

Does Perception of Cleanliness Matter? A Correlational Study Exploring Patient Perception of Cleanliness and HAC Score Performance

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INTRODUCTION

At any given time, approximately 1 in 31 hospitalized patients has a healthcare associated infection.¹ There are multiple etiologies that contribute to the occurrence of HAIs, but one of the most common causes is due to environmental contamination of surfaces in patient care areas.² Environmental transmission has been linked to various HAIs including *Clostridioides difficile* (*C. difficile* or CDI) and Methicillin-Resistant *Staphylococcus aureus* (MRSA) infections.² Cleaning and disinfection of these surfaces has been shown to reduce the incidence of HAIs and contributes to the overall hospital cleanliness.

Currently, hospital cleanliness is publicly reported through the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey that is sent to all patients discharged from a healthcare facility. A hospital's performance on this survey is ranked and compared to other hospitals' performance, which along with their HAI scores, can negatively impact their financial reimbursement from Medicare.³ There is very limited research on if the perception of hospital cleanliness is related to the incidence of HAIs in a healthcare facility as defined by the facility's performance in the Healthcare Acquired Conditions (HAC) program. There were two questions this study aimed to address:

1. What is the relationship between *Clostridioides difficile* HAI standardized infection ratio and the patient perception of hospital cleanliness?
2. What is the relationship between Methicillin-Resistant *Staphylococcus aureus* HAI standardized infection ratio and the patient perception of hospital cleanliness?

METHODS

Design

A retrospective correlational study was performed to examine the relationship of patient perception of hospital cleanliness and the incidence of *Clostridioides difficile* (*C. difficile*) and Methicillin-Resistant *Staphylococcus aureus* (MRSA) HAIs defined by the facility's HAC score.

Participants

Participant hospitals were identified through a review of current CMS datasets that were publicly available. The sample population was selected from two datasets that consisted of all acute care hospitals that reported healthcare associated infection data and HCAHPS patient survey data in the United States for the time period October 1st, 2018 to September 30, 2019. The total sample consisted of 2246 participating hospitals. 1443 hospitals reported both a *C. difficile* standardized infection ratio (SIR) and data for question eight on the HCAHPS survey, "During this hospital stay, how often were your room and bathroom kept clean?"³ 803 hospitals reported both a MRSA SIR and data for the HCAHPS question stated previously.⁴

Measures

The first variable analyzed was the standardized infection ratio for *C. difficile*, which measured an individual hospital's performance against their expected performance.⁵ The second variable analyzed was the standardized infection ratio for MRSA, which again measured an individual hospital's performance against their expected performance. Both of these measures were calculated using the number of positive cultures reported by a hospital that are considered "incident" or "recurrent" cases. The third variable analyzed was the hospital's score on the HCAHPS patient survey for the question "During this hospital stay, how often were your room and bathroom kept clean?"³ Patient responses to that specific question were aggregated into three levels, "sometimes/never clean", "usually clean", and "always clean". These responses were reported in percentages for each level, if applicable.

Analyses

Basic descriptive statistics and Spearman's correlational analyses were performed to analyze the relationships between the HAI HAC scores and the HCAHPS answer description to measure the potential association.

FIGURES

Table 1. *C. difficile* SIR and HCAHPS Correlational Analysis

Response to HCAHPS Question 8: "During this hospital stay, how often were your room and bathroom kept clean?"	n	Mean	SD	Skewness statistic	Spearman Rho Correlation	p-value
Always	1445	73.38	7.16	-0.043	-0.228	0.00*
Usually	1445	18.26	4.09	-0.317	0.243	0.00*
Never	1444	8.35	3.993	0.783	0.180	0.00*

* $p < 0.05$

Table 2. MRSA SIR and HCAHPS Correlational Analysis

Response to HCAHPS Question 8: "During this hospital stay, how often were your room and bathroom kept clean?"	n	Mean	SD	Skewness statistic	Spearman Rho Correlation	p-value
Always	804	71.01	5.401	-0.356	-0.130	0.00*
Usually	804	19.73	2.925	-0.004	0.078	0.027*
Never	803	9.27	3.227	1.036	0.140	0.00*

* $p < 0.05$

REFERENCES

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RESULTS

For *C. difficile*, a Spearman's Rho correlation was performed and revealed a statistically significant negative relationship between the percentage of patients who reported that their room was "always" clean and a hospital's CDI SIR score ($p = -0.228$, $p = 0.00$). For the group of patients that reported that their room was "usually" clean, the Spearman's Rho correlation revealed a statistically significant positive relationship ($p = 0.243$, $p = 0.00$). Finally, the group of patients that reported that their room was "never" clean, the Spearman's Rho correlation revealed a statistically significant weakly positive relationship ($p = 0.180$, $p = 0.00$).

For MRSA, a Spearman's Rho correlation revealed a statistically significant weakly negative relationship between the percentage of patients who reported that their room was "always" clean and a hospital's MRSA SIR score ($p = -0.130$, $p = 0.00$). For the group of patients that reported that their room was "usually" clean, the Spearman's Rho correlation revealed a statistically significant weakly positive relationship ($p = 0.078$, $p = 0.027$). Finally, the group of patients that reported that their room was "never" clean, the Spearman's Rho correlation revealed a statistically significant weakly positive relationship ($p = 0.140$, $p = 0.00$).

DISCUSSION

For *C. difficile*, the correlation analyses showed that the for all three levels of answers, there was a statistically significant correlation. The data showed that for the levels of patients that answered that their room was "usually" clean ($p = 0.243$, $p = 0.00$) or "never" clean ($p = 0.180$, $p = 0.00$), SIR scores increased as the percentage of respondents also increased. Additionally, the data revealed that as the percentage of patients who reported that their room was "always" clean increased, the hospital's CDI SIR score decreased ($p = -0.228$, $p = 0.00$). This supports the current understanding that poor hospital cleanliness can contribute to healthcare associated infections.

For MRSA, the correlation analyses also showed that the for all three levels of answers, there was a statistically significant correlation. The results found that for the levels of patients that answered that their room was "usually" clean ($p = 0.078$, $p = 0.027$) or "never" clean ($p = 0.140$, $p = 0.00$), MRSA SIR scores increased as the percentage of respondents also increased. This again contributes to the current evidence that shows poor hospital cleanliness can contribute to hospital onset bacteremias.⁶ Most interestingly, the data revealed that as the percentage of patients who reported that their room was "always" clean increased, the hospital's MRSA SIR score decreased ($p = -0.130$, $p = 0.00$). While this association is weaker than the CDI correlation, this may be due to an MRSA infection being more multifactorial, as infections can occur from skin contamination, lack of hand hygiene by the healthcare worker, and other potential factors.⁷

This study found that a hospital's HCAHPS performance on patient perception of cleanliness is related to their performance on certain HAIs as defined by performance on HAC scores. Further research is needed to determine if there are specific factors that influence patient perception of cleanliness and if healthcare facilities can use this metric as another proxy measure to measure performance on HAI prevention and patient safety.

