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Missed nursing care is linked to patient satisfaction: a cross-sectional study of US hospitals

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Abstract

Background—As nurses are the principal care provider in the hospital setting, the completion or omission of nursing care is likely to have a sizable impact on the patient care experience. However, this relationship has not been explored empirically.

Aim—To describe the prevalence and patterns of missed nursing care and explore their relationship to the patient care experience.

Methods—This cross-sectional study used secondary nurse and patient survey data from 409 adult non-federal acute care US hospitals in four states. Descriptive statistics were calculated and linear regression models were conducted at the hospital level. Regression models included controls for hospital structural characteristics.

Results—In an average hospital, nurses missed 2.7 of 12 required care activities per shift. Three-fourths (73.4%) of nurses reported missing at least one activity on their last shift. This percentage ranged from 25 to 100 across hospitals. Nurses most commonly reported not being able to comfort or talk with patients (47.6%) and plan care (38.5%). 6 out of 10 patients rated hospitals highly. This proportion ranged from 33% to 90% across hospitals. At hospitals where nurses missed more care (1 SD higher=0.74 items), 2.2% fewer patients rated the hospital highly ($p<0.001$); a coefficient equivalent to a one-quarter SD change.

Conclusions—Missed nursing care is common in US hospitals and varies widely. Most patients rate their hospital care experience highly, but this also varies widely across hospitals. Patients have

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Supplementary Material

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poorer care experiences in hospitals where more nurses miss required nursing care. Supporting nurses' ability to complete required care may optimise the patient care experience. As hospitals face changing reimbursement landscapes, ensuring adequate nursing resources should be a top priority.

INTRODUCTION

It is not commonly recognised that required nursing care is left undone. However, evidence suggests that 9 out of 10 nurses miss essential care activities each shift.¹ Missed care, that is, "any aspect of required patient care that is omitted (either in part or in whole) or delayed",² has been reported in multiple settings and countries and is tied to negative patient outcomes.³⁻⁶ It offers an avenue for quality improvement.

The patient's care experience has long been considered a fundamental quality indicator⁷⁻⁹ that has been linked to nursing.^{10> 11} Recent attention to the patient care experience has been precipitated by the Centers for Medicare and Medicaid (CMS) payment policy changes requiring assessments of patient care experiences to avoid a penalty.¹² Patients' assessments of the hospital experience reveal multiple facets of healthcare in a way that clinical outcomes measured from administrative data, like mortality or infection, cannot. There is a growing awareness of the importance of a positive patient care experience, but few action- able paths have been identified.

Although nurses are the principal caregiver in the hospital, they are often overlooked as a driver of the care experience.¹³⁻¹⁶ However, nurse communication was found to be the principal predictor of the patient's willingness to recommend the hospital to family or friends.¹⁷ The evidence linking nurse staffing and work environment to patient care experience has focused on how nursing is organised, for example, staffing, work environment, skill mix and collaboration.¹⁸⁻²¹ Clinical nursing care processes or deficiencies, such as missed nursing care, may help to explain this relationship but have not been considered. The link between missed care and patient satisfaction is limited to three studies outside the USA.^{22,23} All three identified significant effects of missed care. In a military hospital in Turkey, a single measure of missed care (medications not given on time) was examined and found to be significantly associated with less satisfied patients.²² In a study of eight Swiss acute care hospitals, multiple measures of care rationing were associated with overall patient satisfaction.³ In eight European countries, more patients gave high ratings in hospitals with better nurse staffing and a more favourable work environment in which less clinical care was left undone.²³ This is the first study to explore multiple aspects of the care experience in relation to missed care.

The purpose of this study was to describe the frequency and types of care missed by nurses in general acute care hospitals and to assess the relationships between missed care and patient satisfaction. This study addresses two notable gaps in the evidence linking missed nursing care to the patient care experience: there has been no evidence from a large sample of US hospitals; a national measure such as Hospital Consumer Assessment of Health Providers and Systems (HCAHPS) has not been used to examine this relationship. Without clinically relevant evidence, the myriad incentives to improve hospital quality and reduce

cost may prompt policymakers and hospital managers to implement misguided programmes or policies, potentially leading to negative consequences for nurses and patients.²⁴

STUDY DATA AND METHODS

Design, data sources and samples

This cross-sectional study used nurse survey data from the 2006/2008 University of Pennsylvania Multi-State Nursing Care and Patient Safety Survey²⁵ and patient experience data from the publically available October 2006–June 2007 national HCAHPS survey.²⁶ American Hospital Association (AHA) annual hospital survey data from 2007²⁷ were used to measure hospital characteristics.

The nurse survey was sent to random samples of 272 783 registered nurses licensed in California, Florida, New Jersey and Pennsylvania.²⁵ The response rate was 39%. In each hospital, the number of responses was proportional to the number of employed nurses as measured from AHA survey data. A resurvey of 1300 non-responders yielded a 91% response rate due to incentives and extensive follow-up. Analysis of data from the two samples revealed no significant response bias in the original respondents for job-related variables such as satisfaction and assessment of the work environment.²⁸ Nurses reported their place of employment and various aspects of nursing care, including missed care.

The sample for the present study included 409 adult, non-federal acute care hospitals that reported HCAHPS scores and had a minimum of 10 nurse survey respondents to yield satisfactory hospital-level measures.²⁹ The nurse sample comprised 15 320 respondents who provided direct care to adults, excluding psychiatric or maternity nurses because HCAHPS is not administered in these settings. Each hospital was represented by 10–192 nurses (average=37). To evaluate the representativeness of our sample, we compared our HCAHPS descriptive results with those of all hospitals for the same time period and found they were equivalent (data not shown).

Variables and measures

Dependent variable: patient satisfaction (analysed at the hospital level)—The HCAHPS was developed by the CMS and the Agency for Healthcare Research and Quality and endorsed by the National Quality Forum (NQF) in 2005.³⁰ Since 2008, hospitals' HCAHPS results have been publically reported quarterly.

The HCAHPS survey is sent to adults discharged after spending at least one night in the hospital. HCAHPS data are hospital-level measures comprising 10 risk-adjusted topics from a 32-question patient survey. The publically available data report three categories of patient responses (most to least positive) for all but 'discharge information', which is a yes/no. Our goal is to understand what factors relate to patients having positive care experiences. For a consistent approach across measures and relevance to CMS value-based purchasing, which takes into account the per cent of patients who chose the most positive response option to HCAHPS survey questions,³¹ we used the most positive category. One global measure is the overall rating of the hospital. HCAHPS provides the per cent of patients reporting a high rating (9 or 10). The remaining eight measures address the care provided by nurses,

physicians and staff, as well as timely pain management, cleanliness and the provision of discharge information. HCAHPS provides the per cent of patients choosing the most favourable category (eg, 'always' on a four-point scale), 'yes' for discharge information. Thus, there were nine dependent variables: one overall rating variable and eight variables measuring specific patient care experiences. Prior to public release of the data, HCAHPS data are risk adjusted for seven patient mix adjustment variables (linear self-reported health status, linear education, service line, categorical age, emergency room admission source, response percentile, service by linear age interactions and primary language other than English) and for survey mode (mail only, telephone only, mail with telephone follow-up (also known as mixed mode) and active interactive voice response).³²

Independent variable: missed care (analysed at the hospital level)—The missed care question was developed iteratively by an expert panel of survey methodologists and nurse researchers to capture essential nursing care activities. Nurses responded to the question, "On the most recent day you worked, which of the following activities were necessary but left undone because you lacked the time to complete them?" by marking all items that applied on a list that included adequate patient surveillance, administer medications on time and comfort/talk with patients (complete list displayed in table 2). We examine two domains of missed care recently identified from factor analysis of medical–surgical nurse survey data from 12 European countries:²³ clinical and planning/communication. The clinical domain comprises surveillance, skin care, oral hygiene, pain management, treatments and procedures, administering medication on time. The planning/communication domain comprises comfort/talk with patients, teach/counsel patient/family, documentation, prepare patients/family for discharge, develop/update care plans and care coordination. Missed care was measured as the hospital level per cent of nurses who (1) missed at least one activity or (2) missed a particular activity, as well as the average number of (3) total activities missed, (4) clinical activities missed and (5) planning/communication activities missed by each nurse.

Hospital sample description

The AHA data were used to describe hospital size, teaching status, technology status, ownership, state and core-based statistical area, consistent with previous work.¹⁰ These control variables were chosen because preliminary reports suggested that HCAHPS scores differ by these characteristics.³³

Statistical analysis

Descriptive statistics were calculated for hospital characteristics, missed nursing care and patient care experience. We report means and ranges to describe the central tendency and distribution of all HCAHPS measures. Means are appropriate because the normality of these measures was examined and confirmed by a graphical method in Stata. We computed the Pearson correlation of the two missed care domains, which met the necessary assumptions for Pearson, that is, variables are continuous, exhibit a linear relationship (observed in a scatter plot), have no significant outliers and are normally distributed.³⁴ Linear regression models estimated the association between missed care (the independent variable) and patient care experience (the dependent variable). We tested potential non-linearity in this

relationship using residual plots as well as adding a squared term for the independent variable to every model. None of the relationships exhibited non-linearity; the squared terms were not significant. To account for hospital factors that may be related to whether nurses miss care or patients are satisfied, we estimated unadjusted models and models that included five hospital characteristics and state.¹¹ First, the relationships between the sum of activities missed overall and the nine care experiences were estimated. Second, the relationships between the sum of activities missed per domain for the two domains of missed care and the nine care experiences were estimated first for each domain separately and then both domains together to look at the independent effect of each domain. We calculated the variance inflation factor from a combined model of the two missed care domains. The criterion of 2.5 is considered satisfactory to include variables in the same model.³⁵ Lastly, we examined three dyads of specific missed care activities and similar care experiences (comfort/communication; discharge preparation and pain management) to explore the robustness of the relationships. A one-unit change in the raw missed care data exceeded 1 SD for all explanatory variables. For example, 1 SD in the sum of missed care activities equals 0.74, which is less than one activity. Therefore, a change of one activity would be an unrealistically large metric to consider. Therefore, we standardised the missed care variables by dividing the hospital-specific value (eg, the sum of items missed) by the hospital-level SD for that variable. The standardised variable yields a more realistic (ie, 1 SD) change.

All statistical analyses were conducted using the statistical analysis software, STATA, V. 13,³⁶ and $p < 0.05$ was considered statistically significant.

RESULTS

Descriptive findings

The 409 sample hospitals were predominantly non-profit, medium or large hospitals in urban settings (table 1). Half were teaching hospitals and half were classified as high technology.

Table 2 contains the distributions of missed care and HCAHPS ratings. On average, calculated at the hospital level, nurses reported missing 2.71 of 12 essential care activities per shift (SD 0.74). The mean frequency of missed care varied greatly: one care activity per shift at several hospitals to nearly five activities at others. On average, three-quarters of nurses in a hospital reported missing at least one activity (range 25–100% of nurses across hospitals). Specific care activities were missed in differing frequencies across a tenfold range from 4.5% to 47.6% (table 2). Figure 1 displays the distributions across hospitals of missed care activities in box-and-whisker plots. In the plots, the centre bar is the median value. The top and bottom of the box are the 75th and 25th percentiles. The whisker ends are the 90th (top) and 10th (bottom) values. The dots are specific hospitals with values in the tails of the distribution. Care activities most frequently missed were ‘comfort/talk with patients’ (47.6%) and ‘develop or update care plans’ (38.5%). Those least frequently missed were pain management (4.5%) and treatments/procedures (5.5%). Planning/communication activities were more frequently missed (average=1.75) than clinical activities (0.96). The two domains exhibited a strong positive correlation of 0.69 ($p < 0.001$), meaning that in

hospitals where nurses reported missing planning/communication activities more frequently, nurses also reported missing clinical care activities more frequently.

Similar to nurse reports of missed care, patient reports of satisfaction ranged substantially (table 2). On average, nearly 60% of patients in a hospital rated the hospital highly (range 33–90% across hospitals). Varying percentages of patients reported ‘always’ or ‘yes’ about the remaining aspects of care. For example, less than half reported that it was always quiet at night and more than three-quarters reported that staff provided discharge information or that doctors always communicated well. We note that, although *within* a hospital the distribution of HCAHPS responses is skewed (ie, 60% of patients choose the top two categories on a scale of 0–10), *across* hospitals the distribution of the per cent of patients that chose the high rating is normal, providing for a robust dependent variable.

Associations between missed care and patient satisfaction

Table 3 displays the estimated linear regression effects of a one SD change in the sum of all missed care activities on each of the nine HCAHPS patient care experiences and the variability explained by the model as described by R^2 . The dependent variable is the per cent of patients that were in the positive HCAHPS category. Consistent, statistically significant, negative associations were identified for eight of nine outcomes (all except for quiet at night) before and after adjusting for hospital characteristics. The effect on the global rating was notably higher than for the specific care experiences: about 2.2% (adjusted model) compared with about 0.84% for the remainder, calculated as the mean effect size across the seven statistically significant specific care experiences. The estimate implies that for every 1 SD increase in the sum of missed care activities the percentage of patients who would rate the hospital highly would decrease by 2.2%, or a quarter of an SD (ie, 2.2 percentage point decrease/8.9 percentage point hospital-level SD for the per cent of patients rating the hospital highly=0.25 SD). These effects are similar in size to significant effects of the nurse work environment (coefficient of 3.51) and nurse staffing (coefficient of –1.00) on HCAHPS ratings.¹⁰ The variance explained by missed nursing care in a high HCAHPS rating was 9%; for individual HCAHPS measures, this was small—typically 3%.

Table 4 displays the estimated linear regression effects of joint models (ie, both care domains simultaneously) of a one SD change in the sum of activities missed for each care domain on each HCAHPS measure. Each model shows the independent effect of one domain adjusted for the effect of the other. The results of separate models, which are not displayed in tabular form, showed that eight of nine HCAHPS measures were significantly related to both domains. The insignificant result was for ‘always quiet at night’. In joint models, consistent, statistically significant, negative associations were identified for eight of nine HCAHPS measures for the planning/communication domain in models that adjusted for hospital characteristics. The clinical domain was also significant in just one model: ‘staff always explained medications’. Specifically, an 1 SD increase in the frequency of items missed in the planning/communication domain across hospitals (0.44 items) was associated with a 2.57% decrease in the per cent of patients who give the hospital a high rating. A 2.57% decrease equates to 0.29 SD. Similar to the regression results of the overall missed care frequency, the coefficient for high rating was roughly twice the size of the coefficients

for specific HCAHPS measures. For the specific measures, the largest coefficients were for 'patients always received help as soon as they wanted' ($\beta=1.49$) and 'nurses always communicated well' (β of 1.41). The eight significant coefficients for the planning/communication domain were generally larger than those for overall missed care frequency (table 3). Specifically six of the eight coefficients were 50% larger, and two coefficients were about 10% smaller.

Online supplementary appendix table 5 reports the results of regression models testing specific nursing activities against related specific care experiences. Two of the three yield significant results in adjusted models for nurses communicate well and staff gave discharge information. The third dyad, regarding pain management, was not significant. Notably, this nursing activity is the least frequently missed (5% of nurses).

DISCUSSION AND LIMITATIONS

Missed nursing care in US hospitals is common. In this large US study, almost three-fourths of nurses on average at the hospital level reported that at least one care activity was missed on their last shift. Missed care varies considerably across hospitals. In some hospitals, 100% of nurses reported missing care.

Missed nursing care may have consequences for patients. As patient satisfaction becomes integrated into pay-for-performance programmes and public reporting, hospitals have incentives to improve patient satisfaction. Evidence about patient care experiences from the HCAHPS data suggests that patients are more satisfied in hospitals with better quality of clinical care, higher nurse staffing and better work environments.¹⁰¹¹²¹ The clinical processes that might explain these relationships have not been explored. Several studies have documented higher levels of missed care in poorer work environments or poorly staffed units.¹⁵³⁷³⁸ However, the link between missed care and a range of patient care experiences has not been examined in the USA. Our results add to the literature by showing that patients have worse experiences in hospitals where more nurses miss essential nursing care. We found evidence linking related care activities and experiences, suggesting a relationship at the patient level despite the aggregate nature of the data. Our study joins an emerging base of literature that links missed care with patient outcomes, including mortality, readmissions, adverse events and patient satisfaction.³²³³⁹⁻⁴²

Our study substantially expands the evidence linking missed care to the patient care experience by analysing eight aspects of the care experience and overall high rating in 409 hospitals. The only previous evidence on this topic linked missed care to 'high rating' in eight European countries.²³ Our results, generated from the large majority of staff nurses who care for the large majority of patients in US hospitals (ie, adult medical surgical and critical care patients), largely reflect the hospitalisation experience in the USA. Annually, one-fifth of US hospitalisations take place in these geographically diverse states. Our sample accounts for over half of the non-federal acute care hospitals in these states.

In the complex hospital care setting, the significance of missed care may be underestimated. Our results show that the patient care experience is compromised in hospitals where care is

missed frequently. In these settings, patients are not receiving necessary care, particularly the interpersonal facets of nursing that they are clearly sensitive to. The literature shows that nurses prioritise imminent clinical concerns ahead of providing interpersonal teaching and support.⁴³ Unfortunately, activities considered distinguishing features of the nurse's role, such as comforting and patient education, are missed most frequently. While many nurses are motivated to enter the profession to provide holistic care, our results show that this primary role gets undermined frequently. Numerous questions about the bases and implications of nurses' decisions about care priorities deserve research attention.⁴⁴

In research asking nurses why they miss care, nurses attribute it to inadequate labour and material resources and communication.⁴⁵ It is quite possible that dysfunctional unit organisation is a key driver. It is well known that modifiable features of the work environment, including staffing and teamwork,⁴ influence missed care. These factors were not the focus herein, but recent evidence from Europe supports the role of missed nursing care as mediating the associations between work environments and patient care experiences.²³

Our research confirms that one in two nurses was unable to comfort or talk with their patients, and one in three was unable to teach or counsel patients and family. These results are consistent with international evidence. In 12 European countries,³⁸ the rank order of missed activities was nearly identical to our findings, but missed care was more frequent in Europe (3.6 out of 13 activities vs 2.7 of 12 in the USA). Part of this difference derives from different samples: the US sample included critical care and acute medical/surgical nurses, while the European sample included only the latter. However, our analysis of the US medical/surgical subsample with the common items indicates that missed care is still less frequent in the USA.

In the field of quality of care, it has been difficult to measure the process of nursing care. National nursing performance standards endorsed by the NQF encompass structure (eg, nurse staffing) and outcomes (eg, patient falls), but not process. Research linking nursing to quality has been constrained to questions about structure and outcomes. Missed nursing care may be a promising approach for measuring a quality process measure; however, more research and evidence may be needed. Evidence from eight European countries tests incomplete nursing care as a process variable mediating the structure–outcomes link.²³ However, contrary to our result that planning and communication dominate the link to patients' experiences, the evidence from Europe shows that missed clinical care is the significant domain. We note, however, that the domains are highly correlated ($r=0.69$); missing nursing care seems to be an overarching phenomenon.

Limitations

Our cross-sectional design permits association of hospital-level missed care and patient ratings, but not causal inference. Nursing care left undone may not *cause* the patients for whom care is missed to be less satisfied. That is, it may not be the principal basis for poor patient experience. Rather, it may be indicative of poor quality more broadly, which may account for why patients have poorer care experiences.

There are potential interpretive difficulties with aggregate data. There is a possibility of ecological bias. It is possible that the dissatisfied patients are not the same patients for whom nursing care was missed. The aggregate data from HCAHPS do not make it possible to link individual patients with varying levels of satisfaction to individual nurses with varying levels of missed care. In a large multihospital design, it is not feasible to collect data linking individual nurses to the patients they cared for. The HCAHPS data are limited in the degree to which they explore satisfaction with nursing care.

Our sample, comprising hospitals that voluntarily submitted HCAHPS data during the initial period, does not represent all hospitals. Our findings generalise best to large, non-profit teaching hospitals in urban areas, which were more likely than others to participate in the initial HCAHPS data collection.¹¹ Hospitals have subsequently increased their attention to the patient care experience. This has not translated to improved care experiences, however, judging from the nearly identical HCAHPS ratings for the first few years, based on authors' calculations of publically available data. Additionally, we compared our sample of hospitals with all hospitals submitting HCAHPS in October 2006–June 2007, and we did not find a significant difference in satisfaction between the two groups. Moreover, we note that HCAHPS adjusts for self-reported health status, which may influence care assessments. In this regard, differing distributions of health status across hospitals are accounted for.

CONCLUSIONS

Missed nursing care is common in US hospitals and varies widely. Most patients rate their hospital care experience highly, but this also varies widely across hospitals. Patients have poorer care experiences in hospitals where more nurses miss required nursing care.

Supporting nurses' ability to complete required care may optimise the patient care experience. As hospitals face changing reimbursement landscapes, ensuring adequate nursing resources should be a top priority.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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REFERENCES

1. Ball J, Murrells T, Rafferty A, et al. 'Care left undone' during nursing shifts: associations with workload and perceived quality of care. *BMJ Qual Saf.* 2014; 23:116–25.
2. Kalisch BJ, Landstrom GL, Hinshaw AS. Missed nursing care: a concept analysis. *J Adv Nurs.* 2009; 65:1509–17. [PubMed: 19456994]

3. Schubert M, Glass TR, Clarke SP, et al. Rationing of nursing care and its relationship to patient outcomes: the Swiss extension of the International Hospital Outcomes Study. *Int J Qual Health Care*. 2008; 20:227–37. [PubMed: 18436556]
4. Kalisch BJ, Gosselin K, Choi SH. A comparison of patient care units with high versus low levels of missed nursing care. *Health Care Manage Rev*. 2012; 37:320–8. [PubMed: 22310484]
5. Rochefort CM, Clarke SP. Nurses' work environments, care rationing, job outcomes, and quality of care on neonatal units. *J Adv Nurs*. 2010; 66:2213–24. [PubMed: 20626479]
6. Jones T, Hamilton P, Murry N. Unfinished nursing care, missed care, and implicitly rationed care: state of the science review. *Int J Nurs Stud*. 2015; 52:1121–37. [PubMed: 25794946]
7. Cleary PD, McNeil BJ. Patient satisfaction as an indicator of quality care. *Inquiry*. 1988; 25:25–36. [PubMed: 2966123]
8. Cleary PD, Edgman-Levitan S, Roberts M, et al. Patients evaluate their hospital care: a national survey. *Health Aff*. 1991; 10:254–67.
9. Megivern K, Halm MA, Jones G. Measuring patient satisfaction as an outcome of nursing care. *J Nurs Care Qual*. 1992; 6:9–24. [PubMed: 1611110]
10. Kutney-Lee A, McHugh MD, Sloane DM, et al. Nursing: a key to patient satisfaction. *Health Aff*. 2009; 28:w669–77.
11. Jha A, Orav E, Zheng J, et al. Patients' perception of hospital care in the United States. *N Engl J Med*. 2008; 359:1921–31. [PubMed: 18971493]
12. Werner R, McNutt R. A new strategy to improve quality: rewarding actions rather than measures. *JAMA*. 2009; 301:1375–7. [PubMed: 19336714]
13. Isaac T, Zaslavsky AM, Cleary PD, et al. The relationship between patients' perception of care and measures of hospital quality and safety. *Health Serv Res*. 2010; 45:1024–40. [PubMed: 20528990]
14. Manary MP, Boulding W, Staelin R, et al. The patient experience and health outcomes. *N Engl J Med*. 2013; 368:201–3. [PubMed: 23268647]
15. Robert G, Cornwell J. Rethinking policy approaches to measuring and improving patient experience. *J Health Serv Res Policy*. 2013; 18:67–9.
16. Rozenblum R, Lisby M, Hockey PM, et al. The patient satisfaction chasm: the gap between hospital management and frontline clinicians. *BMJ Qual Saf*. 2013; 22:242–50.
17. Klinkenberg WD, Boslaugh S, Waterman BM, et al. Inpatients' willingness to recommend: a multilevel analysis. *Health Care Manage Rev*. 2011; 36:349–58. [PubMed: 21685795]
18. Bolton LB, Aydin CE, Donaldson N, et al. Nurse staffing and patient perceptions of nursing care. *J Nurs Adm*. 2003; 33:607–14. [PubMed: 14608220]
19. Tervo-Heikkinen T, Kvist T, Partanen P, et al. Patient satisfaction as a positive nursing outcome. *J Nurs Care Qual*. 2008; 23:58–65. [PubMed: 18281877]
20. Larrabee JH, Ostrow CL, Withrow ML, et al. Predictors of patient satisfaction with inpatient hospital nursing care. *Res Nurs Health*. 2004; 27:254–68. [PubMed: 15264264]
21. Aiken LH, Sermeus W, Van den Heede K, et al. Patient safety, satisfaction, and quality of hospital care: cross sectional surveys of nurses and patients in 12 countries in Europe and the United States. *BMJ*. 2012; 344:e1717. [PubMed: 22434089]
22. Oflaz F, Vural H. The evaluation of nurses and nursing activities through the perceptions of inpatients. *Int Nurs Rev*. 2010; 57:232–9. [PubMed: 20579159]
23. Bruyneel L, Li B, Ausserhofer D, et al. Organization of hospital nursing, provision of nursing care, and patient experiences with care in Europe. *Med Care Res Rev*. 2015 [epub ahead of print 10 Jun 2015].
24. Landro L. Nurses Shift, Aiming for More Time with Patients. *The Wall Street Journal*. Jul 21.2014
25. Aiken LH, Cimiotti JP, Sloane DM, et al. Effects of nurse staffing and nurse education on patient deaths in hospitals with different nurse work environments. *Med Care*. 2011; 49:1047–53. [PubMed: 21945978]
26. Centers for Medicare & Medicaid Services. HCAHPS Hospital Survey. Center for Medicare and Medicaid Services; 2011.
27. American Hospital Association. AHA Annual Survey Database 2008 Edition. American Hospital Association; Chicago: 2010.

28. Smith, HL. A double sample to minimize bias due to nonresponse in a mail survey. Population Studies Center Working Papers. 2009. (No. 09-05. 2009)http://repository.upenn.edu/cgi/viewcontent.cgi?article=1013&context=psc_working_papers
29. Glick WH. Conceptualizing and measuring organizational and psychological climate—Pitfalls in multilevel research. *Acad Manage Rev.* 1985; 10:601–16.
30. Centers for Medicare & Medicaid Services. HCAHPS Fact Sheet (CAHPS Hospital Survey). CMS; Baltimore, MD: 2013.
31. Centers for Medicare & Medicaid Services. Open Door Forum: Hospital Value-Based Purchasing: Fiscal Year 2013 Overview for Beneficiaries, Providers, and Stakeholders. 2011. http://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/hospital-value-based-purchasing/downloads/HospVBP_ODF_072711.pdf
32. Centers for Medicare & Medicaid Services. Mode and Patient-mix Adjustment of the CAHPS® Hospital Survey (HCAHPS). Secondary Mode and Patient-mix Adjustment of the CAHPS® Hospital Survey (HCAHPS). 2008. <http://www.hcahpsonline.org/>
33. Lehrman WG, Elliott MN, Goldstein E, et al. Characteristics of hospitals demonstrating superior performance in patient experience and clinical process measures of care. *Med Care Res Rev.* 2010; 67:38–55. [PubMed: 19638640]
34. Laerd Statistics. Pearson's Correlation using Stata. 2013. <https://statistics.laerd.com/stata-tutorials/pearsons-correlation-using-stata.php>
35. Allison, PD. Multiple regression: a primer. Pine Forge Press; Thousand Oaks, California: 1999.
36. Stata/IC 13.1 for Windows [program]. College Station, TX: 2014.
37. Papastavrou E, Andreou P, Tsangari H, et al. Rationing of nursing care within professional environmental constraints: a correlational study. *Clin Nurs Res.* 2013; 23:314–35. [PubMed: 23291314]
38. Ausserhofer D, Zander B, Busse R, et al. Prevalence, patterns and predictors of nursing care left undone in European hospitals: results from the multicountry cross-sectional RN4CAST study. *BMJ Qual Saf.* 2014; 23:126–35.
39. Schubert M, Clarke SP, Aiken LH, et al. Associations between rationing of nursing care and inpatient mortality in Swiss hospitals. *Int J Qual Health Care.* 2012; 24:230–8. [PubMed: 22457240]
40. Brooks Carthon JM, Lasater KM, Sloane D, et al. The quality of hospital work environments and missed nursing care are linked to heart failure readmissions: a cross sectional study of U.S. hospitals. *BMJ Qual Saf.* 2015; 24:255–63.
41. Kalisch BJ, Xie B, Dabney BW. Patient-reported missed nursing care correlated with adverse events. *Am J Med Qual.* 2014; 29:415–22. [PubMed: 24006031]
42. Kalisch BJ, Tschannen D, Lee KH. Missed nursing care, staffing, and patient falls. *J Nurs Care Qual.* 2012; 27:6–12. [PubMed: 21738057]
43. Patterson ES, Ebright PR, Saleem JJ. Investigating stacking: How do registered nurses prioritize their activities in real-time? *Int J Ind Ergonom.* 2011; 41:389–93.
44. Wakefield BJ. Facing up to the reality of missed care. *BMJ Qual Saf.* 2014; 23:92–4.
45. Kalisch BJ, Tschannen D, Lee H, et al. Hospital variation in missed nursing care. *Am J Med Qual.* 2011; 26:291–9. [PubMed: 21642601]

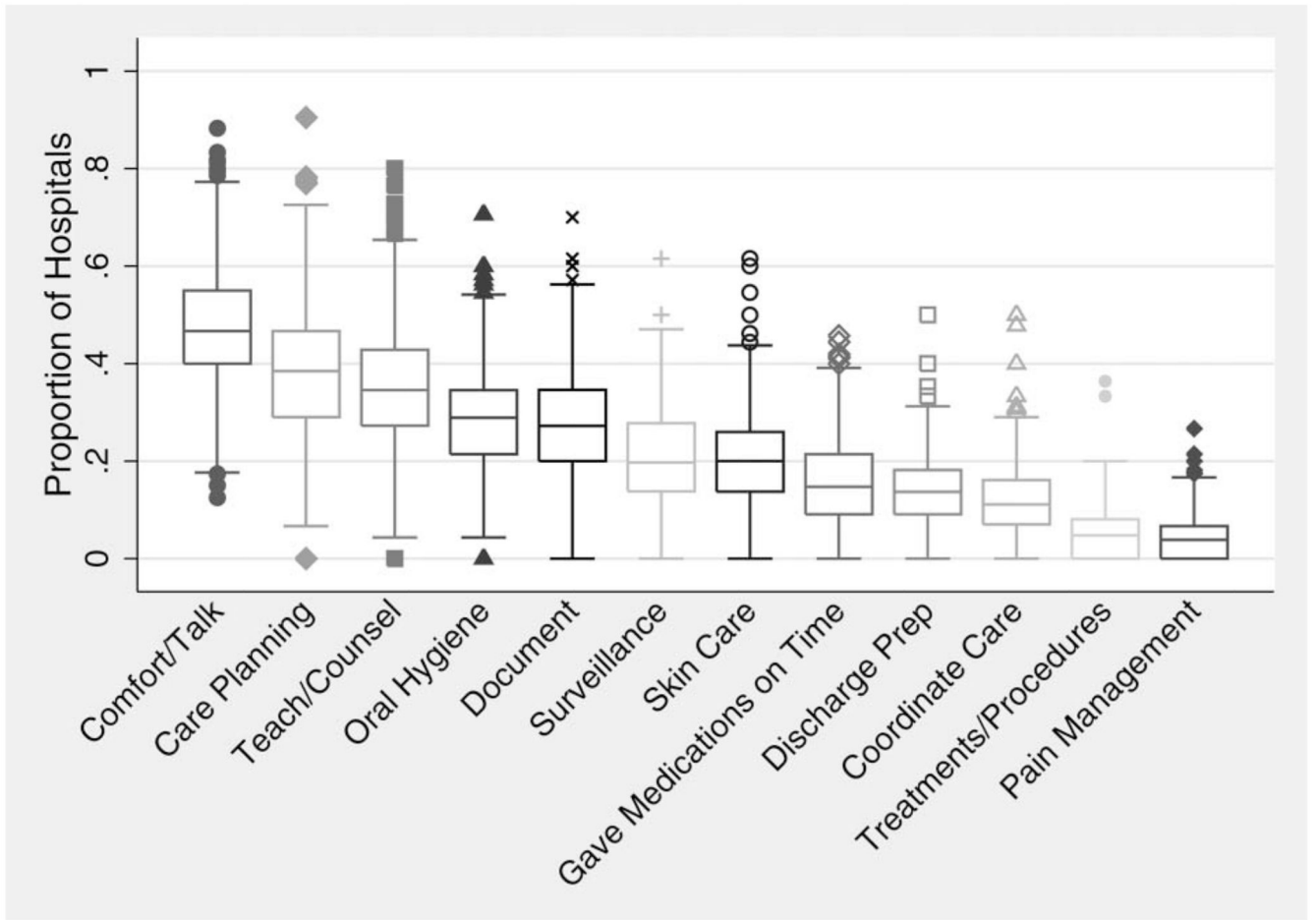


Figure 1. Distribution of missed care activities across 409 hospitals.

Table 1

Characteristics of hospitals included in the sample (N=409)

Characteristic	No. (%)
Bed size	
<100	28 (7)
101–250	180 (44)
>250	201 (49)
Teaching status	
None	205 (50)
Minor	170 (42)
Major	34 (8)
Core-based statistical area	
Division (>2.5 million)	166 (41)
Metropolitan (50 000–2.5 million)	214 (52)
Micro (10 000–50 000)	24 (6)
Rural (<10 000)	5(1)
Ownership	
Government	32 (8)
Non-profit	303 (74)
For profit	74 (18)
Technology (high)	207 (51)
State	
California	169 (41)
Florida	107 (26)
Pennsylvania	93 (23)
New Jersey	40 (10)

Authors' tabulations of data from American Hospital Association, available on the American Hospital Association website (2007).

Percentages might not add to 100 because of rounding.

Table 2

Distribution of missed nursing care and Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) outcomes across 409 hospitals

	Mean	Range
Missed nursing care		
All care activities missed, n (SD)	2.71 (0.74)	0.5–5.0
Clinical activities missed, n (SD)	0.96 (0.36)	0.15–2.2
Planning/communication activities missed, n (SD)	1.75 (0.44)	0.31–3.4
At least one activity missed, % (SD)	73.4 (11.1)	25–100
Comfort/talk with patients, % (SD)	47.6 (11.9)	13–88
Develop or update care plans, % (SD)	38.5 (14.0)	0–90
Teach/counsel patients and family, % (SD)	35.1 (12.3)	0–80
Oral hygiene, % (SD)	28.6 (11.3)	0–71
Adequately document nursing care, % (SD)	27.7 (11.1)	0–70
Adequate patient surveillance, % (SD)	21.3 (10.5)	0–62
Skin care, % (SD)	20.5 (9.8)	0–62
Administer medications on time, % (SD)	15.8 (9.0)	0–46
Prepare patients and families for discharge, % (SD)	14.2 (7.4)	0–50
Coordinating patient care, % (SD)	12.1 (7.7)	0–50
Treatment and procedures, % (SD)	5.5 (5.1)	0–36
Pain management, % (SD)	4.5 (4.4)	0–27
Outcome		
Patients gave a rating of 9 or 10 (high), % (SD)	59.4 (8.9)	33–90
Nurses always communicated well, % (SD)	68.7 (6.8)	48–84
Patients always received help as soon as they wanted, % (SD)	55.0 (7.5)	34–77
Always quiet at night, % (SD)	45.6 (7.4)	27–78
Doctors always communicated well, % (SD)	75.5 (4.8)	59–87
Room was always clean, % (SD)	63.4 (7.0)	42–82
Staff gave patients discharge information, % (SD)	76.1 (4.6)	59–87
Pain was always well controlled, % (SD)	64.3 (5.8)	42–81
Staff always explained medications, % (SD)	53.6 (6.1)	35–77

Authors' tabulations from nurse survey data, 2006–2007, and HCAHPS data, available on the Hospital Compare website (October 2006–June 2007).

Values are means, with SDs in parentheses. HCAHPS adjusts for linear self-reported health status, linear education, service line (medical, surgical or maternity care), age, emergency room admission source, response percentile ('relative lag time' based on the time between discharge and survey completion), service by age interactions and primary language other than English.

Table 3

Effects of the sum of missed nursing care activities on Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) outcomes in a four state sample of hospitals, 2006–2007

Outcome	Unadjusted	Adjusted
Patients gave a rating of 9 or 10 (high)		
Coefficient	−2.72 ^{***}	−2.21 ^{***}
95% CI	−3.5 to −1.9	−3.0 to −1.4
R ²	0.09	0.22
Nurses always communicated well		
Coefficient	−1.21 ^{***}	−1.04 ^{**}
95% CI	−1.9 to −0.5	−1.6 to −0.4
R ²	0.03	0.30
Patients always received help as soon as they wanted		
Coefficient	−1.20 ^{**}	−1.16 ^{**}
95% CI	−1.9 to −0.5	−1.8 to −0.5
R ²	0.03	0.27
Always quiet at night		
Coefficient	0.38	−0.31
95% CI	−0.3 to 1.1	−1 to 0.4
R ²	0.00	0.20
Doctors always communicated well		
Coefficient	−0.80 ^{**}	−0.50 [*]
95% CI	−1.3 to −0.3	−0.95 to −0.04
R ²	0.03	0.17
Room was always clean		
Coefficient	−1.40 ^{***}	−1.05 ^{**}
95% CI	−2.1 to −0.7	−1.7 to −0.4
R ²	0.04	0.24
Staff gave patient discharge information		
Coefficient	−0.88 ^{***}	−0.76 ^{***}
95% CI	−1.3 to −0.4	−1.17 to −0.36
R ²	0.04	0.29
Pain was always well controlled		
Coefficient	−1.01 ^{***}	−0.74 ^{**}
95% CI	−1.6 to −0.5	−1.30 to −0.19
R ²	0.03	0.17
Staff always explained medications		
Coefficient	−1.07 ^{***}	−0.66 [*]
95% CI	−1.6 to −0.5	−1.23 to −0.09
R ²	0.03	0.19

Authors' tabulations of data from nurse survey data, 2006–2007, and HCAHPS, available on the Hospital Compare website (October 2006–June 2007).

N=409. Results were generated from linear regression of HCAHPS outcome on standardised missed care frequency. HCAHPS adjusts for linear self-reported health status, linear education, service line (medical, surgical or maternity care), age, emergency room admission source, response percentile ('relative lag time' based on the time between discharge and survey completion), service by age interactions and primary language other than English. Adjusted models included hospital characteristics (size, teaching status, technology status, core-based statistical area type, owner) and state.

p<0.001,

**
p<0.01,

*
p<0.05.

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Table 4

Effects of the sum of activities missed per domain for two domains of missed care on Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) outcomes in a four state sample of hospitals, 2006–2007

Outcome	Unadjusted		Adjusted [†]			
	Coefficient	95% CI	R ²	Coefficient	95% CI	R ²
Patients gave a rating of 9 or 10 (high)			0.10			0.24
Missed planning and communication	-2.16***	-3.29 to -1.03		-2.57***	-3.65 to -1.49	
Missed clinical care	-0.77	-1.88 to 0.38		0.27	-0.84 to 1.38	
Nurses always communicated well			0.03			0.31
Missed planning and communication	-0.48	-1.38 to 0.43		-1.41**	-2.21 to -0.62	
Missed clinical care	-0.84	-1.74 to 0.064		0.35	-0.47 to 1.17	
Patients always received help as soon as they wanted			0.03			0.27
Missed planning and communication	-0.58	-1.61 to 0.40		-1.49**	-2.39 to -0.59	
Missed clinical care	-0.73	-1.71 to 0.29		0.30	-0.63 to 1.22	
Always quiet at night			0.00			0.20
Missed planning and communication	0.64	-0.35 to 1.64		-0.00088	-0.93 to 0.93	
Missed clinical care	-0.24	-1.24 to 0.75		-0.35	-1.30 to 0.61	
Doctors always communicated well			0.03			0.18
Missed planning and communication	-0.38	-1.02 to 0.25		-0.82**	-1.43 to -0.22	
Missed clinical care	-0.50	-1.13 to 0.14		0.32	-0.30 to 0.94	
Room was always clean			0.04			0.24
Missed planning and communication	-0.39	-1.32 to 0.53		-0.98*	-1.83 to -0.12	
Missed clinical care	-1.15*	-2.08 to -0.22		-0.14	-1.02 to 0.74	
Staff gave patient discharge information			0.04			0.29
Missed planning and communication	-0.45	-1.04 to 0.16		-0.66*	-1.20 to -0.19	
Missed clinical care	-0.51	-1.12 to 0.08		-0.16	-0.71 to 0.40	
Pain was always well controlled			0.03			0.22
Missed planning and communication	-0.91*	-0.16 to -0.92		-1.40***	-1.97 to -0.52	
Missed clinical care	-0.18	0.60 to -0.16		0.64	-0.10 to 1.38	
Staff always explained medications			0.03			0.24
Missed planning and communication	-1.03*	-1.85 to -0.25		-1.3***	-2.05 to -0.56	
Missed clinical care	-0.11	-0.90 to 0.71		0.81*	0.42 to 1.57	

Authors' tabulations of data from nurse survey data, 2006–2007, and HCAHPS, available on the Hospital Compare website (October 2006–June 2007). N=409. Results were generated from linear regression of HCAHPS outcome on two standardised domains of missed care. HCAHPS adjusts for linear self-reported health status, linear education, service line (medical, surgical, or maternity care), age, emergency room admission source, response percentile ('relative lag time' based on the time between discharge and survey completion), service by age interactions, and primary language other than English.

p<0.001,

**
p<0.01,

*
p<0.05.

† Adjusted for hospital characteristics (size, teaching status, technology status, core-based statistical area type, owner and state).

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