

Beyond the Pain Scale: Provider Communication and Staffing Predictive of Patients' Satisfaction with Pain Control

■ ■ ■ *Judith Shindul-Rothschild, PhD, MSN, RN,
Jane Flanagan, PhD, RN, ANP-BC,
Kelly D. Stamp, PhD, ANP-C, RN, FAHA,
and Catherine Y. Read, PhD, RN*

■ ABSTRACT:

This paper examined hospital characteristics, staffing, and nursing care factors associated with patient perception of poor pain control by conducting a secondary analysis of the Hospital Consumer Assessment of Health Care Providers Systems (HCAHPS) survey in California, Massachusetts, and New York hospitals. Analysis of variance was used to analyze the relationship between nurse, hospitalist, physician, and resident staffing and patients' perception of pain control. Twenty-one factors correlated with patients' reports of pain control were included in the stepwise linear regression analysis. Patients' perception of pain control significantly improved with higher numbers of registered nurses ($p = .045$), nursing staff ($p = .005$), and hospitalists ($p = .035$) and worsened with higher numbers of residents or interns ($p = .010$). Six predictors explained 79% of the variance in patients' self-reports of pain control. Four factors increased the likelihood that patients reported their pain was poorly controlled: (1) patients did not receive help as soon as they wanted ($p < .001$), (2) poor nurse communication ($p < .001$), (3) poor medication education ($p < .001$), and (4) teaching hospitals ($p < .001$). Two factors decreased the likelihood that patients reported their pain was poorly controlled: (1) higher numbers of nursing staff ($p = .001$) and (2) nonprofit hospitals ($p = .001$). Nurse staffing and nurse-patient communication are highly predictive of patients' perception of pain management. In teaching hospitals, with rotating intern/resident assignments, patients reported less satisfaction with pain management. This study provides new evidence for the importance of continuity of care in controlling the pain of hospitalized patients.

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From the Boston College, William F. Connell School of Nursing, Chestnut Hill, Massachusetts.

Address correspondence to Judith Shindul-Rothschild, PhD, MSN, RN, Associate Professor, Boston College William F. Connell School of Nursing, 140 Commonwealth Avenue, Maloney Hall 370, Chestnut Hill, MA 02467. E-mail: judith.shindul-rothschild@bc.edu

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Intuitively one might assume that patients reporting higher levels of pain would report lower satisfaction with pain management, as well as the reverse. Studies are inconsistent in finding a relationship between the level of pain a patient experiences and his or her perception of the adequacy of pain management (Phillips, Gift, Gelot, Duong, & Tapp, 2013). These findings have led pain experts to argue that there is a powerful biopsychosocial aspect to pain and that outcome measures of pain control should include both pain intensity scales and patient satisfaction with pain management (Phillips et al., 2013).

Studies on patients known to be vulnerable to the experience of pain and/or breakthrough pain suggest assessments of patients do not consider covariate factors. Further, this lack of assessment of all contributors to the experience of pain leads to inadequate pain control. One study found that in patients with chronic obstructive pulmonary disease, coexisting symptoms of depression, fatigue, and multisite pain (i.e., back, chest, and head) correlated with higher levels of reported pain (Christensen et al., 2016). Others found that patients who had breakthrough pain despite regular pain medication experienced despair and depression. They suggest the health care team provide patients with education about pain control, alternatives to medicine, empathy, and support to alleviate pain (Pathmawathi et al., 2015).

Collectively these studies indicate that health care providers' education and knowledge related to assessment and treatment of pain is an important consideration in improving the patient experience of pain. Despite this, there continues to be a lack of adequate pain management education for health care providers across disciplines. Findings on pain management education across health professions in Canada reported veterinarians receive up to five times more pain management education than colleagues in dentistry, medicine, and pharmacy and about one third more than nursing, occupational therapy, and physical therapy (Watt-Watson et al., 2009). Other work in the United Kingdom reported that veterinarians receive twice as much education as their colleagues in nursing or medicine and that the only profession to receive more than veterinarians was physical therapy (Briggs, Carrl, & Whittaker, 2011). These findings are consistent with findings from work in the United States that also reports a lack of educational preparation of health care professionals in the area of pain management (Doorenbos et al., 2013; Tauben & Loeser, 2013).

PATIENT SATISFACTION WITH PAIN CONTROL IN HCAHPS

The Centers for Medicare and Medicaid Services (CMS) acknowledge that there are no studies suggesting that the pain management domain measured by patients' self-reports in the Hospital Consumer Assessment of Health Care Providers Survey (HCAHPS) has encouraged the overuse of opioid analgesics by health care providers (CMS, 2016). In fact, one study of surgical patients at a tertiary academic medical center found that patient satisfaction with pain management and overall hospital satisfaction was not associated with intra-operative and postanesthesia care unit anesthetics or analgesic interventions (Maher et al., 2015). Nonetheless, CMS is proposing a rule change that would remove the pain management domain from the Hospital Value-Based Purchasing program in 2017 until more appropriate dimensions of pain management related to provider communications and pain can be developed (CMS, 2016).

Nationally the percentage of patients reporting in HCAHPS that their pain is poorly controlled is 7% and is lowest in west North Central region (5%) followed by the New England region (6%), with the Mid-Atlantic and Pacific regions having the greatest percentage of patients reporting their pain was poorly controlled (8%) (HCAHPS, 2013a). Regional variation in patient reports of pain control in HCAHPS may reflect geographically varying hospital practices or socioeconomic or cultural factors (Tighe, Fillingim, & Hurley, 2014). Nonblack minorities, Asians, and patients in poor health have been found to be the least satisfied with their pain control as measured in HCAHPS (Jannuzi et al., 2015; Li, Lee, Glicksber, Radbill, & Dudley, 2016). A study of county-level predictors of pain management in HCAHPS found that 12% of the variability could be predicted by race, gender, ethnicity, and population density (McFarland, Shen, & Holcombe, 2016).

Significant differences have also been reported among government, nonprofit, and for-profit hospitals, with poorer pain control reported in for-profit hospitals and the best pain control reported in government-controlled hospitals ($p < .05$) (Gupta, Daigle, Mojica, & Hurley, 2009). A follow-up study 5 years later, in 2012, found that patients' perception of pain control improved in for-profit hospitals, but significant differences among the 3 sectors of hospitals persisted ($p < .01$) (Gupta, Lee, Mojica, Nairizi, & George, 2014).

The quality of the therapeutic relationship between patients and members of the health care team

is consistently reported as the strongest predictor of overall patient satisfaction in HCAHPS. Overall satisfaction with hospital care has been found to be associated with nurses and physicians listening, explaining things, treating patients with respect, and controlling pain ($p < .001$) (Kahn, Iannuzzi, Stassen, Bankey, & Gestring, 2015). These findings are consistent with a national analysis of HCAHPS from 2011 to 2012 that found the strongest correlation with overall hospital satisfaction to be communication with nurses, followed by pain management and responsiveness of hospital staff ($p < .001$) (HCAHPS, 2013b). Each 1-point increase in patients' satisfaction with nursing care measured in a hospital satisfaction questionnaire by Press Ganey increased the odds of achieving a top overall satisfaction score in HCAHPS by 4.9%—the highest of all 10 hospital care domains (Wolosin, Ayala, & Fulton, 2012).

Nursing care as measured by HCAHPS has been reported to be strongly associated with both high level of patient satisfaction and high levels of patients reporting their pain was well controlled (Craig, Otani, & Herrmann, 2015). Other recent work exploring best practices of nurses suggests nurses have an important role in improving the patient experience of pain. Daniels (2016) found that nurse daily rounding improved communication, patient safety, staff responsiveness, and pain control. Others indicate that a multidisciplinary best practice approach, which was led by nursing and included assessment, education, and patient involvement in pain control, improved HCAHPS scores from the 1st percentile to the 90th in just 5 months (Martin, Kelly, & Roosa, 2012).

Previous studies have examined hospital and patient characteristics associated with patients' perception of pain control measured in HCAHPS. However, prior studies have not examined how specific levels of registered nurse, total nursing staff, hospitalist, physician, and resident/intern staffing affect patient satisfaction with pain management. The aim of this study was to determine which hospital, nursing care, and hospital staffing factors are most predictive of the quality of pain management as measured in HCAHPS.

METHODS

This cross-sectional study examined factors associated with patients' self-report that pain was "never" or "sometimes" well controlled. The dependent measure in this study was defined by CMS and measured in the HCAHPS survey that asks patients to self-report on clinical quality measures of their hospital experience. This specific measure is used to assess the

percentage of adult inpatients who reported how often ("Never," "Sometimes," "Usually," "Always") their pain was controlled by asking, "During this hospital stay, how often was your pain well controlled?" (CMS HCAHPS, 2011–2012). HCAHPS is administered to a random sample of adults after hospital discharge from medical, surgical, and maternity units (CMS, 2011).

Data Sources

The data sources used in this study included the CMS HCAHPS from September 30, 2011 to October 1, 2012 and the American Hospital Association (AHA) Annual Survey of Hospitals released for 2011. CMS and AHA data sources were merged using the CMS hospital identifier number with the AHA Annual Survey of Hospitals released for 2011. The sample consisted of nonfederal general hospitals in California ($n = 295$), New York ($n = 109$), and Massachusetts ($n = 60$). This study was exempt from an institutional review board approval because the data are available from public and proprietary sources and do not include any identifiable patient data.

Statistical Analysis

Correlations, analysis of variance, independent t tests, and a stepwise linear regression were conducted using IBM SPSS Version 21 (IBM, 2012). Variables were computed in the AHA dataset to permit comparisons across hospitals in the stepwise linear model analysis. Dummy variables were created for city/county hospitals, for-profit hospitals, nonprofit hospitals, teaching hospitals, and Massachusetts, New York, and California hospitals. The proportion of adult intensive care unit beds to total staffed hospital beds, Medicare case mix, and Medicaid days to adjusted patient days were included as proxy measures of intensity of care.

In the AHA Annual Survey of Hospitals (2011), the staffing domain includes full-time, part-time, and full-time equivalent (FTE) staffing for hospital personnel. Full-time employees are defined as working ≥ 35 hours a week and part-time employees as working < 35 hours a week. Full-time equivalents (FTE) are defined as equal to the sum of full-time workers plus .5 of the part-time workers. Employee hours per patient day (HPPD) were calculated by multiplying full-time and full-time equivalent employees by 2,080 (40 hours/week \times 52 weeks) and dividing by adjusted patient days. Total nursing staff FTE HPPD was calculated by summing registered nurse, licensed practical nurse, and nursing assistant FTE HPPD.

The data file was examined for random or systematic missing data and marked skewness. No systematic missing data or marked skewness were found in the

variables included in the data analysis. Scatterplots of the candidate predictors were examined for applicability of the linear model, outliers, or unusual distributional shapes.

RESULTS

Analysis of variance was used to examine the relationship between hospital staff FTE HPPD and patients' perception of pain control. The likelihood ratio test from the analysis of variance ($\alpha = .05$) was used to examine pain control by low ($\leq 4\%$), average (5%-11%), and high ($\geq 12\%$) percent of patients reporting their pain was "never" or "sometimes" controlled by hospital staffing levels. Categories for the factor pain control were determined by adding or subtracting the standard deviation of pain control ($SD \pm 3.567$) from the median sum of 8%. [Figure 1](#) illustrates that higher nursing staff FTE HPPD ($F = 5.348, p = .005$) and higher registered nurse FTE PPS ($F = 3.131, p = .045$) were significantly associated with lowering percentages of patients who reported their pain was "never" or "sometimes" controlled.

[Figure 2](#) illustrates that higher hospitalist FTE HPPD significantly lowered the percentage of patients reporting their pain was "never" or "sometimes" controlled ($F = 3.408, p = .035$). Conversely, higher resident/intern FTE HPPD significantly increased the percentage of patients reporting their pain was not well controlled ($F = 4.679, p = .010$), whereas physician (M.D.) FTE HPPD had no effect on patients' perception of pain control ($F = .296, p = .744$).

[Figures 1 and 2](#) illustrate that an increase of 2.61 hours per day for nursing staff, 1.7 hours per day for registered nurses, and approximately 30 minutes per day for a hospitalist decreased the percentage of patients reporting poor pain control by more than half. Conversely, an increase of 63 minutes per day for a resident/intern had the opposite effect, doubling the percentage of patients reporting poor pain control.

Covariates significantly positively or negatively correlated with patients' perception of pain control, as well as factors known to be associated with pain management measured in HCAHPS, were included in the stepwise linear regression analysis. [Table 1](#) describes the pairwise correlations of 20 covariates examined for significant association or scientific relevance with the dependent variable. All covariates were initially placed in the linear regression model and then eliminated by stepwise modeling if they remained associated at $p = .05$ and were removed at $p = .10$. This was determined by stepwise procedures and likelihood ratio tests.

[Table 2](#) shows the six factors that significantly explained 79% of the variance patients' self-report that their pain was "never" or "sometimes" controlled. The percentage of patients self-reporting their pain was "never" or "sometimes" controlled increased by .277 SD for each increase of 1 standard deviation in the percentage of patients self-reporting they "never" or "seldom" received help when they wanted, by .234 SD when patients self-reported nurses "never" or "seldom" communicated well to the patient, by .090

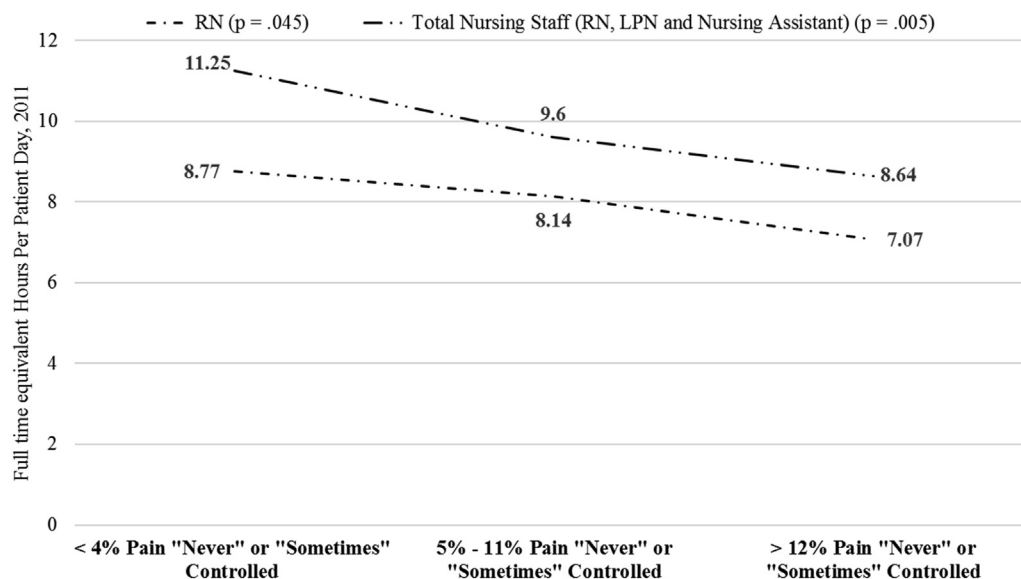


FIGURE 1. ■ Pain "never" or "sometimes" controlled with hospital staffing; N = 512. Data for pain "never" or "sometimes" controlled from [CMS HCAHPS, 2011–2012](#); data for full-time equivalent hours per patient day from [AHA, 2011](#).

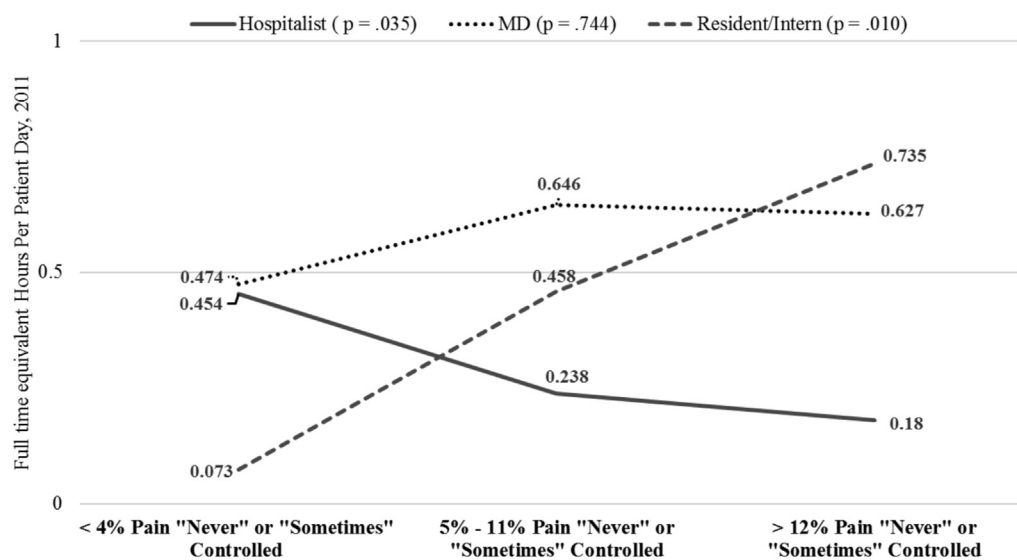


FIGURE 2. ■ Pain “never” or “sometimes” controlled with physician staffing; $n = 512$ medical doctors and residents/interns, $n = 262$ hospitalists. Data for pain “never” or “sometimes” controlled from [CMS HCAHPS, 2011–2012](#); and data for full-time equivalent hours per patient day from [AHA, 2011](#).

SD when patients reported staff “never” or “sometimes” explained medicines before giving them, and by .776 SD in teaching hospitals. Conversely, the percentage of patients self-reporting their pain was “never” or “seldom” controlled decreased by .076 for each standard deviation increase in nursing staff FTE HPPD and by .768 in nonprofit hospitals.

In clinical terms, approximately 50% of the variance in each percentage increase in patients self-reporting their pain was “never” or “seldom” controlled was explained by patients reporting they “never” or “seldom” received help as soon as they wanted; approximately 25% when patients reported nurses “never” or “sometimes” communicated well to them; and approximately 15% when staff “never” or “seldom” explained medications. Hospital characteristics including Medicare case mix, Medicaid days to adjusted patient days, city/county hospitals, for-profit hospitals, total adult intensive care unit beds to total facility beds staffed, and hospital region did not explain the variation in patients’ perception of pain control. Registered nurse, licensed practical nurse, nursing assistant, physician (M.D.), resident/intern, and hospitalist FTE HPPD did not independently contribute to the explained variation in patients’ perception of pain control in the linear regression analysis.

DISCUSSION

In this study we found that higher staffing by nurses and hospitalists was associated with improvements in perceived pain control (Figs. 1 and 2), whereas

staffing by interns and residents was not. The aggregate variable “nursing staff FTE” was found to improve patient perception of pain control in the regression model (Table 2), but care in teaching hospitals, where residents and interns are on the front line, did not. These findings suggest that having consistent staff and higher numbers of nursing staff and hospitalists results in higher patient satisfaction with pain management than when more care is provided by rotating interns and residents.

It should be noted that in some institutions hospitalists are physicians, whereas in others they are nurse practitioners. Hospitalists are typically assigned to one unit and typically work consecutive days, often on a 5-7 on, 5-7 off rotation. Data obtained for this study do not indicate the professional role of hospitalists nor their scheduling patterns. However, given the improvement in patient perception of pain management with hospitalists, this finding needs further exploration to determine if this role has a multidisciplinary best practice approach.

Given that, poor pain control was associated with teaching hospitals and residents/interns in this study; medical education has a notable role in promoting patients’ satisfaction with pain management. [Phillips and Barker \(2010\)](#) reported significant spikes in fatal medication errors when new residents and interns began their hospital training in July. A systematic review found medical students had limited understanding of effective pain treatment because of the absence of a comprehensive curriculum on pain management ([Ung, Salamonson, Hu, & Gallego, 2016](#)). In response

TABLE 1.
Correlations with Percentage of Patients' Self-Reporting Their Pain Was "Never" or "Sometimes" Controlled^a (One-Tailed) (N = 255)

Model Factors Included in Stepwise Linear Regression	Coefficient	p
Patients "never" or "sometimes" received help as soon as they wanted ^a	.841	<.001
Nurses "never" or "sometimes" communicated well with patient ^a	.809	<.001
Staff "never" or "sometimes" explained medicines before giving them ^a	.660	<.001
Medicaid days/adjusted patient days ^b	.553	<.001
Nonprofit hospitals (0 = no, 1 = yes) ^b	-.345	<.001
City/county hospitals (0 = no, 1 = yes) ^b	.325	<.001
Teaching hospitals (0 = no, 1 = yes) ^b	.299	<.001
Nursing assistant FTE HPPD ^b	-.291	<.001
New York (0 = Massachusetts and California, 1 = New York) ^b	.251	<.001
Hospitalist FTE HPPD ^b	-.190	.001
Licensed practical nurse FTE HPPD ^b	.178	.002
Massachusetts (0 = California and New York, 1 = Massachusetts) ^b	-.174	.003
Residents/interns FTE HPPD ^b	.172	.003
Nursing staff FTE HPPD ^b	-.164	.004
Registered nurse FTE HPPD ^b	-.132	.016
California (0 = Massachusetts and New York, 1 = California) ^b	-.123	.025
Total ICU/CCU beds/total facility beds staffed ^b	-.116	.032
For-profit hospitals (0 = no, 1 = yes) ^b	.101	.055
Medicare case mix, 2011	-.053	.200
Medical doctor FTE HPPD ^b	.015	.406

FTE = full-time equivalent; HPPD = hours per patient day; ICU = intensive care unit; CCU = critical care unit; LPN = licensed practical nurse; NA = nursing assistant.

Total Nursing Staff FTE HPPD = RN FTE HPPD + LPN FTE HPPD + NA FTE HPPD.

Data sources: ^aCMS HCAHPS, 2011–2012; ^bAHA, 2011.

to fragmented pain education in medical schools, the University of Washington School of Medicine revised their curriculum to introduce a 4-year integrated pain curriculum that substantially increased didactic and

multidisciplinary clinical training (Tauben & Loeser, 2013).

Limited clinical experiences requiring coordination of multimodal treatment approaches for pain

TABLE 2.
Stepwise Linear Regression of Patients' Self-Report of Pain "Never" or "Sometimes" Well Controlled (%) With Predictors

Predictors	Unstandardized Coefficients		Standardized Coefficients	t	95% CI		p
	B	SE(B)	(β)		Lower	Upper	
Patients "never" or "sometimes" received help as soon as they wanted (%)	.277	.028	.499	9.933	.222	.332	<.001
Nurses "never" or "sometimes" communicated well to patient (%)	.234	.053	.237	4.409	.129	.338	<.001
Teaching hospital	.776	.210	.113	3.691	.362	10.191	<.001
Staff "never" or "sometimes" explained medicines before giving them (%)	.090	.025	.146	3.645	.042	.139	<.001
Nursing staff FTE HPPD	-.076	.022	-.104	-3.507	-.119	-.033	.001
Nonprofit hospitals	-.768	.230	-.107	-3.340	-1.221	-.315	.001

CI = confidence interval; SE = standard error; FTE = full-time equivalent; HPPD = hours per patient day.

Stepwise: $R^2 = .795$; adjusted $R^2 = .790$; standard error of estimate = 1.319; SS = 2,106.196; $p < .001$, $N = 254$.

control may also contribute to a lack of appreciation among medical students for the importance of interdisciplinary collaboration (Ung et al., 2016). In 2015 a German pharmaceutical company brought together pain specialists from Europe and the United States to form a Pain Advisory Board to advance the management of acute pain (Meissner et al., 2015). The Pain Advisory Board issued key priorities to improve pain management including better education and training for the multidisciplinary team and the inclusion of an acute pain service consisting of a pain nurse, pain specialist, and clinical psychologist in every hospital (Meissner et al., 2015). In other reports from two academic health centers, a best practice that improved trauma patients' experience of pain control was the inclusion of the pain relief service in the orientation of new residents and implementation of a transdisciplinary team approach emphasizing mutual learning, training, and education (Gordon et al., 2014; Martin et al., 2012). The findings in our study confirm the need for further medical education on pain management and clinical experiences that reinforce the value of interdisciplinary collaboration.

Patients' self-reports of not being helped soon enough and poor nurse-patient communication underscore the importance of timely attention to reports of pain. Possible explanations for poor nurse-patient communication may be inadequate nurse staffing and the need for additional education on pain assessment and management. In either case, both become organizational issues that hospital administrators will need to address through improved nurse staffing as well as education and training on patient-centered communication. As noted earlier, nurses' daily rounding has been reported to improve communication, patient safety, staff responsiveness, and pain control (Daniels, 2016). Multimodal collaborative group meetings that foster communication about pain control plans with patients and families significantly improve patients' self-reports of pain management (Martin et al., 2012). Our findings are consistent with previous research highlighting the importance of adequate numbers of nursing staff, especially pain resource nurses, to provide expert consultation (Williams et al., 2012).

Limitations

The three states chosen for this study, California, Massachusetts, and New York, may not be representative of all hospitals in the Pacific, Northeast, or Mid-Atlantic regions. Although three covariates were entered into the model to account for the intensity of care, the data analyzed in this study did not account for comorbid medical diagnoses, psychiatric

conditions, or socioeconomic factors that may also influence patients' satisfaction with pain management. HCAHPS is case mix adjusted; however, scores are not adjusted for type of specialty care or diagnosis, which have been found to be significantly associated with HCAHPS score (Thiels et al., 2016). Participation in HCAHPS is voluntary, and response bias may influence patients' perception of pain control. Observed differences in HCAHPS scores have been found to be sensitive to response rates (Siddiqui, Wu, Kurbanova, & Qayyum, 2014). Survey response rates for HCAHPS from 2011 to 2012 were 33% in Massachusetts and 30% in California and New York (HCAHPS, 2013c).

Implications for Nursing Practice and Research

Findings from this study support nurses as key contributors to patient satisfaction with pain control, a measure correlated with a positive impact on HCAHPS overall hospital satisfaction scores. The findings in this study also highlight the need for adequate numbers of nursing staff to achieve optimal patient satisfaction with pain management. Further research is needed to determine what factors contribute to better pain management and how residents/interns, nurses, and hospitalists can best work together to improve patients' satisfaction with pain control. Research priorities should center on potentially modifiable factors, such as hospital-specific policies and procedures, structure of the staff orientation, increased nurse staffing, and opportunities for interdisciplinary communication around pain management.

Interdisciplinary education aimed at improving patient assessment, provider-patient communication, and alternative pain control interventions are essential steps toward achieving improved patient satisfaction with pain control. There is a need for creative educational approaches that build cohesive pain management teams. Some nursing education programs have successfully used e-learning strategies to enhance knowledge of pain management (Keefe & Wharrad, 2012). Hospitals could adopt computer-based learning, but required pain management training modules completed in isolation could fail to achieve the desired outcome. A better approach would be through group simulation exercises. A team-based learning simulation exercise, ideally in multiple sessions, could be a powerful way for nurses, residents, physicians, and other members of the health care team to develop and share creative strategies for pain management and build collaborative relationships.

Patients in pain also want their health care providers to reduce suffering by introducing nonpharmacologic approaches and demonstrating more empathy and understanding (Pathmawathi et al., 2015). Meeting

this challenge requires guidance, education, time, and commitment—and may be easier to achieve when clinicians are full-time professionals, such as nurses, who are better positioned to provide continuity of care.

CONCLUSIONS

This study sought to explore how hospital characteristics, staffing, and nursing care factors in California, Massachusetts, and New York hospitals were associated with patient satisfaction with pain control in the Hospital Consumer Assessment of Health Care Providers Systems (HCAHPS) survey. Our findings indicate that patients who are more satisfied with pain management report higher satisfaction with nurse

responsiveness to care, nurse communication, and medication education. Higher numbers of nursing staff and hospitalists as well as nonprofit hospitals were associated with higher satisfaction with pain control, whereas teaching hospitals and a higher number of residents and interns were associated with poor pain control.

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