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Linking Patient Safety Climate with Missed Nursing Care in Labor and Delivery Units: Findings from the LaborRNs Survey

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Abstract

Objective: To explore the association of nurses' perceptions of patient safety climate with missed nursing care in labor and delivery (L&D) units.

Methods: We recruited nurse respondents via email distribution of an electronic survey between February 2018 and July 2019. Hospitals with L&D units were recruited from states with projected availability of 2018 State Inpatient Data in the United States. Measures included the Safety Attitudes Questionnaire Safety Climate Subscale and the Perinatal MISSCARE Survey. We estimated the relationship between safety climate and missed care using Kruskal-Wallis tests and mixed-effects linear regression.

Results: The analytic sample included 3,429 L&D registered nurses from 253 hospitals (response rate=35%). A majority of respondents (65.7%) reported a perception of good safety climate in their units, with a mean score of 4.12 (± 0.73) out of 5. The mean number of aspects of care occasionally, frequently, or always missed on respondents' units was 11.04 (± 6.99) out of 25. Chi-Square tests showed that six mostly commonly missed aspects of care (e.g., timely documentation) and three reasons for missed care (Communications, Material Resources, and Labor Resources) were associated with safety climate groups (p<0.001). The adjusted mixed-effects model identified a significant association between better nurse-perceived safety climate and less missed care (β: −2.65, 95% CI −2.97 to −2.34, p<0.001) after controlling for years of experience and highest nursing education.

Conclusion: Our findings suggest that improving safety climate - for example, through better teamwork and communication - may improve nursing care quality during labor and birth through

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decreasing missed nursing care. Conversely, it is also possible that strategies to reduce missed care - such as staffing improvements - may improve safety climate.

Introduction

Safety culture in healthcare systems has been a national policy priority for almost two decades in the United States (U.S.). The Joint Commission requires hospitals to measure and monitor safety culture in an ongoing fashion, and includes the establishment of safety culture as one of the critical components for achieving highly reliable care.[1] A culture of safety is defined as "individual and group values, attitudes, perceptions, competencies, and patterns of behavior that determine the commitment to, the style and proficiency of, an organization's health and safety management".[2] As one of the best-studied subdomains in safety culture, safety climate refers to healthcare staff's perceptions of a strong and proactive organizational commitment to patient safety.[3] A poor culture of safety has been linked with adverse clinical outcomes including healthcare-associated infection and mortality.[4–6] An emerging body of evidence suggests that features inherent in a better culture of safety, such as adequate staffing, attention to workload, and open team communication, are associated with less missed nursing care by supporting nurses to do the important work they perform everyday.[7–9]

Donabedian's Structure-Process-Outcome framework has been used to explicate the relationship between attributes of the organization where care occurs (structure), actions of clinicians and patients (process), and patient outcomes.[10,11] The American Nurses Association has grounded the development of nurse-sensitive indicators in this framework to measure nurse contribution to patient outcomes.[11,12] Process indicators, including the specific interventions nurses provide in the process of delivering care, have been explored but to a lesser extent than structure indicators.[11,13–15] Missed nursing care is a process indicator referring to any aspect of required patient care that is completely or partially omitted or delayed.[16] In the midst of multiple demands, nurses may find it difficult to fulfill some nursing care requirements and may abbreviate, delay, or omit some aspects of nursing care.[16] Missed nursing care has been used to indicate nursing care quality in medical-surgical, intensive, and pediatric care settings[9,17,18] and has been associated with adverse patient outcomes including infections, falls, and readmissions.[18]

Prior studies have suggested significant effects of structural indicators such as staffing, nursing workload, and nurse work environment at the unit or hospital level on missed nursing care.[7,14,19–21] Despite the conceptualization of missed nursing care as an error of omission related to patient safety,[16] evidence about the relationship between safety culture and missed care is limited. Hessels et al. have studied this association, finding that safety culture explained 30% of the variance in missed care and 15% of the variance in vascular access device events.[8] Further, all patient safety culture aspects, except for management support, were associated with greater adherence to standard precautions.[22]

Over 98% of U.S. births occur in hospitals.[23] Childbirth is a leading reason for hospital admission. Approximately 3.75 million annual births represent 1 in 9 hospitalizations in the United States.[24] Inpatient labor and delivery settings are specialty care units with limited

evidence about nursing care quality. In consultation with physicians and midwives, Labor and Delivery (L&D) Registered Nurses (RNs) provide a majority of the direct moment-to-moment management of labor that is instrumental to labor progression, patient safety, and quality.[25–29] The United States is the only high-income country in which maternal mortality increased between 1987 and 2021, more than quadrupling from 7.2 deaths to 32.2 deaths per 100,000 live births.[30] Approximately 1,178 women died from pregnancy-related complications in 2020, and the majority of deaths were preventable.[31] Recent studies with labor nurses suggest that missed nursing care may be prevalent during labor and birth[35] and may be associated with structural indicators, nurse outcomes such as job satisfaction and burnout,[32,34,35] and birth outcomes such as exclusive breastfeeding rates.[29,36]

In this study, we conceptualized patient safety climate as an aspect of structure and missed nursing care as an error of omission, both of which can be essential indicators of quality care. The goal of this analysis was to explore the relationship between nurse perceptions of patient safety climate and missed nursing care in labor and delivery units.

Methods

Sample and Procedures

Recruitment for this cross-sectional study occurred via email distribution of an electronic survey from February 2018 through July 2019, as previously described.[37] In summary, we selected 37 states in the US for recruitment based on the projected availability of 2018 state inpatient data for a larger study that includes patient outcomes. We recruited Registered Nurses (RNs) who worked in labor and delivery (L&D) units that reported at least 40 births in the 2016 American Hospital Association Annual Survey of Hospitals.[38] The LaborRNs survey was distributed to 10,630 nurses in 277 hospitals, and we received 3,676 completed surveys (35% response rate). We excluded surveys with: (1) ineligible respondents (e.g. receptionist, lactation consultant); (2) greater than or equal to 40% items and/or less than or equal to 3 scales incomplete; or (3) respondents from hospitals with less than 4 completed surveys. However, to ensure inclusion of small rural hospitals, we retained responses from hospitals with less than 4 completed surveys if this resulted in a response rate greater than or equal to 35% (the mean hospital response rate in the sample). This study was approved under expedited review by the institutional review boards at New York University and University of California San Francisco. Our analytic sample included 3,471 labor nurses for the nurse-level analyses and 253 hospitals with 3,429 labor nurses for the hospital-level analyses.

Measures

Patient Safety Climate—Nurses' perceptions of patient safety climate were measured using 7 items from the Safety Climate Subscale of the Safety Attitudes Questionnaire (SAQ).[5] The questions include: "*The culture of this unit makes it easy to learn from the errors of others*," "*Medical and nursing errors are handled appropriately on this unit*," "*I know the proper channels to direct questions regarding patient safety*," "*I am encouraged by my colleagues to report any patient safety concerns that I may have*," "*I receive appropriate feedback about my performance*", and "*I would feel safe being treated here as a patient*,"

and "*In this unit, it is difficult to discuss errors*" (reverse scored). Each item is rated on a 5-point Likert scale ranging from 1 = "*Disagree strongly*" to 5 = "*Agree strongly*". The subscale is scored by averaging safety climate items with scores ranging between 1 to 5, with higher scores indicating better perceived safety climate.

The SAQ is normally administered to all professional staff in the unit,[39] but we limited our study to registered nurses in the L&D unit. We interpreted the Safety Climate Subscale as a measure for nurse perception of the unit safety climate[39] and explored its association with nurse-reported missed care. Nurse-perceived safety climate was categorized as poor, acceptable, or good, based on each respondent's mean score: less than 3 was classified as poor (disagree or disagree strongly with statements indicating a good safety climate), 3–3.99 was classified as acceptable (neither disagree or agree), and greater than or equal to 4 was classified as good (agree or agree strongly).

Perinatal Missed Nursing Care—Missed nursing care was measured using the Perinatal Missed Care Survey,[37] which is a psychometrically sound adaptation of the well-established MISSCARE Survey. The Perinatal Missed Care Survey contains 2 sets of questions measuring incompleteness of required basic nursing care during labor and birth (Aspects scale) and reasons care might be missed (Reasons scale). The Aspects scale includes 25 items assessing the frequency at which required aspects of nursing care are delayed, unfinished, or completely missed on the respondent's unit. Frequency of missed care is measured on a 4-point Likert scale, ranging from 1 = "*Rarely delayed/unfinished/missed*", 2 = "*Occasionally*", 3 = "*Frequently*", to 4 = "*Always delayed/unfinished/missed*", with a response option for "*Not applicable*". Each item response was dichotomized as 0 for a response of "*Rarely delayed/unfinished/missed*" or 1 for responses of *occasionally, frequently or always*. The sum of the 25 dichotomized items was calculated for each respondent, with scores ranging from 0 to 25 and higher scores indicating more missed care.[37]

The Reasons scale assesses 16 potential reasons that nursing care is delayed, unfinished, or missed, using a 4-point Likert scale from 1= "*Not a reason*" to 4 = "*Significant factor*". Prior psychometric testing indicated a three-factor solution for the Reasons Subscale: Communication (8 items; α=0.85), Material Resources (3 items; α=0.86), and Labor Resources (5 items; α=0.87). Mean scores for each subscale were computed, ranging from 1 to 4 for each respondent, with higher scores indicating a stronger contribution to missed care.

Potential Confounders—Several nurse characteristics, including age, shift usually worked, employment status, highest nursing education, and years of experience as a L&D RN were included in the survey as potential covariates. Associations between these characteristics and structural indicators of nursing care quality or missed nursing care have been found in prior research.[32,34,40]

Data analysis

We evaluated missing data in nurse responses to determine if imputation methods were needed to address missing values. The construct-level missing data rate was 2.1%

among all variables of interest in the final sample of 3,471 nurse respondents. Hence, imputation methods (typically indicated if missing data exceeds 5–10%[41]) were not required. Descriptive statistics were computed, including means and standard deviations for continuous variables, and frequencies and proportions for categorical variables. Kruskal-Wallis tests were conducted to test the associations of missed care aspects with nurse characteristics.

To examine the association between safety climate group (poor, acceptable, good) and missed care aspects, we employed the Kruskal-Wallis test, followed by non-parametric post-hoc pairwise comparisons using Dunn's test.[42] Non-parametric methods were used due to the non-normality distribution of missed care aspects. Chi-Square tests were conducted to compare differences between safety climate groups on the 6 most frequent aspects of missed care. We then employed mixed-effects linear regression models with robust variance to estimate the association of nurse-perceived safety climate with missed care aspects, with safety climate as a fixed effect and hospital as a random effect to account for the clustering of nurses within hospitals. The scores of the Safety Climate Subscale was used as a continuous variable in the mixed effects model. Nurse characteristics that were significant in bivariate analysis were included as covariates. To account for the non-normal distribution of missed care scores, confidence intervals were calculated with bootstrapped standard errors, generated from 1,000 iterations. All analyses were conducted using Stata software version 13[43] with a significance level of 0.05.

Results

Characteristics of nurse respondents are presented in Table 1. The majority of nurse respondents self-identified as female (97.7%), White (82.7%), and non-Hispanic (94.3%), with a mean age of 40.7 (11.8) years. More than half of nurse respondents worked day shift (53.3%), full time (75.3%), and as a staff RN (62.7%). Respondents were experienced, with mean years of working as an RN in the current hospital of 14.8 (± 11.6), 12.3 (± 10.6) and mean years as a L&D RN of and 10.4 (± 9.8). Thirty percent of respondents held a diploma or associate's degree; 70% held a bachelor's or higher degree. Table 2 describes the distributions of missed care scores by select nursing characteristics. The results of Kruskal-Wallis tests showed that only age (p = 0.03) and years of experience as a L&D RN (p = 0.006) were significantly associated with missed nursing care.

The distributions of missed care scores, item scores for the top quartile of items missed, and mean scores for reasons subscales by perceived safety climate group are presented in Table 3. Among labor nurses, the average missed care score was 11.04 (± 6.99) indicating, on average, 11 of 25 aspects basic nursing care were missed or delayed. The mean safety climate score was 4.12 (± 0.73) on a 5-point Likert scale. A majority (65.7%) of labor nurses had a positive perception of safety climate in their units (score ≥ 4) and only a small proportion (7.5%) of labor nurses had a poor perception of safety climate (score < 3). Missed care aspects scores were significantly associated with nurse-perceived safety climate (p < 0.001) -- nurses who perceived a poor safety climate in the unit reported the most missed care (14.75 ± 6.35); nurses who perceived an acceptable safety climate in the unit (score between 3–3.99) reported less missed care (13.17 ± 6.72); and nurses who perceived

a good safety climate in the unit reported the least missed care (9.81 ± 6.79). Post-hoc tests showed these differences were statistically significant.

Overall, labor resources were rated as the most significant reason for missed care (2.54 ± 0.80), followed by material resources (2.20 ± 0.81) and communication (1.81 ± 0.55). Mean scores for labor resources, material resources, and communication differed across safety climate groups and these differences were significant (p < 0.001). Nurses with a poor perception of safety climate reported all three reasons (communication, material resources, and labor resources) to be stronger factors contributing to missed care compared to nurses with a good perception of safety climate (Table 3).

Estimates from the mixed-effects linear regression models of nurse-perceived safety climate on missed care aspects are displayed in Table 4. In the unadjusted model, there was an estimated 2.6 unit decrease in missed care aspects for each unit increase in nurse-perceived safety climate scores (β: –2.60; 95% CI: –2.91, –2.29). This relationship was slightly larger in the adjusted model (β: –2.65; 95% CI: –2.97, –2.34). Perceptions of safety climate explained approximately 3.4% of the variance in missed care scores.

Discussion

In this cross-sectional study with 3,471 labor nurses from 253 hospitals, we found that while nurses on labor and delivery (L&D) units generally had positive perceptions of their unit's safety climate, they reported an average of 11 of 25 aspects of essential nursing care were occasionally, frequently, or always missed. Both the missed care scores and reasons subscale scores were associated with perceived safety climate: a better perception of safety climate was associated with less missed care and lower perceptions of labor resources, material resources, and communication as factors contributing to missed nursing care.

Safety culture refers to the basic assumptions within an organization that are not necessarily about safety but considered good signs of safety.[44,45] As one of the best-studied subdomains in safety culture, safety climate is conceptualized to represent the prevailing attitudes among healthcare staff in the organization specifically regarding safety.[44,45] Based on the commonly reported SAQ conversion to a 100-pt scale, our mean score of 4.12 on a 5-point Likert scale could be converted to 78.0 and be considered an overall positive indicator for safety climate in maternity units. This mean perception is high relative to earlier studies using the SAQ in U.S. maternity settings.[46,47] Our higher safety climate scores could be explained by our relatively experienced sample (mean L&D experience > 10 years), as respondents with more experience have been shown to rate safety culture subdomains more highly than less experienced respondents.[48] The higher safety climate scores in this study may also be attributable to the acceleration of sustained widespread efforts to improve perinatal patient safety in the United States over the last 10 years via unit-based perinatal safety programs and implementation of safety bundles.[46,47] For example, multiple Alliance for Innovation in Maternal Health safety bundles include requirements related to standardization of essential practices, effective communication, teamwork, escalation, debriefing, and continuous learning from prior performance.[49–51]

Our findings provide evidence on most commonly missed aspects of care, including timely documentation, monitoring intake and output, review of prenatal records, assessment of pain status, checking voiding needs, and provision of labor support. These are consistent with the few prior studies reporting domains of perinatal care activities in maternity settings.[32,34,40,52] Treatment, procedures, and medication management are less likely to be reported as missing; on the contrary, documentation, assessments, monitoring, and emotional support during labor are commonly missed. In this study, shortages of labor and material resources were reported as the most significant reasons for why the nursing care is delayed, unfinished, or missed in maternity settings. Health systems can only provide good quality maternity care if facilities have sufficient and skilled staff who have access to functioning equipment, and sufficient drugs and supplies.[53] However, insufficient nurse staffing is commonly viewed as a major challenge in perinatal care because the fetus or the newborn is generally considered the invisible patient and the care required is often not understood or recognized by those making decisions about nurse staffing.[54] Moreover, supplies, equipment, or medication not available when needed is another problem contributing to missed perinatal care, making it difficult for maternity staff to meet urgent needs of women and their fetuses.

Data for this study were collected before the COVID-19 pandemic. Missed care may have been even more relevant in the COVID-19 pandemic due to the maternity staffing crisis.[55–58] Based on in-depth interviews with midwives and maternity support workers, maternity staffing shortages and pressures worsened and delayed nursing care provision during the pandemic.[58] In practice, seamless communication can facilitate the process of handing over cases, exchanging clinical information, and establishing a relationship with birthing people. However, the physical barrier of personal protective equipment (PPE) provided an additional barrier to communication with birthing women and within the care team.[58] Therefore, the challenge of missed perinatal care in the pandemic needs to more attention.

Clinically, the inverse relationship between missed nursing care and perceived safety climate offers several opportunities. The underlying components of safety climate (i.e., ease of reporting, discussing, and learning from errors; ease, clarity, and encouragement for reporting safety concerns; receiving feedback on performance; and having confidence that patients are kept safe), are a function of operational priorities. Focus on these priorities may directly or indirectly influence processes of nursing care delivery. Thus, improving handling of medical errors and learning from adverse obstetric events may help to reduce errors of omission – i.e., the frequency of missing essential aspects of basic nursing care. Safety strategies such as conducting facility reviews by independent consultants, incorporating perinatal safety nurses, using simulation programs for team work and communication,[44,46,59] should be implemented in maternity settings, wherein missed nursing care can be measured as a process indicator. Meanwhile, it is also possible that strategies to reduce missed care - such as staffing improvements - may improve safety climate. The incorporation of safe staffing as a perinatal safety strategy has the potential to enhance both nursing care quality and patient safety in maternity settings.

There are several limitations that need to be considered. First, this study used a subjective approach to evaluating missed nursing care, as is the norm for this field.[29,32,60] Direct

observation has been used to study missed care,[21] but infrequently due to its time-intensive nature, which typically also limits such studies using direct observation to a smal number of sites. Second, we used the SAQ to measure only nurses' attitudes on the safety climate subscale, which differs from its typical use as a measure of attitudes among multi-professional staff.[3,39] Furthermore, causality in the relationship between safety climate and missed care could not be determined using this cross-sectional study design. Finally, safety climate explained only 3.4% of the variance in missed care scores in our model. While this may be partially explained by generally high safety climate ratings in our study, explanation of variance in our model was rather low compared to 30% in Hessels et al., which measured safety culture with a tool covering other subdomains such as teamwork and staffing.[8] Additional structure indicators need to be explored and linked to missed perinatal nursing care.

Conclusion

Our findings suggest that improving safety climate may improve nursing care quality during labor and birth through decreasing missed nursing care. Conversely, it is also possible that strategies to reduce missed care - such as staffing improvements - may improve safety climate. Safety strategies such as adequate nurse staffing consistent with national standards, promoting open communication, ensuring non-punitive response to error, incorporating perinatal safety nurses, and ongoing learning from safety events may decrease missed care in daily nursing activities. It may be important to think more synergistically about relationships between patient safety and nursing care quality in the context of maternity care in order to achieve reliably safe, high-quality maternity care.

Source of Support:

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Table 1

Description of Nurse Characteristics (N=3,471 Labor Nurses)

Nurse Characteristics	n (%)	Mean ± SD
Age (years)		40.69 ± 11.77
18–24.9	135 (4.2)	
25–44.9	1,923 (59.7)	
45–64.9	1,107 (34.4)	
65	57 (1.8)	
Gender		
Female	2,989 (97.7)	
Male	16 (0.5)	
Other	2 (0.07)	
Decline to report	53 (1.7)	
Race		
White/Caucasian	2,871 (82.7)	
Black/African American	72 (2.1)	
Asian	75 (2.2)	
American Indian/Alaska Native or Native Hawaiian/Other Pacific Islander	29 (0.8)	
Multiracial	68 (2.0)	
Declined to report	356 (10.3)	
Ethnicity		
Not Hispanic/Latino	2,968 (94.3)	
Hispanic/Latino	181 (5.8)	
Shift usually worked		
Days	1,814 (53.3)	
Evenings	119 (3.5)	
Nights	1,191 (35.0)	
Rotating	278 (8.2)	
Employment status		
Full-time	2,559 (75.3)	
Part-time	841 (24.7)	
Role in the unit		
Staff RN	2,146 (62.7)	
Charge RN	125 (3.7)	
Staff and charge RN	879 (25.7)	
Administrator	146 (4.3)	
Clinical nurse specialist or nurse educator	43 (1.3)	
Other	83 (2.4)	
Highest nursing education		
Diploma	88 (2.6)	
Associate degree	939 (27.5)	
Bachelor degree	2,105 (61.7)	

Nurse Characteristics	n (%)	Mean ± SD
Master degree	266 (7.8)	
Doctoral degree	13 (0.4)	
Years of experience as an RN		14.77 ± 11.59
<5	704 (20.9)	
5–9.9	749 (22.2)	
10–19.9	865 (25.7)	
20	1,050 (31.2)	
Years of experience as a L&D RN		12.27 ±10.60
<5	1,097 (32.6)	
5–9.9	591 (17.6)	
10–19.9	865 (25.7)	
20	813 (24.2)	
Years of working in current hospital		10.41 ± 9.77
<5	1,284 (38.4)	
5–9.9	644 (19.3)	
10–19.9	831 (24.8)	
20	587 (17.5)	

Note: SD=Standard Deviation; RN=Registered Nurse; L&D=Labor and delivery; # American Indian/Alaska Native and Native Hawaiian or other Pacific Islander groups were combined due to small cell size

Table 2

Distribution of Missed Care Aspects by Select Nurse Characteristics (N=3,471 Labor Nurses)

Nurse Characteristics	Missed Care Aspects Mean ± SD	p values
Age (years)		0.035
18–24.9	9.74 ± 6.35	
25–44.99	11.32 ± 7.01	
45–64.99	10.87 ± 6.95	
65	9.98 ± 7.08	
Shift usually worked		0.52
Days	11.12 ± 7.03	
Evenings	11.62 ± 7.10	
Nights	11.14 ± 6.92	
Rotating	10.55 ± 6.76	
Employment status		0.32
Full-time	11.02 ± 6.96	
Part-time	11.31 ± 6.99	
Highest nursing education		0.34
Diploma	10.40 ± 6.83	
Associate degree	10.79 ± 7.07	
Bachelor degree	11.24 ± 6.89	
Master degree	11.06 ± 7.28	
Doctoral degree	11.53 ± 7.04	
Years of experience as a L&D RN		0.007
<5	10.90 ± 6.89	
5–9.99	11.89 ± 6.89	
10–19.99	11.28 ± 7.16	
20	10.65 ± 6.94	

Note: SD=Standard Deviation; RN=Registered Nurse; L&D=Labor and delivery.

Table 3

Distribution of Missed Care Aspects and Reasons by Patient Safety Climate (N=3,471 Labor Nurses)

Missed Care: Aspects and Reasons	All Nurse Respondents Mean ± SD or n (%)	Perception of Safety Climate, Mean ± SD or n (%)			p values
		Poor[1]	Acceptable[2]	Good[3]	
N	3,401	254 (7.47)	914 (26.87)	2,233 (65.66)	--
Aspects of Missed Care					
Sum Score (0–25)	11.04 ± 6.99	14.75 ± 6.35	13.17 ± 6.72	9.81 ± 6.79	<0.001
Missed timely documentation	2,729 (78.92%)	222 (87.40%)	777 (85.01%)	1,684 (75.41%)	<0.001
Missed monitoring intake and output	2,708 (78.45%)	222 (87.40%)	769 (84.14%)	1,672 (74.88%)	<0.001
Missed thorough review of prenatal records	2,173 (63.04%)	182 (72.44%)	652 (71.33%)	1,301 (58.26%)	<0.001
Missed assessment of pain status	1,978 (57.52%)	184 (72.44%)	591 (64.66%)	1,168 (52.30%)	<0.001
Missed checking voiding needs	1,902 (55.61%)	248 (97.63%)	591 (64.66%)	1,113 (49.81%)	<0.001
Missed provision of labor support	1,863 (54.00%)	197 (77.56%)	599 (65.53%)	1,042 (56.67%)	<0.001
Reasons for Missed Care					
Communication (1–4 Likert Scale)	1.81 ± 0.55	2.26 ± 0.62	1.98 ± 0.50	1.68 ± 0.51	<0.001
Material Resources (1–4 Likert Scale)	2.22 ± 0.81	2.74 ± 0.91	2.43 ± 0.77	2.07 ± 0.77	<0.001
Labor Resources (1–4 Likert Scale)	2.54 ± 0.80	3.15 ± 0.70	2.83 ± 0.73	2.36 ± 0.76	<0.001

Notes: SD=Standard Deviation. Kruskal-Wallis tests were conducted for the sum score of missed care aspects (0–25) and the mean scores of missed care reasons (1–4), and Chi-Square tests were conducted for the top 6 (25% quartile of 25 items) most commonly missed aspects of care. Patient safety climate scores ranged from 1–5.

[1] Poor perception of safety climate stands for mean score <3.

[2] Acceptable perception of safety climate stands for mean score between 3–3.99.

[3] Good perception of safety climate stands for mean score 4.

Table 4

Unadjusted and Adjusted Coefficients of Patient Safety Climate on Missed Care Aspects (N=253 Hospitals with 3,429 Labor Nurses)

Models	Coefficient	95% CI	*p* values
Model 1 (unadjusted)			
Patient safety climate	−2.60	(−2.91, −2.29)	<0.0001
Model 2 (adjusted for nurse characteristics)			
Patient safety climate	−2.65	(−2.97, −2.34)	<0.0001
Year of experience as a L&D RN	−0.01	(−0.03, 0.02)	0.64
Highest nursing education below BSN	0.45	(−0.03, 0.92)	0.07

Note: 95% CI=95% Confidence Interval; SE=Standard Error; RN=Registered Nurse; L&D=Labor and delivery, BSN=Bachelor of Science in Nursing. Multilevel models used robust procedures to account for clustering of nurses in hospitals; Models were bootstrapped with 1,000 samples; Perceptions of safety climate explained approximately 3.4% of the variance in missed care scores.