RESEARCH ARTICLE

Are Caregivers Who Respond to the Child HCAHPS Survey Reflective of All Hospitalized Pediatric Patients?

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ABSTRACT

OBJECTIVES: The Child Hospital Consumer Assessment of Healthcare Providers and Systems (C-HCAHPS) survey was developed to measure satisfaction levels of pediatric inpatients' caregivers. Studies in adults have revealed that certain demographic groups (people of color or who are multiracial and people with public insurance) respond to surveys at decreased rates, contributing to nonresponse bias. Our primary goal was to determine if results from the C-HCAHPS survey accurately reflect the intended population or reveal evidence of nonresponse bias. Our secondary goal was to examine whether demographic or clinical factors were associated with increased satisfaction levels.

METHODS: This was a retrospective cohort study of responses ($n = 421$) to the C-HCAHPS survey of patients admitted to a tertiary-care pediatric hospital between March 2016 and March 2017. Respondent demographic information was compared with that of all hospital admissions over the same time frame. Satisfaction was defined as "top-box" scores for questions on overall rating and willingness to recommend the hospital.

RESULTS: Caregivers returning surveys were more likely to be white, non-Hispanic, and privately insured ($P < .001$). Caregivers with the shortest emergency department wait times were more likely to assign top-box scores for global rating ($P = .025$). We found no differences in satisfaction between race and/or ethnicity, length of stay, insurance payer, or total cost.

CONCLUSIONS: Caregivers who identified with underrepresented minority groups and those without private insurance were less likely to return surveys. Among the surveys received, short emergency department wait time and older age were the only factors measured that were associated with higher satisfaction. Efforts to increase patient satisfaction on the basis of satisfaction scores may exacerbate existing disparities in health care.

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Patient satisfaction is considered a key indicator of quality of care in inpatient hospital medicine, and as such, measuring and improving patient satisfaction is seen as an important task.[1–4] Patient satisfaction scores, as determined in surveys conducted after hospitalization, are a key metric used to determine value-based purchasing and currently drive hospital and physician compensation.[5] To measure inpatient satisfaction in adults, those at the Centers for Medicare and Medicaid Services require the use of the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey, which is used to collect information from adult patients regarding hospital environment, nurse and physician communication, and pain management. The results of the survey in turn comprise a hospital's "Star Rating," a publicly reported designation intended to be an easily accessible and understandable evaluation of a hospital.[6]

Despite agreements on the importance of patient satisfaction, previous studies in which researchers investigated the accuracy and correlates of satisfaction have revealed mixed results. Nonresponse bias, which is defined as a systematic difference between responders and nonresponders,[7] is common in survey studies and has resulted in spurious conclusions.[8] In studies of the HCAHPS survey, researchers have found significantly different response rates based on multiple demographic factors, with the strongest predictors of nonresponse being race and/or ethnicity, a lack of private insurance, and age.[9–16] Among patients who respond to the surveys, age, English proficiency, higher socioeconomic status, private insurance status, and identifying as white are all correlated with higher satisfaction.[17–25] Increased satisfaction levels are correlated with greater rates of treatment adherence, reduced readmission rates, and reduced complications.[26–28] However, increased satisfaction has also been shown to be correlated with increased mortality rates, total hospital-level costs, and pain medication prescriptions.[29–31]

We sought to analyze responses to the pediatric version of the HCAHPS survey, the Child Hospital Consumer Assessment of Healthcare Providers and Systems (C-HCAHPS),[32] from caregivers of pediatric patients discharged from 1 institution. The C-HCAHPS is a widely used instrument that may become the standard tool for measuring pediatric inpatient satisfaction. Our primary goal was to determine if results from the C-HCAHPS survey accurately reflect the intended population or reveal evidence of nonresponse bias. Our secondary goal was to determine if factors that are unrelated to inpatient medical care were associated with higher levels of reported satisfaction.

METHODS

This was a retrospective study of all C-HCAHPS surveys returned over a 13-month period (March 2016 to March 2017) at an 87–bed, free–standing, tertiary-care children's hospital. C-HCAHPS surveys are sent by the survey vendor (Press Ganey Associates, South Bend, IN) to the primary addresses of caregivers of patients who are aged ≤18 years and classified as inpatients within 14 days of their discharge from the hospital. Surveys were not sent to patients whose admissions were classified as observations, who died during hospitalization, were labeled as restricted by their caregivers, or were admitted with a primary psychiatric diagnosis or to an inpatient psychiatry bed, which is standard practice and consistent with how the tool was validated.[32,33] Surveys were sent only in English. The C-HCAHPS is a 62-question, pediatric version of the HCAPHS, created in 2015 with 39 patient-experience questions, which includes 10 screening questions, 12 questions regarding demographics, and 1 open-ended question.[32]

Raw survey data were provided by the survey vendor (Press Ganey Associates, South Bend, IN) for all returned surveys. When multiple surveys were returned for the same patient, the survey that corresponded with the earliest hospital encounter was included. Similar to previous studies,[34] the primary outcome variables used to determine caregiver satisfaction levels were top-box scores on 2 independent questions regarding global satisfaction levels, specifically "Hospital Rating" and "Likelihood to Recommend" the hospital. Consistent with how researchers from the Centers for Medicare and Medicaid Services determine satisfaction levels, a top-box score is the highest possible rating for an individual question.[35] Additionally, in pediatric studies, responses to these global-assessment questions have been shown to be positively correlated with top-box responses for many of the other domains in the survey; this reveals that these 2 questions can be used as proxies for overall satisfaction levels.[32] Top-box scores for these questions correspond to scores of 9 or 10 out of 10 on global hospital rating and to a response of "definitely yes" on willingness to recommend the hospital.

During the same time frame (from March 2016 to March 2017), we obtained records from all patients discharged from our institution. Demographic, billing, and administrative data were used to compare the overall hospital patient population with survey respondents as well as identify significant predictors of high levels of caregiver-reported satisfaction.

For our primary outcome, predictors included sex, race, ethnicity (Hispanic), total hospital charges, and payer type. Age at admission and length of stay were calculated. Total charges were calculated by combining provider and hospital charges. Payer type (public, private, or self-pay) was categorized by examining the primary insurance billed, if any. We hypothesized that we would find significant demographic differences between C-HCAHPS respondents and nonrespondents, which could reveal evidence of nonresponse bias.

For our secondary outcome, we included the same predictor variables but also compared ICU admissions and primary discharge diagnoses, and we calculated emergency department (ED) wait times. ICU admissions were determined by using notes written by members of the pediatric critical care faculty. Discharge diagnoses were categorized by using *International Classification of Diseases, Ninth Revision* and *International Classification of Diseases, Tenth Revision* codes. ED wait times were calculated by using triage times and times

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of admission orders. Patients were grouped by service type (medical versus surgical) on the basis of the attending physicians. All analysis-predictor variables were categorical. Age and length of stay were converted to categorical variables on the basis of a priori cutoffs, which we experientially thought to correspond with similar populations. Total charges and ED wait time were converted to categorical variables (tertiles and quartiles, respectively) on the basis of their distributions. We hypothesized that we would have findings similar to those with adult data, namely that certain demographic factors and resource use would correlate with increased caregiver satisfaction levels. ED wait time was further stratified to compare the lowest wait times (quartile 1 and direct admissions) with the highest wait times (quartiles 2–4) because we hypothesized that the lowest wait times would correlate with increased caregiver satisfaction levels.

Reasons for exclusion are included in Fig 1. If a patient submitted multiple surveys, only the first survey was included in the analysis. Surveys without demographic information and those we were unable to match to a specific inpatient encounter were excluded from all analyses. Surveys that included basic demographic information but not information linking them to a specific encounter were excluded from analyses of top-box versus not–top-box analyses. In addition, patients admitted to a surgery service did not have accessible charges associated with their stays and were excluded from that specific analysis. Surveys that did not include responses for global hospital rating or willingness to recommend the hospital were also excluded from those respective analyses. Finally, because patients admitted to a surgery service did not have data detailing total charges or readmission, they were excluded from multivariate analyses.

To compare the population of patients who returned surveys with the overall hospital population, comparisons across levels of categorical variables were performed with χ^2 tests, with Fisher's exact tests being used for variables with any cells <5. To identify predictors of hospital satisfaction levels, univariate analyses with χ^2 tests were performed for all potential predictors. Bivariate associations are reported by using unadjusted odds ratios (ORs) with 95% confidence intervals (CIs). Multivariate analysis was performed by using logistic regression to identify any confounding that occurred between predictor variables. Any predictor variable with $P < .2$ was entered into the model. Stepwise selection with an entry and exit criterion of 0.1 was used to build a final model, with only predictors with a significance of 0.05 remaining in the final model. Adjusted ORs with 95% CIs are reported.

All statistical analyses were performed by using SAS version 9.4 (SAS Institute, Inc, Cary, NC). This study was approved by the institutional review board.

RESULTS

Between March 2016 and March 2017, 7287 patients were discharged at least once from our institution; 4482 of these patients were classified as inpatients (62%), and 75% were admitted to a medical service. During this time frame, the average length of stay was 2.5 days (SD 5.8 days). Four hundred and twenty-one C-HCHAPS surveys were completed and returned by eligible caregivers. Two hundred and ninety-six (70%) patients were admitted to a medical service. When querying Press Ganey, our hospital had a 15% response rate during this time frame compared with a national response rate to the C-HCHAPS survey of 11.1%. Excluding duplicate surveys (ie, a patient submits >1 surveys) and those returned without any identifying information, 371 surveys (88%) were included in the overall analysis (Fig 1).

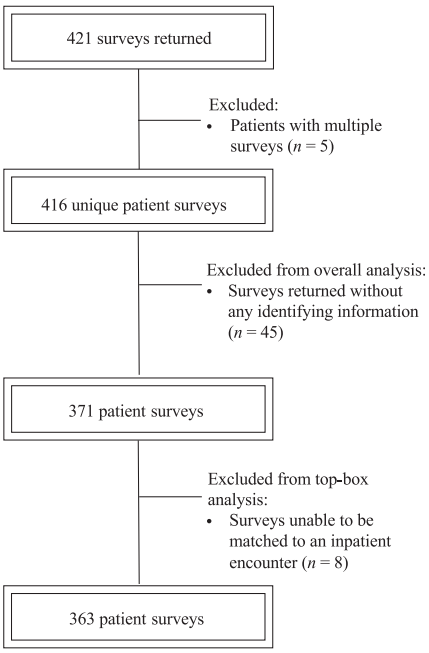

FIGURE 1 Returned surveys and reasons for exclusion.

In Table 1, we compare the demographics of C-HCAHPS respondents with both patients designated as inpatients and all patients discharged from the hospital, the latter category including patients who would be ineligible to receive a survey. In our cohort, 202 patients (54.6%) were boys. Their average age was 8.0 years (SD 6.4 years), and they had a mean hospital length of stay of 3.1 days (SD 4.8 days). Eighty-four children (30%) who were admitted to a medical service were admitted for respiratory diagnoses. The most common reason for admission was acute bronchiolitis. The most common surgery diagnosis was acute appendicitis (33%). Comparing respondents with patients classified as inpatients, we found that sex, length of stay, and total charges were similar. However, survey respondents were significantly more likely to be white, non-Hispanic, and privately insured ($P < .001$). These findings were unchanged even when we excluded patients who did not list English as their preferred language.

In Table 2, we list overall demographics and the relationship between levels of global satisfaction and willingness to recommend the hospital. Univariate analysis revealed that caregivers who waited the least amount of time in the ED were also more likely to assign top-box scores for global rating compared with caregivers who waited longer ($P = .025$). Top-box ratings also differed among the different age groups of children ($P = .036$), with

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TABLE 1 Demographic Characteristics of C-HCAHPS Respondents Compared With Nonrespondents

Characteristic	Classified as Inpatient			All Discharges	
	Survey Respondents, *n* of *N* (%)	Nonrespondents, *n* of *N* (%)	*P*	Nonrespondents, *n* of *N* (%)	*P*
Sex			.581		.795
Boys	202 of 370 (54.6)	2183 of 4111 (53.1)		3728 of 6916 (53.9)	
Girls	168 of 370 (45.4)	1928 of 4111 (46.9)		3188 of 6916 (46.1)	
Age, y			.008		.026
≤1	69 of 371 (18.6)	1077 of 4111 (26.2)		1649 of 6916 (23.8)	
>1 to ≤5	85 of 371 (22.9)	940 of 4111 (22.9)		1732 of 6916 (25.0)	
>5 to ≤10	67 of 371 (18.1)	684 of 4111 (16.6)		1187 of 6916 (17.2)	
>10	150 of 371 (40.4)	1410 of 4111 (34.3)		2348 of 6916 (34.0)	
Charges, $[a]			.413		<.001
<10 581	91 of 280 (32.5)	1117 of 3355 (33.3)		2064 of 4523 (45.6)	
10 581–16 028.11	87 of 280 (31.1)	922 of 3355 (27.5)		1091 of 4523 (24.1)	
>16 028.11	102 of 280 (36.4)	1316 of 3355 (39.2)		1368 of 4523 (30.2)	
Length of stay, d			.181		<.001
≤2	249 of 371 (67.1)	2564 of 4111 (62.4)		5334 of 6916 (77.1)	
3–5	79 of 371 (21.3)	1029 of 4111 (25.0)		1063 of 6916 (15.4)	
>5	43 of 371 (11.6)	518 of 4111 (12.6)		519 of 6916 (7.5)	
Payer			<.001		<.001
Public	148 of 371 (39.9)	2646 of 4082 (64.8)		4437 of 6873 (64.6)	
Private	220 of 371 (59.3)	1361 of 4082 (33.3)		2333 of 6873 (33.9)	
Self-pay	3 of 371 (0.8)	75 of 4082 (1.8)		103 of 6873 (1.5)	
Race			<.001		<.001
White	308 of 364 (84.6)	2480 of 4037 (61.4)		4102 of 6806 (60.3)	
Multiracial or person of color	56 of 364 (15.4)	1557 of 4037 (38.6)		2704 of 6806 (39.7)	
Hispanic			<.001		<.001
Yes	33 of 363 (9.1)	1052 of 4040 (26.0)		1877 of 6805 (27.6)	
No	330 of 363 (90.9)	2988 of 4040 (74.0)		4928 of 6805 (72.4)	

[a] Total charges were available only for patients admitted to nonsurgical services. C-HCAHPS was only sent to patients classified as inpatients.

caregivers of children aged >10 years having >2 times the odds of indicating a top-box rating compared with caregivers of children <1 year of age (OR: 2.49; 95% CI 1.28–4.83). No characteristics were associated with top-box scores for recommendation of the hospital. Specifically, race, length of stay, ICU admission status, and admission diagnosis were not associated with reported top-box scores.

In multivariate analysis of caregiver-reported top-box satisfaction of patients admitted to a medical service (Fig 2), ED wait time, and age of child all remained significant. In this model, sex also became significant. Caregivers who waited the least in the ED (OR: 2.4; 95% CI 1.3–4.4), caregivers of boys (OR: 2.2; 95% CI 1.2–3.7), and caregivers of children >10 years of age compared with those of children <1 year of age (OR: 3.7; 95% CI 1.7–7.9) were significantly more likely to assign top-box scores for global satisfaction. When looking at levels of willingness to recommend the hospital, none of the predictors were significant in multivariate models.

DISCUSSION

Our analysis of satisfaction levels of caregivers of children admitted to a tertiary-care center reveals that caregivers who participate in patient satisfaction surveys constitute a significantly different demographic compared with the overall population of patients and caregivers. We found no differences related to sex, length of stay, or hospital charges when comparing respondents with nonrespondents classified as inpatients. Our secondary analysis reveals that among caregivers who completed the survey, those who experienced shorter wait times in the ED as well as those caring for older children were more satisfied with their children's care.

We identified demographic differences between respondents and nonrespondents, which is consistent with the results in previous literature of adult studies; but to our knowledge, this is the first time these results have been demonstrated in pediatric C-HCAHPS studies. In an era in which administrators in health care systems are pressured to increase their satisfaction scores, the absence of representative surveys is particularly troublesome. Racial

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TABLE 2 Patient Demographics and Overall Satisfaction Levels

Characteristic	Global Rating			Recommendation of Hospital		
	Top-Box, *n* of *N* (%)	Not Top-Box, *n* of *N* (%)	*P*	Top-Box, *n* of *N* (%)	Not Top-Box, *n* of *N* (%)	*P*
Sex			.146			.595
Boys	146 of 193 (76)	47 of 193 (24)		165 of 196 (84)	31 of 196 (16)	
Girls	105 of 153 (69)	48 of 153 (31)		128 of 156 (82)	28 of 156 (18)	
Age, y			.036			.113
≤1	36 of 59 (61)	23 of 59 (39)		45 of 60 (75)	15 of 60 (25)	
>1 to ≤5	54 of 80 (68)	26 of 80 (33)		66 of 83 (80)	17 of 83 (20)	
>5 to ≤10	48 of 65 (74)	17 of 65 (26)		57 of 65 (88)	8 of 65 (12)	
>10	113 of 142 (80)	29 of 142 (20)		25 of 144 (87)	19 of 144 (13)	
Total charges, $[a]			.09			.08
<10 581	58 of 88 (66)	30 of 88 (34)		75 of 89 (84)	14 of 89 (16)	
10 581–16 028.11	62 of 88 (70)	26 of 88 (30)		69 of 89 (78)	20 of 89 (22)	
>16 028.11	70 of 87 (80)	17 of 87 (20)		80 of 89 (90)	9 of 89 (10)	
Length of stay, d			.100			.214
≤2	134 of 197 (68)	63 of 197 (32)		160 of 199 (80)	39 of 199 (20)	
3–5	84 of 107 (79)	23 of 107 (21)		94 of 110 (85)	16 of 110 (15)	
>5	33 of 42 (79)	9 of 42 (21)		39 of 43 (91)	4 of 43 (9)	
Payer			.319			.459
Public	92 of 133 (69)	41 of 133 (31)		116 of 136 (85)	20 of 136 (15)	
Private	155 of 209 (74)	54 of 209 (26)		174 of 212 (82)	38 of 212 (18)	
Self-pay	4 of 4 (100)	0 of 4 (0)		3 of 4 (75)	1 of 4 (25)	
Race			.595			.529
White	212 of 290 (73)	78 of 290 (27)		248 of 296 (84)	48 of 296 (16)	
Multiracial or person of color	39 of 56 (70)	17 of 56 (30)		45 of 56 (80)	11 of 56 (20)	
ICU admission			.234			.636
Yes	54 of 69 (78)	15 of 69 (22)		59 of 69 (86)	10 of 69 (14)	
No	197 of 277 (71)	80 of 277 (29)		232 of 279 (83)	47 of 279 (17)	
Wait time, h			.025			.057
≤1.75	129 of 165 (78)	36 of 165 (22)		149 of 171 (87)	22 of 171 (13)	
>1.75	122 of 181 (67)	59 of 181 (33)		144 of 181 (80)	37 of 181 (20)	

[a] Total charges were available only for patients admitted to nonsurgical services.

minorities, patients without insurance, and those of lower socioeconomic status generally rate their levels of satisfaction with care as lower than those who identify as non-Hispanic and white, and their exclusion would result in artificially high satisfaction scores.[25,36–39] Worse, neglecting these important viewpoints from patients and their caregivers, especially those from groups that are already underrepresented in medicine, may perpetuate or even exacerbate disparities in patient care. For example, if a lack of interpreter services is a dissatisfier for underrepresented responders, this would not be reflected in the satisfaction scores. Additionally, the lack of representation of such patients may contribute to nonresponse bias and negatively affect the generalizability of such surveys, and it may limit researchers' ability to compare hospitals that serve significantly different patient demographics.

Our results reveal that in using the C-HCAHPS, in which patients who are designated as being of observation status are systematically excluded, important demographic groups are overlooked and an important cohort of patients is ignored. Similar to our findings, results from previous studies have revealed that patients admitted under observation status constitute a significant percentage of admissions to pediatric hospitals.[40,41] In addition, these studies reveal that despite the differences in classification, the clinical care delivered is likely similar. As such, surveys that include all discharges may be needed to better elicit patient and caregiver satisfaction levels.

For caregivers returning surveys, our results reveal that their surveys might be influenced by availability and/or search-satisfying bias. Availability bias occurs when individuals judge something to be more likely the more easily that it comes to mind, whereas search-satisfying bias occurs when individuals call off a search when an answer is found.[42] This is most evident in

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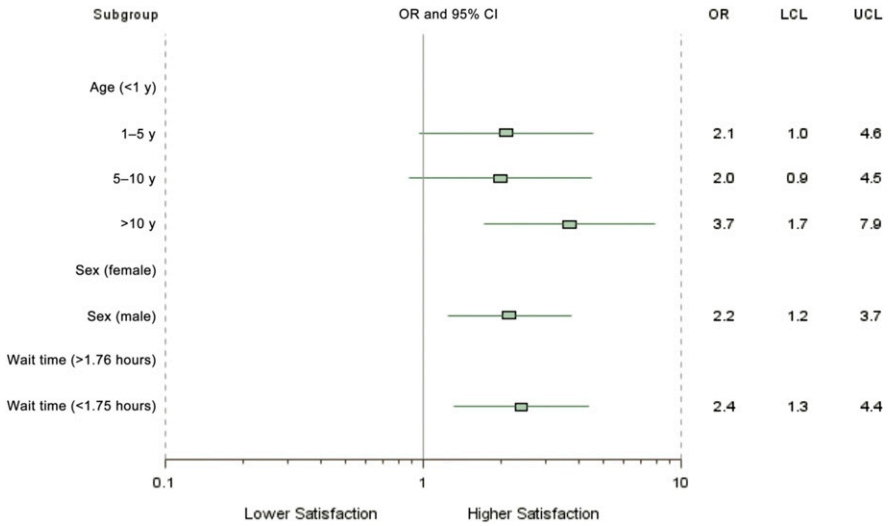

FIGURE 2 Multivariate ORs of top-box scores for reported global satisfaction. CL, confidence limit; LCL, lower confidence limit; UCL, upper confidence limit.

our finding that ED wait times significantly correlate with inpatient satisfaction levels. Our analysis is consistent with the results in previous literature, in which researchers report that shorter wait times are associated with improved ED patient satisfaction levels.[43–45] However, this finding questions the current practice of assigning an attending physician at the time of discharge for the bulk of the satisfaction score. In previous studies of adult patients, researchers have advocated for the use of a weighting system to ensure that all providers who care for a patient are given proportional credit for the ultimate score,[46] which may be a more equitable mechanism for assigning satisfaction.

Finally, our finding that caregivers of boys and older children rate services higher is of unclear significance. At face value, our results could reveal that providers may interact with children differently on the bases of age and sex. However, the statistical significance of these findings is small, and this may represent a type 1 error. These findings, although consistent with those of adult studies revealing that age and sex impact satisfaction levels, require further study before firm conclusions can be drawn.

Our study has several strengths. First, because they are from the only tertiary-care center in the state, our results are reflective of most (if not all) children who were hospitalized during this time frame and were therefore eligible for the C-HCAHPS survey. Our ability to collect and analyze nearly all completed responses in a single state increases the study's generalizability.

Our study also has several important limitations. First, our results are from a tertiary-care center and may not be generalizable to community settings. Conversely, compared with other, larger children's hospitals, our hospital is relatively small (<100 beds), and our overall length of stay is shorter than reported national averages from other children's hospitals (2.5 vs 4.03 days).[47] As such, our results may also not be generalizable to larger institutions and those with longer average lengths of stay. Finally, in our analysis of respondents versus nonrespondents, the group of patients who were discharged and had an inpatient status may include patients who were not eligible for the survey because we were not provided information related to whether they were discharged as deceased, if they were classified as restricted, or if they listed an address. However, we feel this is likely a small population and that it would not significantly change our results.

CONCLUSIONS

In a study of pediatric patients at a single institution, patients from underrepresented minority groups and those without private insurance were less likely to participate in mailed patient-satisfaction surveys. Additionally, when using surveys designed to capture only the satisfaction of patients designated as inpatients, a significant number of admissions is neglected. The lack of patient satisfaction data for these populations may skew results and contribute to nonresponse bias. Among the surveys received, short ED time and older age were the only factors measured that were associated with higher rating scores for inpatient care. Efforts to increase patient satisfaction on the basis of these data may exacerbate existing disparities in health care or be based on factors that cannot be influenced during hospitalization.

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