


Which Hospitals Promote a Sleep-Friendly Patient Experience?

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Abstract

The Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey measures patient perceptions of hospital experience to determine the annual Center for Medicare and Medicaid Services (CMS) reimbursement. This study focuses on the “Quiet at Night” variable and identifies institutions with the highest scores to determine characteristics that facilitate patient sleep. The key findings were as follows:

1. CMS Top Rated Hospitals have a mean score of 5 on the “Quiet at Night” variable.
2. US News Honor Roll Hospitals have a mean score of 2.67, with a statistically significant difference of $P < .001$ between the groups.
3. The key characteristics of the CMS Hospitals are that they are predominantly privately owned, specialized, surgical facilities with few total hospital beds.

Knowing that HCAHPS scores directly impact and reflect patient experience, the objective of this study was to better understand the hospital practices that facilitate a high score on the “Quiet at Night” question to empower low scoring hospitals to improve their sleep practices at night and to score higher on the HCAHPS survey.

Keywords

the Center for Medicare and Medicaid (CMS) comparative analysis, Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey, “Quiet at Night” metrics, patient sleep

Introduction

In an effort to promote greater transparency in healthcare and to improve the quality of care delivered to patients, the Center for Medicare and Medicaid Services (CMS) disseminates a quality-assessment survey to all hospital patients (1). The survey, Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS), aims to measure patient perceptions of hospital experience to produce comparable data for consumer and hospital utilization. Subject matter ranges from questions about hospital comfort, provider respect, and pain management to assess the universal care received by patients in hospital settings and ascertain a larger care domain score (2,3). The survey results are publicly available and are directly linked to both the hospital reputation and hospital reimbursement, such that if a hospital scores poorly on a single metric it can negatively impact the value-based incentive payments they receive through the Patient Protection and Affordable Care Act (2-4). One of the questions on the HCAHPS survey is a patient-assessed

measurement of the nighttime environment and whether it is conducive to sleep as depicted by the “Quiet at Night” variable (3).

Though the “Quiet at Night” metric is only a single measure of hospital care, it is an important one as it addresses both hospital culture and acknowledges the importance of sleep as a healing tool for patients. Sleep is well-documented to benefit health outcomes by decreasing recovery time and medical complications and a lack of it is correlated with

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both increased morbidity and mortality (5). However, most hospital settings are often subject to constant commotion and frequent disruptions that prevent patients from receiving adequate sleep and thus interfere with patient experience (5-7). Thus far no studies have analyzed the CMS data to qualify the types of hospitals that score well on this question. Given the financial implications of the HCAHPS survey and the positive benefit that sleep has on patient health and healing, this is a highly pertinent question to address. The objective of this study was to analyze the CMS data to better understand the demographics of hospitals that score well on the "Quiet at Night" question and compare them to the scores of the US News World Report (USNWR) honor roll hospitals to identify improvable and sleep-friendly measures that can be used by institutions nationally.

Methods

The HCAHPS dataset contains 4 variables for measuring "Quiet at Night." Patients are asked to rate the hospital using discrete descriptors ("Always" Quiet at Night, "Usually" Quiet at Night, "Sometimes" Quiet at Night or "Never" Quiet at Night) which are then assigned numeric values. CMS then applies necessary adjustments (patient mix, survey mode, etc) and translates these national survey results into (1) the Linear Mean Score (1-100), an annual 4 quarter average, and (2) the HCAHPS Star Rating (1-5) (1,8,9). The HCAHPS Star Rating is created using the Linear Mean Score and clustering algorithms to identify gaps in the data, thereby grouping the hospitals closest in quality together (8,9). A HCAHPS Star Rating of 5 indicates that a hospital is among the highest quality performers for the "Quiet at Night" metric and a HCAHPS Star Rating of 1 is assigned to the lowest performers. In an effort to identify and understand trends in this survey, this study conducts a secondary analysis on the HCAHPS dataset from 2019, which incorporates information from 4722 hospitals (8,9). Given that this research analyzed pre-existing online datasets, an ethics review board was not consulted for this study.

The CMS database, available publicly, was downloaded and imported into RStudioTM, a statistical programming software. Additional software packages allowed for the original dataset to be filtered down to data only related to the "Quiet at Night" question. The hospitals were then further isolated based on their Star Ratings for this metric and then ranked based on their Linear Scores. Using the Linear Mean Scores and the HCAHPS Star Ratings' inherent clustering algorithm, the top scorers among the 5 Star Rated hospitals were isolated. These facilities were grouped together as CMS Top Rated "Quiet at Night" Hospitals. The underlying notion being that the Theory of Positive Deviance would shed light on practices that would improve this metric for all hospitals. This theory is predicated on the idea that different hospitals, in this case, have uncommon practices that enable them to find better solutions to universal challenges (10). Thus, the key characteristics of these institutions were

then assessed using the American Hospital Database (AHD), an independent organization that provides and publicly reports national hospital data and statistics (11). To ascertain trends in these facilities and determine their predictive value, the US News Honor Roll Hospitals (2019-2020) were used as a comparison group (11,12). A significance threshold of $P < .05$ was established when comparing the 2 cohorts. For these groups, the Linear Mean Scores and the HCAHPS Star Ratings were isolated from the CMS data and the same key characteristics were assessed utilizing AHD.

Results

The mean HCAHPS Star Rating for CMS Top Rated "Quiet at Night" Hospitals ($n = 22$, 0.46% of institutions nationally) was 5.00 (out of 5.00), with a standard deviation of 0.00 (Figure 1). These values can be explained by the selection criteria used to isolate these hospitals. The mean HCAHPS Star Rating for US News Honor Roll Hospitals ($n = 21$, 0.44% of institutions nationally) was 2.67 (out of 5.00), with a standard deviation of 1.24 (Figure 1). Though there was no overlap between these 2 groups, 2 US News Honor Roll Hospitals, Johns Hopkins Hospital and the Mayo Clinic, received a HCAHPS Star Rating of 5. However, these hospitals' HCAHPS Star Ratings did not place them in the Top Rated "Quiet at Night" Hospitals as that list compounded both HCAHPS Star Ratings and Linear Mean Scores. An unpaired *t*-test of this data found a 2-tailed *P*-value of less than .0001, which is considered statistically significant under all conventional significance levels.

The key, overarching characteristics of the CMS Top Rated "Quiet at Night" Hospitals were that these facilities are predominantly privately owned (77%), non-trauma-designated (100%), short-term acute care facilities, and are often specialized, surgical facilities (77%) with a mean of 31.73 beds staffed (Figure 2). Of note, these hospitals also appear to be located predominantly in cities throughout the South (Figure 2). In looking at these same characteristics for the US News Honor Roll Hospitals, these facilities are largely composed of voluntary non-profit controlled (76%), trauma-designated (100%), short-term care facilities containing various specialties (100%) with a mean of 1028.43 beds staffed (Figure 3).

Limitations

The results from this study provide a secondary analysis of the CMS data of institutions nationally and identify potential characteristics that may contribute to having success on the "Quiet at Night" measure. This study focused on one variable and found that smaller, surgical hospitals had greater success in comparison to large academic centers. A potential shortcoming of this observation is that the practices that allow these smaller centers to be successful may not be feasible in larger hospitals. Moreover, as with any secondary analysis, this study relies on the primary data and patient perceptions

CMS Top "Quiet at Night" Hospitals (n=22)	CMS Star Ratings (1-5)	US News Star Ratings (1-5)	US News Best Hospitals Honor Roll (n=21)
Fayette Medical Center	5.00	5.00	Mayo Clinic
Iowa Specialty Hospital - Belmond	5.00	2.00	Cleveland Clinic
Kansas City Orthopedic Institute	5.00	5.00	Johns Hopkins Hospital
Physicians Medical Center	5.00	2.00	New York-Presbyterian Hospital-Columbia and Cornell
Surgical Specialty Center of Baton Rouge	5.00	3.00	UCLA Medical Center
Park Place Surgical Hospital	5.00	2.00	Massachusetts General Hospital
Lafayette Surgical Specialty Hospital	5.00	2.00	Cedars-Sinai Medical Center
Central Louisiana Surgical Hospital	5.00	3.00	UCSF Medical Center
Baptist Memorial Hospital Booneville	5.00	2.00	NYU Langone Hospitals
Midwest Surgical Hospital LLC	5.00	4.00	Northwestern Memorial Hospital
Davie Medical Center	5.00	2.00	University of Michigan Hospitals-Michigan Medicine
TriHealth Evendale Hospital	5.00	2.00	Brigham and Women's Hospital
Surgical Hospital of Oklahoma	5.00	1.00	Stanford Health Care-Stanford Hospital
Tulsa Spine & Specialty Hospital	5.00	1.00	Mount Sinai Hospital
Summit Medical Center	5.00	1.00	Hospitals of the University of Pennsylvania-Penn Presbyterian
James E. Van Zandt VA Medical Center	5.00	4.00	Mayo Clinic - Phoenix
Black Hills Surgical Hospital LLP	5.00	2.00	UPMC Presbyterian Shadyside
The Physicians Centre	5.00	4.00	University of Wisconsin Hospitals - Madison
Texas Health Harris Methodist Hospital Southlake	5.00	3.00	Keck Hospital of USC
Oakleaf Surgical Hospital	5.00	4.00	Houston Methodist Hospital
Foundation Surgical Hospital of San Antonio	5.00	2.00	Yale New Haven Hospital
Methodist Hospital for Surgery	5.00		
Averages	5.00	2.67	

Figure 1. Comparison of HCAHPS Star Ratings between CMS top rated "Quiet at Night" hospitals and the US News honor roll hospitals derived from the CMS national database.

There was a significant difference between the 2 groups for HCAHPS Star Ratings ($P < .0001$).

CMS Top "Quiet at Night" Hospitals	Location (City, State)	Type of Control	Inpatient Specialties	Total Beds Staffed
Baptist Memorial Hospital Booneville	Booneville, Mississippi	Voluntary Nonprofit, Church	Various Specialties	54
Black Hills Surgical Hospital LLP	Rapid City, South Dakota	Proprietary, Partnership	Surgical	26
Central Louisiana Surgical Hospital	Alexandria, Louisiana	Proprietary, Corporation	Surgical	24
Davie Medical Center	Bermuda Run, North Carolina	Voluntary Nonprofit, Other	Various Specialties	50
Fayette Medical Center	Fayette, Alabama	Governmental, Other	Surgical	167
Foundation Surgical Hospital of San Antonio	San Antonio, Texas	Proprietary, Corporation	Surgical	20
Iowa Specialty Hospital - Belmond	Belmond, Iowa	Governmental, County	Various Specialties	22
James E. Van Zandt VA Medical Center	Altoona, Pennsylvania	Governmental, Federal	Various Specialties	57
Kansas City Orthopedic Institute	Leawood, Kansas	Proprietary, Corporation	Orthopedic Surgery	17
Lafayette Surgical Specialty Hospital	Lafayette, Louisiana	Proprietary, Partnership	Surgical	20
Methodist Hospital for Surgery	Addison, Texas	Proprietary, Corporation	Surgical	32
Midwest Surgical Hospital LLC	Omaha, Nebraska	Proprietary, Partnership	Surgical	19
Oakleaf Surgical Hospital	Altoona, Wisconsin	Proprietary, Corporation	Surgical	13
Park Place Surgical Hospital	Lafayette, Louisiana	Proprietary, Partnership	Surgical	10
Physicians Medical Center	Houma, Louisiana	Proprietary, Corporation	Various Specialties	30
Summit Medical Center	Edmond, Oklahoma	Proprietary, Corporation	Surgical	9
Surgical Hospital of Oklahoma	Oklahoma City, Oklahoma	Proprietary, Corporation	Surgical	12
Surgical Specialty Center of Baton Rouge	Baton Rouge, Louisiana	Proprietary, Partnership	Surgical	16
Texas Health Harris Methodist Hospital Southlake	Southlake, Texas	Proprietary, Corporation	Surgical	17
The Physicians Centre	Bryan, Texas	Proprietary, Other	Surgical	16
TriHealth Evendale Hospital	Evendale, Ohio	Proprietary, Corporation	Surgical	29
Tulsa Spine & Specialty Hospital	Tulsa, Oklahoma	Proprietary, Partnership	Surgical	38
			Average =	31.7

Figure 2. Descriptive characteristics of the CMS top "Quiet at Night" Hospitals.

CMS Top "Quiet at Night" Hospitals determined from the HCAHPS data and the hospital characteristics obtained from the American Hospital Directory.

captured by the CMS methodology. Therefore, it should be noted that the overarching themes discussed in this study may be more correlatory than causatory. This data does not capture all factors that influence a hospital's environment, and it is worth acknowledging that while many of the potential solutions (ie, room occupancy, hospital visitation policies, light and noise restrictions, etc) are modifiable, others (ie, size, ownership, services offered) are not. For the modifiable factors, further studies would need to isolate these themes and determine their causatory effects based on the Bradford Hill Criteria (13).

Discussion

This study critically analyzes hospitals that score well on the CMS "Quiet at Night" metric and compares their CMS ratings and demographic information to the US News Honor Roll Best Hospitals, a list of the best hospitals as demonstrated by national rankings. In comparing the ratings for these 2 lists, a stark disparity emerged in the average HCAHPS Star Rating score, the type of hospital, the patient populations targeted (ie, by specialty), and the number of beds staffed for the 2 groups. Most notably,

US News Best Hospitals Honor Roll	Location (City, State)	Type of Control	Inpatient Specialties	Total Beds Staffed
Brigham and Women's Hospital	Boston, Massachusetts	Voluntary Nonprofit, Other	Various Specialties	804
Cedars-Sinai Medical Center	Los Angeles, California	Voluntary Nonprofit, Other	Various Specialties	883
Cleveland Clinic	Cleveland, Ohio	Voluntary Nonprofit, Other	Various Specialties	1310
Hospitals of the University of Pennsylvania-Penn Presbyterian	Philadelphia, Pennsylvania	Voluntary Nonprofit, Other	Various Specialties	807
Houston Methodist Hospital	Houston, Texas	Voluntary Nonprofit, Other	Various Specialties	1163
Johns Hopkins Hospital	Baltimore, Maryland	Voluntary Nonprofit, Other	Various Specialties	952
Keck Hospital of USC	Los Angeles, California	Voluntary Nonprofit, Other	Various Specialties	331
Massachusetts General Hospital	Boston, Massachusetts	Voluntary Nonprofit, Other	Various Specialties	1019
Mayo Clinic	Rochester, Minnesota	Governmental, City	Various Specialties	1318
Mayo Clinic - Phoenix	Phoenix, Arizona	Voluntary Nonprofit, Other	Various Specialties	271
Mount Sinai Hospital	New York City, New York	Voluntary Nonprofit, Other	Various Specialties	1133
New York-Presbyterian Hospital-Columbia and Cornell	New York City, New York	Voluntary Nonprofit, Other	Various Specialties	2670
Northwestern Memorial Hospital	Chicago, Illinois	Voluntary Nonprofit, Other	Various Specialties	908
NYU Langone Hospitals	New York City, New York	Voluntary Nonprofit, Other	Various Specialties	1629
Stanford Health Care-Stanford Hospital	Stanford, California	Voluntary Nonprofit, Other	Various Specialties	553
UCLA Medical Center	Los Angeles, California	Governmental, State	Various Specialties	445
UCSF Medical Center	San Francisco, California	Governmental, State	Various Specialties	785
University of Michigan Hospitals-Michigan Medicine	Ann Arbor, Michigan	Governmental, Other	Various Specialties	1007
University of Wisconsin Hospitals - Madison	Madison, Wisconsin	Governmental, State	Various Specialties	604
UPMC Presbyterian Shadyside	Pittsburg, Pennsylvania	Voluntary Nonprofit, Other	Various Specialties	1438
Yale New Haven Hospital	New Haven, Connecticut	Voluntary Nonprofit, Other	Various Specialties	1567
Average =				1028.428571

Figure 3. Descriptive characteristics of the US News Best Hospitals Honor Roll.

US News Best Hospitals Honor Roll pulled from US News data and the hospital characteristics obtained from the American Hospital Directory.

those who score well on the “Quiet at Night” question are predominantly privately controlled, specialized, surgical facilities with few total hospital beds staffed. Hospitals recognized by US News are predominantly non-profit controlled, widely specialized, short-term facilities with high patient capacity. Specifically, the patient capacity increases 32-fold between the 2 groups. As noise is a proxy for sleep disturbances within hospitals and sleep is vital for patient health, this observation alone could be detrimental to patient well-being and health outcomes. With the added burden that larger hospitals experience when caring for and managing trauma, these differences in characteristics between the cohorts are not immediately surprising. The “Quiet at Night” metric is only one means of measuring the success of a hospital center and oftentimes more complex patient cases (as seen with trauma) require a multispecialty approach to comprehensive care that smaller facilities are unable to provide. However, ideally the goal would be for these larger centers and their multidisciplinary care teams to also improve their sleep quality practices to aid their patients’ care from every direction. The US News Honor Roll Hospitals are considered outstanding across metrics allowing them to set the standard for quality care nationally. However, the large differences in characteristics observed above and difference in “Quiet at Night” rating highlights the fact that these institutions lack certain qualities that are correlated with an ability to score well on the “Quiet at Night” question and thus optimize patient sleep.

The difference in success may be attributed to sleep-friendly actions taken by top performing “Quiet at Night” Hospitals, such as more programs aimed at promoting sleep through quiet hours and nighttime light reduction, specialized hospital units allowing for more personalized patient care, a less vulnerable/sick patient population and/or overall

decreased activity throughout the night due to lower patient acuity and smaller hospital size. The common thread in the potential factors above is that there may be a hospital culture surrounding sleep that is more responsive and better equipped to facilitate patient sleep in the top performing “Quiet at Night” Hospitals compared to those on the US News Honor Roll Report list.

Conclusions

This study provides a comparison of hospitals that excel and fall behind in “Quiet at Night” metrics. Given the importance of sleep hygiene on improving patient health outcomes, sleep-friendly practices could potentially be implemented throughout hospitals nationally in a low-cost, low-tech manner. Moreover, the financial incentives tied to succeeding in this metric could benefit hospital systems and enable these extra funds to be allocated to other technologies and efforts to further improve patient health.

With the knowledge that “Quiet at Night” scores impact patient experience and CMS reimbursement, it is important to learn from those positive deviant hospitals to help the US News Hospitals improve on this metric. A greater understanding of how top CMS hospitals so efficiently provide care in a sleep-protective way may help inform larger institutions about Best Practices. Moving forward it is important to determine the cultural and organizational factors that enable hospitals to be top performers on the “Quiet at Night” metric, that is, through quantitative surveys and/or qualitative interviews of these hospitals. Ultimately, these next steps and further analysis needs to be done to determine how to meaningfully recreate and translate successful sleep programs to US News Honor Roll hospitals and all other hospitals nationally.

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