The Effect of Contact Precautions for MRSA on Patient Satisfaction Scores

Livorsi DJ[1], Kundu MG[2], Batteiger B[1], Kressel AB[1]

1. **Division of Infectious Diseases, Indiana University School of Medicine, Indianapolis, IN**
2. **Indiana University Fairbanks School of Public Health, Department of Biostatistics, Indianapolis, IN**

Running title: Contact precautions and patient satisfaction

Keywords: contact precautions, patient satisfaction, MRSA

Word count: 1661 (not including references)

Corresponding author:
Daniel Livorsi, MD, MSc
Assistant Professor, Division of Infectious Diseases
Indiana University School of Medicine
545 Barnhill Drive, EH 421
Indianapolis, IN 46202
Phone number: 317-274-2835
Fax number: 317-274-1587
E-mail: dlivorsi@iu.edu

Abstract

Contact precautions may adversely affect a patient's hospital experience and the delivery of care. In this case-control study, we compared patient satisfaction scores between 70 patients isolated for MRSA and 139 non-isolated patients. Based on an adjusted analysis, there was no difference in patient satisfaction between these 2 groups. The factors that did affect patient satisfaction were age and educational status.

Introduction

Contact precautions may prevent the spread of resistant organisms like methicillin-resistant *Staphylococcus aureus* (MRSA) [1], but their use may also have adverse consequences.[2][3] Few studies have evaluated how contact precautions affect patients' perceptions of care.[4-6]

Hospitals in the United States (US) are increasingly evaluated on patient satisfaction scores. One standardized tool for measuring patient satisfaction is the HCAHPS (Hospital Consumer Assessment of Healthcare Providers and Systems) survey. Hospitals participating in the Centers for Medical and Medicare (CMS) Inpatient Prospective Payment System must collect and submit HCAHPS data on discharged patients. These data help determine the rates at which CMS reimburses hospitals.

Using a case-control design, we evaluated whether the use of contact precautions for patients with a history of MRSA impacts HCAHPS scores.

Methods

Wishard-Eskenazi Hospital resides in Marion County, Indiana and serves as a safety-net facility, i.e. it accepts all patients regardless of their ability to pay. All hospitalized patients known to be infected or colonized with MRSA (MRSA-positive) are placed on contact precautions. Contact precautions involves 1) a private room, 2) dedicated care equipment, and 3) all providers and visitors donning gown and gloves prior to room entry.[7]

During this study, a list of MRSA-positive patients was maintained by the hospital's Bed Control Department based on daily input from the microbiology laboratory and electronic alerts from a regional MRSA database.[8] Per hospital protocol, MRSA-positive patients would remain in isolation until eradication of MRSA colonization was demonstrated. An infection preventionist made regular rounds to ensure patients on the MRSA isolation list were on contact precautions.

Cases in this study had to be on contact precautions for MRSA during their entire hospital stay. To exclude active MRSA infections, cases could not have a MRSA-positive clinical culture identified during or immediately prior to the hospitalization of interest. Patients were also excluded if they were placed in isolation for reasons other than MRSA. In addition, patients on the psychiatric, obstetrics, and burn units were excluded from this study. None of the involved units had an active MRSA surveillance, or screening, program in place.

Cases were identified in both a retrospective (1/1/2012-5/31/2012) and prospective manner (6/1/2012-3/31/2013). To identify cases retrospectively, a list of hospitalized MRSA-positive patients who meet inclusion criteria was cross-matched against a list of discharged patients who had undergone the HCAHPS survey. To identify cases prospectively, a list of study-eligible MRSA-positive patients was provided to an outside agency conducting the HCAHPS survey. These patients were contacted by telephone within 30 days after discharge and underwent the HCAHPS Survey questionnaire per routine protocol. To ensure an adequate availability of matching controls, no more than 15 cases were enrolled each month.

For each case, 2 controls were sought. Controls were selected retrospectively from a list of all HCAHPS survey participants. All controls met the following criteria: 1) discharged from the same hospital unit as the case within 2 weeks of the case's discharge date; 2) not on any form of isolation during their entire hospital stay; and 3) underwent the HCAHPS survey for the hospitalization of interest. When selecting controls, preference was given to patients discharged closest to the case's discharge date.

For all cases and controls, the following information was electronically extracted from the medical record: age; Charlson comorbidity index (calculated based on data from prior year) [9]; the number of intensive-care unit (ICU) days during the hospitalization of interest; the number of total hospital days within past 6 months, ICD-9 coding for depression, anxiety or delirium (290.11, 290.41, 780.09, 293.0x, 290.3x, 293.1x); and total length of hospital stay.

The primary outcome of interest was the overall HCAHPS hospital rating, or question 21 (version March 2011): *Using any number from 0 to 10, where 0 is the worse hospital possible and 10 is the best hospital possible, what number would you use to rate this hospital during your stay?* The proportion of patients with a rating of at least 9 out of 10 was calculated. Secondary outcomes included patient responses to HCAHP questions 1-20, 22. Categorical variables were compared using the χ^2 test or, if the sample size was small, the Fisher's exact test. Continuous variables were compared with the *t* test.

The primary outcome was analyzed using multivariate logistic regression models to examine the adjusted difference between case and control groups. In addition to age and gender, baseline variables differing significantly between case and control groups with p-value < 0.20 were included as covariates in both the multivariate regression models. Adjusted odds ratios (ORs) were reported with 95% confidence intervals from the multivariate logistic regression. Statistical analysis was conducted in R statistical software, version 2.15.1. All the tests were two-sided. We used p-values of less than 0.05 to represent statistically significant associations.

The conduct of this study was reviewed and approved by the Indiana University Institutional Review Board. There was a waiver of informed consent.

Results

Seventy of 622 (11.3%) eligible MRSA-positive patients were enrolled as cases between 1/1/2012 and 3/31/2013. Only 1 matching control could be found for one case. Therefore, there were 70 isolated patients (cases) and 139 non-isolated patients (controls).

There were no significant differences between isolated and non-isolated patients in terms of age, gender, race, educational level, primary language, mental health diagnoses, hospital unit of discharge, and length of stay. The median Charlson score was significantly higher in isolated than non-isolated patients (2 vs. 1, p < 0.01). A significantly larger proportion

of non-isolated patients had undergone a surgical procedure during their hospital stay (54.0% vs 22.9%; p <0.01). In addition, more isolated patients had been hospitalized for at least a day over the past 6 months (35.7% vs. 20.1%, p=0.01).

HCAHPS responses

Table I shows the unadjusted comparison of patients' responses to the HCHAPS survey. The two groups were comparable in terms of median overall hospital rating (p=0.88). There was no significant difference in how many isolated vs. non-isolated patients would recommend the hospital to their friends (64.2% vs 73.7%, p=0.19). The two groups were comparable in terms of patients' response to other HCAHPS questions.

Table II depicts results from a multivariate logistic regression for the overall hospital rating. The multivariate logistic regression included age, gender, Charlson score, history of surgery and number of previous hospital days as covariates in the model. The probability of scoring the hospital ≥ 9 out of 10 was significantly increased by 59% with every 10-year increase in age (p < 0.01). Further, the overall rating was significantly better among those who had no college education compared to those who had some college education (p = 0.04). In this adjusted analysis, we did not observe any significant difference between the isolated and non-isolated groups in terms of overall rating (p = 0.89).

Discussion:

Contact precautions are intended to control the spread of resistant organisms [10], but they may also have adverse consequences, including less contact with healthcare-workers, more service care errors, and altered perceptions of care.[2][3]

Some studies have used the HCAHPS survey to compare the hospital experience of isolated and non-isolated patients.[4-6]   In Gasink *et al*, the HCAHPS survey was administered to 43 isolated and 43 non-isolated patients. The survey was performed while the patients were still

in the hospital, which may have not adequately evaluated the entire hospital experience.[5] Although isolated patients were generally more dissatisfied with their care, the differences between isolated and non-isolated patients were not significant. Mehrotra *et al*. found that contact precautions were not associated with significant differences in HCAHPS scores in 88 patients.[6] In a large study from the Cleveland Clinic, isolated patients reported lower HCAHPS scores for physician communication and staff responsiveness, but the analysis did not adjust for potential confounding factors.[4]

In the current study, there were no significant differences in HCAHPS scores for isolated and non-isolated patients. In addition, after adjusting for potential determinants of patient satisfaction, there was no association between a low score for overall hospital rating and isolation status.   The factors that did affect patient satisfaction were age and educational status, which is consistent with prior reports.[11] [12]

The strengths of this study include its adjustment for potential confounders of the HCAHPS scores. Patients in contact isolation all had a history of MRSA, and all other forms of isolation were excluded from the study. Finally, to our knowledge, this is the largest study that has specifically evaluated the effect of MRSA contact precautions on HCAHPS scores.

This study has the following limitations. First, although our multivariable analysis did adjust for several factors predictive of patient satisfaction, we did not adjust for severity of illness. Second, the study was done at a safety-net hospital, which may not reflect the experience of other facilities. Third, a large number of eligible subjects were not included, and it is unclear how these non-responders differed from those who were enrolled. Finally, there were differences between isolated and non-isolated patients in terms of the Charlson comorbidity index, recent surgeries, and the number of hospital days within the past 6 months. The multivariable analysis did adjust for these differences, but the presence of these differences raises the possibility that even additional variability existed between the 2 groups.

In conclusion, patients on contact precautions for a history of MRSA were as satisfied with their hospital care as patients who were not in any form of isolation. Although there are reasons to use contact precautions judiciously, the need to improve patient satisfaction should not be justification for altering isolation policies.

References:

1. Calfee DP, Salgado CD, Classen D, Arias KM, Podgorny K, Anderson DJ, et al. Strategies to prevent transmission of methicillin-resistant Staphylococcus aureus in acute care hospitals. *Infection control and hospital epidemiology : the official journal of the Society of Hospital Epidemiologists of America* 2008;29 Suppl 1:S62-80.

2. Morgan DJ, Diekema DJ, Sepkowitz K, Perencevich EN. Adverse outcomes associated with Contact Precautions: a review of the literature. *Am J Infect Control* 2009;37(2):85-93.

3. Abad C, Fearday A, Safdar N. Adverse effects of isolation in hospitalised patients: a systematic review. *J Hosp Infect* 2010;76(2):97-102.

4. Vinski J, Bertin M, Sun Z, Gordon SM, Bokar D, Merlino J, et al. Impact of isolation on hospital consumer assessment of healthcare providers and systems scores: is isolation isolating? *Infection control and hospital epidemiology : the official journal of the Society of Hospital Epidemiologists of America* 2012;33(5):513-6.

5. Gasink LB, Singer K, Fishman NO, Holmes WC, Weiner MG, Bilker WB, et al. Contact isolation for infection control in hospitalized patients: is patient satisfaction affected? *Infect Control Hosp Epidemiol* 2008;29(3):275-8.

6. Mehrotra P, Croft L, Day HR, Perencevich EN, Pineles L, Harris AD, et al. Effects of contact precautions on patient perception of care and satisfaction: a prospective cohort study. *Infect Control Hosp Epidemiol* 2013;34(10):1087-93.

7. Siegel JD, Rhinehart E, Jackson M, Chiarello L. 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Health Care Settings. *Am J Infect Control* 2007;35(10 Suppl 2):S65-164.

8. Kho AN, Doebbeling BN, Cashy JP, Rosenman MB, Dexter PR, Shepherd DC, et al. A regional informatics platform for coordinated antibiotic-resistant infection tracking, alerting, and prevention. *Clinical infectious diseases : an official publication of the Infectious Diseases Society of America* 2013;57(2):254-62.

9. Charlson ME, Pompei P, Ales KL, MacKenzie CR. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. *J Chronic Dis* 1987;40(5):373-83.

10. Siegel JD RE, Jackson M, Chiarello L, and the Healthcare Infection Control Practices Advisory Committee. Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings., 2007.

11. Quintana JM, Gonzalez N, Bilbao A, Aizpuru F, Escobar A, Esteban C, et al. Predictors of patient satisfaction with hospital health care. *BMC Health Serv Res* 2006;6:102.

12. Mira JJ, Tomas O, Virtudes-Perez M, Nebot C, Rodriguez-Marin J. Predictors of patient satisfaction in surgery. *Surgery* 2009;145(5):536-41.

Table I. HCAHPS scores for 70 case patients and 139 matched-controls

HCAHPS question	Case[1] (n=70)	Control[1] (n=139)	p-value[2]
Overall rating of hospital ≥ 9 out of 10 (question 21)	44 (64.7%)	85 (63%)	0.88
Nurses treat you with courtesy and respect	51 (73.9%)	110 (79.7%)	0.38
Nurses listen carefully	47 (67.1%)	101 (73.7%)	0.33
Nurses explain things in an understandable way	47 (68.1%)	102 (75.6%)	0.32
Received help after pressing call button	28 (53.9%)	70 (61.4%)	0.40
Doctors treat you with courtesy and respect	53 (75.7%)	106 (77.4%)	0.86
Doctors listen carefully to you	48 (70.6%)	103 (75.7%)	0.50
Doctors explain things in an understandable way	50 (73.5%)	99 (72.3%)	0.99
Room and bathroom kept clean	42 (61.8%)	82 (64.6%)	0.76
Room quiet at night	51 (72.9%)	98 (71.5%)	0.87
Received help with bathroom/bedpan	19/30 (63.3%)	49/68 (72.0%)	0.48
Pain well controlled	34/62 (54.8%)	75/117 (64.1%)	0.26
Hospital staff help with pain	45/62 (72.6%)	96/115 (83.5%)	0.12
Hospital staff explain new medications	20/27 (76.9%)	47/59 (79.7%)	0.78
Hospital staff describe side effects of medications	13/25 (52.0%)	35/57 (61.4%)	0.47
Hospital staff discussed help after discharge	52/61 (85.3%)	108/124 (87.8%)	0.65
Written information on problems to look for after discharge	52/62 (83.9%)	106/120 (88.3%)	0.49
Recommend hospital to friends and family (definitely yes)	43 (64.2%)	98 (73.7%)	0.19

1. Percentages reflect responses of "always" or "yes" unless otherwise indicated.
2. p-values were obtained by either two-sample t tests or Fisher's exact test.

Table II. Predictors of HCAHPS overall hospital rating (9 or higher) based on logistic regression analysis

Predictors	OR (95% CI)	p-value
Isolated vs. non-isolated	1.05 (0.52, 2.15)	0.8869
Increase in age by 10 years	1.59 (1.21, 2.10)	0.0010
Gender (Male vs. Female)	0.64 (0.34, 1.23)	0.1791
Education (College vs. No college)	0.51 (0.26, 0.98)	0.0422
Increase in Charlson score by 1 unit	1.09 (0.92, 1.29)	0.3438
Surgery (Yes vs. No)	1.78 (0.85, 3.70)	0.1252
Increase in number of previous hospital days	0.79 (0.56, 1.12)	0.1911