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Abstract

The aim of this study was to describe the frequencies and types of missed nursing care in nursing homes, and to determine the relationship between missed care and the incidence of UTI among nursing home residents. A secondary data analysis was conducted including New Jersey nurse survey data and data from Nursing Home Compare. The data included responses from 340 direct care RNs from 63 nursing homes. Nearly one half of nurses reported missing at least one necessary care activity during their last shift. Of the 12 categories or types of reported missed care activities, seven categories of missed care were significantly correlated with UTI. Regression analysis indicated that failure to administer medications on time and failure to provide adequate patient surveillance explained 40% of the variance in the percent of residents with UTI in this sample.

Over 1.5 million Americans reside in nursing homes. Unfortunately, the quality of care that these residents receive may be questionable. The Department of Health and Human Services estimates that between 2008 and 2012, nearly one quarter of Medicare or Medicaid patients who received care in a skilled nursing facility experienced an adverse event, including urinary tract infection (UTI). It is also estimated that the majority of these events are likely preventable and are attributed to substandard treatment, inadequate monitoring, or delay or failure to provide necessary care.¹

The delay or failure to provide necessary care is an emerging area of concern in nursing. Necessary but uncompleted nursing care activities, commonly labeled missed care, are indicators of impaired nursing processes and overall poor care quality.²⁻⁶ Within the emerging literature, there are several labels that are used to embody missed care, including nursing care left undone and implicit rationing of nursing care. Regardless of minor differences, these labels each represent necessary nursing activities that are partially or fully omitted.⁷

The concept of missed care has further been described as an error of omission and can include activities such as failure to provide needed patient education, emotional support, timely medication administration, developing and documenting plans of care, and assessment and reassessment as well as many more.⁸ Inadequate labor resources, increased workload, and lack of teamwork contribute to missed care within the acute care environment.^{2,5,9-11} The outcomes of missed care affect both nurses and patients.

As more care is missed, nurses perceive the quality of nursing care to decrease.² Nurses who report more missed care also report higher frequencies of adverse events including medication errors, nosocomial infections, and patient falls with injury.^{4,5}

Missed care also occurs in nursing settings outside of the hospital. Among chronic hemodialysis nurses, increased missed care is correlated with adverse patient outcomes of dialysis related hypotension, shortened treatments, skipped treatments, and patient complaints.¹² Missed care may be the operant mechanism by which nurses' workloads are associated with patient and nurse outcomes. Although there is a growing body of evidence related to missed care in hospitals, little is known about the frequency of missed care in nursing homes and its relationship to adverse patient events, such as nosocomial infections and UTI.

Background

The Centers for Medicare and Medicaid Services have identified the percent of residents with a urinary tract infection (UTI) as one measure of quality among long-term care facilities.¹³ This nosocomial infection affects between 11.2% to 19.3% of nursing home residents^{14,15} and comprises between 20% and 30% of all infections reported by nursing home facilities.¹⁵⁻¹⁸ These infections are costly, and are the leading cause of avoidable hospitalizations among nursing home residents, accounting for an estimated 23% of avoidable hospitalizations within this population.¹⁹

The Nursing Organization and Outcomes Model²⁰ is a theoretical framework explaining that patient outcomes, including preventable adverse patient events, are frequently the result of inadequate surveillance leading to the lack of early detection of changes in patients' conditions. Inadequate surveillance is one of the factors posited to impair nursing care processes (Figure 1) of which missed care is a recognized indicator. This model predicts that patient outcomes are influenced by the provision or, conversely, the omission of care to patients. The surveillance and observation of patients informs

nursing care processes and guides nursing actions. There has been little research, however, that explores these relationships in acute care hospitals and little to no research that has explored these relationships in nursing homes.

The purpose of this study was to describe the frequencies and types of missed nursing care in nursing homes, and to determine the relationship between missed care and adverse patient outcomes, as measured by the prevalence of UTI, among nursing home residents. The specific types of missed nursing care activities that are most strongly related to the occurrences of UTIs among nursing home residents were also explored.

Methods

A secondary analysis was conducted with a data set comprised of New Jersey nurse survey data and data from Nursing Home Compare.^{21,22} Nursing Home Compare (NHC) is a national database containing nursing home-level indicators, including patient outcome data, from the Online Survey Certification and Reporting (OSCAR) database and the Minimum Data Set (MDS). The NHC data, made publically available by the Centers for Medicare and Medicaid Services (CMS), are aggregated to the nursing home level by CMS, risk-adjusted as appropriate, and reported for all Medicare-and- Medicaid-certified nursing homes in the nation. To obtain temporal congruency, NHC data specific to New Jersey's certified nursing homes were extracted from the NHC dataset for the 3-month period concurrent with the collection of New Jersey nurse survey data.

Nurse Sample

Survey data from registered nurses (RNs) were originally collected as part of the Multi-State Nursing Care and Patient Safety Study.²³ The protocol for data collection and analyses were approved by Institutional Review Boards of two leading Universities. In

New Jersey, the survey was mailed to a random sample of 44,343 RNs representing 50% of the RNs licensed and residing in the State. The comprehensive survey contained multiple items and measures, including nurses' reports related to the frequency and types of missed nursing care. A total response rate of 51% yielded a sample of 22,406 participants. Of this group, 1,143 (5.1%) worked in nursing homes and 897 reported providing direct resident care as the main function of their job. The respondents were asked to indicate the name of the nursing home in which they were employed in order to for the research team to (1) aggregate the nurses' responses to the nursing home in which they practiced; and then (2) link the aggregated nurse survey data for each nursing home to patient outcomes as reported in NHC.

Nursing Home Sample and Final Nurse Sample

Nursing homes were included in the sample if they were Medicare-and-Medicaid-certified, located in New Jersey, and represented by survey responses from four or more staff RNs whose primary position was direct resident care. Of the state's 347 certified nursing homes, 63 met the criteria for inclusion in this study, yielding a nurse sample of 340 direct-care RN survey respondents. The mean number of RN respondents per nursing home was 5.5 (SD = 2.17), and ranged from four to 16. Demographic characteristics of the final sample of 340 direct-care RNs are presented in Table 1. A total of 35.2% of the nurses in the sample held a Baccalaureate degree or higher.

The number of beds per nursing home in the sample ranged from 54 to 552 with a mean of 186.6 (SD = 107.3), and occupancy rates ranged from 29% to 100% with a mean of 89.4% (SD = 12.1). A total of 48% of nursing homes in the sample were classified as for-profit facilities. The range of facility size and occupancy rate of nursing homes in the

sample were consistent with those state-wide. The percentage of for-profit nursing homes in the sample, however, was less than the 65.7% reported in the state.

Measures

Because urinary tract infection rates have been recognized by CMS as a key indicator of care quality in long term care facilities, this outcome was selected for investigation. Although nurse reported nosocomial infection frequency has been found to be associated with missed care in other settings,⁴ this study advances this line of inquiry through the inclusion of actual patient outcome data in the analyses. Within the NHC data set, CMS calculated the percentage of long stay residents with a urinary tract infection as reported by each facility. The numerator included long stay residents whose most recent quarterly assessment indicated a urinary tract infection within the last 30 days. Unfortunately, there is not a clear differentiation between symptomatic UTI and asymptomatic bacteriuria within this data set. The denominator included all long stay residents residing in the nursing home. Long stay residents are defined as residing in the nursing home for more than 100 days. The percentage of residents with an indwelling catheter in the last 30 days was similarly computed by CMS as the number of long stay residents whose most recent quarterly assessment indicated an indwelling catheter present during the last 30 days divided by the total number of long stay residents.

As a metric of missed care, the nurse survey included 12 items that asked nurse respondents to indicate which necessary activities, during his or her last shift worked, were left undone due to a lack of time to complete them. These activities included: patient surveillance, skin care, oral hygiene, pain management, the comforting of patients, teaching patients and families, ordered treatments and procedures, the administration of

medications on time, preparing patients for discharge, documentation, developing or updating nursing care plans, or none of the above. Positive responses were summed and aggregated, or averaged, to the nursing home level. A similar metric for missed care has been used in previously published studies conducted in the U.S. as well as those conducted internationally.^{2,7,12,23,24}

Nurses' workload was measured using the 4-item workload subscale of the Individual Workload Perception Survey, which has been found to be a reliable and valid measure.²⁵ The internal consistency coefficient of the 4-item subscale in this sample of nurses was 0.78. Nurses' responses to each item, measured on a 4-point rating scale were summed to compute a total score and aggregated to the nursing home level.

Analysis

Descriptive statistics for missed care were examined in the nurse-level data set prior to aggregation to the nursing home level. Descriptive statistics related to the prevalence of UTI across the sample of 63 nursing homes were also computed and examined. Following examination of bivariate correlations, regression models were estimated to determine predictors of UTI prevalence.

Results

Among the 63 nursing homes included in this study, the percentage of residents with a UTI in the previous 30 days ranged from 0 to 26% (mean 7.97 ± 5.23), and the percentage of residents with a catheter placed in the previous 30 days ranged from 0 to 14% (mean 5.35 ± 2.85).

A total of 48.2% of nurse respondents reported that they had missed at least one necessary care activity by leaving it undone during their last shift worked. As presented

in Table 2, the most common missed care activities by type included comforting / talking with patients, developing or updating nursing care plans, teaching patients and families, documenting nursing care, and patient surveillance. The number of missed care activities ranged from 0 to 9 with a mean of 1.22 (SD = 1.73).

The nursing system factors of practice environment, staffing levels, and nurse characteristics theoretically associated with adverse patient events and the key study variables were aggregated to the nursing home level to produce an analytic dataset of 63 nursing homes. There were no significant associations between measures of the practice environment, staffing levels, or demographics of the nursing staff, including percent of RNs with a Baccalaureate degree or higher or years of experience, and the outcome variable of percent of residents with UTI. As presented in Table 3, there were significant correlations among the percent of residents with a urinary catheter, nurses' reported workloads, seven of the 12 types of missed care, and the outcome variable of percent of residents with a UTI. Since the percentage of residents with an indwelling catheter was significantly associated with the percentage of residents with a UTI, subsequent regression models predicting UTI were estimated with and without adjusting for the percent of residents with indwelling catheters.

Among the missed care activities correlated with UTI, the failure to administer medications on time and the failure to provide adequate patient surveillance had the strongest association with missed care. As presented in Table 4, subsequent regression analysis indicated that these two predictors were significantly associated with UTIs, and together explained 40% of the variance in the percent of UTIs in the sample. The effect of nurses' workload, aggregated to the nursing home level was not significantly

associated with the percent of residents with UTI when adjusted for the percent of residents with an indwelling urinary catheter.

Discussion

Nearly one half of the nurse sample reported missing at least one necessary care activity during their last shift. This omission of care may be a mechanism that links nursing care processes and adverse outcomes. The purpose of this study was to explore the theoretical relationships linking missed nursing care, such as adequate surveillance, and adverse patient outcomes as posited by Aiken et al.²⁰ These findings provide limited support for this proposition in that the failure of nurses to provide necessary care including the administration of medications on time and adequate patient surveillance were associated with the incidence of UTI in this sample. These results mirror positive relationships between missed care and adverse patient outcomes seen in acute care settings.⁴

The missed care activities of timely medication administration and surveillance significantly predicted the incidence of UTI in nursing home residents and explained 40% of the variance in the incidence of UTI. These two activities involve important assessment and interaction between the nurse and the resident. Although not investigated in this study, inadequate surveillance may also impair nurses' initiation of other care activities known to reduce the incidence of UTIs in nursing home residents, such as active continence restoration strategies and frequent toileting.^{26,27} Unfortunately, the data used in this study did not include these individual activities, but rather measured more generalized categories of care. Clearly additional research is needed to further understand the relationships between other missed care activities and UTI in nursing homes.

Other specific assessment and surveillance activities not measured in this study that may reduce the incidence of UTI in nursing homes include monitoring for urinary retention and bowel functioning. The untimely or missed administration of specific medications, also not measured in this study, that may influence the incidence of UTI in nursing homes might include antibiotics in that late or missed antibiotic administration can contribute to multi drug resistant organism colonization. When antibiotics are appropriately administered, they are more effective in treating the organisms. The supervision of nursing assistants, while also not measured in this study, is another possible care activity that may influence the outcome of UTI. Ensuring that assistants provide appropriate toileting and patient hygiene will aid in bladder emptying and reduce risk for infection.

Missed care is costly to the resident, the nurses, the care facility, and insurers. Adverse outcomes such as UTI require additional treatment and monitoring. Not only are medications costly, additional nursing care is required during treatment. The human cost includes pain, discomfort, hospitalization, and the potential for sepsis and death. The findings of this study indicate that the prevention of missed care may be a way to mitigate these costs.

Awareness of the negative outcomes of missed care must be increased. Nursing home administrators should consider assessing the frequency and types of missed care in their facility in order to adequately assess the quality of the care delivery process within their facilities. This assessment may help identify areas for improvement regarding needed resources, support, and prioritization. It is important to understand how nurses prioritize their work and manage their assigned workload in order to prevent missed care

activities. While workload was not predictive of UTI in the adjusted model in this sample, the relationship did approach significance. In acute care, nurse-patient staffing ratios, workload, and practice environment have been shown to influence missed care.^{5,7} Further research between nurses' workloads and missed care needs to be conducted in non-acute settings. Additional research is also needed to identify the predictors of impaired nursing care processes, including missed care, within nursing home facilities so that evidence-based strategies can be developed and implemented to support nurses' work and prevent missed nursing care.

Limitations

These results may be limited by the nature of secondary analysis. The data available provides a measure of missed care but lacks specificity regarding many specific nursing activities that can influence the incidence of UTI in nursing homes. . In addition, the diagnostic criteria for UTI, including signs and symptoms, for this sample is not available. It is possible that UTIs were over reported and included residents experiencing asymptomatic bacteriuria.²⁸

There is a potential threat to the internal validity of the respondents' self report of missed care. The nurses in this sample may have perceived that the least frequently reported missed activities, pain management, on time medication administration, and performance of necessary treatments were not socially acceptable to report. These activities may actually be under-reported. External validity may also be limited. The data was collected from nurses working in only one state. The results may reflect a regional phenomenon that is not generalizable to other areas.

Conclusion

As the US population continues to age, the demand for high quality, long term nursing care will continue to rise. Nursing care is not merely a series of discrete tasks. Rather, nursing is a process of ongoing assessment, critical thinking, and intervention. This study provides evidence that impaired processes of care as measured by missed care activities can predict the adverse patient outcome of UTI in nursing home residents. In order to improve resident outcomes, further research is needed to identify the predictors of missed care. With this understanding, strategies can be developed and implemented that will support the necessary processes of care and reduce the amount of missed nursing care in the nursing home environment.

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Figure 1. Nursing organization and outcomes model (Aiken, Clarke, & Sloane, 2002)

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Table 1. Demographic characteristics of the nurse sample (n = 340 RNs)

Variable	<i>M</i>	<i>SD</i>
Age	51.10	9.43
Years of experience	23.66	12.71
Years of tenure at nursing home	8.42	7.38
Total number of necessary care tasks left undone during last shift	1.22	1.73
	n	%
Race		
African American / Black	17	5.0
Asian	18	5.3
Filipino	61	17.9
Hispanic	0	0
White / Caucasian	217	63.9
Other	9	2.6
Not reported	18	5.3

Table 2. Frequency of missed care by type of care activity (n = 340 RNs).

Missed Care Activity	n	%
Comfort / talk with patients	114	33.5
Develop or update care plans	89	26.2
Teach patients and/or families	65	19.1
Document nursing care	59	17.4
Adequate patient surveillance (direct observation and monitoring)	51	15.0
Oral hygiene	43	12.6
Skin care	34	10.0
Coordinate patient care	27	7.9
Perform necessary treatments and procedures	26	7.6
Administer medications on time	24	7.1
Prepare patients for discharge	16	4.7
Pain management	6	1.8

Table 3. Bivariate correlations with percent of residents with UTI within last 30 days

(n = 63 nursing homes).

	% of Patients with UTI
% of Patients with indwelling catheter	.275*
Missed care	
Administer medications on time	.582**
Adequate patient surveillance	.432**
Perform necessary treatments and procedures	.392**
Comfort / talk with patients	.328**
Teach patients and / or families	.309*
Document nursing care	.306*
Coordinate patient care	.254*
Nursing system factors	
Nurses' workload	.301*

*p < 0.01, **p < 0.001

Table 4. Regression results for percent of residents in nursing homes with UTI (n = 63 nursing homes)

Variable	β	Unadjusted			Adjusted*			
		<i>SE</i>	<i>df</i>	<i>p</i>	β	<i>SE</i>	<i>df</i>	<i>p</i>
Missed care								
Administer medications on time	.582	.597	1	.000	.573	.030	2	.000
Adequate patient surveillance	.432	.039	1	.000	.398	.038	2	.001
Perform necessary treatments and procedures	.392	.047	1	.001	.341	.049	2	.007
Comfort / talk with patients	.328	.026	1	.009	.320	.025	2	.008
Teach patients and / or families	.309	.032	1	.014	.289	.031	2	.018
Document nursing care	.306	.036	1	.015	.258	.036	2	.040
Coordinate patient care	.254	.031	1	.045	.256	.030	2	.036
Nursing system factors								
Nurses' workload	.301	.376	1	.016	.246	.384	2	.054

*Adjusted for percent of residents in nursing home with an indwelling catheter