



CRITICAL CARE NURSE BURNOUT IN VETERANS HEALTH ADMINISTRATION: RELATION TO CLINICIAN AND PATIENT OUTCOMES

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Background Critical care nurses have a burnout rate among the highest of any nursing field. Nurse burnout may impact care quality. Few studies have considered how temporal patterns may influence outcomes.

Objective To test a longitudinal model of burnout clusters and associations with patient and clinician outcomes.

Methods An observational study analyzed data from annual employee surveys and administrative data on patient outcomes at 111 Veterans Health Administration intensive care units from 2013 through 2017. Site-level burnout rates among critical care nurses were calculated from survey responses about emotional exhaustion and depersonalization. Latent trajectory analysis was applied to identify clusters of facilities with similar burnout patterns over 5 years. Regression analysis was used to analyze patient and employee outcomes by burnout cluster and organizational context measures. Outcomes of interest included patient outcomes (30-day standardized mortality rate and observed minus expected length of stay) for 2016 and 2017 and clinician outcomes (intention to leave and employee satisfaction) from 2013 through 2017.

Results Longitudinal analysis revealed 3 burnout clusters among the 111 sites: low ($n=37$), medium ($n=68$), and high ($n=6$) burnout. Compared with sites in the low-burnout cluster, those in the high-burnout cluster had longer patient stays, higher employee turnover intention, and lower employee satisfaction in bivariate models but not in multivariate models.

Conclusions In this multiyear, multisite study, critical care nurse burnout was associated with key clinician and patient outcomes. Efforts to address burnout among nurses may improve patient and employee outcomes. (*American Journal of Critical Care*. 2021;30:435-442)

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Burnout is a maladaptive response to persistent work-related stress that is characterized by feelings of emotional exhaustion, depersonalization or cynicism, and lack of personal achievement.¹ In recent years, a growing body of literature has drawn attention to the high prevalence of burnout among health care workers and the pervasive health system factors that perpetuate the burnout crisis.^{2,3}

Increasingly, clinicians and clinical leaders are advocating for organizational changes to mitigate burnout and promote clinician well-being.⁴ A key step in this advocacy is being able to identify and communicate the impact of burnout on patients, clinicians, and health systems.⁵ Studies that examine longitudinal data and include multiple medical centers would support these efforts.

Nurses working in the intensive care unit (ICU) can be particularly susceptible to burnout because they deal with many complex patient care challenges

and need to navigate multidisciplinary relationships at work. Nurses in the ICU must cope with dying patients, moral distress, and perceived delivery of inappropriate care.^{6,7} Approximately a third to half of nurses have symptoms of burnout.⁸⁻¹⁰ Because of their essential

role on the front lines of delivering care, burnout in ICU nurses may be a major driver of poor patient outcomes. A meta-analytic review identified burnout as a risk to patient satisfaction and patient

safety.¹¹ In a cross-sectional study, nurse burnout was associated with higher ICU mortality and longer patient stays.¹² In addition to its impact on patients, burnout can have devastating consequences for clinicians themselves, causing higher rates of depression, substance abuse, and suicide.¹³⁻¹⁵ Burnout also contributes to substantial health system costs because of burnout-related turnover and recruitment challenges.^{16,17} The Veterans Health Administration (VA) is one of the largest integrated health care systems in the United States. Nursing staff shortages are common across the VA partly because of high turnover and difficulties with recruitment,¹⁸ concerns likely relevant to other organizations as well. Our previous work confirmed high rates of burnout among VA critical care nurses.¹⁹

A major gap in the literature is that most studies have focused on burnout at the individual level, with less attention directed to the site-level impact of burnout across multiple facilities. Additionally, few studies have accounted for variation in burnout in relation to outcomes over time.²⁰ This information is critical for establishing the impact of burnout on important outcomes and revealing areas in which actions to reverse negative trends can be taken. Understanding the relationships between levels of burnout in the workforce and patient outcomes could provide valuable evidence that directs ICU improvement efforts, which may be particularly salient during the COVID-19 pandemic.^{21,22}

Our research aims were to perform a site-level analysis of longitudinal burnout among critical care nurses and to determine the association of burnout with key outcomes over multiple years. We hypothesized that sites with higher levels of burnout over time would have worse performance on patient outcomes such as length of stay and mortality and on the clinician outcomes of intention to leave and employee satisfaction.

Methods

Study Design

We conducted a facility-level longitudinal study of self-reported survey data combined with internally collected risk-adjusted performance measures to identify relationships between burnout patterns and patient and employee outcomes. Our study

Nurses working in intensive care units can be susceptible to burnout.

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population included ICU registered nurses in the VA from 2013 through 2017. The institutional review board at VA Boston Healthcare System approved the study protocol.

Participants

Data from nurses were obtained from the All-Employee Survey (AES). The AES is an anonymous and confidential census survey conducted annually in the VA since 2006. The survey offers employees' perspectives about working conditions.²³ Data from the AES were collected primarily (>95%) through online surveys in June of each calendar year from 2013 through 2017. The response rate ranged from 56.1% to 60.3% each year. To identify survey responses from ICU nurses for our study sample, we examined self-reported responses about occupation and responses to the question "What is the main type of service provided?" wherein we included respondents selecting "intensive care unit—critical care." We aggregated data to the site level for each year with at least 5 respondents.

Study Measures

Our independent variable of interest was derived from self-reported measures of burnout on the AES. We identified burnout on the basis of 2 single-item statements about depersonalization ("I worry that this job is hardening me emotionally") and/or emotional exhaustion ("I feel burned out from my work") from the Maslach Burnout Inventory.²⁴ Responses were reported on a 7-level frequency scale ranging from "never" to "every day." A respondent who reported having either of the 2 experiences once a week or more frequently was considered to be experiencing burnout.²⁵ This coding approach has been evaluated and validated against the full set of items in the depersonalization and emotional exhaustion domains from the complete Maslach Burnout Inventory.^{26,27}

Patient Outcomes

Patient outcomes included facility-level observed minus expected length of stay and the standardized 30-day mortality rate for ICUs; for these outcomes we used data from 2016 and 2017. The standardized 30-day mortality rate is computed by dividing the number of observed deaths within 30 days of hospital admission by the number of deaths predicted to occur. The predicted value is risk adjusted in a multivariate model by using individual patient characteristics, diagnoses, physiological variables, and length of stay.^{28,29} Values of less than 1 indicate that there were fewer deaths than predicted (ie, preferred

values), and values greater than 1 indicate that there were more deaths than predicted.

The observed minus expected length of stay is exactly what it says. The expected value is obtained via a method similar to that used for the predicted 30-day mortality rate and then subtracted from the observed (ie, actual) length of stay. Values of less than 0 indicate that the overall observed length of stay in a unit was less than expected (ie, preferred values), and values greater than 0 indicate that the length of stay was greater than expected. Data for both measures were provided only at the summative level by the Inpatient Evaluation Center within the VA Office of Analytics and Performance Integration under the Office of Quality and Patient Safety.

Outcomes included employee satisfaction and intent to leave and adjusted patient length of stay and 30-day mortality.

Clinician Outcomes

Clinician outcomes included turnover intention and the best places to work index, which were reported in the VA AES from 2013 through 2017. To identify turnover intention, we used responses to the statement "I plan to leave my job within the next 6 months." Responses were reported on a 5-point scale; lower scores indicated less agreement. The best places to work index is a weighted score ranging from 0 to 1, computed for each employee and averaged for each site on the basis of 3 AES items that ask about overall satisfaction, organizational satisfaction, and organizational commitment.³⁰

Covariates

We included covariates to account for variation in site-level characteristics. Measures included the number of respondents per site and whether a site had Magnet recognition, which reflects a focus on developing and retaining nurses.³¹ We used the VA system approach for classifying ICUs as basic, moderate, or complex. The site-level classification system is adapted from the private sector and takes into account the availability of subspecialists, pharmacy, diagnostic and therapeutic radiologic procedures, and laboratory services.³² We included academic teaching affiliation and US census region. We adjusted for time-based changes in outcomes by including fixed effects by year.

Statistical Analysis

We characterized burnout clusters by using a site-level analysis of burnout rates for 5 years according

Table 1
Descriptive statistics for critical care nurse burnout clusters per year (N=111 medical centers)

Study year	Burnout rate in each burnout cluster, ^a mean (SD)		
	Low (n=37)	Medium (n=68)	High (n=6)
2013	17.9 (15.4)	36.0 (18.7)	63.6 (9.7)
2014	19.5 (17.0)	34.0 (15.1)	47.3 (20.9)
2015	20.4 (14.1)	36.6 (14.3)	53.6 (18.6)
2016	17.9 (11.3)	39.0 (12.4)	64.4 (19.8)
2017	19.0 (17.0)	38.7 (15.3)	67.4 (6.4)

^a Percentage of nurses meeting criteria for burnout.

to data from the VA AES. Clusters are used to help represent a latent class reflecting common patterns among measured variables. We used latent growth curve models estimated in Mplus software (Muthén & Muthén) to create facility burnout clusters that remained consistent over time.³³ Change in burnout was modeled as a function of time through specification of a latent variable, providing an estimate of the average trajectory and variation over time.³⁴ Full-information maximum likelihood was applied for missing data. We first tested a 1-class solution, then gradually increased to 5 classes to assess model fit. We evaluated and selected the best-fitting solution based on model comparison tools for a variety of fit statistics: Bayesian information criterion, bootstrapped χ^2 test, entropy, Lo-Mendell-Rubin likelihood ratio test, and Vuong-Lo-Mendell-Rubin likelihood ratio test.³⁵⁻³⁷

We used χ^2 tests and analysis of variance to characterize ICU nurse burnout clusters by site-level variables. We then conducted multivariate generalized linear regression, while controlling for covariates,

to assess the relationship between burnout clusters and patient and clinician outcomes. We also examined whether patient outcomes were associated with burnout. Statistical analyses were performed with

a general least-squares random-effects model with robust standard errors using Stata software, release 15 (StataCorp LLC).

Results

We included a mean of 23.44 survey respondents from the 111 VA medical centers for each year of the study. After testing several variations for classes and examining model fit statistics across all sites for 5 years, we selected a final model with 3 latent variable classes to describe site-level ICU registered nurse burnout trajectories on the basis of a variety of fit

statistics. Given the observed patterns, we categorized the 111 medical centers into 3 burnout clusters: low burnout (n = 37), medium burnout (n = 68), and high burnout (n = 6). We computed the mean (SD) burnout rates among sites for each year (Table 1). The mean percentages of nurses reporting burnout across 5 years were 19.2%, 37.0%, and 59.3% in the low-burnout, medium-burnout, and high-burnout clusters, respectively.

In bivariate analysis, burnout clusters were associated with several site-level characteristics (Table 2). We found a significant association between burnout cluster and geographic location ($P = .02$), with more sites in the high-burnout cluster located in the western United States. We also found ordered differences in best places to work index ($P < .001$) and turnover intention ($P < .001$); sites in the low-burnout cluster had more favorable scores.

In a multivariate model, neither complexity, standardized 30-day mortality rate, nor the observed minus expected length of stay was associated with burnout. Magnet status was negatively associated with burnout (-0.12 ; $P = .01$). Employee satisfaction was lowest at sites in the high-burnout (-0.39 percentage points) and medium-burnout (-0.14 percentage points) clusters (Table 3). Turnover intention also showed an ordered effect, with significantly higher intention-to-leave scores in the high-burnout (0.58 percentage points, $P < .01$) and medium-burnout (0.18 percentage points, $P < .01$) clusters than in the low-burnout cluster. Compared with sites in the low-burnout cluster, sites in the high-burnout cluster had a higher observed minus expected length of stay (0.45 standardized units, $P < .01$).

Discussion

In this nationwide study of burnout among ICU registered nurses over time, sites in the high-burnout cluster had longer than expected risk-adjusted lengths of stay, unlike sites in the low-burnout cluster. Burnout may affect length of stay through several potential mechanisms leading to worse quality and safety, which can delay recovery. Specifically, burnout may contribute to inefficiency that delays discharge planning.³⁸ Burnout has been reported to contribute to greater use of workarounds³⁹ and care left undone,⁴⁰ which could lead to higher infection rates⁴¹ and prolonged stays.⁴² Further, burned-out clinicians may experience problems engaging with families of critically ill patients, delaying important discussions on care planning for patients.⁴³ Perceived use of non-beneficial treatments, unnecessary diagnostic tests, or delayed end-of life decisions may increase burnout⁴⁴ and lead to longer stays. Although our analysis

Three longitudinal profiles emerged for low-, medium-, and high-burnout medical centers.

Table 2
Site characteristics and outcomes of interest among medical centers in each burnout cluster pooled from 2013 through 2017

Characteristic or outcome	Burnout cluster			P ^a
	Low (n=37)	Medium (n=68)	High (n=6)	
Characteristic				
No. of nurse respondents, mean (SD)	23.35 (17.47)	23.93 (23.10)	18.41 (13.88)	.26
ICU complexity, No. (%) of medical centers				.07
Highest	15 (41)	38 (56)	1 (17)	
Moderate	6 (16)	12 (18)	3 (50)	
Lowest	16 (43)	16 (24)	2 (33)	
Magnet status, No. (%) of medical centers	3 (8)	1 (1)	0 (0)	.20
Teaching affiliation, No. (%) of medical centers	21 (57)	47 (69)	2 (40)	.24
Region, No. (%) of medical centers				.02
Midwest	9 (24)	15 (22)	0 (0)	
Northeast	11 (30)	5 (7)	2 (33)	
South	13 (35)	31 (46)	1 (17)	
West	4 (11)	17 (25)	3 (50)	
Urban, No. (%) of medical centers	37 (100)	59 (87)	5 (83)	.56
Outcome score, mean (SD)				
Best places to work	0.70 (0.18)	0.54 (0.19)	0.33 (0.17)	<.001
Turnover intention	1.98 (0.48)	2.23 (0.44)	2.63 (0.42)	<.001
Observed minus expected length of stay	-0.02 (0.62)	-0.10 (0.54)	0.26 (0.37)	.09
Standardized 30-day mortality rate	1.02 (0.23)	1.00 (0.20)	0.96 (0.08)	.60

Abbreviation: ICU, intensive care unit.

^a P values reflect results of χ^2 tests for ICU complexity, Magnet status, teaching affiliation, region, and urban/rural variables and of 1-way analysis of variance for nurse respondent measure and all outcome measures.

did not find that site-level burnout was associated with mortality, length of stay, or ICU complexity, further research is warranted to investigate these potential causal mechanisms that could link burnout to longer stays.

Our finding that burnout cluster was associated with lower employee satisfaction and intention to leave at the site level is consistent with the results of individual-level research.⁴⁵ Further work could consider the role of mediating factors such as organizational climate and leadership. Organizational climate is an important risk factor for burnout and may influence job satisfaction and intention to leave.⁴⁶⁻⁴⁸ Additional work, such as qualitative investigations, to understand organizational climate and leadership style exhibited among units with high and low levels of burnout may yield insights that could guide future interventional studies.

To address potential detrimental effects of burnout on care quality and clinician outcomes, health systems may invest in solutions to promote clinician well-being.⁴⁹ Emerging evidence suggests that organizational solutions (eg, schedule management, clinician autonomy)⁵⁰ may be more effective than individual solutions (eg, gardens, mindfulness interventions, stress management)⁵¹⁻⁵³ and could guide

Table 3
Association of burnout cluster with clinician and patient outcomes in multivariate regression analysis^a

Burnout cluster	Best places to work ^b	Turnover intention ^c	SMR-30 ^d	OMELOS ^e
Intercept	0.70 (0.03) ^f	1.82 (0.08) ^f	1.03 (0.05) ^f	0.20 (0.14) ^g
High	-0.39 (0.05) ^f	0.58 (0.13) ^f	-0.10 (0.06)	0.45 (0.15) ^f
Medium	-0.14 (0.03) ^f	0.18 (0.06) ^f	-0.03 (0.04)	-0.04 (0.13)
Low (reference)				

Abbreviations: ICU, intensive care unit; SMR-30, standardized 30-day mortality rate; OMELOS, observed minus expected length of stay.

^a Model controls for ICU complexity, Magnet recognition, teaching affiliation, geographic region, and year.

^b Values could range from 0 to 1.

^c Values could range from 1 to 5.

^d Value could be greater than 0; higher values indicate more mortality than expected.

^e Values less than 0 indicate length of stay lower than expected; values greater than 0 indicate length of stay higher than expected.

^f P<.001; robust standard error in parentheses

^g P=.04.

health system responses. Organizational and leadership support for such practices will be important for success.^{54,55}

Our findings highlight 3 patterns of burnout that tend to be stable over time: low, medium, and high. The sites in the high-burnout cluster are particularly

important given that more than half of the nurses at these sites may be experiencing burnout. Understanding local field conditions at these sites would be an important starting point for learning about unique and shared-site issues of high-burnout sites. It is important for health systems to monitor burnout because of the negative impacts on outcomes analyzed in this study. The high-stress situations in the ICU that have materialized during the COVID-19 pandemic underscore the importance of monitoring burnout.^{56,57}

Limitations

We used a dichotomous definition of burnout with 2 single-item questions from the Maslach Burnout Inventory. Although this approach has been validated against the comprehensive Maslach Burnout

Inventory, it may not describe the full spectrum of clinician experiences.²⁵ Because of the anonymous and confidential nature of the survey, we were unable to track respondents over time and instead relied on site-level estimates. Although our overall response rate was relatively large, the number of respondents at

some of the ICUs was smaller than preferred, which could reflect the size and complexity of the unit as well as interest in responding to the survey.

Without interview and observational data, we also were unable to evaluate differences in contextual factors, such as staffing and specialization, between the ICUs. Intensive care unit factors such as end-of-life care, ethical issues, and bearing witness to trauma may also play a significant role in the development of burnout but were not addressed in this investigation. Although we had 5 years of data for burnout and organizational characteristics, our ICU mortality and length of stay outcomes data were limited to 2 years. Our outcome measures were based on an observed-to-expected model with aggregate values reported. Whether certain patient types may affect burnout more than others is unclear; for example, patients receiving mechanical ventilation may be more challenging to care for and may lead to greater burnout. Although we partially accounted for patient type by including complexity as a covariate, we lacked individual patient measures for refined analysis. We used summative measures to represent clinical outcomes; our data sources did not include the number of events, eligible patients, or unadjusted prevalence ratios. These data could provide a focus

for future research to examine patient-level analyses. We did not account for the balance between supply and demand characteristics, which may be important to understand ICU capacity strain.^{58,59} Thus, unmeasured factors, such as workload, may be important confounders. Our study also focused specifically on registered nurses to minimize the variation in professional roles observed in other studies,⁶⁰ but examining other occupations may offer valuable insights. Although we assessed turnover intention, ascertaining the reasons for wanting to leave would be important for understanding whether work-related factors, personal factors, or a combination of factors contributed to nurse ratings. The study was conducted in the VA, so the results may not be generalizable outside this setting.

Although our study examined clinical data that predated the COVID-19 pandemic, we believe that our findings may have additional relevance to current care delivery. At the time of writing the manuscript, research on the negative effects of COVID-19 on burnout was just being reported and newer research also seems to corroborate those early findings. Our study suggests that greater levels of burnout in ICUs may negatively impact employee outcomes, including turnover. This information could be particularly salient during the COVID-19 pandemic as health systems have struggled to maintain adequate staffing.

Conclusion

The results of our multiyear study emphasize the importance of nurse burnout clusters on employee morale and ICU length of stay, findings that may impact health care delivery in multiple ways. Organizational leaders should work closely with staff members to improve the work environment and mitigate the strain on frontline clinicians. It is important to recognize the ever-present risk of burnout in health care workers, given the intricate nature and demands of their work. Emotionally and physically exhausted clinicians can be hampered in delivering optimal care.

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SEE ALSO

For more about burnout of critical care nurses, visit the *AACN Advanced Critical Care* website, www.aacnac-online.org, and read the article by Howell, "Battling Burnout at the Frontlines of Health Care Amid COVID-19" (Summer 2021).

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