



The Impact of Nursing Work Environments on Patient Safety Outcomes

The Mediating Role of Burnout/Engagement

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Objective: To test a theoretical model of professional nurse work environments linking conditions for professional nursing practice to burnout and, subsequently, patient safety outcomes.

Background: The 2004 Institute of Medicine report raised serious concerns about the impact of hospital restructuring on nursing work environments and patient safety outcomes. Few studies have used a theoretical framework to study the nature of the relationships between nursing work environments and patient safety outcomes.

Methods: Hospital-based nurses in Canada (N = 8,597) completed measures of worklife (Practice Environment Scale of the Nursing Work Index), burnout (Maslach Burnout Inventory-Human Service Scale), and their report of frequency of adverse patient events.

Results: Structural equation modeling analysis supported an extension of Leiter and Laschinger's Nursing Worklife Model. Nursing leadership played a fundamental role in the quality of worklife regarding policy involvement, staffing levels, support for a nursing model of care (vs medical), and nurse/physician relationships. Staffing adequacy

directly affected emotional exhaustion, and use of a nursing model of care had a direct effect on nurses' personal accomplishment. Both directly affected patient safety outcomes.

Conclusions: The results suggest that patient safety outcomes are related to the quality of the nursing practice work environment and nursing leadership's role in changing the work environment to decrease nurse burnout.

The link between negative working conditions and employee stress is well known. Work stress and burnout are also associated with negative work attitudes and performance. In healthcare settings, these conditions threaten the quality of patient care and patient safety. A 2004 report by the Institute of Medicine¹ raised serious concerns about the impact of hospital restructuring in the 1990s on nursing work environments and patient safety outcomes. The authors noted that typical nursing work environments are "characterized by many serious threats to patient safety..." (p3) and suggested that these conditions are caused by organizational management practices, work design issues, organizational culture, and the way nurses are deployed in current inpatient settings. The report found that strong, visible nursing leadership was an important factor in creating a positive work environment and a "culture of safety." The Institute of Medicine report also showed that many hospitals have inadequate numbers of nurses to provide safe patient care and that unsafe work practices pose

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threats to patient safety. Indeed, Aiken et al² and Tourangeau et al³ linked nurse staffing adequacy to patient mortality. Nurse burnout played a major role in these studies of relationships between nursing work environments and patient outcomes.

Few studies, however, have used an explicit theoretical framework to study the nature of the relationships between nursing work environments and patient safety outcomes. In our study, we tested a theoretical model of professional nursing work environments that linked perceived conditions for professional nursing practice in nursing work environments to burnout/engagement and, subsequently, patient safety outcomes.

Theoretical Framework

The Nursing Worklife Model⁴ served as the theoretical framework for this study. The model describes relationships among nursing worklife factors, burnout, and nurse and patient outcomes. In this model, 5 worklife factors identified by Lake⁵ as characteristics of effective professional nursing practice environments interact with each other and affect nurse and patient outcomes through the burnout/engagement process. The 5 worklife factors are the following: (1) effective nursing leadership, (2) staff participation in organizational affairs, (3) adequate staffing for quality care, (4) support for a nursing (vs medical) model of patient care, and (5) effective nurse/physician relationships. Leiter and Laschinger⁶ described how these factors interact to predict the extent of nurses' burnout or engagement with their work. In that study, nursing leadership was found to be the driving force of the model, strongly influencing the other professional practice environment factors, which in turn influenced the degree of work engagement/burnout. In this study, we further test the model by adding patient safety as an outcome of this process.

Related Literature

Interest in the impact of nursing working conditions on patient safety outcomes has grown since the Institute of Medicine report in 1999.⁷ There have been numerous studies linking worklife characteristics, particularly nurse staffing levels, to patient outcomes, such as adverse events and patient mortality.^{3,8-11} Lang et al¹² concluded from their systematic review of studies that there is substantial evidence to support the relationship between adequate staffing levels and lower hospital

mortality levels, failure to rescue ratios, and shorter patient length of stay.

Aiken et al¹³ have shown that patients in US Magnet hospitals had lower inpatient mortality than those in non-Magnet hospital settings. Magnet hospitals are institutions that support professional nursing practice by ensuring nurse autonomy, control over the practice setting, and strong nurse/physician relationships. Nurses in these settings have lower levels of burnout, greater job satisfaction, and lower turnover intentions. Aiken's program of research was one of the first to systematically link nursing work environments to patient outcomes.

Kazanjian et al¹⁴ conducted a systematic review of studies linking nursing work environment characteristics to patient mortality and concluded that the evidence from 27 studies supported a link between inpatient mortality and variables such as autonomy, good nurse/physician relationships, reasonable workloads, care based on nursing standards, positive manager attributes, and professional development opportunities. These characteristics have been described as forces of magnetism by Kramer and Schmalenberg.¹⁵

Nursing worklife characteristics also are related to the occurrence of less ominous patient outcomes, such as falls, nosocomial infections, and medication errors. Sovie and Jawad¹⁶ found that nurse staffing levels were significantly related to lower patient fall rates, better pain control, and fewer nosocomial infections. Whitman et al¹⁷ also linked nurse staffing levels to decreased fall rates and medication error rate in intensive care units. These outcomes complicate patient progress, have a negative effect on their well-being, and can lead to untimely death.¹⁷

In this study, we suggest that burnout is an important mediating mechanism between nursing worklife conditions and patient safety outcomes. Burnout is a common phenomenon in nursing and other health professions. Maslach and Leiter^{18(p17)} define burnout as "the index of the dislocation between what people are and what they have to do. It represents an erosion in values, dignity, spirit and will—an erosion of the human soul. It is a malady that spreads gradually and continuously over time, putting people into a downward spiral from which it is hard to recover." Burnout comprises chronic emotional exhaustion, cynicism and detachment from work, and feelings of ineffectiveness on the job. A major source of burnout is an overloaded work schedule, that is, having too little time and too few resources to accomplish the job. Lack of control (eg, a situation in which reducing costs becomes more important than meeting client or

employee needs prevails), performing tasks that conflict with employee values and beliefs, and a breakdown in social work factors are also factors that lead to burnout. Performance suffers when work is so fast paced that workers lose a sense of community. Finally, unfair management practices may lead to distrust and disillusionment among employees and result in symptoms of burnout.

Burnout has been studied extensively in nursing. Several studies by Aiken and her colleagues linked lower levels of burnout to work environments that provided job autonomy, control over the practice environment, and good nurse/physician relationships.^{19,20} Emotional exhaustion has been related to work pressure²¹ and a lack of workplace support.²² Bakker et al²³ found that nurses who felt their job demands exceed the accompanying rewards reported higher levels of emotional exhaustion than those who did not experience such an imbalance. This relationship was particularly strong for nurses with strong needs for personal control. These studies clearly suggest that burnout is a serious problem that is costly for both people and organizations and that every effort must be made to prevent it.

Hypothesized Model

Figure 1 displays the expanded Nursing Worklife Model tested in this study. The model describes the mediating role of burnout between worklife factors

and patient safety outcomes. Moving from left to right in Figure 1, the pattern of relationships among Lake's 5 qualities of professional nursing work environments is defined according to Leiter and Laschinger's previous results.⁴ Leadership is the starting point, with direct paths to staffing adequacy and policy involvement as well as nurse/physician relationships. Both policy involvement and nurse/physician relationships are hypothesized to predict the prevalence of a nursing model of care (in contrast to a medical model). Use of a nursing model of care is projected as enhancing leadership's prediction of staffing. Staffing adequacy has a direct path to exhaustion which mediates that relationship with depersonalization. Nursing model also has a direct path to personal accomplishment. The burnout mediation quality of the model is captured in the channeling of all relationships of the work environment variables with adverse events through the 3 qualities of burnout. This pattern signifies that qualities of the work environment influence adverse events to the extent that they contribute to feelings of exhaustion, depersonalization, and personal accomplishment.

Methods

Participants

The sample used for this analysis consisted of a subset from a larger study: the *International Survey*

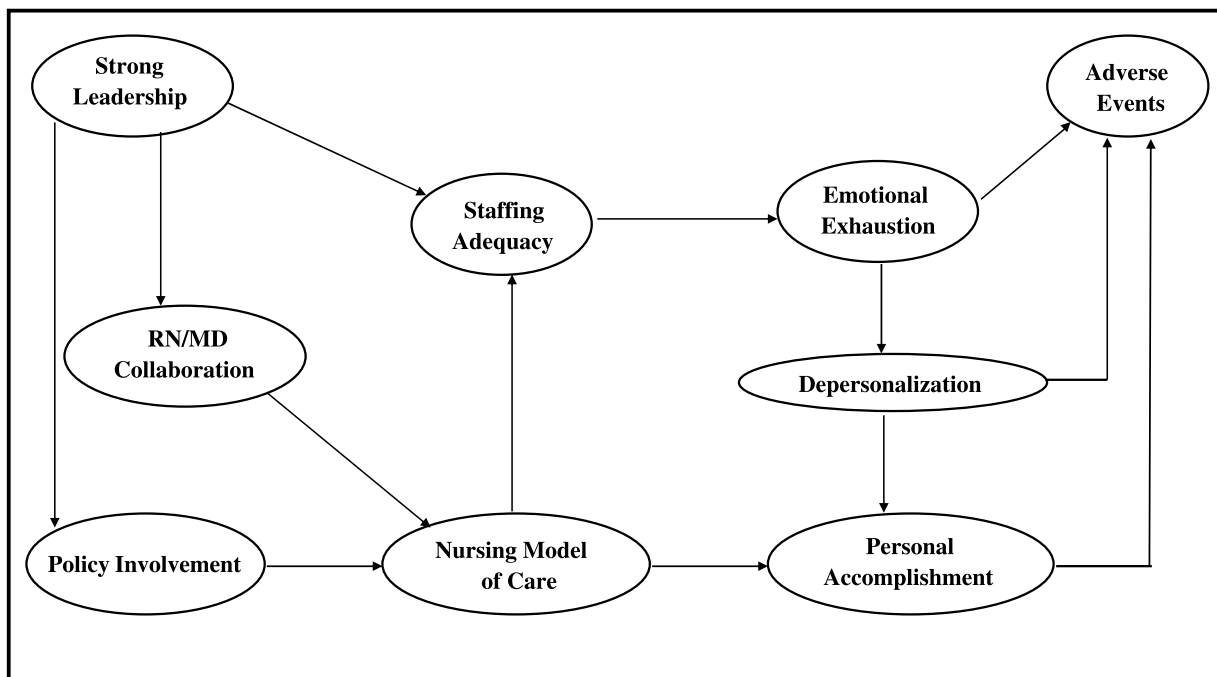


Figure 1. Hypothesized model.

of *Hospital Staffing and Organization of Patient Outcomes*²⁴ conducted in 5 countries (Canada, USA, England, Scotland, and Germany). The study was designed to explore relationships between hospital work environment characteristics, nurse staffing, and nurse and patient outcomes. In Canada, nurses working in 292 acute care hospitals in 3 provinces were surveyed. In Ontario and British Columbia, stratified random samples of nurses were randomly selected from the registry lists of the provincial licensing bodies. In Alberta, the entire population of acute care nurses was surveyed. A total of 17,965 nurses returned useable questionnaires (response rate, 59%).

The results reported in this article relate to a subset of the Ontario and Alberta data ($n = 4,606$ and $n = 3,991$, respectively) who provided valid responses on all variables in the analysis ($N = 8,597$). Consistent with the demographic profile of nurses in Canada, nurses' average age was 44 years with 19 years of experience in nursing (see Table 1). Most were female, diploma prepared, and worked full time. The majority held permanent positions (85%), whereas others had temporary positions or casual positions. Of those in casual positions, most preferred this position (61%). Nurses had worked

in their current hospital for 12 years ($SD = 7.6$), primarily on medical/surgical units (64%).

Procedures

Nurses received questionnaires through regular mail in the fall of 1998. Participation was anonymous with instructions to clarify informed consent. The Dillman²⁵ technique was used to maximize return rates.

Instruments

Practice Environment Scale of the Nursing Work Index

In this analysis, we used items on the survey questionnaire included in Lake's⁵ modification of the NWI-R, the Practice Environment Scale of the Nursing Work Index (NWI-PES). Items capturing each of Lake's subscales reflect 5 aspects of professional nursing worklife environments. Respondents rated positively worded statements as Strongly Disagree (1), Disagree (2), Agree (3), and Strongly Agree (4). The Canadian survey did not include 3 items included in Lake's⁵ analysis of USA data (career ladder in place, use of nursing diagnosis, and supervisors use mistakes as learning opportunities). The nurse participation in hospital affairs subscale (Participation) consisted of 9 items; the nursing foundations for quality of care subscale (Nursing Model), 8 items; nurse manager ability/support of nurses subscale (Leadership), 4 items; the staff and resource adequacy subscale (Staffing), 4 items; and the collegial nurse/physician relationships subscale (Nurse/Physician Relationship), 3 items. Lake⁵ established evidence for the construct validity and internal consistency reliability for the NWI-PES.

Maslach Burnout Inventory—Human Service Scale

The Maslach Burnout Inventory—Human Service Scale (MBI-HSS) is the original version of this measure, which is the most widely used measure of job burnout.²⁶ The 22-item measure comprises 3 subscales: emotional exhaustion (9 items), depersonalization (5 items), and personal accomplishment (8 items). The items are framed as statements of job-related feelings (eg, "I feel burned out from my work," "I feel confident that I am effective at getting things done"), and are rated on a 7-point frequency scale (ranging from "never" to "daily"). Burnout is reflected in higher scores on emotional exhaustion and depersonalization and lower scores on personal accomplishment. A factor analysis of the data in this study for the MBI-HSS items replicated the established MBI-HSS factor structure.

Table 1. Demographics

	$\bar{x}$	SD
Average age	44	9.3
Years experience	19	9.2
Years worked in current hospital	12	7.6
	%	
Sex		
Female	98	
Male	2	
Highest educational credentials		
Diploma	48	
Baccalaureate	28	
Masters	2	
Employment status		
Full-time	59	
Part-time	40	
Employment type		
Permanent	85	
Temporary	3	
Casual	13	
Primary specialty areas		
Medical/surgical units	64	
Intensive care unit	12	
Obstetrics	10	
Operating/recovery room	6	
Pediatrics	4	
Psychiatry	4	

A considerable body of research has confirmed the validity and reliability of this measure.^{27,28}

Adverse Events

Adverse events²⁴ were measured by nurses' reports of the frequency of occurrence of 4 types of negative patient incidents on their shifts over the past year: falls, nosocomial infections, medication errors, and patient complaints. Nurses were asked "Over the past year, how often would you say each of the following incidents has occurred involving you or your patients." Response options ranged from 1 (never) to 4 (frequently).

Results

Table 2 displays the means, SDs, Cronbach α reliability estimates, and correlations for the variables in the study. The scores on the MBI subscales are close to the usual level for health service professionals.²⁶ Emotional exhaustion and depersonalization are highly correlated ($r = 0.71$), and both are moderately correlated with personal accomplishment ($r = -0.28$ and $r = -0.35$, respectively). The strongest correlations with adverse events are with staffing ($r = -0.30$), emotional exhaustion ($r = 0.30$), and depersonalization ($r = 0.34$). All α levels are in the acceptable range above .70. Regarding the patient safety items, the most frequent were patient complaints ($M = 2.36$, $SD = 0.91$) followed by nosocomial infections ($M = 2.06$, $SD = 0.87$), patient falls ($M = 1.96$, $SD = 0.89$), and medication errors ($M = 1.89$, $SD = 0.76$).

Data Analysis

Through structural equation modeling, the analysis assessed Lake's⁵ factor structure for the NWI-PES, the factor structure for the MBI-HSS by Maslach et al,²⁶ and the measure of adverse events. The structural equation modeling analysis also examined the fit between the hypothesized model and the data and the magnitude of the direct and indirect effects within the model (Figure 1).

Model Testing

The hypothesized model was tested with EQuationS,²⁹ a structural equation modeling statistical package. The first phase of the analysis examined the measurement models of the NWI-PES, the MBI-HSS, and the patient safety items. Based on Hoyle and Panter's³⁰ recommendations, several criteria were used to evaluate fit of the models. These included omnibus fit indexes such as the

Table 2. Means, SDs, Cronbach α 's, and Correlations for Major Study Variables

	Mean	SD	Cronbach α	Staffing	Physician/ Nurse	Leadership	Policy Involvement	Nursing Model	Emotional Exhaustion	Personal Accomplishment	Depersonalization
Staffing	2.32*	0.69	.78								
Nurse/Physician	2.82*	0.65	.83	.37							
Leadership	2.46*	0.78	.84	.67	.48						
Policy involvement	2.38*	0.54	.79	.64	.47	.89					
Nursing model	2.71*	0.49	.72	.63	.51	.73	.82				
Emotional exhaustion	22.34†	11.20	.91	-.61	-.22	-.41	-.39	-.39			
Personal accomplishment	37.38†	7.14	.80	.24	.13	.21	.22	.25	-.28		
Depersonalization	6.30†	5.67	.78	-.43	-.16	-.29	-.28	-.27	.71	-.35	
Adverse events	2.06*	0.65	.75	-.30	-.14	-.23	-.23	-.25	.30	-.22	.34

N = 8,560. All correlations significant at $P < .01$.

*Item means.

†Sums of item ratings.

chi-square (χ^2),³¹ incremental fit indexes, such as the Comparative Fit Index (CFI)³² and the Incremental Fit Index (IFI),³³ and the Root Mean Square Error of Approximation (RMSEA) advocated by Browne and Cudeck.³⁴

The χ^2 test is interpreted as the test of the difference between the hypothesized model and the just identified version of the model. Low, non-significant values are desired.³⁵ However, the χ^2 test is very sensitive to sample size; thus, in a model with a relatively large sample size, the null hypothesis will almost always be rejected. Because of this limitation, the χ^2 test was used only to evaluate the relative differences in fit among competing models. Incremental fit indexes indicate the proportion of improvement of the hypothesized model relative to a null model, typically one assuming no correlation among observed variables. The generally agreed upon critical value for the CFI and IFI is .90 or higher.^{32,33} The RMSEA is the standardized summary of the average covariance residuals and is thus a measure of the *lack* of fit between the data and the model. Low values (between 0 and .06) indicate a good fitting model.³⁶

The confirmatory factor analysis supported the measurement models for Lake's 5-factor solution for the NWI-PES items and the 3-factor solution for the MBI-HSS by Maslach et al. The analysis identified 10 correlated errors between pairs of items within the MBI-HSS factors and 7 correlated

errors between pairs of items within the NWI-PES factors. A confirmatory factor analysis also confirmed a single factor structure of the 4 patient safety items with no correlated errors.

Next, the structural relationships among the latent variables in the model were examined. A structural equation modeling analysis using maximum likelihood estimation identified a good fit of the data to the hypothesized model ($\chi^2 = 16,557.35$, $df = 1,346$, CFI = .907, IFI = .907, RMSEA = .037). This model met the criterion for incremental fit indexes (CFI/IFI greater than .90). All structural coefficients were statistically significant. The relationships among worklife factors and burnout were consistent with those of our previous research, and the posited relationships to adverse events were supported by these data. However, the modification indexes indicated that adding 2 direct paths to adverse events would further enhance the fit of the model. When paths from staffing adequacy and from nursing model to adverse events were added, the χ^2 improved significantly ($\chi^2\text{Diff} = 119.19$, $df = 2$, $P = .001$), producing a good overall fit ($\chi^2 = 16,438.19$, $df = 1,344$, CFI = .908, IFI = .908, RMSEA = .037). In this significantly enhanced model fit, all coefficients, except the path from exhaustion to adverse events, were significant (see Figure 2). This suggests that burnout only partially mediated the relationship between worklife factors and adverse events.

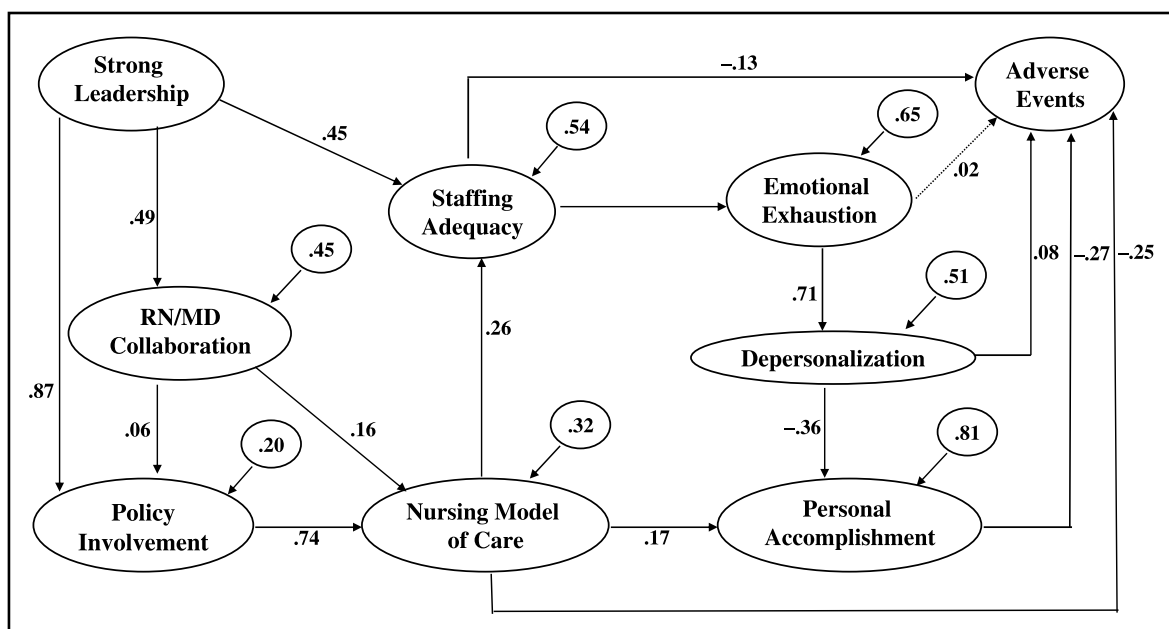


Figure 2. Final model. Note: Numbers in circles are error terms for the endogenous latent variables. Numbers by the arrows are path coefficients.

Limitations

We acknowledge that the findings of this study must be viewed with caution given the cross-sectional nature of the design, which precludes strong statements on causality. Longitudinal analyses would allow us to examine the dynamic nature of work by measuring changes in perceptions of working conditions over time and the impact of these conditions on nurse and patient outcomes. Replication of the study in other samples of staff nurses is needed to validate the current findings.

Discussion

The results are consistent with the notion that patient safety outcomes are associated with the quality of the nursing practice work environment and that the burnout/engagement process plays an important mediating role. The results suggest that when nurses perceive that their work environment supports professional practice, they are more likely to be engaged in their work, thereby ensuring safe patient care. The results also support the key role of strong nursing leadership in creating conditions for work engagement and, ultimately, safe, high-quality patient care.

The results extend those of our previous research that found support for a structural model linking Lake's⁵ professional practice work environment characteristics⁵ to nurse burnout.⁴ That model defined a fundamental role for nursing leadership in relation to the quality of worklife through links with staff nurse policy involvement, staffing levels, support for a nursing model of care, and nurse/physician relationships.

Our current analysis took the conceptual model a step further by examining adverse events with implications for patient safety. The analysis also provided ample support for a model in which the 3 components of burnout mediated the relationship of workplace factors with adverse events. The hypothesized Nursing Worklife Model provided an adequate fit with the data, consistent with the notion that workplace qualities affect adverse events to the extent that they influence nurses' exhaustion, depersonalization, and personal accomplishment.

The analysis suggested that burnout's mediation function was less than complete. In fact, modification indexes suggested that both of the workplace qualities with direct paths to burnout—staffing adequacy and use of a nursing model of care—would further enhance the prediction of adverse events. The revised model with direct paths from each of these workplace qualities to adverse

events made a substantial improvement in χ^2 . Both of the added path coefficients were more substantial than the paths from burnout to adverse events, with the path from exhaustion losing statistical significance in the context of the added paths.

This pattern suggests that nurses' psychological relationship with work is related to adverse events in the context of their direct relationships with workplace qualities. Both resource issues (adequate staffing) and values issues (use of a nursing model of care) are directly relevant to the incidence of adverse events. These same qualities are directly related to nurses' experience along the continuum of burnout to engagement with work.

The link between adequate staffing and adverse events corroborates the findings by Aiken et al¹⁹ that linked nurse/patient staffing ratios to inpatient mortality and other studies linking nurse staffing to adverse events.^{15,16} In our model, staffing adequacy was a consequence of effective nursing leadership in the unit, which resulted in collaborative relationships with physicians and greater involvement of nurses in unit governance. Both of these conditions, in turn, were associated with emphasis on a nursing model of care (vs medical), which subsequently had both direct and indirect effects on patient safety outcomes in our model.

When the hospital supported a nursing model of care, nurses felt a greater sense of personal accomplishment in their work, which in turn translated into more positive nurse-sensitive patient outcomes. These findings support Aiken and Lake's contentions that professional work environments affect patient outcomes, as well as Leiter's argument for the mediating role of burnout in this process. The results provide further support for Leiter and Laschinger's⁴ model of nursing worklife and extend it to include patient safety outcomes.

The severe downsizing of the nursing work force because of hospital restructuring in the 1990s has had a major impact on nursing work environments. Although nurses have responded positively to the challenges created by these conditions, their coping resources are being severely strained. Burnout results from accumulated exposure to stressful working conditions. Research is beginning to document high levels of nurse burnout levels after a decade of restructuring.

In 2 recent Canadian studies carried out concurrently,^{37,38} nurses reported severe levels of burnout according to Maslach and Leiter's norms. In the study of new graduate nurses in Ontario by

Kim et al,³⁷ 64% of the sample reported severe levels of burnout. This is particularly distressing given the current severe nursing shortage and the drop in enrollment in nursing education programs. In the study by Greco et al,³⁸ 58% of a sample of nurses of all ages who worked in acute care settings across Ontario also reported severe levels of burnout. In both studies, burnout level was strongly related to the degree of fit between personal expectations and existing worklife conditions described by Leiter and Maslach.³⁹

Given the manifestations of advanced stages of the burnout process, it is reasonable to expect that nurses experiencing burnout would be challenged to provide high quality of care. Our findings lend support to this hypothesis by linking characteristics of nursing professional practice environments to adverse patient outcomes through the mediating mechanisms of burnout.

Finally, the key role played by nursing leadership in this research highlights the importance of developing effective staff nurse leaders to ensure that nurses feel confident and satisfied with their work and that patients receive the quality of care they deserve. Nursing leadership plays a key role in providing the direction and infrastructure to ensure that nurses are empowered to practice professionally, and thus, deliver high-quality care.⁴⁰ Reductions in management staff because of restructuring initiatives over the past decade, however, have hindered nurse leaders' ability to lead. Significantly expanded spans of control have reduced their

visibility to staff and availability for mentoring and support.⁴¹⁻⁴³ Our results suggest that this situation must change to prevent nurse burnout and reduce the likelihood of adverse patient events.

In conclusion, the results of this study suggest that characteristics of professional nursing work environments described in the Magnet hospital research play an important role in the quality of nurses' worklife and patient safety outcomes. Burnout seems to be a key mediating process through which work environments affect patient outcomes. The results suggest that nurse administrators must develop strategies to create work environments that allow nurses to practice according to professional standards, thereby increasing work satisfaction, preventing burnout, and assuring that patients are provided with safe effective high-quality care.

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