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Original Research

Nursing Professionals' Stress Level During Coronavirus Disease 2019: A Looming Workforce Issue

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A B S T R A C T

The purpose of this study was to assess the impact of coronavirus disease 2019 on perceived stress experienced by nurse practitioners/nurses and their desire to remain employed as health care providers. A cross-sectional survey of 40 questions was administered between May and September 2020 to a convenience sample of 433 nurse practitioners and nurses in Missouri and Georgia through a Qualtrics (Provo, UT) link provided via their professional organization listserv. Anxiety-related symptoms and perceived helplessness were correlated with personal protective equipment concerns and management approachability. Problematic stress was associated with willingness to leave their current job or the nursing profession altogether.

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When severe acute respiratory syndrome coronavirus 2 was first identified at the end of 2019, the world was not prepared for the impact of this deadly virus on everyday life and health. As governments struggled to cope, health care workers (HCWs) began to face a more ominous realization. This pandemic swiftly sickened over 99 million people worldwide and killed 2.1 million.[1] In the United States alone, over 25 million have been sickened, and over 418,000 have died.[1] For US HCWs, an estimated 378,220 have been sickened, and 1,286 have died.[2] Although the number of HCWs sickened by coronavirus disease 2019 (COVID-19) is thought to be much higher than current estimates, data reporting on specific occupations of COVID-19 victims has been inconsistent.[2] Estimates from the US Centers for Disease Control and Prevention (CDC) noted that nursing-related occupations accounted for the largest proportion of US HCWs and US COVID-19 cases among hospitalized HCWs, which is consistent with global findings.[3-5]

COVID-19 and Stress in Nursing

The transmission of COVID-19 is primarily through respiratory droplets expelled through coughing, sneezing, talking, or singing, as well as aerosolized with procedures such as intubation and nebulizer care.[6] To date, prevention recommendations have largely consisted of frequent handwashing, the use of personal protective equipment (PPE), and social distancing.[6] PPE availability during the current outbreak has been a particularly sensitive issue as nurse practitioners (NPs) struggle to protect themselves and their families from this easily transmittable infectious agent.[7] The CDC recommendations have fluctuated between using the most helpful PPE available when recommended protection is in short supply to

using the standard of care for respiratory diseases, which include N95 respirators, goggles/face shields, and gowns.[8] Shortages of necessary PPE while caring for patients with a potentially lethal, highly contagious infectious agent is an untenable situation. A cloth or fabric mask is not PPE and should not typically be used in place of a respirator or face mask; however, this was a recommendation aimed at PPE conservation and a reality for HCWs at various points in the pandemic response.[8]

NPs and nurses have been heavily burdened during the pandemic. An increased volume of critically ill patients, the need to shift from familiar areas of care to dedicated COVID units, changes in work hours, and the increased burden of providing care to patients isolated from their usual support systems have added to an already difficult care environment. Challenges brought on by a loss of income as a result of furloughs and the ever-present fear that they too could be sickened or bring the disease home to their family have further potential to increase stress in this vital workforce.[4,9]

Purpose

Many of the tangible effects of COVID-19 are easily noted, such as the lack of PPE and the long hours. However, significant intangible effects are also occurring during this pandemic. Secondary traumatic stress, also called compassion fatigue, has been identified in caregivers as a result of caring for traumatized patients.[10-12] To explore concerns over the potential deleterious state of stress during the COVID-19 crisis and the lingering effect of repeated stress on the nursing workforce, this study aims to identify NPs' and nurses' experiences with stress during the COVID-19 pandemic and what impact their stress may have on their risk of attrition.

Methods

Design

This study used a cross-sectional survey design methodology delivered in an electronic format. Subjects were drawn from a convenience sample of NPs and nurses who are current members of Missouri and Georgia NP and nursing state organizations. After institutional review board approval, a link to the electronic Qualtrics (Provo, UT) survey was provided to the state nursing organizations for distribution to their membership via their professional organization listserv. The researchers had no direct contact with participants and reported findings in an aggregate manner to further protect the participants' identities. The recruitment materials were displayed before initiation of the electronic survey. At the end of the survey, a link to the CDC coronavirus website was provided to allow the participants to find additional information on the topics queried during the survey.

Measures

The survey consisted of 40 total questions in the following areas: demographics, length of time in nursing and current role, weekly hours worked, type of area/unit where the NP/nurse works, volume of COVID-19 patients cared for by the NP/nurse, 10 questions on perceived stress from the Perceived Stress Scale (PSS-10),[13] 5 items from the Post-Traumatic Stress Disorder (PTSD) Checklist–Civilian Version,[14] 2 questions on whether the participant plans to change jobs and whether they plan to leave nursing in the next 2 years, and 1 open-ended question that allowed participants to share any thoughts they had about the current COVID-19 crisis.

The levels of stress reported by NP/nursing professionals were captured, in part, using the PSS-10.[13] The PSS-10 is a validated, frequently used self-report measure designed to capture respondents' perceptions on how inordinate their stress is and how well they perceive they can cope.[13] Respondents indicate on a 5-point rating scale how frequently their stressful experiences have reflected the descriptions delineated in the items. The rating scale ranges from 1 (never) to 5 (very often). Ratings on 6 PSS-10 items that capture perceived helplessness toward stress are aggregated to form a Perceived Helplessness Subscale (PHS) score for each respondent, whereas ratings on 4 items that capture the degree to which respondents believe they are able to weather their stress are aggregated to form a Perceived Self-Efficacy Subscale (PSES) score.[15] Scores on both the PSES and PHS exhibited adequate levels of reliability in this study with Cronbach's alpha values of .804 and .892, respectively. The literature has indicated that scores on the PSS-10 subscales exhibit adequate levels of reliability (Cronbach's α > .80) and adequate evidence for construct validity.[15]

Stress levels were also quantified using 5 items comprising the hyperarousal subscale of the PTSD Checklist–Civilian form.[14] The 5 items reflect ongoing hyperarousal with respect to traumatic stimuli consistent with criteria "E" symptoms for the diagnosis of PTSD under the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*.[16] Participants provide responses on a self-report rating scale ranging from 1 (not at all) to 5 (extremely), which ranks the degree to which they have recently been experiencing the symptoms described by each item. The researchers opted to average the ratings for each participant in order to reduce the amount of missing data produced by summing the ratings.[17] Ratings on the 5 items exhibited adequate reliability, with a Cronbach's alpha of .857. Validity studies on the hyperarousal subscale have suggested that the tool exhibits some evidence of construct validity for PTSD but has not consistently exhibited discriminant validity from other PTSD symptom clusters.[14,18]

Participants

Analyses in this study are based on 433 responses provided by nursing professionals from the states of Georgia (n = 244) and Missouri (n = 189). Participants were approximately 45.96 years old (standard deviation [SD] = 12.05 years) with more than half reporting greater than 15 years of service in the nursing profession (n = 239, 52.41%). Approximately 34.95% (n = 151) had completed a bachelor's degree, 39.81% (n = 172) had completed a master's degree, and 11.57% (n = 50) had completed a doctoral degree. More than half of the participants indicated they were registered nurses (53.35%, n = 231), 36.95% indicated they were NPs (n = 160), and 2.31% (n = 10) indicated they served as a nursing professional in an administrative role. Approximately 36.69% (n = 113) shared they were practicing in an outpatient setting; 26.30% (n = 81) were on a hospital floor other than the intensive care unit (ICU); and 25.00% (n = 77) were in an ICU, emergency department, or COVID unit. Approximately 12.01% (n = 37) were practicing in home care or hospice.

Data Analysis

To speak to the intangible effects experienced by nursing professionals during the COVID-19 crisis, means and SDs were used to summarize participants' current perceived stress and clinically significant anxiety symptoms. This study also included medians and ranges because several variables did not appear to be normally distributed, as evidenced by histograms that revealed notable deviations away from normality. One-way analysis of variance (ANOVA) was used to broadly speak to how participants' responses on the stress measure varied by potential concerns such as workplace PPE resources. Before interpreting the results of the ANOVA models, diagnostics (eg, homogeneity of the variance, outliers, and missing data) were inspected to ensure the validity of the statistical findings. Analyses were changed over to the Kruskal-Wallis H test when the assumptions for the 1-way ANOVA were untenable. Spearman's rho was used to help describe the association between stress and participants' intention to change their professional circumstances. An alpha level of .05 and effect sizes were used to evaluate the significance of the results from all inferential tests. The rate of missing data remained below 10% across all study variables.

Responses to the open-ended question "What would you like to share about your experiences and thoughts during COVID-19?" were evaluated using a thematic conceptual coding analysis development process utilizing strategies of theme development by Polit and Beck.[19] Themes of emotional distress, financial impact, workplace issues, and inconsistency in scientific recommendations were identified.

Results

Although there was variation noted on stress measures when analyzed by state, education levels, and role, NPs exhibited similar levels of stress compared with non-NP nurses in this study.

Stress Levels

Participants exhibited an average PSES score of 2.56 (SD = 0.68, median = 2.50) and an average PHS of 1.98 (SD = 0.82, median = 2.00). This denotes that participants felt capable of addressing the challenges they faced most of the time, even though their stress was "sometimes" too taxing. Scores across the hyperarousal subscale of the PTSD Checklist–Civilian form ranged from 0.00 to 4.00 with a median score of approximately 1.20 (mean = 1.37,

Table 1
Associations Between Perceived Helplessness Subscale and Confidence in Employer Management of Personal Protective Equipment

Items	Mean (SD)	Median (Range)	1-way ANOVA and Tukey-Kramer Testing	
Sufficient recommendations to protect me			$F_{(2,414)} = 15.99$, $P < .01$, $\omega^2 = .07$	
No (n = 101)	2.35 (0.80)	2.33 (0.50-3.83)	Not sure vs no	$q = 4.51$, $P < .01$
Not sure (n = 87)	1.98 (0.72)	2.00 (0.17-4.00)	Yes vs no	$q = 7.10$, $P < .01$
Yes (n = 229)	1.81 (0.82)	1.83 (0.00-3.83)	Yes vs not sure	$q = 2.35$, $P = .22$
Enough resources to protect me			$F_{(2,414)} = 18.66$, $P < .01$, $\omega^2 = .08$	
No (n = 132)	2.33 (0.81)	2.33 (0.17-4.00)	Not sure vs no	$q = 5.58$, $P < .01$
Not sure (n = 75)	1.88 (0.66)	1.83 (0.00-3.67)	Yes vs no	$q = 8.45$, $P < .01$
Yes (n = 210)	1.80 (0.82)	1.83 (0.00-3.83)	Yes vs not sure	$q = 0.98$, $P = .77$
Positive change if expressed concern			$F_{(2,413)} = 11.35$, $P < .01$, $\omega^2 = .05$	
No (n = 128)	2.20 (0.88)	2.25 (0.17-4.00)	Not sure vs no	$q = 2.05$, $P = .32$
Not sure (n = 123)	2.05 (0.74)	2.50 (0.17-4.00)	Yes vs no	$q = 6.54$, $P < .01$
Yes (n = 165)	1.76 (0.80)	1.83 (0.00-3.83)	Yes vs not sure	$q = 4.29$, $P < .01$
Disciplined if expressed concern			$F_{(2,415)} = 12.29$, $P < .01$, $\omega^2 = .05$	
No (n = 294)	1.86 (0.79)	1.83 (0.00-3.83)	Not sure vs no	$q = 5.24$, $P < .01$
Not sure (n = 77)	2.24 (0.73)	2.33 (0.83-4.00)	Yes vs no	$q = 5.47$, $P < .01$
Yes (n = 47)	2.34 (0.98)	2.50 (0.17-3.83)	Yes vs not sure	$q = 1.02$, $P = .75$
Family at risk			$F_{(2,415)} = 25.46$, $P < .01$, $\omega^2 = .10$	
No (n = 224)	1.77 (.077)	1.83 (0.00-3.83)	Not sure vs no	$q = 2.35$, $P = .22$
Not sure (n = 75)	1.94 (0.73)	1.83 (0.50-3.50)	Yes vs no	$q = 10.07$, $P < .01$
Yes (n = 119)	2.40 (0.83)	2.33 (0.50-4.00)	Yes vs not sure	$q = 5.62$, $P < .01$

ANOVA = analysis of variance; SD = standard deviation.

SD = 0.91), denoting a tendency among participants to report less than moderate levels of hyperarousal.

Professional Concerns

Results of *F*-tests consistently suggested that confidence in employers' handling of PPE substantively impacted respondents' self-reported stress levels as evidenced by significant *P* values and ω^2 estimates of .02 or greater (Table 1). Tukey-Kramer post hoc testing highlighted that PHS scores were significantly lower among participants who believed their employer had reasonable PPE recommendations and resources and were approachable over PPE concerns (Table 1). Post hoc testing also suggested average PSES scores were significantly higher among respondents who had confidence in their employers' management of PPE and employee PPE concerns (Table 2). Participants who had confidence in their employers' management of PPE and PPE concerns tended to exhibit significantly lower levels of hyperarousal (Table 3). It is noteworthy that respondents' views on whether their employers' PPE recommendations placed their family members at risk produced the highest distinctions in typical stress levels across measures.

Interestingly, participants' stress levels did not seem to vary by factors reflecting an increasing risk of direct exposure to COVID-19. PHS ($F_{(3,278)} = 0.64$, $P = .59$, $\omega^2 = .004$), PSES ($F_{(3,278)} = 2.30$, $P = .08$, $\omega^2 = .01$), and hyperarousal scores ($F_{(3,268)} = 0.65$, $P = .59$, $\omega^2 = .004$) did not vary significantly by area of practice (eg, outpatient care, end-of-life care, or non-ICU hospital floor). Likewise, PSES ($r_s = -.07$, $t_{(416)} = -1.431$, $P = .153$) and hyperarousal scores ($r_s = .06$, $t_{(403)} = 1.207$, $P = .228$) did not vary significantly by the estimated number of known COVID-19 patients treated in the past month. PHS scores did vary significantly by the known number of COVID-19 patients ($r_s = .13$, $t_{(416)} = 2.674$, $P = .01$), but the size of the association was low, suggesting the association is not substantively significant in the present sample.

It is noteworthy that approximately 16.25% (n = 65) of the participants in this study indicated a moderate risk of leaving the NP/nursing profession, and approximately 42.25% (n = 169) indicated a risk of leaving their current employer in 2 years. Participants consistently indicated that problematic stress tended to increase the chances of leaving their employer within the next 2 years or the nursing profession altogether. Spearman rho indicated a moderate, positive association between PHS scores and the risk of leaving their employer in 2 years ($r_s = .353$, $t_{(398)} = 7.527$, $P < .01$) and a small, positive association of leaving the profession ($r_s = .234$, $t_{(398)} = 4.791$, $P < .01$). Nearly identical trends were observed between hyperarousal and the risk of leaving an employer in 2 years ($r_s = .307$, $t_{(398)} = 6.435$, $P < .01$) and leaving the profession ($r_s = .250$, $t_{(398)} = 5.151$, $P < .01$). Although PSES scores were significantly associated with an increased risk of leaving their current employer within 2 years ($r_s = -.286$, $t_{(398)} = -5.954$, $P < .01$) and the profession ($r_s = -.132$, $t_{(398)} = -2.657$, $P = .008$), the small correlation with the risk of leaving the profession calls into question the meaningfulness of the latter relationship.

Discussion

Nursing professionals have been encumbered by the ongoing crisis and uncertainty in ways that are sometimes easy to see, such as when an NP experiences COVID-19 infection. However, in light of the difficulties identifying the harmful effects of nontangible factors, this study sought to specifically quantify the stress levels in a sample of NPs and nurses who have continued to provide care during the crisis and how their stress may be influencing their willingness to continue in their current role or remain in the nursing profession. Interestingly, although we did not observe evidence that NPs exhibited excessive levels of stress, we did find that stress levels still varied by how well they believed their employer handled PPE-related needs and that stress levels were related to a nursing professional's willingness to continue to provide care in the future.

Self-Reported Stress Levels

Stress levels were quantified using measures of perceived helplessness toward stressful life circumstances and perceived efficacy in managing the stress in life,[13] as well as a measure of hyperarousal symptoms reflective of a response to stressful stimuli.[20] Despite the ongoing crisis, our NPs'/nurses' perceived helplessness tended to indicate that they only occasionally found their stress to be too taxing and believed they were usually capable of weathering the stress in their lives. Similarly, our respondents' hyperarousal tended to be low, suggesting that, at the

Table 2
Associations Between Perceived Self-Efficacy Subscale and Confidence in Employer Management of Personal Protective Equipment

Items	Mean (SD)	Median (Range)	1-way ANOVA and Tukey-Kramer Testing	
Sufficient recommendations to protect me			$F_{(2,414)} = 13.10, P < .01, \omega^2 = .05$	
No (n = 101)	2.30 (0.67)	2.25 (1.00-4.00)	Not sure vs no	$q = 2.60, P = .16$
Not sure (n = 87)	2.48 (0.50)	2.50 (1.50-4.00)	Yes vs no	$q = 7.04, P < .01$
Yes (n = 229)	2.70 (0.71)	2.75 (0.75-4.00)	Yes vs not sure	$q = 3.66, P = .03$
Enough resources to protect me			$F_{(2,414)} = 3.609, P < .01, \omega^2 = .03$	
No (n = 132)	2.37 (0.68)	2.25 (0.75-4.00)	Not sure vs no	$q = 2.87, P = .11$
Not sure (n = 75)	2.56 (0.55)	2.50 (1.50-4.00)	Yes vs no	$q = 5.70, P < .01$
Yes (n = 210)	2.67 (0.70)	2.75 (0.75-4.00)	Yes vs not sure	$q = 1.63, P = .48$
Positive change if expressed concern			$F_{(2,413)} = 8.805, P < .01, \omega^2 = .04$	
No (n = 128)	2.42 (0.70)	2.25 (1.00-4.00)	Not sure vs no	$q = 0.89, P = .80$
Not sure (n = 123)	2.47 (0.61)	2.50 (1.00-4.00)	Yes vs no	$q = 5.46, P < .01$
Yes (n = 165)	2.72 (0.68)	2.75 (0.75-4.00)	Yes vs not sure	$q = 4.45, P < .01$
Disciplined if expressed concern			$F_{(2,415)} = 7.733, P < .01, \omega^2 = .02$	
No (n = 294)	2.64 (0.68)	2.75 (0.75-4.00)	Not sure vs no	$q = 4.83, P < .01$
Not sure (n = 77)	2.35 (0.53)	2.25 (1.00-3.75)	Yes vs no	$q = 3.53, P = .03$
Yes (n = 47)	2.38 (0.80)	2.25 (1.00-4.00)	Yes vs not sure	$q = 0.35, P = .97$
Family at risk			$F_{(2,415)} = 10.08, P < .01, \omega^2 = .04$	
No (n = 224)	2.67 (0.65)	2.75 (1.25-4.00)	Not sure vs no	$q = 1.54, P = .52$
Not sure (n = 75)	2.57 (0.65)	2.50 (0.75-4.00)	Yes vs no	$q = 6.34, P < .01$
Yes (n = 119)	2.33 (0.69)	2.25 (1.00-4.00)	Yes vs not sure	$q = 3.49, P = .04$

ANOVA = analysis of variance; SD = standard deviation.

time of the survey, emotion dysregulation provoked by traumatic circumstances had not generally been problematic during the ongoing crisis.

Regardless of the absolute stress level magnitude, participants consistently indicated that their stress varied by how well their employer cared for their PPE resources and concerns. Specifically, among NPs/nurses who viewed their employers' management of PPE-related needs as poor, levels of perceived helplessness and hyperarousal tended to be higher than respondents who viewed their employers' handling of PPE as good. Similarly, NPs/nurses had a higher sense of self-efficacy in their ability to meet the challenges associated with their stress when they believed that employers managed PPE-related needs well compared with NPs/nurses who believed their employers managed PPE-related needs poorly.

Analyses also revealed that nearly 1 of every 6 NPs/nurses are at risk of leaving the nursing profession completely, and nearly 3 of every 7 are at risk of leaving their employer, with a substantial portion of this attributable to increasing levels of stress. These concerning findings suggest that the ongoing crisis may exacerbate the shortage of HCWs and increase turnover in the nursing profession.[21]

Limitations

The conclusions drawn in this study should be interpreted with a number of limitations in mind. Convenience sampling from 2 states may not allow for generalizability beyond the participants in our study. It is also noteworthy that our measures reflect respondents' views at 1 point in time and may not reflect the full scope of the association between stress and professional satisfaction during an unfolding and dynamic crisis. Although a substantial proportion of our professionals indicated a risk of leaving their employer in 2 years, without the benefit of time, it is unclear whether this will occur. In light of these limitations, future studies are needed.

Table 3
Associations Between Hyperarousal and Confidence in Employer Management of Personal Protective Equipment

Items	Mean (SD)	Median (Range)	1-way ANOVA and Tukey-Kramer Testing	
Sufficient recommendations to protect me			$F_{(2,401)} = 11.53, P < .01, \omega^2 = .05$	
No (n = 98)	1.73 (0.96)	1.60 (0.00-4.00)	Not sure vs no	$q = 3.95, P = .02$
Not sure (n = 85)	1.36 (0.90)	1.20 (0.00-4.00)	Yes vs no	$q = 6.79, P < .01$
Yes (n = 221)	1.21 (0.85)	1.00 (0.00-3.60)	Yes vs not sure	$q = 1.87, P = .38$
Enough resources to protect me			$F_{(2,401)} = 15.60, P < .01, \omega^2 = .07$	
No (n = 128)	1.73 (1.00)	1.60 (0.00-4.00)	Not sure vs no	$q = 5.31, P < .01$
Not sure (n = 74)	1.25 (0.82)	1.20 (0.00-4.00)	Yes vs no	$q = 7.66, P < .01$
Yes (n = 202)	1.19 (0.82)	1.00 (0.00-3.60)	Yes vs not sure	$q = 0.66, P = .89$
Positive change if expressed concern			$F_{(2,401)} = 9.725, P < .01, \omega^2 = .04$	
No (n = 124)	1.65 (1.02)	1.50 (0.00-4.00)	Not sure vs no	$q = 3.78, P = .02$
Not sure (n = 122)	1.34 (0.86)	1.20 (0.00-4.00)	Yes vs no	$q = 6.21, P < .01$
Yes (n = 158)	1.18 (0.81)	1.00 (0.00-3.80)	Yes vs not sure	$q = 2.18, P = .27$
Disciplined if expressed concern			$F_{(2,402)} = 12.07, P < .01, \omega^2 = .05$	
No (n = 286)	1.24 (0.82)	1.00 (0.00-4.00)	Not sure vs no	$q = 3.78, P = .02$
Not sure (n = 75)	1.55 (0.98)	1.20 (0.00-4.00)	Yes vs no	$q = 6.21, P < .01$
Yes (n = 44)	1.89 (1.11)	2.00 (0.00-4.00)	Yes vs not sure	$q = 2.18, P = .11$
Family at risk			$F_{(2,414)} = 23.75, P < .01, \omega^2 = .10$	
No (n = 216)	1.16 (0.83)	1.00 (0.00-4.00)	Not sure vs no	$q = 1.19, P = .68$
Not sure (n = 73)	1.26 (0.77)	1.20 (0.00-3.40)	Yes vs no	$q = 9.59, P < .01$
Yes (n = 116)	1.83 (0.98)	1.80 (0.20-4.00)	Yes vs not sure	$q = 6.32, P < .01$

ANOVA = analysis of variance; SD = standard deviation.

Conclusion

Clearly, NPs and the nursing workforce are experiencing a challenge unlike any seen in the past century. Health care organizations coping with swelling numbers of critically ill patients, limited HCW resources, supply challenges, and the lack of an effective treatment for this frightening disease have been forced into a crisis footing that does not appear to be abating any time soon. Rapid implementation of telehealth and prolonged delays or cancellations in routine tests and procedures have further exacerbated the practice impact of COVID-19 that will continue to send ripples through the health care system in the months and years ahead. For NPs, restrictive practice regulations create an additional barrier to provision of care and limit flexibility that is needed during a crisis. Although some legislation aimed at expanding the health care workforce during this pandemic have been enacted, most are short-term and limited in their scope.

Ongoing restrictions limit NP practice and prevent care from reaching communities disproportionately impacted by COVID-19. Strain on the NP workforce is evident and must be addressed. One participant summed it up this way, "The stress of dealing with the disease, staffing changes and uncertainty was worsened by the health systems furloughing so many nurses and NPs. It makes you feel undervalued and disposable." Clearly, the imperative to develop strategies to stabilize supply chains, provide for time off for HCWs, and create support resources for frontline workers must be a priority. If we do not provide support for the caregivers, soon they will be unable to provide care to those who need it most.

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