Nursing Structure, Processes, and Patient Outcomes in Army Medical Centers[1]

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Abstract:

The purpose of this study was to describe patient outcomes in Army Medical Centers, identify differences in outcomes between mixed medical-surgical bed and specialty intensive care units (ICUs), and explore predictive models for outcomes attributable to nursing structure and processes. Data were collected from 138 patients and 103 nurses in four medical-surgical and four ICUs in two Army Medical Centers. Significant differences for unit type were found for length of stay and patient satisfaction with nursing care. Outcome predictive models were modest (adjusted R2 =.16 to .24) and significant for length of stay, satisfaction with nursing care, satisfaction with pain management, and health status following discharge. Exploring differences and commonalities between military and civilian hospitals will ultimately provide insight into ways of improving patient outcomes and bettering the work environment of nurses.

Keywords: military nursing; nursing structure; nursing processes; patient outcomes; patient satisfaction

Article:

Evidence is emerging that suggests patient outcomes reflect aspects of nursing organizational structure and processes (Aiken, Clarke, Sloane, Sochalski, & Silber, 2002; Aiken & Sloane, 1997; Canavan, 1997; Mitchell, Shannon, Cain, & Hegyvary, 1996; Needleman, Buerhaus, Mattke, Stewart, & Zelevinsky, 2002). Study findings, however, reflect conditions in civilian hospitals. There is much less information about the association of nursing structure and processes with patient outcomes in military hospitals where civilian and military nurses provide care. This avenue warrants exploration because there is less variation in certain attributes of military hospitals compared to civilian acute care facilities. For example, patients on active duty are young and in relatively good health prior to admission, and U.S. Army registered nurses (RNs) must have a baccalaureate degree to enter active duty. The intent of the current study, therefore, was to explore patient outcomes and their association with patient characteristics and nursing structure and processes in two U.S. army medical centers.

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ISSUES IN LINKING PATIENT OUTCOMES TO NURSING CARE

The number of studies exploring the relationship of nursing care to patient outcomes has increased markedly. Much of this work was stimulated by concerns that changes in health care structure, organization, financing, and delivery were compromising the quality of care and creating unpleasant work environments for nurses (Wunderlich, Sloan, & Davis, 1996). Shorter lengths of stay, fewer complications, better pain control, lower mortality rates, and decreased health care costs have been linked to care by expert nurses (Aiken, Smith, & Lake, 1994; Barkell, Killinger, & Schultz, 2002; Oerman & Huber, 1999; Urden, 1999; Wheeler, 1999). Studies also note the importance of nurse-physician (RN-MD) relationships and nurse autonomy to patient outcomes and nurse job satisfaction (Adams & Bond, 2000; Baggs et al., 1999; Rosenstein, 2002; Wild & Mitchell, 2000). The importance of type of hospital unit to patient outcomes, largely in relation to dedicated AIDS units and medical-surgical units, has been explored. Aiken and Sloane (1997) found that nurses who worked on dedicated AIDS units where nurses could develop a specialized area of expertise had more autonomy and higher status than nurses who worked on medical-surgical units. Patients also had a higher quality of care and reported more satisfaction with care (Aiken, Sloan, & Sochalski, 1998). Beyond specific patient diagnosis, the core elements in these units were opportunities for nurses to specialize and patient differentiation, both of which promoted greater nurse control, independence, and authority in the work environment.

These studies are implicitly associated with civilian hospitals. Military hospitals, nurses, and patients have attributes that make them at least somewhat different from civilian counterparts. For example, there is a shared military culture between care providers and care recipients. All nurses in the military are officers, and military personnel in one hospital are likely to know personnel in another hospital. These factors combine to make the military hospital culture distinct from that in civilian hospitals. Findings from the first stage of the current study, in fact, indicated that there were differences in the work environment of nurses in military hospitals compared to that of civilian hospitals even though civilian nurses work alongside military nurses in military hospitals (Foley, Kee, Minick, Harvey, & Jennings, 2002).

Donabedian's (1980) model of structure, process, and outcome as the means to assess quality care was the framework for the current study (Hammermeister, Shroyer, Sethi, & Grover, 1995). Based on the work of Aiken and Sloan (1997), the structure variable for the current study was unit type: a medical-surgical or intensive care unit (ICU; instead of an AIDS unit). Nurses in ICUs possess distinct and highly specialized patient skills focused on maintaining brain, heart, lung, and kidney function; provide care for one or two patients; and through the use of protocols have more autonomy in practice. On the other hand, nurses working in medical-surgical units have a broad array of bedside skills as they care for patients with diverse diagnoses and possess highly developed organizational skills as they care for large numbers of patients. For the current study, process variables included nurse perceptions of the work environment, often conceptualized as job satisfaction, and degree of nurse expertise. Following American Nurse Association's (ANA) nurse-sensitive quality indicators (ANA, 1996), outcome variables were defined as patient adverse events, patient satisfaction with nursing care, and symptom management. Patient functional health status following discharge was also included.

PURPOSE

The purpose of the current study was to describe patient outcomes in two military hospitals and to identify the contributions of nursing structure and nursing processes to patient outcomes. Comparing findings in military hospitals to those found in the literature on civilian hospitals will contribute to our understanding how structure, process, and outcome variables interact to enhance quality of care. The research objectives were to

- describe patient acuity and patient outcomes as measured by adverse events while in the hospital and length of stay and identify differences by unit type (medical-surgical units vs. ICUs)
- describe patient ratings for satisfaction with nursing care, symptom management, and health status following discharge and identify differences in ratings by unit type
- explore differences in patient outcomes attributable to nursing processes and unit type after controlling for patient characteristics and other patient hospitalization variables.

DESIGN

A descriptive, correlational, comparative quantitative design was used for the current study.

SAMPLE

Data for the study were collected in two Army Medical Centers, one with 172 beds and the other with 216 beds. These hospitals were selected because they were geographically distant, roughly comparable in terms of number of beds, and considered to be typical Army hospitals. At each hospital, data were gathered from two adult medical-surgical units and two adult ICU or stepdown units for a total of four adult medical-surgical units and four adult ICU or stepdown units. The nonprobability patient sample included approximately equal numbers of all three types of military beneficiaries who utilize Army Medical Centers: (a) active-duty military personnel, (b) retired military personnel, and (c) authorized family members. Estimated sample size needed for analysis using multiple regression with 12 variables, a minimum power of .80, an alpha of .05, and a moderate effect size of .15 (R2 =. 15) was 120 patient medical records matched to 120 patient questionnaires completed after discharge (Munro, 2001).

A total of 138 matched patient medical records and completed discharge questionnaires was obtained (data were extracted from a larger study so that oversampling resulted). Response rate for the larger study was 33%. Patients

TABLE 1: Patient Characteristics

	Medical-Surgical Units		*Intensive Care Units*	
	Number (%)	M (SD)	*Number (%)*	M (SD)
Total	100 (72)		38 (28)	
Age		54 (17.4)		60 (17.8)
20 to 39 years	22 (22)		7 (18)	
40 to 59 years	38 (38)		9 (24)	
60 to 79 years	35 (35)		15 (40)	
80 years and older	5 (5)		7 (18)	
Gender				
Female	43 (43)		17 (45)	
Male	57 (57)		21 (55)	
Education				
High school or less/GED	37 (37)		18 (48)	
Associates or bachelor's	35 (35)		10 (26)	
Master's or doctorate	17 (17)		8 (21)	
(missing)	11 (11)		2 (5)	
Ethnicity				
White	76 (76)		33 (88)	
African American	18 (18)		1 (3)	
Asian and or Pacific Islander	4 (4)		2 (5)	
Hispanic and/or Other	1 (1)		1 (3)	
Military status				
Retired	32 (32)		15 (40)	
Dependent	39 (39)		15 (40)	
Active duty	29 (29)		8 (20)	

admitted to a medical-surgical unit were discharged from that unit; patients admitted to an ICU were discharged from that unit. The mean age of patients on the medical-surgical units was 54 (SD = 17.4), and the mean age of patients on the ICUs was 60 (SD = 17.8). Other patient characteristics are shown below.

The nonprobability nurse sample included 103 RNs on the selected units who were willing to answer the questionnaires. Response rate was 56%. Of these, 59 (57%) were Army nurses with 1 to 27 months of experience on the current unit, and 41 (40%) were civilian or agency nurses with 4 months to 18 years experience on the current unit. The mean age for these nurse respondents was 34 years (SD = 9.6), most were women (70%), and most were White (64%) while 19% were Black, and 17% were Hispanic, Asian, or other. All Army nurses had at least a bachelor's degree. Of the civilian nurses, 12% had diplomas, 44% had associate degrees, 42% had bachelor's degrees, and 2% had a master's degree. On average, these nurses had spent 9.6 years in nursing (SD = 9.3). Of the respondents, 56 nurses (61%) worked on medical-surgical units, and 36 (39%) worked on ICUs.

METHOD

Patient demographic, acuity, and outcome data were assessed from medical records and by questionnaires mailed to patients about 6 to 8 weeks following discharge from the hospital. Outcomes extracted from the medical records included the occurrence of adverse events such as injury-sustaining falls and length of stay and data to calculate patient acuity. Outcomes assessed

after discharge included patient satisfaction with nursing care, estimates of pain severity and subsequent satisfaction with pain management, and health status.

Nursing organizational structure was defined by unit type (medical- surgical or ICU). Nursing organizational processes were assessed by unit RN responses to scales on the degree of autonomy in nursing practice, control over practice, the level of RN and physician collaboration, and the degree of clinical expertise. Findings on nursing organizational structure and processes from the first stage of the current study have been reported elsewhere (Foley et al., 2002).

Patient Instruments

Patient medical record information form. A form was created to collect background and hospitalization information from the medical records of the patients. These data included birth date, gender, ethnicity, military category (active duty, retired, family member), diagnoses, surgical procedures if any, length of stay, data to calculate acuity, and the occurrence of adverse events.

Patient adverse events. Adverse event data were collected from the medical record and assessed following ANA's (1996) definitions for quality indicators. The indicators were an injury sustaining fall, Grade 2 or higher decubitus ulcer after the first 72 hours of hospital stay, and urinary tract infection after the first 72 hours of hospital stay.

Patient acuity. The Acute Physiology and Chronic Health Evaluation (APACHE II) was used to determine acuity (Knaus, Draper, Wagner, & Zimmerman, 1986). Scores on the APACHE II are derived from physiologic values, chronic health conditions, and age. The first APACHE II physiologic values to appear in the medical record were used to calculate APACHE score. For the APACHE II, more severe conditions are reflected by higher scores. The maximum score is 71, although Knaus et al. (1986) noted that no score above 55 has ever been reported.

Patient satisfaction with nurses and nursing care. Hinshaw and Atwood 's (1982) Patient Satisfaction Instrument (PSI) to measure patient satisfaction with nurses and nursing care was used in the current study. The 25-item scale incorporates three dimensions of nursing care: (a) technical proficiency (7 items), (b) educational relationship (7 items), and (c) trusting relationship (11 items). The 5-point Likert-type responses range from strongly agree to strongly disagree. Scores were coded so that higher scores reflected greater satisfaction. Total instrument scores can range from 25 to 125. In Hinshaw and Atwood's studies using the PSI, reported coefficient alphas ranged from .80 to .98 for all subscales except for one study where internal consistency for the education subscale was .44. Reliability for the current study sample using Cronbach's alpha was .93 for the entire scale, .83 for technical proficiency, .79 for educational relationship, and .87 for trusting relationship.

Patient satisfaction with pain (symptom) management. Pain management was assessed for patients who reported having pain by asking them to indicate pain severity for the worst episode of pain during hospitalization and to estimate the effectiveness of pain treatment for that episode. The anchors for the visual analog scale for pain severity were 0 (no pain), and 10 (the worstpossible pain). Anchors for the visual analog scale for treatment effectiveness were 0 (the treatment did not help at all), and 10 (the treatment completely relieved my pain). Visual analog

scales have been used to measure a variety of subjective phenomena and are considered to be reliable and valid measures of pain (Frank-Stromberg & Olson, 1997). A measure of satisfaction with pain treatment asked patients to indicate their overall satisfaction with the treatment they received for pain during the hospitalization period based on a Likert-type scale ranging from 1(very dissatisfied, to 4 (very satisfied).

Patient health status. Health status after discharge from the hospital was measured using the General Health Short Form-36 (SF-36; Ware, Snow, & Kosinski, 2000). Low scores on the SF-36 indicate poor functional health. Ware et al. (2000) provided evidence for validity. Reliability in this sample for the SF-36 scale was .93.

Nursing Processes Instruments

A demographic and background form was used to collect information about the nurses. The Nursing Work Index–Revised (NWI-R) was used to measure autonomy, control over practice, and RN-MD relationships. The Manifestations of Early Recognition (MER; Minick, 2003), a newly developed instrument, was used to measure clinical nursing expertise.

NWI-R. The NWI was developed by Kramer and Hafner (1989) to measure aspects of job satisfaction and conduciveness of the environment for quality nursing care. The instrument was modified by Aiken and Sloan (1997) to create a 57-item Likert-type response measure, the NWI-R. Fifteen of the 57 items were clustered conceptually to derive subscales for autonomy (5 items), control over practice (7 items), and RN-MD collaboration (3 items). Reports of total and subscale reliability range from .75 to .96, respectively. Content and criterion validity also are reported (Aiken & Patrician, 2000). Reliability in the current study was .71 for autonomy, .75 for control over practice, and .80 for RN-MD relationships.

Nurses' MER. Clinical nursing expertise was measured using the MER (Minick, 2003). The premise underpinning the MER is that early recognition of patient problems, a skill developed through experience and possessed by expert nurses, allows prompt and timely intervention to prevent major complications. The 16-item scale has three dimensions: knowing the patient and family, knowing the system and institution, and knowing the skills of oneself and colleagues. Respondents answer using a Likert-type scale format from 1 (strongly disagree) to 5 (strongly agree). Minick reported Cronbach's alpha for the composite 16-item Likert-type response scale ranging from .87 to .93 across studies. Cronbach's alpha in the current study was .84.

Data Collection

Following approval by Institutional Review Boards (IRBs), RN research coordinators at each hospital collected patient and nurse data. Data collection was sequential for the two hospitals, and procedures varied according to the requirements of the respective IRBs, units, and communication structures. At both hospitals, the names and addresses of all patients recently discharged from the study units were obtained so that questionnaires and consent forms could be mailed to them. At one hospital, medical record data were collected concurrent with mailing the questionnaires. At the second hospital, medical record data were retrieved only for those patients who returned completed questionnaires and consent forms.

A questionnaire packet including an introductory letter and a preaddressed, postage-paid return envelope was provided to RNs on each of the eight units. Respondent names were not requested so that anonymity was provided, and return of the questionnaire indicated consent.

ANALYSIS

Data were gathered from questionnaires mailed to patients who had been discharged, their corresponding medical records, and questionnaires distributed to RNs on units where these patients were hospitalized. Data were entered into data files using Epi-Info that allows double entry so that errors are immediately visible. Remaining discrepancies were resolved through comparison to original forms. Data were analyzed using SPSS version 11.0 and SAS version 8.2 using descriptive statistics, t tests for differences, and multiple regression.

Contributors to patient outcomes were examined taking into account nursing structure (unit type) and processes (selected NWI-R subscales) after controlling for patient characteristics and patient hospitalization variables. Nesting techniques were used for these analyses. Patient and nurse data were first nested within units. Units were categorized as either medical-surgical or ICUs. To examine patient outcomes, nurse variables were aggregated at the unit level (e.g., averaging NWI-R subscale scores within units). This resulted in all patients within a given unit being given the same values for the nursing processes variables. Medical record data and the discharged patient questionnaire data were added to the aggregated nurse data.

Preliminary analyses of the nested data indicated that there was substantial loss in sample size because of reduced responses to the three pain variables critical to these analyses: episode of pain or not, pain severity, and estimate of pain treatment effectiveness. As a result, selection of independent variables for analyses was restricted to six and based on the strength and significance of bivariate correlations. For each of the regression equations (except health status following discharge), the patient characteristic of education level was entered first. The patient hospitalization variables of estimate of pain severity and estimate of effectiveness of pain treatment were entered next as a block. In the third step, the nursing processes variables, the NWI-R unit subscales of autonomy and RN-MD relationship, were entered one at a time (stepwise) because of the exploratory nature of the analysis. To control for all other variables, the nursing structure variable unit type (medical-surgical or ICU) was entered last. For the regression equation of health status following discharge, the patient characteristic of age was entered first; the patient hospitalization variables of length of stay, acuity, and having an episode of pain or not were entered next as a block; the nursing process variable of RN- MD relationship followed, and unit type was entered last.

Because data were combined in a hierarchical fashion with nurse responses and patient data nested within hospital units, the data were first analyzed as a random effects model using SAS PROC MIXED as recommended by Singer (1998). Data were also analyzed using SPSS multiple linear regression modeling that does not account for the random effect of unit.

The results from these two analyses showed no substantive differences in outcome except when health status following discharge was the dependent variable. With SAS PROC MIXED, the RN-MD relationship variable did not achieve significance ($p = .12$) as it did in the equivalent

multiple regression equation (p = .03). Because of the greater facility for multiple regression to provide R^2 terms and test statistics for change in R^2, findings are reported from SPSS using traditional least squares analyses.

FINDINGS

Scores for acuity as measured by the APACHE II on the medical-surgical units ranged from 0 to 20 (M = 6.4, SD = 4.7). On the ICUs, they ranged from 0 to 23 (M = 6.8, SD = 4.5). There were no significant differences between the type of unit (equal variances assumed): t(136) = .43,p =.33. A total of 135 patients had Glasgow Coma Scores of 15 indicating most patients were alert and responsive which is consistent with lower APACHE II scores.

The three ANA quality indicators—falls, pressure ulcers, and urinary tract infections—were used to calculate an occurrence value using Silber's method. A value of 1 was used if one or more adverse events occurred for a single patient; if no adverse event occurred, a value of 0 was used (Silber, Williams, Krakauer, & Schwartz, 1992). The only adverse event to occur in this sample was a single urinary tract infection occurring to a patient in an ICU.

The length of stay (LOS) for patients in the current study ranged from less than 1 day to 16 days with the average stay of 3.9 days (SD = 3.6). Mean LOS on mixed units was 4.3 (SD = 3.8); for the ICUs it was 2.7 (SD = 2.8). There was a significant difference by unit type (equal variances not assumed): t(90) = 2.72, p = .004.

Scores for satisfaction with nursing care ranged from 60 to 125 (M = 100.57, SD =13.17). The mean satisfaction score (total scale) was higher for patients on the ICUs (ICUs M = 103.50, SD = 14.71; medical-surgical units M = 99.40, SD = 12.40). These differences were statistically significant, t(131) = 1.63, p = .05.

Pain severity and effectiveness of pain treatment scores were multiplied by 10 for ease of interpretation. Mean scores for pain severity were just over midpoint (56) for the patients reporting pain. The mean patient estimate for the effectiveness of pain treatment was 65 on the 0-to-100 scale. Of those responding to the pain treatment question, 52% of the patients reported they were very satisfied with pain management, 39% were mostly satisfied, 6% were mostly dissatisfied, and 3% were very dissatisfied with pain management. There were no differences between medical-surgical and ICUs for pain severity, t(95) = .45, p = .66; effectiveness of pain treatment, t(87) = .91, p = .36; or satisfaction with pain management, Mann–Whitney U = 995.50, p = .72.

Mean score for the SF-36 on the medical surgical units was 56 (SD = 22) and in the ICUs it was 54 (SD = 20). The range for SF-36 scores was 12 to 97, and no differences were found by unit type.

The results of the analyses of predictors of length of stay, satisfaction with nursing care, satisfaction with pain management, and health status are shown in Table 2. In these analyses, unit type was forced in as the final variable that caused some variables to lose or gain statistical significance. The model with the highest adjusted R^2 has the strongest predictor variables. The patient outcome variable of adverse events could not be tested because there were too few cases.

Four regression models resulted with LOS as the dependent variable. All provided modest statistically significant results. Model 3 explained more variance in LOS than the other models (p =.001). Of the variance in LOS accounted for, pain severity contributed 29% and autonomy contributed 31%. Unit type was not significant.

Four regression models with statistically significant results were obtained for patient satisfaction with nursing care as the dependent variable. In Model 3, patient level of education (inverse) and RN-MD relationship (inverse) contributed to 23% of the variance in satisfaction with nursing care. The inverse relationship of education and RN-MD relationship to satisfaction with nursing care was unexpected and is addressed in the Discussion

TABLE 2: Predictors for LOS, Satisfaction with Nursing Care, Satisfaction with Pain Management, and Health Status

			Independent Variables							
			(block)		*(block)*		*(stepwise)*		*(enter)*	
Dependent Variable	*Model*	*Adjusted* R^2	*Patient Characteristics*		*Patient Hospitalization Variables*		*Nursing Processes*		*Nursing Structure*	
Length of stay	1*	.05	education	.24*						
	2*	.11	education	.22*	pain severity	.30*				
					effect/pain/treat	.01				
	3*	.20	education	.16	pain severity	.29	autonomy	.31*		
					effect/pain/treat	–.04				
	4*	.19	education	.17	pain severity	.29*				
					effect/pain/treat	–.03	autonomy	.27	unit type	–.05
Satisfaction with nursing care	1*	.09	education	–.32*						
	2*	.15	education	–.31*	pain severity	.01				
					effect/pain/treat	.29*				
	3*	.23	education	–.27*	pain severity	–.04	RN/MD relationship	–.29*		
					effect/pain/treat	.25				
	4*	.24	education	–.28*	pain severity	–.03	RN/MD relationship	–.21	unit type	.16
					effect/pain/treat	.25*				

(continued)

TABLE 2 (continued)

			Independent Variables							
			(block)		*(block)*		*(stepwise)*		*(enter)*	
Dependent Variable	*Model*	*Adjusted* R^2	*Patient Characteristics*		*Patient Hospitalization Variables*		*Nursing Processes*		*Nursing Structure*	
Satisfaction with pain management	1	.00	education	–.11						
	2*	.22	education	.07	pain severity	–.32*				
					effect/pain/treat	.34*				
	3*	.22	education	.07	pain severity	–.31*			unit type	–.12
					effect/pain/treat	.34*				
Health Status	1	.01	age	–.15						
	2*	.14	age	–.05	length of stay	–.13				
					acuity	–.24*				
					episode pain/not	–.28*				
	3*	.17	age	–.04	length of stay	–.14	RN/MD relationship	.20*		
					acuity	–.29*				
					episode pain/not	.26*				
	4*	.16	age	–.03	length of stay	–.15	RN/MD relationship	.20*	unit type	–.04
					acuity	–.29*				
					episode pain/not	.27*				

NOTE: LOS = length of stay; RN = registered nurse; MD = medical doctor.
*$p \leq .05$.

section. The patient characteristic of level of education (again inverse) and the patient hospitalization variable of effectiveness of pain treatment accounted for 24% of the variance in Model 4 (p <.001). Nursing structure (unit type) did not contribute significantly to patient satisfaction with nursing care after controlling for all other variables.

Patient characteristics did not predict satisfaction with pain management in any of the three models. The most important predictors of satisfaction with pain management were the patient hospitalization characteristics of pain severity (inverse) and effectiveness of pain treatment. The process variables of unit autonomy and RN-MD relationship were statistically excluded from the regression equations. After controlling for all variables, there were no differences for unit type.

As shown in Table 2, patient satisfaction with pain management indicates that the total adjusted R2 for the third and final model was .23 ($p < .001$).

Three significant models resulted when health status was the dependent variable. Model 3 was the strongest but modest with an adjusted R^2 of .17 ($p < .001$). The patient characteristic of age was not significant in any of the models; however, the patient hospitalization variables of acuity and episode of pain were significant in all of the models entered. RN-MD relationship was a significant nursing process variable in the third and fourth model. Unit type was not significant.

DISCUSSION

Percentage estimates provided by unit head nurses for type of hospitalized military beneficiary indicated that on average about 54% are family members of military personnel, 25% are retired military, 19% are active- duty personnel, and 2% are other (e.g., emergency admissions of civilians). In the current study, fewer retired personnel than family members participated which was not consistent with the average estimate. Patient participants were diverse in terms of age, gender, education, and ethnicity. Only patients with returned mailed questionnaires matched to medical records were included in this report indicating that all participants recovered to at least some degree following hospitalization.

Acuity in this sample was quite low which might be expected by the requirement that patient participants had to survive to discharge and complete and return a questionnaire. A mean acuity score of 16.4 using the APACHE II was reported for ICU patients in a 1995 study that is more than twice the value for ICU patients in the current study (Bufalo et al., 1995).

Adverse events were also low. Because of variations in definitions and reporting systems, comparison with published adverse event data is not valid. The patient outcome of LOS in this sample was 1 day shorter than the average of 4.9 days for hospital inpatients nationwide (Hall & DeFrances, 2003). Most of this difference is attributable to the short stays found in the ICU portion of the current study's patient sample. Patients who are admitted and discharged from ICUs rather than being transferred to other units tend to have critical but easily resolvable (at least for the moment) conditions. For example, the patients in ICU in our sample had diagnoses such as gastrointestinal bleeding, unstable angina, rule/out myocardial infarction, exacerbation of chronic pulmonary obstructive disease, and altered mental status.

Satisfaction with nursing care was high. This is consistent with Lin's (1996) observation that most patients tend to be satisfied with care. In the current study, ICU patients were more satisfied with their nursing care than patients on medical-surgical units by a small but statistically significant margin. In their reports, Aiken and colleagues (1998) found that satisfaction with nursing care was higher on specialized (AIDs) units. In the current study, ICU patients were acutely sick on admission but much better on discharge. The halo effect might have been operant for these short-stay patients in ICU but not present for the patients in medical-surgical who endured longer stays.

Satisfaction with pain management was also high that may be a reflection of nurse caring more than actual pain relief (Sherwood, Adams-McNeill, Starck, Nieto, & Thompson, 2000). Sherwood et al. (2000) commented that when nurses express concern about pain, patients are

satisfied even if pain is not relieved. On the other hand, if nurses appear uncaring, patients are not satisfied even when pain is relieved. There were no unit differences for this variable.

The health status scores of this sample were close to those reported in a group of patients in ICU assessed at various periods for up to 1 year after discharge (Kleinpell, 2003). Mean SF-36 score for patients age 45 to 64 years 1 month after discharge was 57. At 3 months after discharge, the mean score was 56.

The predictive models for patient outcomes varied in strength from weak to modest. The patient characteristic of education was significant in all four regression models for satisfaction with nursing care but was unexpectedly inverse (negative) for this variable. About 95% of this sample had at least a high school education so patients were well educated as a group. Those with more education may have a tendency to be either more critical or have higher expectations than those with less education.

One or more of the patient hospitalization variables contributed significantly to the four patient outcomes examined. Pain severity contributed significantly and positively to LOS as would be expected and was a negative contributor to satisfaction with nursing care, again as would be expected. Effective pain treatment contributed positively to satisfaction with nursing care and to satisfaction with pain management. The important role nurses play in pain management was substantiated in the current study. As might be expected, having less pain, being less acutely ill, and having a shorter stay in the hospital contributed to better health status following discharge.

Of the nursing processes variables, only autonomy and RN-MD relationship were significantly associated with any patient outcome. Higher autonomy scores were associated with longer length of stay. This is not surprising as, given the opportunity, nurses opt for ensurance that their patients are indeed capable of self-care prior to discharge. Although this might extend the hospital stay, most nurses would consider this necessary. RN-MD relationship was inversely associated with satisfaction with nursing care, and this finding was surprising at first glance. The scale for satisfaction with nursing care, however, captures purely nursing functions while the 3-item RN-MD subscale measures only the ability of RNs and MDs to work together as a team. The RN-MD subscale may be related to something quite distinct from the independent nursing functions measured by the satisfaction with nursing care scale. The finding that RN-MD subscale scores contributed positively to the patient health status measure after discharge lends support to this notion.

Unit type as a proxy for nursing structure and few of the nursing process variables contributed significantly to any of the patient outcome predictive models. This may be because of the unique work environment in military hospitals. Differences between nurses may be less likely to reside in the practice area (ICUs vs. general medical-surgical units) and more likely to reside in military rank and other attributes. Certain skill sets are similar across practice specialties in the military as many military nurses take courses in critical care or trauma. As a result, most military nurses possess some critical care skills regardless of area of practice. Because of this, there may be little variance in nursing processes across unit type. Many of the patients who were sickest and most acutely ill were likely excluded from the current study, and unit type differences may not be especially significant when patients do well.

Findings might also be attributed to differences in military hospital patients themselves. Patients in military hospitals may be inherently different from those in civilian hospitals. The emphasis on physical fitness and other performance criteria throughout active duty may extend into retirement and permeate the values of family members as well. Formal and informal support systems are available to active-duty personnel and their families, and a tradition of support likely continues into retirement. Hospitalization costs are quite different for military hospitals as compared with civilian hospitals. Taken together, the illness experience may be different for military patients and, by extension, results in different patient responses.

Findings from the current study indicate that nursing structure and processes and patient outcomes are different in military hospitals as compared to findings reported for civilian hospitals. Because only two military hospitals were utilized, further study is needed to provide additional support for these findings and to isolate other, as yet unidentified, potential contributors. Exploring differences and commonalities between military and civilian hospitals will ultimately provide insight into ways of improving patient outcomes and bettering the work environment of nurses.

NOTE

1. Drs. Foley, Kee, Minick, and Harvey conceptualized and designed the study. Dr. Kee collected the data and wrote the manuscript. Drs. Kee and Dudley analyzed the data. Dr. Dudley provided statistical expertise and was the major contributor to the findings section. Drs. Foley, Minick, Harvey, and Jennings provided study critique and feedback in manuscript development. All provided editorial assistance as the article was being developed.

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