just scared and want someone familiar, or want someone who has the time to sit and hold their hand for hours. A few others though have had patients with COVID die and it sucks that we can get special permission for a couple of family members to come in right before they die, but sometimes they haven't seen them in weeks and when they see them all swollen with lines and tubes for the first and last time it's awful" (Participant 12).

The interviews also highlighted the changes in the composition of their clinical teams that occurred rapidly. For example, HAU staff received rapid online training to enhance their knowledge to allow for blending with the ICU and to enable their staff to care for ventilated patients. While some HAU staff were excited to receive the additional training, others felt by blending the two teams, they lost their identity. Staff from the emergency department, post-anesthetic recovery unit and cardiac units were also redeployed to assist the critical care teams. Similarly, those ICU nurses who were redeployed to elsewhere in the hospital experienced tremendous distress, as exemplified by one participant's experience as:

"Isolating and alone. I've definitely been having feelings of depression and lots of anxiety. I feel very grouchy and overreacting to things . . . I feeling lack of control and in limbo . . . I'm being thrown into a different areas, redeployment, and not knowing the people or where stuff is that is stressful too" (Participant 11).

Some nurse participants described working with unfamiliar people as stressful because they did not always feel the same support and collegiality working with strangers. They reported the loss of ability to trust that your team "had your back" when they were not familiar with their coworkers. Moreover, the nurses described the collective team experience of heightened fear and anxiety that felt pervasive and unrelenting for some, as one participant stated "I

feel like most of my energy is spent on fear and on adapting to changes. I can feel the stress of my coworkers and it makes me feel stressed and tired too" (Participant 4).

Despite the distress related to changes in their clinical teams, the participants also emphasized the positive aspects of their teams. Many participants commented on the sense of belonging and support they felt within their team, despite the new compositions, and praised their colleagues for the encouragement they felt from one another. Many felt a sense of pride and dedication to the team, and considered their team a source of strength that fuelled their ability to continue to keep going despite their exhaustion. One participant stated:

"I think we have an awesome team as it is. I mean critical care is normally a more cohesive team than most units, but now there's, I don't want to say sense of obligation, because that sounds bad, but I feel obligated to make sure my team is supported, so if that means I'm tired, I'll still come in if I can, cause I don't want the team to be short" (Participant 7).

Managing home and personal commitments to self and Family: Life turned upside down

Most of the participants reported worry over becoming ill themselves or bringing the virus home to their families. One participant remarked: "My first emotion was fear. I feared for my family. I was afraid working on the frontline would put my family at risk. I really didn't want to come to work" (Participant 1). Another participant similarly commented that, "I worry about getting sick from COVID or worse-spreading it to a loved one or to a vulnerable person and feeling guilty about this" (Participant 4). Furthermore, several participants reported additional pandemic-related stresses stemming from outside of work that compounded their work-related distress. They described the change to home schooling children, social distancing protocols, grocery shopping and their ability to socialise / connect with family as stressful, as exemplified by one participant:

"My child is unable to attend school. I now have to homeschool her on top of caring for a toddler. My husband had to close his business. He is still working part time as he runs his family business but is not making an income. I am seeing the effects of the social distancing and the break in routine on my daughter. She has been more emotional. I am trying to stay strong for my kids but it is really hard. And like I said, I've been snappy at home and I'm not normally like that, so I get frustrated with myself when that happens. Everything has been turned upside down it seems and it's really disheartening" (Participant 1).

Some even reported feeling stigmatized by friends and family for working in the COVID unit. They reported feeling isolated and shunned by family and community members who feared that the nurses would infect them with COVID-19. One participant stated "We've had people yelling at us for being too close and uh, cause we're out walking the dog, right." (Participant 5). Others reported that they were not living with family during the pandemic, or had stopped sharing bedrooms with their spouse due to the family's fear of them "bringing COVID home".

The participants described a variety of coping and self-care strategies that they considered necessary for their mental and physical well-being. Some participants reported trying to stay connected with family and friends via telephone and video chats. Others described exercising more, re-engaging in previous hobbies and even taking the opportunity to learn new hobbies. Many reported finding comfort in gardening and spending time outdoors; while others described unhealthy coping mechanisms such

as indulging in poor eating choices and drinking more alcohol than usual.

Discussion

The initial phase of the COVID-19 pandemic evolved rapidly affecting healthcare providers worldwide. Earlier research from previous pandemics and emerging evidence from this pandemic has demonstrated there is a significant impact on the wellbeing of healthcare providers (Alharbi & Jackson, 2020; Brooks et al., 2018; Ives et al., 2009; Lai et al., 2020; Liu et al., 2020; Maben & Bridges, 2020; Matsuishi et al., 2012; McMahan et al., 2016; Mo et al., 2020; Pan American Health Organization, 2009). This study, supported by previous literature, has demonstrated a compelling impact on Canadian CCRNs during the current pandemic, with the overarching theme reflecting psychological distress. Within this overarching theme, anxiety and fear were woven throughout subthemes of rapidly changing policy and information, overwhelming and unclear communication, meeting patient care needs in new ways while staying safe, and managing home and personal commitments to self and family.

The survey responses of participants in our study suggested poor mental health specific to symptoms of PTSD, depression, anxiety and stress. Prior to COVID-19, reported PTSD rates among nurses ranged from 8.5% to 20.8% (Schuster & Dwyer, 2020). A review of PTSD symptoms in healthcare providers during three recent coronavirus outbreaks, including the current COVID-19 pandemic, suggests a high mental health burden, with mild to severe PTSD symptoms reported in up to 71.5% of staff (Carmassi et al., 2020;). The findings of our study, wherein 73.3% of nurses reported mild to severe symptoms of PTSD, are consistent with this emerging research. Similarly, a review of healthcare worker mental health during the current COVID-19 pandemic reported the percentage with anxiety in 22 studies ranged from 9% to 90% with a median of 24%; depression in 19 studies ranged from 5% to 51% with a median of 21%. Literature on previous viral outbreaks is similar. One meta-analysis of healthcare providers during SARS reported a 46% prevalence of anxiety, 37% depression, and 41% distress (Salazar de Pablo et al., 2020). A second meta-analysis combining studies of coronavirus and influenza epidemics reported 45% anxiety, 38% depression, and 31% distress/stress (Cabello et al., 2020). The rates were somewhat higher in our study wherein 67% reported anxiety (25.7% mild, 41.3% moderate or greater); 56.9% depression (14.7% mild, 42.2% moderate or greater); 54.1% stress (16.5% mild, 37.6% moderate or greater). Possible explanations these higher rates could be the inclusion of only nurses in critical care, the focus on the early phase of the pandemic and the larger societal context that was not necessarily experienced to such a great extent in past epidemic/pandemics.

The qualitative findings from our study complement and provide insight into the high mental health burden reported by participants in the surveys. This study found anxiety and fear to be a consistent theme identified by interview participants. Participants described their anxiety and fear as the pandemic evolved. Participants remarked from the rapid spread of COVID-19, the anticipation of the impact of the disease, the concern over PPE shortages, and the fear for their personal safety and that of their loved ones to be paramount. These findings were consistent with other studies that produced similar results (Brooks, et al., 2018; Khalid et al., 2016; Lai et al., 2020; Liu et al., 2020; Maben & Bridges, 2020; McMahan et al., 2016). These findings suggest the distress experienced by CCRNs to be significant.

Other key findings identified were the rapidly changing policy and information, and overwhelming and unclear communication. Brooks et al. (2018) identified less stress and an improved experi-

ence in healthcare providers that had specialized training and previous experience in similar crises. This novel virus challenged healthcare teams, as seen in our study participants, as the evidence was rapidly growing and practices were changing quickly in order to keep up with the latest evidence. The added stress of the rapid change could also be seen in the survey results.

The ability to meet patient care needs while staying safe and also managing home and personal commitments to self and family also proved to be challenging to CCRNs during this pandemic. Similar findings were reported by McMahan et al. (2016) in their research surrounding care providers in the Ebola outbreak, and by Lai et al. (2020) and Mo et al. (2020) in their research describing the initial impact of COVID-19 on healthcare workers in China. The need for social distancing, change to how care was provided to patients and their families, and how participants were able to cope in their personal time was identified as a large change from the normative, and produced significant distress. This was further supported by the work of Brooks et al. (2018) examining the impact of the SARS pandemic.

Although there were some positive aspects identified by the participants, including the support of their teams, and the ability to receive enhanced training, the overall findings produce a worrisome impact on our CCRNs. The findings portray a large burden of psychological distress experienced by CCRNs, and therefore a need to provide support to build resilience in order to mitigate other negative sequelae from this ongoing pandemic context including burnout and intent to leave not only critical care but the profession entirely.

Suggestions and recommendations

The recent review of symptoms of PTSD among healthcare providers during coronavirus outbreaks identified support, training, prompt work organisation and good coping strategies as factors that bolster resilience (Carmassi et al., 2020). Previous literature has recommended supports be implemented to facilitate resilience and psychological wellness for healthcare teams (Alharbi & Jackson, 2020; Brooks et al., 2018; Maben & Bridges, 2020; McMahan et al., 2016; Pan American Health Organization, 2009; United Nations, 2020). This study confirms the need for support for CCRNs. As a result of this study several different supports were implemented for staff at the site. This included several critical incident stress management sessions and regular psychological first-aid check-ins by a hospital psychiatrist. Staff have also been reminded of other supports available to them through their extended health benefits.

Strengths and limitations

Strengths of this study lie in the high response rate (45%) for completion of the surveys and the convergent parallel mixed-methods design which enabled us to gather complementary quantitative and qualitative data to achieve a more comprehensive understanding of the mental health challenges experienced by CCRNs. While our parallel mixed-methods approach was feasible and quicker to conduct, a sequential design (surveys and then interviews) would have enabled us to purposefully sample individuals with different levels of PTSD symptoms, anxiety, depression and stress to more fully examine variation in mental health and factors contributing that were perhaps bolstering resilience. Limitations of this study include the sample was from only one site, and it was a single moment in time. Although the results, both quantitative and qualitative, portray the immediate experiences of CCRNs during the COVID-19 pandemic, follow up research to examine the long term health effects would be beneficial.

Conclusion

Based on the findings from this study, and supported by the related literature, we have concluded that CCRNs have experienced significant psychological distress related to the current COVID-19 pandemic. The participants experienced distress both from their work environment and also from their personal lives. This study has highlighted the need to ensure additional supports are received by staff working in critical care during the pandemic.

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Ethical statement

This research study received approval from the Fraser Health Research Ethics Board and the University of British Columbia harmonized ethics board prior to any data collection. The approval numbers are: FHREB File #: 2020-035 and Harmonized UBC file# H20-01361.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

- Alharbi, J., Jackson, D., 2020. The potential for COVID-19 to contribute to compassion fatigue in critical care nurses. *J. Clin. Nurs.* 29 (15–16). <https://doi.org/10.1111/jocn.15314>.
- Brooks, S.K., Dunn, R., Amlot, R., Rubin, G.J., Greenberg, N., 2018. A systematic, thematic review of social and occupational factors associated with psychological outcomes in healthcare employees during an infectious disease outbreak. *JOEM* 60 (3), 248–257. <https://doi.org/10.1097/JOM.0000000000001235>.
- Cabello, I.R., MenesesEchavez, J.F., Serrano-Ripoll, M.J., Fraile-Navarro, D., Goncalves-Bradley, D., 2020. Impact of viral epidemic outbreaks on mental health of healthcare workers: a rapid systematic review. *MedRxiv* 2020. <https://doi.org/10.1101/2020.04.02.20048892>.
- Carmassi, C., Foghi, C., Dell'Oste, V., Cardone, A., Dell'Osso, L., 2020. PTSD symptoms in healthcare workers facing the three coronavirus outbreaks: What we can expect after the COVID-19 pandemic. *Psychiatry Res.* 292 (2020). <https://doi.org/10.1016/j.psychres.2020.113312>.
- Coombes, M.A., Addlington-Hall, J., Long-Sutehall, T., 2012. Challenges in transition from intervention to end of life care in intensive care: a qualitative study. *Int. J. Nurs. Stud.* 49 (5), 519–527.
- Creamer, M., Bell, R., Falilla, S., 2002. Psychometric properties of the impact of event scale-revised. *Behav. Res. Ther.* 41, 1489–1496.
- Creswell, J.W., 2015. *A Concise Introduction to Mixed Methods Research*. Sage Publications, Thousand Oaks, California.
- Downar, J., Delaney, J.W., Hawryluck, L., Kenny, L., 2016. Guidelines for the withdrawal of life-sustaining measure. *Intensive Care Med.* 42 (6), 1003–1017.
- Forozeiya, D., Vanderspank-Wright, B., Fothergill-Bourbonnais, F., Moreau, D., Wright, D.K., 2019. Coping with moral distress – the experiences of intensive care nurses: an interpretive descriptive study. *Int. J. Nurs. Stud.* 53, 23–29.
- Ives, J., Greenfield, S., Parry, J.M., Draper, H., Gratus, C., Petts, J.L., Wilson, S., 2009. Healthcare workers' attitudes to working during pandemic influenza: a qualitative study. *BMC Public Health* 9 (56), 1–13. <https://doi.org/10.1186/1471-2458-9-56>.

- Khalid, I., Khalid, T., Qabajah, M.R., Barnard, A.G., Qushmaq, I.A., 2016. Healthcare workers emotions, perceived stressors and coping strategies during a MERS-CoV outbreak. *Clin. Med. Res.* 14 (1), 7–14. <https://doi.org/10.3121/cmr.2016.1303>.
- Jackson, J., Vandall-Walker, V., Vanderspank-Wright, B., Wishart, P., Moore, S., 2018. Burnout and resilience in critical care nurses: a grounded theory of managing exposure. *Intensive Crit. Care Nurs.* 48, 28–35.
- Lai, J., Ma, S., Wang, Y., Cai, Z., Hu, J., Wei, N., Hu, S., 2020. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Network Open* 3 (3). <https://doi.org/10.1001/jamanetworkopen.2020.3976>.
- Liu, Z., Han, B., Jiang, R., Huang, Y., Ma, C., Ma, Y., 2020. Mental health status of doctors and nurses during COVID-19 epidemic in China. Retrieved July 17, 2020 from: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3551329. Doi: <http://dx.doi.org/10.2139/ssrn.3551329>.
- Lovibond, S.H., Lovibond, P.F., 1995. *Manual for the Depression, Anxiety & Stress Scales*. Psychology Foundation, Sydney.
- Maben, J., Bridges, J., 2020. Covid-19: supporting nurses' psychological and mental health. *J. Clin. Nurs.* 29 (15–16), 15307. <https://doi.org/10.1111/jocn>.
- Mahase, E., 2020. China coronavirus: WHO declares international emergency as death toll exceeds 200. *BMJ* 2020, 368(m408). Doi: 10.1136/bmj.m408.
- Matsuishi, K., Kawazoe, A., Imai, H., Ito, A., Mouri, K., Kitamura, N., Mita, T., 2012. Psychological impact of the pandemic (H1N1) 2009 on general workers in Kobe. *Psychiatry Clin. Neurosci.* 66, 353–360. <https://doi.org/10.1111/j.1440-1819.2012.02336x>.
- McAlonan, G.M., Lee, A.M., Cheung, V., Cheung, C., Tsang, K.W., Sham, P.C., Chua, S.E., Wong, J.C., 2007. Immediate and sustained psychological impact of an emerging infectious disease outbreak on health care workers. *Can. J. Psychiatry* 52 (4), 241–247. <https://doi.org/10.1177/070674370705200406>.
- McMahon, S.A., Ho, L.S., Brown, H., Miller, L., Ansumana, R., Kennedy, C.E., 2016. Healthcare providers on the frontlines: a qualitative investigation of the social and emotional impact of delivering health services during Sierra Leone's Ebola epidemic. *Health Policy Plann.* 31 (9), 1232–1239. <https://doi.org/10.1093/heapol/czw055>.
- Mitra, A.R., Fergusson, N.A., Lloyd-Smith, E., Wormsbecker, A., Foster, D., Karpov, A., Crowe, S., Griesdale, E.G. (2020). Baseline characteristics and outcomes of patients with COVID-19 admitted to intensive care units in Vancouver, Canada: a case series. *Canadian Medical Association Journal*, May 27, 2020. Doi: <https://doi.org/10.1503/cmaj.200794>.
- Mo, Y., Deng, L., Zhang, L., Lang, Q., Liao, C., Huang, H., 2020. Work stress among Chinese nurses to support Wuhan in fighting against COVID-19 pandemic. *J. Nurs. Manag.* 28 (5). <https://doi.org/10.1111/jonm.13014>.
- Norwell, L.S., Norris, J.M., White, D.E., Moules, N.J., 2017. Thematic analysis: striving to meet the trustworthiness criteria. *J. Qualitative Methods* 16, 1–13. <https://doi.org/10.1177/1609406917733847>.
- Pan American Health Organization, 2009. *Protecting Mental Health During Pandemics*. Retrieved July 13, 2020 from: <https://www.paho.org/en/documents/protecting-mental-health-during-epidemics>.
- Salazar de Pablo, G., Vaquerizo-Serrano, J., Catalan, A., Arango, C., Fusar-Poli, P., 2020. Impact of coronavirus syndromes on physical and mental health of health care workers: systematic review and meta-analysis. *J. Affect. Disord.* 275 (2020), 48–57. <https://doi.org/10.1016/j.jad.2020.06.022>.
- Schuster, M., Dwyer, P.A., 2020. Post-traumatic stress disorder in nurses: An integrative review. *J. Clin. Nurs.* 29 (15–16). <https://doi.org/10.1111/jocn.15288>.
- United Nations, 2020. *Policy Brief: COVID-19 and the Need for Action on Mental Health*. Retrieved July 13, 2020 from: <https://unsdg.un.org/sites/default/files/2020-05/UN-Policy-Brief-COVID-19-and-mental-health.pdf>.
- Vanderspank-Wright, B., Fothergill-Bourbonnais, McPherson, C., Gagnon, P., 2011. Caring for patients and families at end-of-life: the experiences of intensive care nurses withdrawing life-sustaining treatment. *Dynamics Off. J. Canad. Assoc. Critical Care Nurses* 22 (4), 31–35.
- Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., Ho, C.S., Ho, R.C., 2020. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *Int. J. Environ. Res. Public Health* 17 (1729). <https://doi.org/10.3390/ijeroph17051729>.
- Weiss, D.S., 2002. The impact of event scale – revised. In: Wilson, J.P., Keane, T.M. (Eds.), *Assessing Psychological Trauma and PTSD: a Practitioner's Handbook*. 2nd ed. Guilford Press, New York, pp. 168–189.