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The Work Environment, Nurse Staffing, and Outcomes in Hemodialysis Settings

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INTRODUCTION

A large body of literature indicates that the presence of a set of organizational attributes of the nursing work environment, highly valued by hospital-based staff nurses as important to the support of their professional practice, are associated with positive outcomes, including job satisfaction and retention, among hospital-based nurses. More importantly, the empirical literature also indicates that this set of attributes is a predictor of superior inpatient outcomes, including lower rates of adverse events and lower rates of mortality[1]. However, there are few studies that have investigated associations between attributes of the nursing work environment, nurse staffing, and nurse and patient outcomes in hemodialysis settings. It is the purpose of this paper to communicate to key stakeholders the preliminary findings of a recent study, conducted by Drs. Thomas-Hawkins and Flynn, that explored the impact of system factors, including registered nurse staffing levels, on nurse-reported patient outcomes in hemodialysis units.

BACKGROUND

According to sociological theories of organizations and professions, organizational attributes in healthcare settings that support clinical practice, such as interdisciplinary collaboration, autonomy within scope of practice, adequate staffing, continuity of care, effective communication channels, and access to needed resources are essential to the ability of nurses to identify and respond to fluctuating patient conditions. Thus, by supporting patient surveillance and nursing practice, these organizational attributes contribute to high quality patient care. Theorists further propose that healthcare organizations that exhibit these supportive attributes will experience higher rates of positive patient outcomes, fewer adverse patient events, and higher levels of job satisfaction and retention among the nursing staff[2-5]. Moreover, the Nursing Organization and Outcomes Model postulates that both organizational attributes that support nursing practice and nurse staffing levels, indicated by nurse-to-patient ratios, directly influence and enhance processes and quality of care, promoting superior nurse and patient outcomes[6].

During the last two decades, a large body of literature has been amassed providing empirical support for these propositions. Measured by the Nursing Work Index-Revised (NWI-R)[7], characteristics of the nursing work environment that support professional practice have been linked to higher levels of job satisfaction, lower rates of burnout, lower rates of needlestick injuries, and lower rates of injury-related disability among hospital-based staff nurses[8-14]. The presence of these supportive work environment attributes has also been associated with a higher level of quality inpatient care, fewer adverse events, lower mortality, and higher levels of satisfaction with care among hospitalized patients[1,15-18].

This large body of research, however, has been conducted predominately in hospitals, and the impact of organizational attributes and nurse staffing on nurse and patient outcomes in dialysis centers is largely unknown. The evidence that does exist, however, gives cause for concern. Although a recent study indicates that nurses practicing in dialysis centers rate some characteristics of their work environment as supportive, such as nurse-physician relationships, the nurses were less positive in rating other organizational traits shown in previous research to contribute to positive inpatient outcomes, such as control over their practice, participation in decision-making, ongoing educational opportunities, and administrative support[19]. Similar to hospital-based findings, the absence of these supportive traits in dialysis centers was associated with nurses' intentions to leave their job. Data from the Dialysis Outcomes and Practice Patterns Study (DOPPS) indicates that dialysis units with higher registered nursing staffing levels have a lower odds of experiencing skipped dialysis treatments and hepatitis C prevalence and seroconversion rates[20,21]. Moreover, a recent study reveals that dialysis work environments that nurses rate as less supportive of professional nursing practice are significantly associated with nurses' intent to leave their job in the next year, high nurse turnover rates, and patient hospitalizations[22].

It is estimated that the number of persons receiving dialysis for the treatment of end-stage renal disease (ESRD) will double over the next decade[23]. Thus, it is important to identify modifiable attributes of the nursing work environment in dialysis settings that maximize positive patient outcomes, reduce adverse events, and enhance job satisfaction and retention among the nephrology nursing staff. A survey of nephrology nurses working in dialysis centers was conducted to examine the relationships between nurse staffing levels, organizational attributes of nursing work environments in dialysis centers, and nurse-reported outcomes. Preliminary results are reported in this paper

STUDY PURPOSE AND METHODS

The purpose of the study was to examine the effects of nurse staffing levels and work environment attributes in hemodialysis settings on nurse outcomes and nurse-reported adverse patient events.

Two thousand nurses who identified themselves as staff nurses in hemodialysis settings were randomly selected from the American Nephrololgy Nurses' Association membership list. Survey packets were mailed to nurses' homes with follow-up reminders using a modified Dillman method[24]. The 10-page survey included questions about nurses' perceptions of presence (or absence) of organizational attributes that support nursing practice in their current job, staffing (RN, LPN, and patient care technician) in the dialysis unit on the last day worked, burnout, intention to leave the job in the next year, job satisfaction, perception of workload, job satisfaction, care process left undone on the last day worked, and the frequency of selected nurse and patient adverse events. One thousand and fifteen nurses returned a completed survey, representing a 52% response rate. The preliminary findings include an analysis of data on the 815 surveys completed by nurses working in Hemodialysis units.

PRELIMINARY FINDINGS

Nurse Outcomes

The following nurse outcomes were examined in the study: intent to leave the job in the next year, burnout, job satisfaction, and sharps injuries.

Burnout. Twenty-eight percent of nurses' scores on the Malasch Burnout Inventory Emotional Exhaustion scale revealed high levels of burnout. In comparison, data in ambulatory care and home care settings reveal lower percentages of nurses with high levels of nurse burnout (21% and 22%, respectively), and a larger percentage of nurses in hospital settings report high levels of burnout (32%)[25]. Study findings also revealed variations in level of burnout by type of setting and ownership. Thirty-two percent of nurses working in chronic dialysis units had high levels of burnout compared to 20% of nurses working in acute dialysis units. Moreover, dialysis facility ownership appears to be an important environmental characteristic when considering the potential for negative nurse outcomes. Nurses working in units that were corporate-owned had higher levels of burnout compared to levels of burnout in nurses who worked in hospital-owned dialysis units (Figure 1). Moreover, the percentage of hemodiialysis nurses who had high levels of burnout was equal to the percentage of nurses with high levels of burnout in hospital settings and greater than the level of nurse burnout in ambulatory care (amb) and homecare settings (hc) (Figure 2)

Figure 1. Percent of nurse burnout by unit type

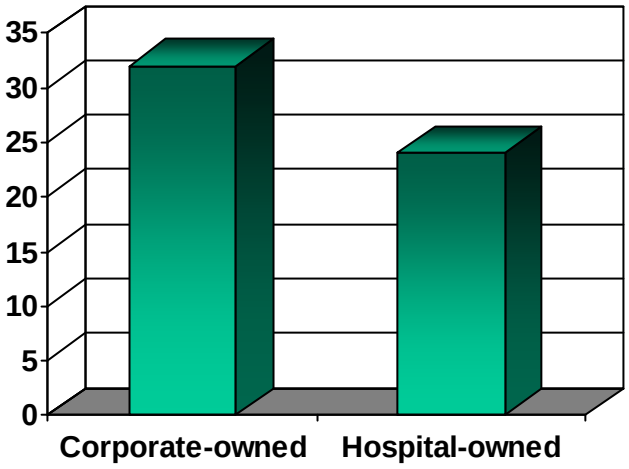
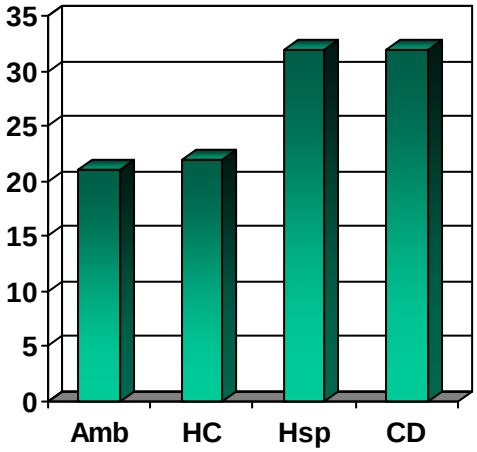


Figure 2. Nurse burnout by facility ownership



Nurses perception of his or her workload and work schedule, work environment ratings, reports of care process left undone (i.e., teaching and adequate surveillance), and lack of confidence in management were significant predictors of nurse burnout (Table 1). These predictors explained 42% of the variance in burnout scores in the hemodialysis nurse sample.

Table 1. Predictors of Nurse Burnout

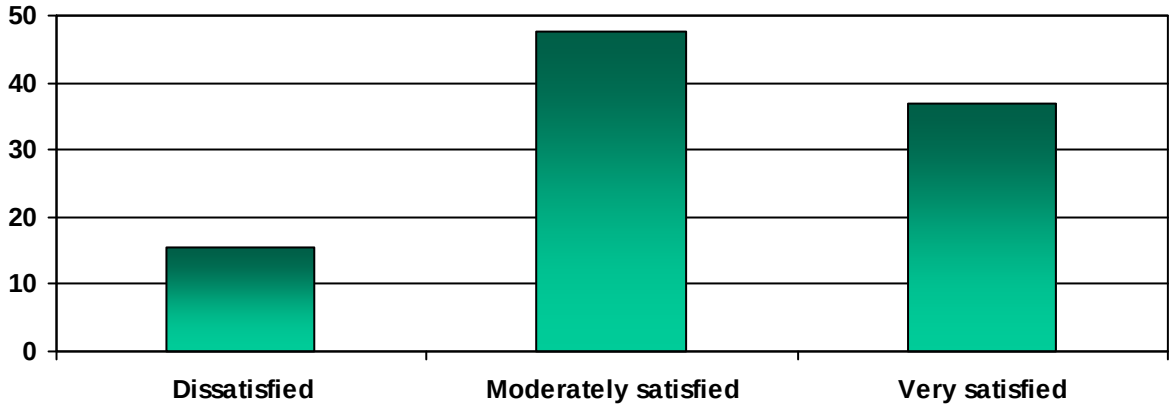
	β	p-value
Perceptions of workload	**.313**	**.000**
Work environment ratings	**-.147**	**.000**
Perceptions of work schedule	**-.134**	**.000**
Care processes left undone **Teaching** **Adequate Surveillance**	 **.120** **.084**	 **.000** **.005**
Lack of confidence in management	**-.123**	**.001**

Logistic regression analysis helps to explain the impact of these predictors on hemodialysis nurse burnout. Compared to nurses who rated the work environment as supportive of professional nursing practice, nurses who did not perceive the dialysis work environment as supportive of professional nursing practice were three times as likely to be burned out [OR = 3.3 (2.2, 4.8), p = .000]. In addition, nurses who believed that their workloads were high were 4.5 times as likely to be burned out compared to nurses who did not believe their workloads were high [OR = 4.5 (3.1, 6.6), p = .000].

It is also important to note that the impact of nurse burnout on other nurse outcomes was significant. Nurses who reported high levels of burnout were seven times as likely to be dissatisfied with their jobs [OR = 6.9 (4.6, 10.3), p=.000] and two and one-half times as likely to plan to leave their job in the next year [OR = 2.5 (1.5, 4.1), p = .000].

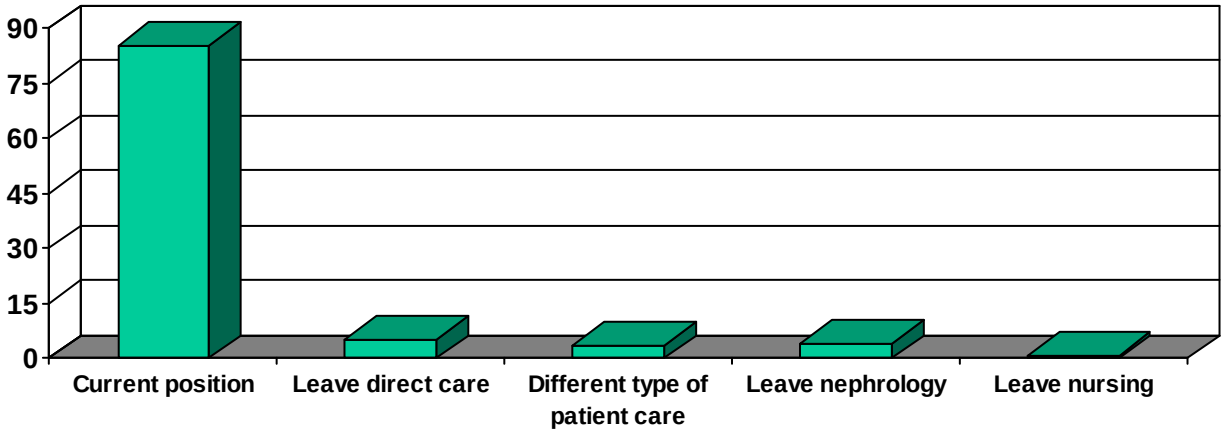
Job satisfaction. The majority of nurses were moderately satisfied to very satisfied with their jobs, and nearly 16% of nurses reported dissatisfaction (Figure 3). Nurses, however, who rated the work environment as unsupportive were more than five times as likely to be dissatisfied with their jobs,[OR = 5.6 (2.7, 11.7),p = .000], those dissatisfied with work schedules were more than four times as likely to be dissatisified with their jobs [OR = 4.5 (2.5, 8.0) = p = .000], those dissatisfied with their level of professional independence were almost three times as likely to be dissatisfied with their jobs, [OR = 2.8 (1.6, 4.9), p = .000], those reporting higher workloads were more than two times as likely to be dissatisfied with their jobs, [OR = 2.5 (1.5, 4.3), p = .001], and those dissatisfied with their professional status within the organization were almost two times as likely to be dissatisfied with their jobs [OR = 1.9 (1.1, 3.4), p = .002].

Figure 3. Percent of nurses satisfied with current primary job



Intent to leave job. Almost 14% of nurses indicated an intention to leave direct patient care in the hemodialyisis unit in the next year (Figure 4). Work environment ratings and workloads were predictors of intention to leave. Nurses who viewed the work environment as least supportive of professional nursing practice were 3 times as likely to intend to leave their jobs [OR = 3.0 (1.6, 5,5) p = .001] compared to nurses who viewed the work environment as supportive. Moreover, nurses who believed that their workloads were high were twice as likely to plan to leave their job [OR = 2.0 (1.1, 3.4), p = .021] compared to nurses who did not believe that their workloads were high.

Figure 4. Plans for type of work next year



Sharps injuries. Eight percent of nurses reported being stuck with a needle used on a patient in the past year, and almost one percent of the sample reported being stuck twice. When asked "How many times were you stuck with a sharp other than a needle used on a patient?", 4.4% of nurses reported this injury once in the past year; 1.2%, twice; and 0.2%, three or more times. Patient-to-RN ratios ($r = .17$, $p = .000$), lack of discussion of strategies for sharp injury prevention ($r = -.08$, $= .046$), and beliefs about lack of manager support ($r = -.08$, $p = .003$) were significantly related to sharps injuries that nurses experienced.

Nurse-Reported Patient Adverse Events

The following nurse-reported patient adverse events were examined in this study: emergency room visits due to volume overload, hospitalizations due to pneumonia, dialysis hypotension, vascular access infiltration, infection, or thrombosis, unexpected bleeding from the vascular access, falls, shortened treatments, skipped treatments, medication errors, and patient complaints.

Nurse staffing and adverse patient events. As illustrated in Table 2. higher patient-to-RN ratios (i.e., less RNs) were significantly related to multiple adverse patient events compared to the effects of higher patient-to-LPN and patient-to-patient care technician (PCT) ratios on adverse patient events.

Table 2. Correlations between patient-to-staff ratios and adverse patient events

Patient-to-RN	Patient-to-LPN	Patient-to-PCT
Unexpected bleeding from vascular access**	Skipped treatments**	Medication errors**
Vascular access infiltration**	Shortened treatments**	
Falls**		
Dialysis hypotension**		
Skipped treatments**		
Shortened treatments**		
Patient complaints**		

**$p \leq .01$

The impact of high patient-to-RN ratios on patient adverse events was significant. Compared to fewer patients assigned to an RN, higher patient-to-RN ratios were significantly associated with a 3% increased risk for unexpected bleeding from the vascular access [OR 1.03 (1.01, 1.05), p = .03], a 4% increased risk for patient complaints [OR = 1.04 (1.02, 1.07), p = .00], an 11% increased risk for shortened treatments [OR = 1.11 (1.07, 1.15), p = .00], and an 18% increased risk for skipped treatments [OR = 1.18 (1.11, 1.23), p = .00].

The work environment and adverse patient events. Nurses' negative ratings of the work environment (i.e., disagreement that work environment supports professional nursing practice) were significantly associated with reports of increased occurrences of the adverse events listed in Table 3.

Table 3. Correlations between nurses' ratings of the work environment and adverse patient events

Adverse Event	Correlation Coefficient (p-value)
Vascular access infiltration	-.40 (.000)
Skipped treatments	-.30 (.000)
Shortened treatments	-.24 (.≤.01)
Unexpected bleeding from the vascular access	-.20 (.000)
Medication error	-.16 (.000)
Falls with injury	-.13 (.000)
Falls without injury	-.11 (≤.01)
ER use due to volume overload	-.11 (≤.01)

Moreover, nurses' negative ratings of the work environment were significantly associated with an almost two-fold increased risk for frequent shortened treatments [OR = 1.94 (1.40, 2.71), p = .00], frequent patient complaints [OR = 1.90 (1.42, 2.52), p = .00], and frequent medication errors [OR = 1.72 (1.11, 2.65), p = .01]. In addition, nurses' negative ratings of the work environment were significantly associated with nearly a 1.5 times increased risk for vascular access infiltration [OR = 1.44 (1.07, 1.94), p = .014], thrombosis [OR1.40 (1.01, 1.82), p = .039], and bleeding [OR = 1.40 (1.03, 1.81), p = .032].

DISCUSSION

Little is known about the relationships between nurse staffing, organizational attributes that support nursing practice (i.e., work environment), and nurse and patient outcomes in hemodialysis settings. This paper provides preliminary explanations of these relationships.

Findings from this study suggest that 28% of staff nurses working in hemodialysis settings have high levels of burnout, and almost one-third of nurses in corporate-owned hemodialysis settings have high levels of burnout compared to 24% of nurses in hospital-owned facilities. Perceptions of high work load, unsupportive work environments, care processes left undone, and lack of confidence in management were significant predictors of burnout for study participants. These findings are important because research in hospitals has consistently shown a relationship between burnout and nurses' intent to leave their jobs[6,26]. In fact, findings in this study reveal that nurses with high levels of burnout were more likely to be dissatisfied with their job and to intend to leave their job in the next year. Since 16% of nurses were dissatisfied with their jobs and 14% reported an intention to leave their job in the next year, these findings suggest nurse staffing in dialysis units may worsen if strategies are not employed to attract new

nurses and retain nurses currently working in these settings, particularly in corporate-owned hemodialysis environments.

Nurse staffing levels and work environment ratings were significantly associated with multiple adverse patient events. That is, higher patient-to-RN ratios were associated with increased reports of adverse patient events. Moreover, RN staffing, unlike LPN and patient care technician staffing, was associated with multiple adverse patient events. Similarly, lower ratings of the work environment (i.e., unsupportive environments), were significantly associated with higher reports of patient adverse events. These findings are consistent with theoretical propositions that contend that nurse staffing and the work environment influence nursing surveillance, care processes, and patient outcomes. Care processes left undone have not been examined in hemodialysis settings. Nurses in this study were queried about care processes that were left undone on the last day worked. Fifty percent of nurses reported that important teaching was not done; 41% reported that talking to and comforting patients was not done; 19% reported that important documentation not done; 19%, reported that adequate supervision of technicians not done; and 16% reported that adequate monitoring of treatments not done. These findings suggest an important mechanism for negative patient outcomes in dialysis centers. In fact, the findings imply that the impact of nurse staffing levels and processes of care on dialysis hypotension events and skipped and shortened treatments is critical since findings from the DOPPS reveal that dialysis hypotension leads to inadequate delivery of dialysis which, in turn, is independently associated with an increased risk for dialysis patient mortality[27]. Moreover, DOPPS data indicate that skipped treatments are also independently associated with an increased risk for mortality in dialysis patients[21]. Clearly, more research is needed to examine the effects of nurse staffing and processes of care on dialysis patient outcomes.

Despite the paucity of research related to the relationship between nurse staffing, the dialysis work environment, and patient outcomes, it is intuitive that nursing matters in dialysis settings. This study provides preliminary data that supports this intuition. Dialysis organizations need an adequate supply of qualified and competent RNs to provide quality patient care, contribute to the attainment of optimal patient outcomes, and meet the needs of a growing and increasingly older patient population. However, the supply of nurses in dialysis centers is dwindling, and the findings from this study indicate that organizational attributes and the existing level of RN staffing in these settings may contribute to insufficient surveillance and processes of care that, in turn, likely contribute to negative patient outcomes. In addition, nurse staffing and organizational attributes in hemodialysis settings contribute to negative nurse outcomes including burnout, job dissatisfaction, intent-to-leave, and sharps injuries. Assuredly, policies and initiatives at the organizational, state, and federal levels that ensure adequate RN staffing and address work environment issues important for professional practice in hemodialysis settings are crucial for quality patient care and outcomes.

FUTURE DIRECTIONS

There is an urgent need for dialysis centers to systematically collect standardized, nurse-sensitive patient outcome and adverse event data such as vascular access infiltration, skipped and shortened treatments, unexpected bleeding from the vascular access, patient falls, and emergency room visits. In addition, a study that examines the relationships between facility-level nurse data and patient-level outcome data is sorely needed.

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