



# CRITICAL CARE NURSES' PHYSICAL AND MENTAL HEALTH, WORKSITE WELLNESS SUPPORT, AND MEDICAL ERRORS

By Bernadette Mazurek Melnyk, PhD, APRN-CNP, Alai Tan, PhD, Andreanna Pavan Hsieh, MPH, Kate Gawlik, DNP, APRN-CPN, Cynthia Arslanian-Engoren, PhD, RN, ACNS-BC, Lynne T. Braun, PhD, CNP, Sandra Dunbar, DSN, RN, Jacqueline Dunbar-Jacob, PhD, RN, Lisa M. Lewis, PhD, RN, Angelica Millan, DNP, CNS, NP, Liana Orsolini, PhD, RN, Lorraine B. Robbins, PhD, RN, FNP-BC, Cynthia L. Russell, PhD, RN, Sharon Tucker, PhD, APRN-CNS, NC-BC, and JoEllen Wilbur, PhD, APN

**Background** Critical care nurses experience higher rates of mental distress and poor health than other nurses, adversely affecting health care quality and safety. It is not known, however, how critical care nurses' overall health affects the occurrence of medical errors.

**Objective** To examine the associations among critical care nurses' physical and mental health, perception of workplace wellness support, and self-reported medical errors.

**Methods** This survey-based study used a cross-sectional, descriptive correlational design. A random sample of 2500 members of the American Association of Critical-Care Nurses was recruited to participate in the study. The outcomes of interest were level of overall health, symptoms of depression and anxiety, stress, burnout, perceived worksite wellness support, and medical errors.

**Results** A total of 771 critical care nurses participated in the study. Nurses in poor physical and mental health reported significantly more medical errors than nurses in better health (odds ratio [95% CI]: 1.31 [0.96-1.78] for physical health, 1.62 [1.17-2.29] for depressive symptoms). Nurses who perceived that their worksite was very supportive of their well-being were twice as likely to have better physical health (odds ratio [95% CI], 2.16 [1.33-3.52]; 55.8%).

**Conclusion** Hospital leaders and health care systems need to prioritize the health of their nurses by resolving system issues, building wellness cultures, and providing evidence-based wellness support and programming, which will ultimately increase the quality of patient care and reduce the incidence of preventable medical errors. (*American Journal of Critical Care*. 2021;30:176-184)

**CE** 1.0 Hour

This article has been designated for CE contact hour(s). See more CE information at the end of this article.

©2021 American Association of Critical-Care Nurses  
doi:<https://doi.org/10.4037/ajcc2021301>

In 2017, the National Academy of Medicine (NAM) launched the Action Collaborative for Clinician Well-being and Resilience in response to increased rates of burnout, depression, and suicide and their adverse effects on clinician well-being and patient safety.<sup>1</sup> A national US study of 1790 practicing nurses from 19 health care systems indicated that worse physical and mental health of nurses was related to a greater number of reported medical errors.<sup>2</sup> That study was the first to demonstrate that depression was the leading predictor of medical errors among nurses. Furthermore, nurses who perceived greater support for wellness at their worksite had better physical and mental health outcomes. Yet that national study did not specifically examine health and medical errors of critical care nurses (CCNs) or the relationship of those factors to perceived wellness support.

Critical care nurses are known to experience higher levels of stress than nurses in other specialties because of their complex clinical environment, which includes high patient acuity, increased use of advanced technology, and frequent exposure to loud

#### About the Authors

**Bernadette Mazurek Melnyk** is vice president for health promotion, university chief wellness officer, dean and professor, and executive director, Helene Fuld Health Trust National Institute for Evidence-Based Practice in Nursing and Healthcare, The Ohio State University, Columbus. **Alai Tan** is a research professor, Center for Research and Health Analytics, College of Nursing, The Ohio State University. **Andreanna Pavan Hsieh** is a science writer, College of Nursing, The Ohio State University. **Kate Gawlik** is an assistant professor of clinical nursing at The Ohio State University College of Nursing. **Cynthia Arslanian-Engoren** is a professor and associate dean of faculty affairs and faculty development, Department of Health Behavior and Biological Sciences, University of Michigan School of Nursing, Ann Arbor. **Lynne T. Braun** is a professor, Rush University and Heart & Vascular Institute, Chicago, Illinois. **Sandra Dunbar** is associate dean for academic advancement, Nell Hodgson Woodruff School of Nursing, Emory University, Atlanta, Georgia. **Jacqueline Dunbar-Jacob** is dean and professor of psychology, epidemiology, and occupational therapy, University of Pittsburgh, Pittsburgh, Pennsylvania. **Lisa M. Lewis** is associate professor of nursing, Calvin Bland fellow, and assistant dean for diversity and inclusivity, University of Pennsylvania, Philadelphia. **Angelica Millan** is nursing director for children's medical services, County of Los Angeles Department of Public Health, Los Angeles, California. **Liana Orsolini** is vice president of nursing services, Armor Correctional Health, Inc, Miami, Florida. **Lorraine B. Robbins** is a professor, College of Nursing, Michigan State University, East Lansing. **Cynthia L. Russell** is a professor, School of Nursing and Health Studies, University of Missouri–Kansas City. **Sharon Tucker** is Grayce Sills Endowed Professor in psychiatric–mental health nursing, professor and director, DNP Nurse Executive Track, and director, Translational/Implementation Research Core, Helene Fuld Health Trust National Institute for Evidence-Based Practice in Nursing and Healthcare, The Ohio State University. **JoEllen Wilbur** is associate dean for research, Department of Women, Children and Family Nursing, College of Nursing, Rush University.

**Corresponding author:** Bernadette Melnyk, PhD, APRN-CNP, FAANP, FNP, FAAN, The Ohio State University, 1585 Neil Avenue, Columbus, Ohio 43210 (email: melnyk.15@osu.edu).

alarms and fluorescent light sources.<sup>3</sup> Their physical health is negatively affected by long shifts with limited breaks to rest properly, often resulting in sleep disruption, headaches, cardiovascular disease, gastrointestinal symptoms, and musculoskeletal disorders.<sup>4–6</sup> The mental health of CCNs is also adversely affected by their work with critically ill patients, which includes frequent exposure to traumatic events and the need to regularly deal with ethical issues that arise.<sup>3</sup>

Research findings indicate that CCNs have high rates of posttraumatic stress disorder, burnout, anxiety, and depression.<sup>7–9</sup> One study showed a 24% prevalence rate of posttraumatic stress disorder in CCNs, compared with 15% in nurses working in other clinical areas.<sup>7</sup> Regarding burnout, a systematic review of 206 studies of CCNs indicated a prevalence ranging from 6% to 47%.<sup>10</sup> Additional prevalence studies have shown that 23% to 28% of CCNs report anxiety and 15% to 30% experience depression.<sup>7,11</sup> In comparison, the 12-month prevalence rate of depression in the general US population is 10%.<sup>12</sup> The rates of mental health problems in CCNs are expected to increase even further as the COVID-19 pandemic continues to amplify fears about contraction and transmission in addition to inconsistent availability of ventilators and personal protective equipment.<sup>13,14</sup>

Medical errors are the third leading cause of death in the United States, resulting in more than 250 000 deaths per year.<sup>15</sup> Errors occur more frequently in critical care units because of complex patient cases and multiple-system illnesses, which introduce more opportunity for human error.<sup>16</sup> Previous studies have demonstrated positive associations between medical errors and clinician stress, quality of life, burnout, and physical and mental health.<sup>17–20</sup> Few studies have examined these associations in CCNs. The effect of perceived worksite wellness support on CCNs' health and medical error occurrence is also not known. Therefore, the aims of this study were to

(1) describe CCNs' physical and mental health (symptoms of depression, anxiety, stress, and burnout), (2) assess the relationships between CCNs' physical and mental health and medical errors, and (3) examine the association between CCNs' perceptions of worksite wellness support and their physical and mental health.

## Methods

### Design

This study used a cross-sectional, descriptive correlational design. The institutional review board at the study site deemed the study protocol exempt from the need for approval. Data were collected from August 31, 2018, through August 11, 2019.

### Population

A simple random sample of 2500 members of the American Association of Critical-Care Nurses (AACN) was recruited to participate in this study after the entire AACN membership was initially contacted and informed about the opportunity. The study survey was administered through Qualtrics, an online survey software program. An anonymous survey link

was emailed or mailed directly to the AACN members; of the 2500 members contacted, 1139 agreed to participate (response rate, 45.6%). Once the email link or QR code was

activated and before starting the survey, participants provided consent through an online consent form. Data gathered were anonymous and did not have any of the 18 HIPAA (Health Insurance Portability and Accountability Act)<sup>21</sup> privacy rule identifiers. To examine the relationship among CCNs' health, perceived worksite wellness support, and medical errors, we analyzed data only from participants whose primary role was in clinical practice (N = 771).

### Study Measures

Demographic data collected included sex, marital status, ethnic background, number of children in the home, age, educational attainment, and history of chronic illness. Participants also rated their physical and mental health on a scale of 0 to 10, with higher scores representing better health.

The valid and reliable 2-question Patient Health Questionnaire-2 (PHQ-2) was used to screen for depressive symptoms.<sup>22</sup> In this measure, 2 questions are asked about feeling down, depressed, and hopeless

and experiencing an inability to feel pleasure in the past 2 weeks. Participants rated their depressive symptoms using a 4-point Likert-type scale from 0 (not at all) to 3 (nearly every day). The Cronbach  $\alpha$  for the instrument with this sample was 0.76.

The Generalized Anxiety Disorder Questionnaire-2 (GAD-2), a valid and reliable screening tool, was used to screen for symptoms of anxiety.<sup>23</sup> The measure includes questions about the presence of anxiety symptoms (feeling nervous, anxious, or on edge and not being able to stop or control worrying) in the past 2 weeks. Participants rated their anxiety symptoms on a 4-point Likert-type scale with scores ranging from 0 (not at all) to 3 (nearly every day). The Cronbach  $\alpha$  with this sample was 0.74.

The valid and reliable Perceived Stress Scale-4 (PSS-4) is a 4-question instrument used to measure perception of stress.<sup>24,25</sup> The score is generated by calculating the sum of all 4 items, with reverse scoring on 2 of the questions. Higher scores are correlated with higher perceived stress. The Cronbach  $\alpha$  for this sample was 0.65.

Four questions from the Professional Quality of Life Scale (ProQOL) were used to assess burnout: "I feel worn out because of my work"; "I feel trapped by my job"; "I am not as engaged with my patients today as I used to be"; and "I believe I can make a difference through my work."<sup>26,27</sup> Participants rated each item on a Likert-type scale from 1 (never) to 5 (very often). The Cronbach  $\alpha$  with this sample was 0.39 and was improved to 0.78 after we removed the item "I believe I can make a difference through my work."

Perceived workplace wellness support was assessed by asking "How supportive is your work environment of personal wellness?" Participants rated this question using a Likert-type scale that ranged from 0 (not at all) to 4 (very much so).

Medical errors were defined as "preventable adverse effects of care." Participants reported the number of medical errors they had made in the past 5 years. Response options were none, 1 to 2, 3 to 5, or more than 5.

### Statistical Analysis

Descriptive statistics were used to summarize sample characteristics, CCNs' health, and the proportion of nurses having any medical errors in the past 5 years. Bivariate tests (eg,  $\chi^2$  test) were used to examine the associations of nurses' health with medical errors and with workplace wellness support.

For multiple regression analyses, each health measure was analyzed separately and dichotomized as a better or worse health category. Better health

Critical care nurses have high rates of posttraumatic stress disorder, burnout, anxiety, and depression.

categories included better physical health (self-rated physical health score of 6-10), better mental health (self-rated mental health score of 6-10), no symptoms of depression (PHQ-2 score of 0), no symptoms of anxiety (GAD-2 score of 0), no or little stress (PSS-4 score of  $\leq 4$ ), and high professional quality of life (ProQOL-4 score of  $\geq 12$ ). Worse health categories included worse physical health (self-rated physical health score of 0-5), worse mental health (self-rated mental health score of 0-5), presence of depressive symptoms (PHQ-2 score of  $\geq 1$ ), presence of anxiety symptoms (GAD-2 score of  $\geq 1$ ), presence of stress (PSS-4 score of 5-12), and low professional quality of life (ProQOL-4 score of 0-11).

Multiple logistic regression models were used to examine the relationship between CCNs' health (independent variable) and the odds of having made medical errors in the past 5 years (dependent variable), adjusting for covariates (nurses' age, sex, race/ethnicity, marital status, educational degree, and hours of work per day or shift). We also conducted sensitivity analyses treating health measures as continuous variables using multiple logistic regression for the associations of health (independent variable) and multiple linear regression for the associations of workplace support of wellness (independent variable) and health (dependent variable). The reliability of the ProQOL measure improved from 0.39 to 0.78 after the item "I believe I can make a difference through my work" was removed, suggesting that this item did not measure the same underlying construct as the other 3 items of the ProQOL measure. To examine its impact on study findings, we also repeated the analyses after removing the item "I believe I can make a difference through my work" from the ProQOL-4 measure. All of the analyses had similar findings. Therefore, the results are presented primarily by analyzing the health measures as dichotomous variables for ease of understanding. We used SAS version 9.4 (SAS Institute) for all of the analyses.

## Results

### Descriptive Analysis

Of the 771 CCNs whose primary role was clinical practice, the majority were female ( $n = 711$ ; 92.2%), non-Hispanic White ( $n = 643$ ; 83.4%), and married or in a relationship ( $n = 570$ ; 74.0%). The mean (SD) age was 39.9 (12.8) years. More than half ( $n = 440$ ; 57.7%) of the nurses were between 25 and 44 years of age. A total of 101 (13.1%) of the nurses had an associate's degree or diploma, 517 (67.1%) had a bachelor of science in nursing degree, 120 (15.6%) had a master's degree, and 10 (1.3%) had a doctorate.

**Table 1**  
Characteristics of 771 critical care nurses who responded to the survey

Characteristic	No. (%) <sup>a</sup>
Age, years (mean [SD], 39.9 [12.8] y)	
<25	55 (7.2)
25-34	290 (38.1)
35-44	150 (19.7)
45-54	122 (16.0)
55-64	125 (16.4)
$\geq 65$	20 (2.6)
Sex	
Male	60 (7.8)
Female	711 (92.2)
Race/ethnicity	
Non-Hispanic White	643 (83.4)
Non-Hispanic Black	26 (3.4)
Hispanic	3 (0.4)
American Indian/Alaskan Native	46 (6.0)
Asian/Pacific Islander	31 (4.0)
Multiracial/other	22 (2.8)
Marital/relationship status	
Married or in a relationship	570 (74.0)
Never married, divorced, or widowed	200 (26.0)
Degree	
Associate's or diploma	101 (13.1)
Bachelor of science in nursing	517 (67.1)
Master's	120 (15.6)
Doctorate	10 (1.3)
Other	22 (2.9)
Hours of work per day or shift	
<8	3 (0.4)
8	63 (8.2)
9-10	87 (11.3)
11-12	92 (11.9)
>12	526 (68.2)

<sup>a</sup> The percentages are based on nonmissing values. Number and percentage of missing data: age (9, 1.2%), marital/relationship status (1, 0.1%), and degree (1, 0.1%).

A majority ( $n = 705$ ; 91.4%) of the nurses worked more than 8 hours per day, and more than two-thirds of the nurses reported that their typical workday or shift was longer than 12 hours (Table 1).

The CCNs reported suboptimal health, with 470 (61.0%) reporting a physical health score of 5 or lower and 393 (51.0%) reporting a mental health score of 5 or lower (Table 2). A substantial proportion of nurses reported some degree of depressive symptoms ( $n = 304$ ; 39.5%), anxiety symptoms ( $n = 409$ ; 53.2%), and stress ( $n = 325$ ; 42.2%). Only about a third of the nurses ( $n = 307$ ; 39.8%) reported high professional quality of life. Nearly two-thirds (60.9%) of the CCNs reported having made medical errors in the past 5 years. For all of the health measures (physical health, mental health, PHQ-2, GAD-2, PSS-4, and ProQOL-4), the occurrence of medical errors was significantly higher among nurses in worse health than those in the better

**Table 2**  
Associations between critical care nurses' self-reported physical and mental health and the occurrence of medical errors

Characteristic	No. (%) of nurses	Having medical error(s) in the past 5 years	
		%	Adjusted odds ratio (95% CI) <sup>a</sup>
Overall	771 (100)	60.9	Not applicable
Physical health			
0-5	470 (61.0)	63.1	1.31 (0.96-1.78)
6-10 (better)	301 (39.0)	57.5	Reference
Mental health			
0-5	393 (51.0)	65.9	1.49 (1.09-2.04)
6-10 (better)	377 (49.0)	55.7	Reference
PHQ-2			
0 (no depressive symptoms)	466 (60.5)	56.6	Reference
≥1	304 (39.5)	67.7	1.62 (1.17-2.29)
GAD-2			
0 (no anxiety symptoms)	360 (46.8)	55.0	Reference
≥1	409 (53.2)	66.2	1.58 (1.16-2.16)
PSS-4			
0-4 (no/little stress)	446 (57.8)	56.5	Reference
5-12	325 (42.2)	67.0	1.53 (1.18-2.10)
ProQOL-4			
0-11	464 (60.2)	63.2	1.34 (0.98-1.83)
12-16 (high professional QOL)	307 (39.8)	57.5	Reference

Abbreviations: GAD-2, Generalized Anxiety Disorder Questionnaire-2; PHQ-2, Patient Health Questionnaire-2; ProQOL-4, Professional Quality of Life Scale; PSS-4, Perceived Stress Scale-4; QOL, quality of life.

<sup>a</sup> Derived from multiple logistic regression models. Dependent variable was medical error; independent variables were each health measure; covariates were age, sex, race/ethnicity, marital status, degree, and hours of work per day or shift.

health categories. For example, 67.0% of the nurses with higher stress scores versus 56.5% of the nurses with no or little stress reported having made medical errors in the past 5 years.

### Logistic Regression

The association between the nurses' health measures and medical errors was sustained after adjusting for age, sex, race/ethnicity, marital status, education, and hours of work per day or shift. Compared with nurses reporting better health, those with worse health had a 31% (odds ratio [OR], 1.31; 95% CI, 0.96-1.78 for physical health) to 62% (OR, 1.62; 95% CI, 1.17- 2.29 for depressive symptoms) higher likelihood of having made medical errors (Table 2).

The proportion of nurses with better physical health (self-reported physical health score ≥6) increased with higher perceived workplace wellness support: 32.9%, 38.0%, and 55.8% for not at all/a little, somewhat, and very much support, respectively (Table 3). The same trend was also observed for all of the other health measures, including mental health, depressive symptoms, anxiety symptoms, stress, and professional quality of life.

The significant relationship between greater perceived support of wellness and better health held after adjusting for nurses' age, sex, race/ethnicity, marital status, education, and hours of work per day or shift in the multiple logistic regression models. Compared with nurses whose workplaces provided little or no support, those whose workplaces provided greater support for wellness were more than twice as likely to have better personal health, with

**Table 3**  
Relationship between perceived support of worksite wellness and nurses' health

Nurses' health	Perceived support of wellness at the place of employment				
	%			Adjusted odds ratio (95% CI) <sup>a</sup>	
	Not at all/a little (n=234)	Somewhat (n=424)	Very much (n=113)	Very much vs not at all/a little	Somewhat vs not at all/a little
Better physical health	32.9	38.0	55.8	2.16 (1.33-3.52)	1.20 (0.84-1.71)
Better mental health	37.2	50.5	67.3	2.68 (1.62-4.46)	1.61 (1.13-2.28)
No depressive symptoms	50.0	61.1	79.6	3.23 (1.87-5.60)	1.52 (1.08-2.14)
No anxiety symptoms	36.3	45.8	71.7	3.99 (2.38-6.69)	1.38 (0.97-1.94)
No/little stress	48.7	57.8	77.0	3.25 (1.91-5.56)	1.37 (0.98-1.92)
High professional quality of life	20.9	42.2	69.9	8.96 (5.21-15.42)	2.96 (2.00-4.36)

<sup>a</sup> Derived from logistic regression models. Dependent variable was each health measure; independent variable was perceived support of wellness at the place of employment; covariates were age, sex, race/ethnicity, marital status, degree, and hours of work per day or shift.

**Table 4**  
Health measures, analyzed as continuous variables, and their association with having medical errors in the past 5 years

Health measure	Score, mean (SD)			Adjusted odds ratio (95% CI) <sup>a</sup>
	All	No medical error	Having medical error	
Physical health score	6.81 (1.77)	6.92 (1.82)	6.75 (1.74)	0.95 (0.87-1.03)
Mental health score	7.18 (1.91)	7.44 (2.00)	7.01 (1.84)	0.90 (0.82-0.98)
Depressive symptoms (PHQ-2)	0.83 (1.32)	0.73 (1.33)	0.90 (1.31)	1.10 (0.98-1.25)
Anxiety symptoms (GAD-2)	1.18 (1.50)	0.99 (1.40)	1.30 (1.54)	1.15 (1.03-1.28)
Stress (PSS-4)	4.51 (3.15)	4.17 (3.04)	4.73 (3.20)	1.06 (1.01-1.12)
ProQOL	10.13 (3.38)	10.39 (3.65)	9.97 (3.18)	0.96 (0.92-1.01)

Abbreviations: GAD-2, Generalized Anxiety Disorder Questionnaire-2; PHQ-2, Patient Health Questionnaire-2; ProQOL, Professional Quality of Life Scale; PSS-4, Perceived Stress Scale-4.

<sup>a</sup> Estimated from multiple logistic regression models. Dependent variable was medical error; independent variables were each health measure and covariates (age, sex, race/ethnicity, marital status, degree, and hours of work per day or shift).

**Table 5**  
Health measures, analyzed as continuous variables, and their association with perceived worksite wellness support

Health measure	Perceived support of wellness at the place of employment				
	Score, mean (SD)			Coefficient (SE) <sup>a</sup>	
	Not at all/a little	Somewhat	Very much	Somewhat vs not at all/a little	Very much vs not at all/a little
Physical health score	6.46 (1.90)	6.84 (1.68)	7.43 (1.66)	0.35 (0.14) <sup>b</sup>	0.81 (0.20) <sup>c</sup>
Mental health score	6.67 (2.05)	7.24 (1.79)	8.03 (1.74)	0.43 (0.15) <sup>d</sup>	1.06 (0.21) <sup>c</sup>
Depressive symptoms (PHQ-2)	1.18 (1.58)	0.73 (1.12)	0.50 (1.30)	-0.41 (0.11) <sup>c</sup>	-0.54 (0.15) <sup>c</sup>
Anxiety symptoms (GAD-2)	1.57 (1.70)	1.11 (1.39)	0.62 (1.20)	-0.38 (0.12) <sup>d</sup>	-0.81 (0.17) <sup>c</sup>
Stress (PSS-4)	5.29 (3.23)	4.47 (3.09)	3.05 (2.66)	-0.73 (0.25) <sup>d</sup>	-2.02 (0.35) <sup>c</sup>
ProQOL	8.39 (3.50)	10.50 (3.00)	12.36 (2.62)	2.11 (0.25) <sup>c</sup>	3.82 (0.36) <sup>c</sup>

Abbreviations: GAD-2, Generalized Anxiety Disorder Questionnaire-2; PHQ-2, Patient Health Questionnaire-2; ProQOL, Professional Quality of Life Scale; PSS-4, Perceived Stress Scale-4.

<sup>a</sup> Estimated from multiple linear regression models. Dependent variable was each health measure; independent variable was perceived support of wellness at the place of employment and covariates (age, sex, race/ethnicity, marital status, degree, and hours of work per day or shift).

<sup>b</sup>  $P < .05$ .

<sup>c</sup>  $P < .001$ .

<sup>d</sup>  $P < .01$ .

ORs ranging from 2.16 (95% CI, 1.33-3.52) for better physical health to 8.96 (95% CI, 5.21-15.42) for high professional quality of life. Nurses whose workplace provided some support also had higher odds of having better health and professional quality of life compared with those whose workplace provided little or no support after adjusting for other covariates in the model, with ORs ranging from 1.20 (95% CI, 0.84-1.71) for better physical health to 2.96 (95% CI, 2.00-4.36) for high professional quality of life. We found similar associations of health with medical errors (Table 4) and workplace wellness support (Table 5) when analyzing health measures as continuous variables. We also found similar associations in the analyses removing the item "I believe

I can make a difference through my work" from the ProQOL-4 measure.

## Discussion

This study's findings provide support for a strong positive association between suboptimal physical and mental health in CCNs and the occurrence of medical errors. Nearly 40% of CCNs in this study reported some degree of depressive symptoms, and more than 50% reported anxiety symptoms, proportions that are higher than those that have been reported in other studies of CCNs (depression, 23%-31%; anxiety, 18%-20%).<sup>7,9</sup> Unresolved depression can lead to suicidal ideation and action, which have been on the rise and occur at a higher rate in nurses than in the general

population.<sup>28</sup> Therefore, health care leaders need to implement screening programs that detect symptoms of depression in their clinicians so that evidence-based treatment can be made available. One successful program is the HEAR (Healer Education Assessment and Referral) screening program, which provides anonymous online depression screening and treatment referral<sup>28,29</sup> and is patterned after a program developed by the American Foundation for Suicide Prevention.<sup>30</sup> Since its inception, the program has successfully identified a substantial number of suicidal nurses and connected them with treatment options.

A key study finding is that nurses who perceived high levels of wellness support from their organizations were more than twice as likely to have better health than nurses who reported not having supportive worksites. This result was also found in a previous national study.<sup>2</sup> Even nurses who reported their workplaces as only somewhat supportive of wellness had higher odds of better health and professional quality of life.

Although it has been reported that the safest and most efficient means of improving patient safety in critical care is to improve the safety of the medication process,<sup>31</sup> improving the overall well-being of clinicians has begun to be emphasized in the patient safety literature. However, the literature generally focuses on the

health of physicians, rather than nurses, and does not specifically address critical care units.<sup>20</sup> To improve quality and safety, organizations must invest in resources and support that enhance nurses' and other clinicians' overall well-being. Although employers usually understand that health and engagement of clinicians translate into higher levels of productivity, less absenteeism, and lower health care costs owing to less turnover,<sup>2</sup> investment in the overall well-being of clinicians is often not given high priority.

A survey conducted by the American Hospital Association indicated that 90% of hospitals implement employee wellness programs; however, the comprehensiveness of these programs varies greatly.<sup>32</sup> More chief wellness officers have been hired in the past few years following an urgent call to action by the NAM's Action Collaborative on Clinician Well-being.<sup>33</sup> However, most hospitals in the United States still do not invest in the chief wellness officer role or provide the resources to build comprehensive wellness cultures. Evidence-based interventions known

to be effective need to be rapidly translated into clinical settings in order to improve outcomes for nurses and other clinicians. A systematic review of 29 randomized controlled trials that tested interventions designed to improve physician and nurse mental and physical health, well-being, and lifestyle behaviors indicated that mindfulness, cognitive-behavioral therapy-based programs, gratitude practices, and deep breathing are effective in reducing depression, anxiety, and stress.<sup>34</sup> For increasing physical activity, the same study found that visual triggers, pedometers, and health coaching with texting were effective.

Findings from a recent randomized controlled trial with new nurse residents indicated that provision of a manualized cognitive-behavioral skills building program consisting of 8 weekly sessions (entitled MINDBODYSTRONG) resulted in less depression, anxiety, and stress as well as higher job satisfaction.<sup>35,36</sup> These positive outcomes lasted up to 6 months after completion of the program.

Well-being support options also exist for nurses without workplace support. The NAM and the American Nurses Association provide free wellness resources via their Action Collaborative on Clinician Well-being<sup>1</sup> and Well-Being Initiative.<sup>37</sup> The urgent call to action for nurse well-being does not apply solely to industry leaders; of equal importance is nurses' need to prioritize their own self-care. Challenges to self-care do exist and can feel overwhelming<sup>38</sup>; however, a good starting place is engaging in the practice of mindfulness, that is, being present in the current moment and becoming aware of how one responds to a situation without applying judgment to it.<sup>39</sup> Self-care also includes seeking professional help when functioning becomes challenging. When seeking professional help, finding a therapist who practices cognitive-behavioral therapy is recommended, as this type of treatment is considered the criterion standard for anxiety and depression.<sup>40,41</sup>

The major implication of this study's findings for hospital leaders and policy makers is that CCNs whose well-being is supported by their organizations are more likely to be fully engaged in patient care and make fewer medical errors, resulting in better patient outcomes and more lives saved. It is also important to note that this study was conducted before the COVID-19 outbreak in the United States. Therefore, current levels of depression, anxiety, and stress in CCNs are likely to be higher than indicated by our study results. Critical care nurses' ability to provide optimal care during these extraordinary times is linked to hospitals' ability to build and sustain wellness cultures and provide solutions to long-standing systemic problems that contribute to burnout, stress, and

CCNs who perceived high levels of wellness support from their organizations were twice as likely to have better health.

depression, such as short staffing, electronic health record issues, and 12-hour shifts.<sup>42</sup>

## Limitations

The first limitation of this study is the cross-sectional design. Although findings showed that CCNs with worse self-reported health had a higher likelihood of reporting medical errors compared with nurses with better health, causality cannot be inferred. Additionally, the type of medical error was not measured; thus the seriousness of the error is unknown. Another limitation is recall bias, as the study relied on self-reporting for medical errors. However, self-reporting is a common approach to assessing medical errors and has been used in previous studies.<sup>43</sup> Some researchers have recommended using objective measures of medical errors<sup>44</sup>; however, these may not be accurate owing to clinician underreporting influenced by concerns about negative consequences.<sup>45,46</sup> Use of an anonymous survey removed some of these concerns. The final limitation is that only CCNs were studied, so the results cannot be generalized to the entire US nurse population.

Sensitivity analyses showed similar associations of health with medical errors and workplace wellness support, suggesting that our study findings were robust. Another study strength was the simple random sampling used, which increases the external validity of the study. Our sample's demographics (sex, race, age, and level of education) were similar to those found in the 2018 AACN nurse work environment survey.<sup>47</sup>

## Conclusion

This study addresses a gap in the literature by providing evidence that CCNs' perception of worksite wellness support is related to their physical and mental health as well as the number of preventable medical errors made. Health care leaders must prioritize the overall well-being of their nurses and other clinicians by fixing system issues known to cause burnout (eg, long shifts, poor staffing ratios), creating wellness cultures, and providing evidence-based wellness programming, which will ultimately optimize health care quality and patient safety.

## ACKNOWLEDGMENTS

This work was performed at The Ohio State University in collaboration with the AACN. The work was conducted by members of the American Academy of Nursing's Million Hearts Sub-Committee of the Health Behavior Expert Panel. We would like to acknowledge Marian Altman, PhD, RN, CCRN-K, CNS, ANP, Connie Barden, MSN, RN, CNS, CCRN-K, CCNS, Virginia Hill Rice, PhD, RN, CS, FAAN, and the AACN for collaborating with us on this study.

## FINANCIAL DISCLOSURES

None reported.

## SEE ALSO

For more about critical care nurses' work environments, visit the *Critical Care Nurse* website, [www.ccnonline.org](http://www.ccnonline.org), and read the article by Ulrich et al, "Critical Care Nurse Work Environments 2018: Findings and Implications" (April 2019).

## REFERENCES

1. National Academy of Medicine. Action Collaborative on Clinician Well-being and Resilience. National Academy of Sciences. Published 2016. Updated 2020. Accessed June 19, 2020. <https://nam.edu/initiatives/clinician-resilience-and-well-being>
2. Melnyk BM, Orsolini L, Tan A, et al. A national study links nurses' physical and mental health to medical errors and perceived worksite wellness. *J Occup Environ Med*. 2018; 60(2):126-131. doi:10.1097/JOM.0000000000001198
3. Donchin Y, Seagull FJ. The hostile environment of the intensive care unit. *Curr Opin Crit Care*. 2002;8(4):316-320. doi:10.1097/00075198-200208000-00008
4. Jensen HI, Larsen JW, Thomsen TD. The impact of shift work on intensive care nurses' lives outside work: a cross-sectional study. *J Clin Nurs*. 2018;27(3-4):e703-e709. doi:10.1111/jocn.14197
5. Pryce C. Impact of shift work on critical care nurses. *Can J Crit Care Nurs*. 2016;27(4):17-21.
6. Yan P, Yang Y, Zhang L, et al. Correlation analysis between work-related musculoskeletal disorders and the nursing practice environment, quality of life, and social support in the nursing professionals. *Medicine (Baltimore)*. 2018;97(9):e0026. doi:10.1097/MD.00000000000010026
7. Mealer ML, Shelton A, Berg B, Rothbaum B, Moss M. Increased prevalence of post-traumatic stress disorder symptoms in critical care nurses. *Am J Respir Crit Care Med*. 2007;175(7):693-697. doi:10.1164/rccm.200606-735OC
8. Mealer M, Burnham EL, Goode CJ, Rothbaum B, Moss M. The prevalence and impact of post traumatic stress disorder and burnout syndrome in nurses. *Depress Anxiety*. 2009; 26(12):1118-1126. doi:10.1002/da.20631
9. Karanikola M, Giannakopoulou M, Mpouzika M, Kaite CP, Tsiaousis GZ, Papathanassoglou EDE. Dysfunctional psychological responses among intensive care unit nurses: a systematic review of the literature. *Rev Esc Enferm USP*. 2015;49(5):847-857. doi:10.1590/S0080-623420150000500020
10. Chuang CH, Tseng PC, Lin CY, Lin KH, Chen YY. Burnout in the intensive care unit professionals: a systematic review. *Medicine (Baltimore)*. 2016;95(50):e5629. doi:10.1097/MD.0000000000005629
11. Janda R, Jandová E. Symptoms of posttraumatic stress disorder, anxiety and depression among Czech critical care and general surgical and medical ward nurses. *J Res Nurs*. 2015; 20(4):298-309.
12. Hasin DS, Sarvet AL, Meyers JL, et al. Epidemiology of adult DSM-5 major depressive disorder and its specifiers in the United States. *JAMA Psychiatry*. 2018;75(4):336-346. doi:10.1001/jamapsychiatry.2017.4602
13. Xie J, Tong Z, Guan X, Du B, Qiu H, Slutsky AS. Critical care crisis and some recommendations during the COVID-19 epidemic in China. *Intensive Care Med*. 2020;46(5):837-840. doi:10.1007/s00134-020-05979-7
14. Lai J, Ma S, Wang Y, et al. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Netw Open*. 2020;3(3):e203976. doi:10.1001/jamanetworkopen.2020.3976
15. Makary MA, Daniel M. Medical error—the third leading cause of death in the US. *BMJ*. 2016;353:i2139. doi:10.1136/bmj.i2139
16. Boyle D, O'Connell D, Platt FW, Albert RK. Disclosing errors and adverse events in the intensive care unit. *Crit Care Med*. 2006;34(5):1532-1537. doi:10.1097/01.CCM.0000215109.91452.A3
17. Brunsberg KA, Landrigan CP, Garcia BM, et al. Association of pediatric resident physician depression and burnout with harmful medical errors on inpatient services. *Acad Med*. 2019;94(8):1150-1156. doi:10.1097/ACM.00000000000002778
18. Hall LH, Johnson J, Watt I, Tsipa A, O'Connor DB. Healthcare staff wellbeing, burnout, and patient safety: a systematic review. *PLoS One*. 2016;11(7):e0159015. doi:10.1371/journal.pone.0159015
19. Rainbow JG, Drake DA, Steege LM. Nurse health, work environment, presenteeism and patient safety. *West J Nurs Res*. 2020;42(5):332-339. doi:10.1177/0193945919863409



20. Tawfik DS, Proffit J, Morgenthaler TI, et al. Physician burnout, well-being, and work unit safety grades in relationship to reported medical errors. *Mayo Clin Proc.* 2018;93(11):1571-1580. doi:10.1016/j.mayocp.2018.05.014
21. Health Insurance Portability and Accountability Act of 1996. Pub Law No. 104-191, 110 Stat 1936 (August 21, 1996).
22. Kroenke K, Spitzer RL, Williams JBW, Löwe B. The Patient Health Questionnaire somatic, anxiety, and depressive symptom scales: a systematic review. *Gen Hosp Psychiatry.* 2010;32(4):345-359. doi:10.1016/j.genhosppsych.2010.03.006
23. Kroenke K, Spitzer RL, Williams JBW, Monahan PO, Löwe B. Anxiety disorders in primary care: prevalence, impairment, comorbidity, and detection. *Ann Intern Med.* 2007;146(5):317-325. doi:10.7326/0003-4819-146-5-200703060-00004
24. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Soc Behav.* 1983;24(4):385-396.
25. Andreou E, Alexopoulos EC, Lionis C, et al. Perceived Stress Scale: reliability and validity study in Greece. *Int J Environ Res Public Health.* 2011;8(8):3287-3298. doi:10.3390/ijerph8083287
26. Stamm BH. *The Concise ProQOL Manual.* 2nd ed. Professional Quality of Life Measure. Published 2010. Accessed June 22, 2020. [https://proqol.org/ProQOL\\_Test\\_Manuals.html](https://proqol.org/ProQOL_Test_Manuals.html)
27. Shen J, Yu H, Zhang Y, Jiang A. Professional quality of life: a cross-sectional survey among Chinese clinical nurses. *Nurs Health Sci.* 2015;17(4):507-515. doi:10.1111/nhs.12228
28. Davidson JE, Proudfoot J, Lee K, Terterian G, Zisook S. A longitudinal analysis of nurse suicide in the United States (2005-2016) with recommendations for action. *Worldviews Evid Based Nurs.* 2020;17(1):6-15. doi:10.1111/wvn.12419. Published correction appears in *Worldviews Evid Based Nurs.* 2020;17(2):180.
29. Davidson JE, Accardi R, Sanchez C, Zisook S, Hoffman LA. Sustainability and outcomes of a suicide prevention program for nurses. *Worldviews Evid Based Nurs.* 2020;17(1):24-31. doi:10.1111/wvn.12418. Published correction appears in *Worldviews Evid Based Nurs.* 2020;17(2):179.
30. Garlow SJ, Rosenberg J, Moore JD, et al. Depression, desperation, and suicidal ideation in college students: results from the American Foundation for Suicide Prevention College Screening Project at Emory University. *Depress Anxiety.* 2008;25(6):482-488. doi:10.1002/da.20321
31. Moyer E, Camiré E, Stelfox HT. Clinical review: medication errors in critical care. *Crit Care.* 2008;12(2):208. doi:10.1186/cc6813
32. American Hospital Association/Health Research & Educational Trust. Health and Wellness Programs for Hospital Employees: Results From a 2015 American Hospital Association Survey. Published 2016. Accessed June 22, 2020. <http://www.hpoe.org/resources/aharet-guides/2987>
33. Kishore S, Ripp J, Shanafelt T, et al. Making the case for the chief wellness officer in America's health systems: a call to action. Health Affairs blog. October 26, 2018. Accessed June 19, 2020. <https://www.healthaffairs.org/doi/10.1377/hblog20181025.308059/full/>
34. Melnyk BM, Kelly SA, Stephens J, et al. Interventions to improve mental health, well-being, physical health, and lifestyle behaviors in physicians and nurses: a systematic review. *Am J Health Promot.* 2020;34(8):929-941. doi:10.1177/0890117120920451
35. Sampson M, Melnyk BM, Hoying J. The MINDBODYSTRONG intervention for new nurse residents: 6-month effects on mental health outcomes, healthy lifestyle behaviors, and job satisfaction. *Worldviews Evid Based Nurs.* 2020;17(1):16-23. doi:10.1111/wvn.12411
36. Sampson M, Melnyk BM, Hoying J. Intervention effects of the MINDBODYSTRONG cognitive behavioral skills building program on newly licensed registered nurses' mental health, healthy lifestyle behaviors, and job satisfaction. *J Nurs Adm.* 2019;49(10):487-495. doi:10.1097/NNA.0000000000000792
37. American Nurse Association Enterprise. Well-Being Initiative website. Accessed September 23, 2020. <https://www.nursingworld.org/practice-policy/work-environment/health-safety/disaster-preparedness/coronavirus/what-you-need-to-know/the-well-being-initiative>
38. Riegel B, Dunbar SB, Fitzsimons D, et al. Self-care research: where are we now? where are we going? *Int J Nurs Stud.* Published online August 23, 2019. doi:10.1016/j.ijnurstu.2019.103402
39. Halm M. The role of mindfulness in enhancing self-care for nurses. *Am J Crit Care.* 2017;26(4):344-348. doi:10.4037/ajcc2017589
40. David D, Cristea I, Hofmann SG. Why cognitive behavioral therapy is the current gold standard of psychotherapy. *Front Psychiatry.* 2018;9:4. doi:10.3389/fpsy.2018.00004
41. Hofmann SG, Asnaani A, Vonk IJ, Sawyer AT, Fang A. The efficacy of cognitive behavioral therapy: a review of meta-analyses. *Cognit Ther Res.* 2012;36(5):427-440. doi:10.1007/s10608-012-9476-1
42. Health Policy Institute of Ohio, The Ohio State University College of Nursing, Helene Fuld Health Trust National Institute for Evidence-Based Practice in Nursing and Healthcare. A Call to Action: Improving Clinician Wellbeing and Patient Care and Safety. Published February 2020. Accessed June 22, 2020. <http://www.hpio.net/a-call-to-action>
43. Yung HP, Yu S, Chu C, Hou IC, Tang FI. Nurses' attitudes and perceived barriers to the reporting of medication administration errors. *J Nurs Manag.* 2016;24(5):580-588. doi:10.1111/jonm.12360
44. Dyrbye LN, Shanafelt TD, West CP. Clarifications needed on study of association between physician burnout and patient safety. *JAMA Intern Med.* 2019;179(4):593. doi:10.1001/jamainternmed.2019.0149
45. Bass K, McGeeney K. U.S. physicians set good health example. Gallup. Published October 3, 2012. Accessed June 22, 2020. <https://news.gallup.com/poll/157859/physicians-set-good-health-example.aspx>
46. Letvak S, Ruhm CJ, McCoy T. Depression in hospital-employed nurses. *Clin Nurse Spec.* 2012;26(3):177-182. doi:10.1097/NUR.0b013e3182503ef0
47. Ulrich B, Barden C, Cassidy L, Varn-Davis N. Critical care nurse work environments 2018: findings and implications. *Crit Care Nurse.* 2019;39(2):67-84. doi:10.4037/ccn201960

To purchase electronic or print reprints, contact American Association of Critical-Care Nurses, 27071 Aliso Creek Road, Aliso Viejo, CA 92656. Phone, (800) 899-1712 or (949) 362-2050 (ext 532); fax, (949) 362-2049; email, [reprints@aacn.org](mailto:reprints@aacn.org).



### Notice to CE enrollees:

This article has been designated for CE contact hour(s). The evaluation demonstrates your knowledge of the following objectives:

1. Identify the relationships among critical care nurses' health, perceived wellness support, and medical errors.
2. Describe how hospital/health care system leaders can improve nurses' health and well-being and reduce errors in critical care units.
3. Discuss evidence-based interventions that are effective in reducing nurses' depression, anxiety, and stress.

To complete the evaluation for CE contact hour(s) for this article #A21504, visit [www.ajconline.org](http://www.ajconline.org) and click the "CE Articles" button. No CE evaluation fee for AACN members. This expires on May 1, 2023.

The American Association of Critical-Care Nurses is accredited as a provider of nursing continuing professional development by the American Nurses Credentialing Center's Commission on Accreditation, ANCC Provider Number 0012. AACN has been approved as a provider of continuing education in nursing by the California Board of Registered Nursing (CA BRN), CA Provider Number CEP1036, for 1.0 contact hour.