

# Safety Organizing, Emotional Exhaustion, and Turnover in Hospital Nursing Units

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**Context:** Prior research has found that safety organizing behaviors of registered nurses (RNs) positively impact patient safety. However, little research exists on how engaging in safety organizing affects caregivers.

**Objectives:** While we know that organizational processes can have divergent effects on organizational and employee outcomes, little research exists on the effects of pursuing highly reliable performance through safety organizing on caregivers. Specifically, we examined whether, and the conditions under which, safety organizing affects RN emotional exhaustion and nursing unit turnover rates.

**Subjects:** Subjects included 1352 RNs in 50 intensive care, internal medicine, labor, and surgery nursing units in 3 Midwestern acute-care hospitals who completed questionnaires between August and December 2011 and 50 Nurse Managers from the units who completed questionnaires in December 2012.

**Research Design:** Cross-sectional analyses of RN emotional exhaustion linked to survey data on safety organizing and hospital incident reporting system data on adverse event rates for the year before survey administration. Cross-sectional analysis of unit-level RN turnover rates for the year following the administration of the survey linked to survey data on safety organizing.

**Results:** Multilevel regression analysis indicated that safety organizing was negatively associated with RN emotional exhaustion on units with higher rates of adverse events and positively associated with RN emotional exhaustion with lower rates of adverse events. Tobit regression analyses indicated that safety organizing was associated with lower unit level of turnover rates over time.

**Conclusions:** Safety organizing is beneficial to caregivers in multiple ways, especially on nursing units with high levels of adverse events and over time.

**Key Words:** adverse events, emotional exhaustion, high reliability, safety organizing, turnover

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In the continuing effort to make health care delivery safer, researchers, accreditors, and governmental agencies<sup>1,2</sup> have embraced high-reliability organizations (HROs, eg, nuclear power control rooms) as potential models for health care organizations striving to navigate the complex and dynamic conditions they face in a nearly error-free manner.<sup>1–5</sup> Research on HROs suggests that they achieve their exceptional performance through safety organizing—a set of behaviors for detecting and correcting errors and unexpected events.<sup>6</sup> Research in hospital nursing units finds that safety organizing positively influences patient safety.<sup>7–9</sup> However, processes that improve organizational outcomes such as safety can simultaneously be costly to the frontline caregivers charged with enacting them.<sup>10</sup> Thus, it is important to examine how engaging in safety organizing affects frontline caregivers. We focus on 2 especially important and costly outcomes—registered nurse (RN) emotional exhaustion (ie, feelings of being overextended and depleted<sup>11,12</sup>) and nursing unit turnover rates.<sup>13</sup>

Safety organizing is cognitively<sup>14,15</sup> and emotionally<sup>16</sup> effortful. Such effort can lead to emotional exhaustion when there is no tangible gain following the investment of time and energy.<sup>17</sup> Whether there is a tangible gain from safety organizing depends upon the safety context in which it is deployed, that is, the rate of adverse events. When there is a relatively low adverse event rate, caregivers are experiencing the nonevent of safe care delivery.<sup>18</sup> Outcomes of absence (such as safety) have a lower hedonic intensity<sup>19</sup> and lack a clear beneficiary, meaning they are more likely to be experienced as depleting existing resources without an offsetting benefit or impact.<sup>17,20</sup> In contrast, when deployed on units with high rates of adverse events, safety organizing resolves specific threats to resources and has 2 clear beneficiaries (the patient and the caregiver). The clear threat of an adverse event motivates action to resolve it.<sup>21</sup> Eliminating dangerous conditions (ie, adverse events) also directly impacts patients. When people see the beneficiaries of their work they experience challenging conditions as energizing rather than exhausting.<sup>22,23</sup> In addition, resolving adverse events also helps caregivers experiencing emotional distress following adverse events (the “second victim”<sup>24,25</sup>). That is, the collective attention on an adverse event through safety organizing helps the caregiver feel supported and redirect their efforts to resolving their guilt and the event.<sup>24,25</sup>

Nursing turnover often results from disruptive events and otherwise difficult workplace conditions.<sup>26,27</sup> Safety organizing has been shown to reduce the types of disruptive (ie, adverse) events that trigger turnover.<sup>7–9,24</sup> Safety

organizing may also affect a broader array of events that increase the likelihood of turnover such as everyday operational failures (eg, missing information, missing supplies) and workarounds.<sup>28</sup> Specifically, safety organizing is in part comprised of behaviors that can reduce operational failures and workarounds such as engaging in regular process improvement activities, learning from errors and close calls, and taking advantage of expertise when problem solving.<sup>6,28</sup>

Safety organizing is also likely to reduce nursing turnover because it entails practicing in a manner consistent with professional ideals.<sup>29,30</sup> Specifically, it entails constant surveillance of the patient and the surrounding care environment.<sup>31</sup> In other words, safety organizing represents engaging in the invigorating work of improving other peoples' lives by preventing and mitigating harm in the care process.<sup>30,32</sup> As a result, safety organizing should be directly associated with lower turnover. Thus, we hypothesize that safety organizing will be associated with lower levels of RN emotional exhaustion in units with high rates of adverse events, higher levels of RN emotional exhaustion in units with low rates of adverse events, and lower unit-level turnover rates.

## METHODS

### Sample

The units, Nurse Managers, and RNs for this study were drawn from a convenience sample of 3 urban hospitals ranging from 430 to 828 acute-care beds in a single large health system. Data from RNs were collected between August and December 2011. We separately surveyed Nurse Managers in 2012 to gather data on turnover for the year subsequent to our survey of RNs. Nurse Managers and RNs in the final sample were from 50 inpatient units including 25 internal medicine units, 15 intensive care units, 7 surgical units, and 3 labor and delivery units. The number of respondents in each unit ranged from 5 to 114, with an average of approximately 29. We had data on adverse events from 28 of the 50 units.

We surveyed all RNs in the participating units online and received usable responses from 1352 of 2572 (52.5%), consistent with prior research.<sup>9,33</sup> To ensure that the resulting sample was not biased, we conducted *t* tests comparing the age and tenure of the respondents to hospital data on all RNs for each unit. There were no significant differences. We also assessed whether a unit's response rate was correlated with any of the variables used in the study. None of the correlations were statistically significant. We also surveyed the Nurse Managers in participating units online and received usable responses from 50 of 53 (94%).

Our analyses of unit-level turnover rates were conducted on 50 nursing units using the aggregated survey responses from 1352 RNs. Our analyses of RN emotional exhaustion were conducted on 577 RNs (of 1069, 54% response rate) from 28 units (ie, those with data on adverse events).

### Measures

We used survey data from the 2 sets of respondents (RNs and Nurse Managers) and the hospital risk management system to construct the variables used in our analyses. All survey items were measured on a 7-point Likert-type

scale. We used a natural logarithm transformation on 3 variables (turnover rate, number of years in nursing, and patient-per-RN) to correct for skewness in their distributions.<sup>34</sup> We measured turnover rate as the number of RNs that voluntarily left the hospital during the 12 months following the administration of the survey divided by the number of full-time RNs on the unit.<sup>35</sup> Emotional exhaustion was measured using 4 items from the emotional exhaustion component of the Maslach Burnout Inventory.<sup>36</sup> Adverse events were defined as occurring whenever any event that caused harm to patients (ie, the patient had to undergo further treatment or hospitalization). The rate was measured as the sum of the unit's rates of events (bloodstream infections,<sup>37</sup> urinary tract infections,<sup>37</sup> pressure ulcers,<sup>38</sup> medication errors,<sup>38</sup> and falls<sup>38</sup>) over the 12 months before the administration of the survey. Individual rates were calculated as number of events divided by 1000 device days (bloodstream and urinary tract infections)<sup>37</sup> or 1000 patient days (errors, falls, and ulcers).<sup>38</sup> We measured safety organizing using the 9-item safety organizing scale (SOS<sup>8</sup>).

We selected control variables based on 3 criteria—research suggests that the variable might be correlated with the dependent variable, hypothesized independent variable, or the variable is not integral to a model, but theoretically important.<sup>39</sup> Specifically, we included control variables (8 for emotional exhaustion, 5 for turnover). At the individual level we controlled for negative affectivity (10 items),<sup>40–42</sup> positive affectivity (6 items),<sup>40,42</sup> and leader-member exchange (measured using 9 items<sup>43–46</sup>). At the unit level we controlled for safety climate (measured using 9 items<sup>47–49</sup>) and unit type (measured using 3 dummy variables for intensive care, labor and delivery, and surgery with medical units as the omitted category).<sup>50</sup> Some variables were measured at the individual level in our models of emotional exhaustion and the unit level in our models of turnover including professional commitment<sup>51–54</sup> (measured using 4 items), the natural logarithm of the number of years in nursing,<sup>46,55–57</sup> and the natural logarithm of patients-per-RN which is measured by RN responses to our questionnaire.<sup>50,57</sup>

### Level of Analysis

Safety organizing and safety climate are conceptually unit-level variables and emotional exhaustion and professional commitment are established antecedent of unit-level turnover. To demonstrate that aggregating individual responses to the unit level is statistically appropriate, we assessed within-unit agreement by calculating 3 coefficients—within-group interrater reliability ( $r_{wg(j)}$ ),<sup>58</sup> the intraclass correlation (ICC1),<sup>59</sup> and the reliability of the unit mean (ICC2)<sup>59</sup> for emotional exhaustion, safety organizing, safety climate, and professional commitment. The median  $r_{wg(j)}$  value for emotional exhaustion was 0.75, safety organizing 0.95, safety climate 0.94, and professional commitment 0.91 with ICC(1) 0.27 for emotional exhaustion, 0.23 for safety organizing, 0.10 for safety climate, and 0.29 for professional commitment, and ICC(2) 0.90 for emotional exhaustion, 0.89 for safety organizing, 0.73 for safety climate, and 0.91 for professional commitment. These results indicate that

individual responses for these measures can be aggregated to the unit level.<sup>58,59</sup>

**Data Analysis**

We used 2 distinct methods to evaluate the hypothesized relationships between safety organizing, emotional exhaustion, and turnover. To assess the cross-level effects of safety organizing and adverse event rates on individual RN emotional exhaustion, we used a 3-level hierarchical regression using Latent Gold 4.5.<sup>60</sup> This is appropriate given the multilevel nature of our data (RNs nested within units within hospitals). The interaction term in the regression model was centered at the mean to reduce concerns of multicollinearity.<sup>61</sup> To assess the effects of safety organizing on unit-level turnover rates, we used Tobit regression with random effects in STATA 12.<sup>62</sup> Tobit regression with random effects accounts for the multilevel nature of our data (units nested within hospitals) as well as the left-censored distribution of RN turnover rates.<sup>63</sup>

**RESULTS**

Table 1 summarizes the means, SDs, and correlations among the variables at the nursing unit (level 2) and individual (level 1) levels of analysis. Results of our regression analyses reported in Table 2 demonstrate that the interaction effect between adverse events and safety organizing had a significant, negative relationship with RN emotional exhaustion ( $\beta = -0.14, P < 0.01$ ). That is, on a unit with a high rate of adverse events, safety organizing is negatively associated with emotional exhaustion. To more clearly illustrate this impact of the interaction on emotional exhaustion, with all other variables at their mean, we plotted the effects of safety organizing at low and high levels for low and high rates of adverse events, where low is 1 SD below the mean and high is 1 SD above the mean.<sup>61</sup> Figure 1 shows high rates of adverse events coupled with high levels of safety organizing result in an 8.3% reduction in emotional exhaustion relative to RNs in units with low levels of safety organizing. It also shows that low rates of adverse events coupled with high levels of safety organizing result in a 29.3% increase in

emotional exhaustion relative to RNs in units with low levels of safety organizing. In the presence of the interaction term, we also find a direct effect of safety organizing on emotional exhaustion ( $\beta = 1.83, P < 0.01$ ) meaning safety organizing is associated with higher levels of emotional exhaustion when the adverse event rate is 0. We also found that safety organizing was associated with lower rates of RN turnover ( $\beta = -0.45, P < 0.05$ , Table 3) with a 1 SD increase in safety organizing associated with a 13.6% decrease in the RN turnover rate.<sup>64</sup> In financial terms, the average size hospital in our study would save between \$169,000 and \$1,000,000<sup>13</sup> for each SD increase in safety organizing. However, the potential cost savings should be considered in light of the costs of engaging in (eg, RN and Nurse Manager time and effort) and supporting (eg, training<sup>65</sup>) safety organizing.

To parallel our analyses of emotional exhaustion, we conducted a supplemental analysis to explore whether the effect of safety organizing on turnover rates was amplified for units experiencing higher rates of adverse events. We suspect this is the case because the effects of safety organizing will be more tangible in such units. Unfortunately, the resulting sample is small due to only 28 units providing adverse event rate data allowing us to only include limited control variables (emotional exhaustion). We do find suggestive support for an interaction between safety organizing and adverse events ( $\beta = -0.11, P < 0.05$ , 1-tailed test). However, we find no direct effects for safety organizing or adverse event rate, but do, consistent with a large body of the literature,<sup>66,67</sup> for emotional exhaustion ( $\beta = 0.46, P < 0.01$ ).

**DISCUSSION**

Health care organizations have increasingly attempted to emulate HROs, often with benefits for patient safety.<sup>4,7-9</sup> However, these efforts are also fragile<sup>68</sup> and dependent upon effort from frontline staff. Yet researchers know relatively little about how pursuing high reliability through safety organizing affects frontline caregivers. We find that safety organizing has mixed effects depending on the context in which it is deployed.

**TABLE 1.** Variable Means, SDs, and Correlations

	Mean (SD)	1	2	3	4	5	6	7
Level 1: individual level								
RN emotional exhaustion	3.29 (1.37)	(0.91)						
Professional commitment	6.05 (0.93)	-0.45***	(0.81)					
Leader-member exchange	4.95 (1.20)	-0.28***	0.22***	(0.95)				
Patient-to-RN ratio	4.07 (2.76)	0.04	-0.04	0.06				
RN experience	10.13 (10.28)	0.00	0.01	-0.01	0.09			
Positive affectivity	5.54 (0.82)	-0.50***	0.54***	0.41***	0.02	-0.07*	(0.92)	
Negative affectivity	2.54 (0.81)	0.43***	-0.24***	-0.13***	-0.02	-0.13***	-0.34***	(0.82)
Level 2: unit level								
Turnover rate	0.15 (0.14)							
Safety organizing	5.41 (0.35)	-0.23	(0.93)					
Safety climate	5.29 (0.43)	-0.09	0.47***	(0.85)				
Adverse event rate	22.72 (10.51)	-0.04	-0.02	-0.40*	-0.05			

Cronbach  $\alpha$  is in parentheses on the diagonal.

\* $P < 0.05$ .

\*\*\* $P < 0.001$ .

RN indicates registered nurse.

**TABLE 2.** Multilevel Regression of RN Emotional Exhaustion

Variables	RN Emotional Exhaustion <sup>†</sup>				
Level 1 controls					
Professional commitment	-0.38*** (0.06)	-0.38*** (0.06)	-0.38*** (0.06)	-0.38*** (0.06)	-0.39*** (0.06)
Leader-member exchange	-0.10* (0.05)	-0.10* (0.05)	-0.10* (0.05)	-0.10* (0.05)	-0.10* (0.05)
RN experience <sup>‡</sup>	-0.02 (0.04)	-0.02 (0.04)	-0.03 (0.04)	-0.03 (0.04)	-0.04 (0.04)
Patient-to-RN ratio <sup>‡</sup>	0.32* (0.14)	0.33* (0.14)	0.32* (0.14)	0.33* (0.14)	0.33* (0.14)
Positive affectivity	-0.47*** (0.07)	-0.47*** (0.07)	-0.47*** (0.07)	-0.47*** (0.07)	-0.46*** (0.07)
Negative affectivity	0.40*** (0.06)	0.40*** (0.06)	0.41*** (0.06)	0.41*** (0.06)	0.40*** (0.06)
Level 2 controls					
Unit type <sup>§</sup>					
Intensive Care	0.07 (0.13)	0.06 (0.13)	0.10 (0.14)	0.10 (0.14)	0.20 (0.13)
Surgery	0.09 (0.16)	0.12 (0.17)	0.09 (0.16)	0.12 (0.16)	0.30 (0.16)
Safety climate	-0.12 (0.16)	-0.25 (0.20)	-0.14 (0.17)	-0.29 (0.21)	-0.69** (0.24)
Cross-level main effect					
Safety organizing		0.21 (0.20)		0.23 (0.20)	1.83** (0.59)
Level 2 moderator					
Adverse event rate			-0.01 (0.01)	-0.01 (0.01)	0.73** (0.26)
Level 2 interaction					
Safety organizing × adverse event rate					-0.14** (0.05)
Intercept	7.96*** (0.94)	7.51*** (1.04)	8.11*** (0.98)	7.66*** (1.05)	1.14 (2.49)
R <sup>2</sup>	0.44	0.44	0.44	0.44	0.44
Log likelihood	-853.13	-852.57	-853.00	-852.32	-848.28
-2LN (likelihood ratio)		1.12	0.26	1.63	11.70**
Level 1 N	577	577	577	577	577

\*P < 0.05

\*\*P < 0.01.

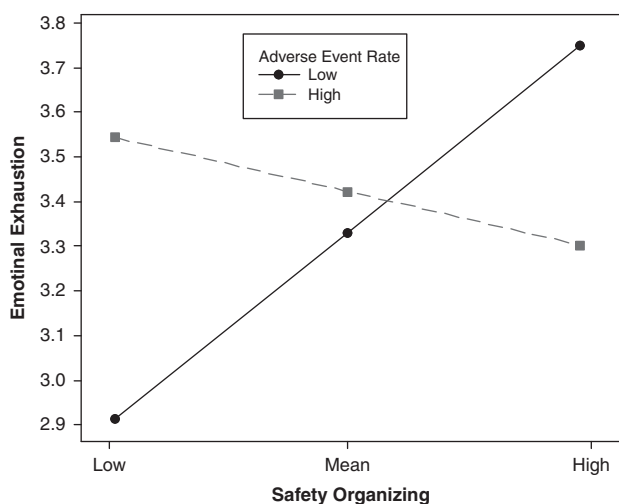
\*\*\*P < 0.001.

<sup>†</sup>Coefficient estimate with SE in parentheses.

<sup>‡</sup>Natural logarithm.

<sup>§</sup>Unit type is a series of dummy variables with internal medicine as the omitted reference category.

RN indicates registered nurse.



N = 577 RNs, 28 units

**FIGURE 1.** Emotional exhaustion as a function of safety organizing and adverse event rate (N = 577 registered nurses, 28 units).

Safety organizing is associated with lower levels of RN emotional exhaustion when it is readily seen as beneficial and necessary, namely on units with high rates of adverse events. In contrast, on units where the benefits of safety organizing may be less tangible (ie, with low rates of adverse events) the effects are reversed and safety organizing is associated with higher levels of emotional exhaustion. This suggests that pursuing highly reliable performance through safety organizing should be undertaken in contexts where there is a clear “burning platform” for doing so. In other words, our findings suggest that hospitals should prioritize safety interventions and safety organizing on units where there are high levels of adverse events. In such units, safety organizing holds the potential to improve safety outcomes as well as reduce RN emotional exhaustion and turnover rates. Although the results suggest prioritizing interventions in this way, we would be hesitant to conclude that units with relatively low levels of adverse events should curtail safety organizing. Instead, such units will likely need safety organizing to be coupled with other interventions to ameliorate emotional exhaustion. For example, it may take specific leader actions to foster safety organizing,<sup>9,68</sup> while simultaneously illustrating its importance in the absence of adverse events (eg, refreshing caregivers’ memories of prior events,<sup>65</sup> explicitly connecting safety organizing to beneficiaries of it<sup>23</sup>).

**TABLE 3.** Tobit Regression With Random Effects of Turnover Rate

Variables	RN Turnover Rate <sup>†‡</sup>	95% CI	RN Turnover Rate <sup>†‡</sup>	95% CI
Professional commitment	0.05 (0.26)	−0.46, 0.56	0.05 (0.25)	−0.44, 0.54
Safety climate	0.16 (0.21)	−0.26, 0.58	0.39 (0.22)	−0.04, 0.82
RN experience <sup>‡</sup>	−0.26 (0.17)	−0.60, 0.08	−0.24 (0.17)	0.57, 0.94
Patient-to-RN ratio <sup>‡</sup>	−0.38 (0.48)	−1.33, 0.56	−0.34 (0.43)	−1.17, 0.50
Unit type <sup>§</sup>				
Intensive care	0.09 (0.24)	−0.39, 0.56	0.13 (0.22)	−0.31, 0.57
Labor	0.49 (0.30)	−0.09, 1.07	0.55 (0.29)	−0.01, 1.12
Surgery	0.26 (0.23)	−0.20, 0.71	0.15 (0.21)	−0.26, 0.57
RN emotional exhaustion	0.59*** (0.17)	0.26, 0.93	0.62*** (0.17)	0.29, 0.94
Safety organizing			−0.45* (0.22)	−0.87, −0.02
Intercept	−1.05 (2.15)	−5.27, 3.16	−0.06 (2.16)	−4.28, 4.17
Log likelihood	−34.60		−32.75	
Wald statistic	19.71*		24.37**	
N	50		50	

\* $P < 0.05$ .\*\* $P < 0.01$ .\*\*\* $P < 0.001$ .

†Coefficient estimate with SE in parentheses.

‡Natural logarithm.

§Unit type is a series of dummy variables with internal medicine as the omitted reference category. CI indicates confidence interval; RN, registered nurse.

Safety organizing was also associated with lower unit-level turnover rates. Thus we answer calls to revive studies of unit-level turnover<sup>13,69</sup> and identify a novel source of lower turnover—safety organizing. Our findings suggest that safety organizing may influence turnover rates by reducing adverse events, interruptions, and workarounds while improving meaningfulness of work; however, future research is needed to more precisely specify the mechanisms through which safety organizing affects turnover rates. In addition, our supplemental analysis provided suggestive support for an interaction between safety organizing and adverse event rate on turnover rates. This finding merits more rigorous examination using a larger sample study and assessing other interaction effects implied by our theorizing of how safety organizing affects turnover rates. Specifically, practicing in a manner consistent with one's professional ideals, operational failures, and workarounds are some of the additional moderators worth exploring in future work.

### Limitations

The findings of our study should be considered in light of its limitations. First, the research was conducted using a convenience sample of hospitals with exclusively RN respondents, possibly limiting generalizability. Second, although some of our data are temporally separated (eg, survey data and our measure of turnover rates), the study design is cross-sectional so the findings should not be considered causal. Third, the measures of emotional exhaustion and safety organizing come from the same respondents. This raises concerns of common-method bias. However, our results are unlikely to be biased by common-method effects for the following reasons: (1) emotional exhaustion and safety organizing were measured at different levels of analysis; (2) we proposed and tested a complex relationship between safety organizing and emotional exhaustion (ie, an interaction effect with adverse events) that is less likely to be affected by common-method bias; and (3) we controlled for respondent positive and negative affectivity.<sup>70</sup>

### CONCLUSIONS

To date, researchers have focused on whether emulating HROs through processes of safety organizing improves patient safety,<sup>7–9</sup> but have ignored its effects on caregivers. The present study deepens our understanding of safety organizing by demonstrating how it affects frontline caregivers. Safety organizing is associated with lower levels of emotional exhaustion on units experiencing higher rates of adverse events and higher exhaustion on units experiencing lower rates of adverse events. Over time, safety organizing is associated with lower rates of turnover.

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### REFERENCES

- Chassin MR, Loeb JM. The ongoing quality improvement journey: next stop, high reliability. *Health Aff.* 2011;30:559–568.
- Hines S, Luna K, Lofthus J, et al. *Becoming a High Reliability Organization: Operational Advice for Hospital Leaders.* AHRQ Publication No. 08-0022. Rockville, MD: Agency for Healthcare Research and Quality; 2008.
- Baker DP, Day R, Salas E. Teamwork as an essential component of high-reliability organizations. *Health Serv Res.* 2006;41:1576–1598.
- Pronovost PJ, Berenholtz SM, Goeschel CA, et al. Creating high reliability in health care organizations. *Health Serv Res.* 2006;41:1599–1617.
- Roberts KH. Some characteristics of high-reliability organizations. *Organ Sci.* 1990;1:160–177.
- Weick KE, Sutcliffe KM. *Managing the Unexpected: Resilient Performance in an Age of Uncertainty.* 2nd ed. San Francisco, CA: Jossey-Bass; 2007.
- Ausserhoffer D, Schubert M, Desmedt M, et al. The association of patient safety climate and nurse-related organizational factors with selected patient outcomes: a cross-sectional survey. *Int J Nurs Stud.* 2013;50:240–252.
- Vogus TJ, Sutcliffe KM. The safety organizing scale: development and validation of a behavioral measure of safety culture in hospital nursing units. *Med Care.* 2007;45:46–54.

9. Vogus TJ, Sutcliffe KM. The impact of safety organizing, trusted leadership, and care pathways on reported medication errors in nursing units. *Med Care*. 2007;45:997–1002.
10. Givan R, Avgar A, Liu M. Having your cake and eating it too? Human resource management practices and organizational performance in hospitals. *Adv Ind Labor Relat*. 2010;17:31–67.
11. Maslach C, Leiter MP. Early predictors of job burnout and engagement. *J Appl Psychol*. 2008;93:498–512.
12. Vahey DC, Aiken LH, Sloane DM, et al. Nurse burnout and patient satisfaction. *Med Care*. 2004;42:II57–II66.
13. Gilmartin MJ. Thirty years of nursing turnover research: looking back to move forward. *Med Care Res Rev*. 2013;70:3–28.
14. Levinthal DA, Rerup C. Crossing and apparent chasm: bridging mindful and less mindful perspectives on organizational learning. *Organ Sci*. 2006;17:502–513.
15. Weick KE. Organizing for transient reliability: the production of dynamic non-events. *J Contingencies Crisis Manage*. 2011;19:21–27.
16. Schulman PR. The negotiated order of organizational reliability. *Admin Soc*. 1993;25:353–372.
17. Hobfoll SE. The influence of culture, community, and the nested-self in the stress process: advancing the conservation of resources theory. *Appl Psychol*. 2001;50:337–421.
18. Weick KE. Organizational culture as a source of high-reliability. *Calif Manage Rev*. 1987;29:112–127.
19. Brendl CM, Higgins ET, Lemm KM. Sensitivity to varying gains and losses: the role of self-discrepancies and event framing. *J Pers Soc Psychol*. 1995;69:1028–1051.
20. Halbesleben JR. Sources of social support and burnout: a meta-analytic test of the conservation of resources model. *J Appl Psychol*. 2006;91:1134–1145.
21. Kiazad K, Seibert SE, Kraimer ML. Psychological contract breach and employee innovation: a conservation of resources perspective. *J Occup Organ Psychol*. [In press].
22. Bellé N. Experimental evidence on the relationship between public service motivation and job performance. *Pub Admin Rev*. 2013;73:143–153.
23. Grant AM. *Give and Take: A Revolutionary Approach to Success*. New York: Viking; 2013.
24. Dekker S. *Second Victim: Error, Guilt, Trauma, and Resilience*. New York: CRC Press; 2013.
25. Ullström S, Sachs MA, Hansson J, et al. Suffering in silence: a qualitative study of second victims of adverse events. *BMJ Qual Saf*. [In press].
26. Brewer CS, Kovner CT, Greene W, et al. Predictors of actual turnover in a national sample of newly licensed registered nurses employed in hospitals. *J Adv Nurs*. 2012;68:521–538.
27. Morrell K. Towards a typology of nursing turnover: the role of shocks in nurses' decisions to leave. *J Adv Nurs*. 2005;49:315–322.
28. Tucker AL, Spear SJ. Operational failure and interruptions in hospital nursing. *Health Serv Res*. 2006;41:643–662.
29. Benner P, Tanner CA, Chesla CA. *Expertise in Nursing Practice: Caring, Clinical Judgment, and Ethics*. New York: Springer Publishing Company; 1996.
30. Pellico LH, Brewer CS, Kovner CT. What newly licensed registered nurses have to say about their first experiences. *Nurs Outlook*. 2009;57:194–203.
31. Clarke SP, Aiken LH. Failure to rescue. *Am J Nurs*. 2003;103:42–47.
32. Skovholt TM, Grier TL, Hanson MR. Career counseling for longevity: self-care and burnout prevention strategies for counselor resilience. *J Career Dev*. 2001;27:167–176.
33. Asch DA, Jedrzejewski MK, Christakis NA. Response rates to mail surveys published in medical journals. *J Clin Epidemiol*. 1997;50:1129–1136.
34. Cohen J, Cohen P, West S, et al. *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences*. 3rd ed. Mahwah, NJ: Lawrence Erlbaum Associates Inc; 2013.
35. Gardner TM, Wright PM, Moynihan LM. The impact of motivation, empowerment, and skill-enhancing practices on aggregate voluntary turnover: the mediating effect of collective affective commitment. *Pers Psychol*. 2011;64:315–350.
36. Maslach C, Jackson SE, Leiter MP, et al. *Maslach Burnout Inventory: Instruments and Scoring Guides*. Menlo Park, CA: Mind Garden, Inc; 1986.
37. Dudeck MA, Weiner LM, Allen-Bridson K, et al. National Healthcare Safety Network (NHSN) report, data summary for 2012, device-associated module. *Am J Infect Control*. 2013;41:1148–1166.
38. Montalvo I. The national database of nursing quality indicators™ (NDNQI). *Online J Issues Nurs*. 2007;3. [Online article].
39. Becker TE. Potential problems in the statistical control of variables in organizational research: a qualitative analysis with recommendations. *Org Res Methods*. 2005;8:274–289.
40. Iverson RD, Olekalns M, Erwin PJ. Affectivity, organizational stressors, and absenteeism: a causal model of burnout and its consequences. *J Vocat Behav*. 1998;52:1–23.
41. Thoresen CJ, Kaplan SA, Barsky AP, et al. The affective underpinnings of job perceptions and attitudes: a meta-analytic review and integration. *Psychol Bull*. 2003;129:914–945.
42. Judge TA, Erez A, Thoreson CJ. Why negative affectivity (and self-deception) should be included in job stress research: bathing the baby with the bath water. *J Organ Behav*. 2000;1:101–111.
43. Liden RC, Wayne SJ, Stillwell D. A longitudinal study on the early development of leader-member exchanges. *J Appl Psychol*. 1993;78:662–674.
44. Laschinger HKS, Finegan J, Wilk P. Situational and dispositional influences on nurses' workplace well-being: the role of empowering unit leadership. *Nursing Res*. 2011;60:124–131.
45. Leiter MP, Maslach C. The impact of interpersonal environment on burnout and organizational commitment. *J Organ Behav*. 1988;9:297–308.
46. Thomas CH, Lankau MJ. Preventing burnout: the effects of LMX and mentoring on socialization, role stress, and burnout. *Human Resource Manage*. 2009;48:417–432.
47. Naveh E, Katz-Navon T, Stern Z. Readiness to report medical treatment errors: the effects of safety procedures, safety information, and priority of safety. *Med Care*. 2006;44:117–123.
48. Profit J, Sharek PJ, Amspoker AB, et al. Burnout in the NICU setting and its relation to safety culture. *BMJ Qual Saf*. [In press].
49. Vogus TJ, Sutcliffe KM, Weick KE. Doing no harm: enabling, enacting, and elaborating a culture of safety in health care. *Acad Manage Perspect*. 2010;24:60–77.
50. Hayes LJ, O'Brien-Pallas L, Duffield C, et al. Nurse turnover: a literature review. *Int J Nurs Stud*. 2006;43:237–263.
51. Meyer JP, Allen NJ, Smith CA. Commitment to organizations and occupations: extension and test of a three-component conceptualization. *J Appl Psychol*. 1993;78:538–551.
52. Lu K-Y, Lin P-L, Wu C-M, et al. The relationships among turnover intentions, professional commitment, and job satisfaction of hospital nurses. *J Prof Nurs*. 2002;18:214–219.
53. Aryee S, Chay YW, Chew J. An investigation of the predictors and outcomes of career commitment in three career stages. *J Vocat Behav*. 1994;44:1–16.
54. Blau G, Lunz M. Testing the incremental effect of professional commitment on intent to leave one's profession beyond the effects of external, personal, and work-related variables. *J Vocat Behav*. 1998;52:260–269.
55. Aiken LH, Clarke SP, Cheung RB, et al. Educational levels of hospital nurses and surgical patient mortality. *JAMA*. 2003;290:1617–1623.
56. Heavey AL, Holwerda JA, Hausknecht JP. Causes and consequences of collective turnover: a meta-analytic review. *J Appl Psychol*. 2013;98:412–453.
57. Aiken LH, Clarke SP, Sloane DM, et al. Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. *JAMA*. 2002;288:1987–1993.
58. James LR, Demaree RG, Wolf G. Estimating within-group interrater reliability with and without response bias. *J Appl Psychol*. 1984;69:85–98.
59. Bliese PD. Within-group agreement, non-independence, and reliability: implications for data aggregation and analysis. In: Klein KJ, Kozlowski SWJ, eds. *Multilevel Theory, Research, and Methods in Organizations*. San Francisco: Jossey-Bass; 2000:349–381.
60. Statistical Innovations. *Latent Gold 4.5*. Belmont, MA: Statistical Innovations Inc; 2005.
61. Aiken L, West S. *Multiple Regression: Testing and Interpreting Interactions*. London: Sage; 1991.

62. StataCorp. *Stata Statistical Software: Release 12*. College Station, TX: StataCorp LP; 2011.
63. Batt R, Colvin AJS. An employment systems approach to turnover: human resources practices, quits, dismissals, and performance". *Acad Manage J*. 2011;54:695–717.
64. McDonald JF, Moffitt RA. The uses of Tobit analysis. *Rev Econ Stat*. 1980;62:318–321.
65. Weick KE, Roberts KH. Collective mind in organizations: heedful interrelating on flight decks. *Admin Sci Q*. 1993;38:357–381.
66. Gelsema TI, Van der Doef M, Maes S, et al. A longitudinal study of job stress in the nursing profession: causes and consequences. *J Nursing Manage*. 2006;14:289–299.
67. Meeusen VC, Van Dam K, Brown-Mahoney C, et al. Understanding nurse anesthetists' intention to leave their job: how burnout and job satisfaction mediate the impact of personality and workplace characteristics. *Health Care Manage Rev*. 2011;36:155–163.
68. Roberts KH, Madsen P, Desai V, et al. A case of the birth and death of a high reliability healthcare organization. *Qual Saf Health Care*. 2005;14:216–220.
69. Alexander JA. The effects of patient care unit organization on nursing turnover. *Health Care Manage Rev*. 1988;13:61–72.
70. Podsakoff PM, Mackenzie SB, Lee JY, et al. Common method biases in behavioral research: a critical review of the literature and recommended remedies. *J Appl Psychol*. 2003;88:879–903.