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## Effects of Contact Precautions on Patient Perception of Care and Satisfaction: A Prospective Cohort Study

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### Abstract

**Objective**—Contact precautions decrease healthcare worker–patient contact and may impact patient satisfaction. To determine the association between contact precautions and patient satisfaction, we used a standardized interview for perceived issues with care.

**Design**—Prospective cohort study of inpatients, evaluated at admission and on hospital days 3, 7, and 14 (until discharged). At each point, patients underwent a standardized interview to identify perceived problems with care. After discharge, the standardized interview and Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey were administered by telephone. Responses were recorded, transcribed, and coded by 2 physician reviewers.

**Participants**—A total of 528 medical or surgical patients not admitted to the intensive care unit.

**Results**—A total of 528 patients were included in the primary analysis, of whom 104 (20%) perceived some issue with their care. On multivariable logistic regression, contact precautions were independently associated with a greater number of perceived concerns with care (odds ratio, 2.05 [95% confidence interval, 1.31–3.21];  $P < .01$ ), including poor coordination of care ( $P = .02$ ) and a lack of respect for patient needs and preferences ( $P = .001$ ). Eighty-eight patients were included in the secondary analysis of HCAHPS. Patients under contact precautions did not have different HCAHPS scores than those not under contact precautions (odds ratio, 1.79 [95% confidence interval, 0.64–5.00];  $P = .27$ ).

**Conclusions**—Patients under contact precautions were more likely to perceive problems with their care, especially poor coordination of care and a lack of respect for patient preferences.

Healthcare-associated infections (HAIs) are an important cause of patient morbidity and mortality.<sup>1</sup> Contact precautions have been used with increasing frequency for the prevention

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of HAIs.<sup>2</sup> Contact precautions are routinely used in the hospital to prevent the spread of multidrug-resistant organisms (MDROs), such as methicillin-resistant *Staphylococcus aureus* (MRSA).<sup>2</sup>

By creating a physical barrier, contact precautions may modify how healthcare workers interact with patients, thereby affecting patients' experience of care.<sup>3</sup> Use of contact precautions has been associated with decreased healthcare worker visits, increased adverse events, and depression among inpatients.<sup>3-7</sup>

The effect of contact precautions on patient satisfaction has been debated.<sup>5,8,9</sup> A large retrospective cohort study found that those patients under contact precautions were much more likely to have made a complaint while in the hospital.<sup>5</sup> A recent case-control study used the Hospital Consumer Assessment of Healthcare Professionals and Systems (HCAHPS) questionnaire to measure inpatient satisfaction.<sup>8</sup> Patient's overall evaluation of the hospitalization was not affected by contact precautions; however, some HCAHPS measures were lower in patients under contact precautions.<sup>8</sup> Yet another study of inpatients demonstrated an association between various forms of barrier precautions and lower HCAHPS scores for physician communication and staff responsiveness.<sup>9</sup> It is critical to understand how contact precautions affect patient satisfaction and perception of care. To further understand the effect of contact precautions on patient satisfaction and perception of care, we conducted a prospective cohort study of hospitalized patients under and not under contact precautions.

## Methods

### Study Sample

We conducted a prospective cohort study at the University of Maryland Medical Center (UMMC), a 662-bed tertiary care teaching hospital in Baltimore, Maryland. Patients were recruited in an attempt to enroll approximately equal numbers of patients under and not under contact precautions. This study was approved by the Institutional Review Board of the University of Maryland in Baltimore.

From January 11, 2010, to November 17, 2010, study personnel approached patients who were admitted to all general medical and surgical services over the previous 36 hours. Patients were enrolled after obtaining written informed consent.<sup>10</sup> At UMMC, patients are placed under contact precautions for the duration of their hospitalization in accordance with hospital infection control protocol. Contact precautions require the use of a disposable gown and gloves for all patient contact as well as segregation into a private or cohorted room. Upon enrollment, patients underwent a standardized validated interview with 3 open-ended questions to elicit their perceptions of hospitalization.<sup>11-13</sup> These questions were repeated on hospital days 3, 7, and 14 if the patient remained hospitalized.<sup>11-13</sup>

Using the telephone number provided at the time of hospital admission, study personnel made up to 3 attempts to reach patients by telephone 7-30 days after hospital discharge. After obtaining permission to record the conversation, patients were again asked the same 3 open-ended questions regarding their hospital stay and were also administered HCAHPS.

## Measurements and Outcomes

Baseline demographic data were obtained during the initial enrollment process. Other variables examined included education and history of depression, which were factors found to be associated with patient satisfaction in previous studies.<sup>14</sup> Length of stay, inpatient mortality, and Charlson comorbidity score were obtained from the hospital central data repository. The Charlson comorbidity score was calculated using administrative International Classification of Diseases, Ninth Revision, coding.<sup>15</sup>

Our primary outcome was any patient-reported perceived issues of care via standardized interview with a validated method on interview days 1, 3, 7, or 14 or after discharge.<sup>11–13</sup> Secondary outcomes included specific categorization of perceived patient concern as elicited during the standardized interview. Our additional secondary outcome includes individual items on the HCAHPS survey and, in particular, the global hospital rating.<sup>9,14</sup>

Patient perception of care was assessed by coded open-ended responses to standardized questions throughout hospitalization and after hospital discharge. Using a standardized interview, patients were asked the following questions: (1) Do you believe that there have been any problems with your care during this hospitalization? (2) Do you believe that you were hurt or stayed in the hospital longer than necessary because of problems with your care? (3) Do you believe that anyone made a mistake that affected your care during this hospitalization?<sup>11–13</sup> These questions were developed and validated in multiple earlier studies.<sup>11–13</sup> Four interviewers collected all data. Different interviewers may have interviewed the same patient on different days. Each patient response, regardless of the day it was reported, was then transcribed and categorized by 2 independent physician reviewers (P.M. and D.J.M.). Patient responses were categorized into the following 6 different types, as done previously: (1) waits and delays, (2) poor communication, (3) environmental issues, (4) poor coordination of care, (5) poor interpersonal skill and unprofessional care, and (6) lack of respect for patient needs and preferences, as described elsewhere.<sup>11</sup> Reviewers (P.M. and D.J.M) were blinded to patient contact precautions status while categorizing complaints and reached consensus on all complaints.

The HCAHPS survey is a standardized measure of patient satisfaction endorsed by the Centers for Medicaid and Medicare Services. HCAHPS includes 23 questions relating to patient perception of care received during a recent hospitalization. It is administered by mail or phone after hospital discharge by those interviewers who also did telephone interviews.<sup>14</sup> One item on HCAHPS relates to the global hospital impression and was our main secondary outcome. HCAHPS “top box” is the standard form for reporting results. Top box is the most positive response to HCAHPS survey questions. It is a response of “always” or “yes” or a score of 9 or 10 on a 10-point scale.<sup>14</sup> Composite HCAHPS scores are presented for each subgroup of questions (nurse communication, doctor communication, staff responsiveness, pain management, medication communication, and discharge information). Composite scores are generated by averaging together the proportions of top box response for each question within a domain.<sup>14</sup> For the purposes of completing statistical testing, we also report the percentage of patients reporting top box for all elements of a subgroup.

## Statistical Analysis

Factors that have been previously associated with contact precaution status were assessed using  $\chi^2$  tests.<sup>16</sup> These factors included education level, age, sex, race, comorbid diagnoses, Charlson comorbidity score, and length of stay. Significant factors were then considered for inclusion in a logistic regression model using the best subset model building approach in SAS, version 9.1 (SAS). This approach used significant factors from bivariate analysis to build all possible models containing a specified number of predictor variables, which were then ranked by global fit  $\chi^2$  score statistic. Factors considered were Charlson comorbidity score, length of stay, history of depression, education, home ownership, sex, and history of substance abuse. Best subset logistic regression models were identified for models containing 2–5 variables, including patient contact precaution status and potential confounding variables. The two best-fit models for each size model were then regressed and compared for model fit using the Akaike information criterion and c-statistic to identify the final regression model. Interaction terms were then introduced one at a time for each covariate combination and showed no significant interactions. Models were constructed for both top rating on global hospital scale and patient service quality error. We report adjusted odds ratios (ORs) and 95% confidence intervals (CIs) from the multivariable logistic regression model. All statistical tests were 2-sided; P less than .05 was considered statistically significant. All analyses were performed using SAS, version 9.1.

## Power Calculation

With an assumed rate of 10% of patients having each outcome (any type of negative perception or, secondarily, a non-top-box-level rating on HCAHPS) and , we had 80% power to detect an absolute change in the outcome of 9% (from 10% to 19%) if approximately 210 isolated and 210 nonisolated patients were enrolled. In a retrospective assessment of power, given the limited number of patients who completed HCAHPS and the actual data, sufficient power was available to detect a 30% absolute decrease in top box hospital rating (from 60% to 30%).

## Results

Between the months of January and November 2010, we approached 1,872 patients, and 528 patients (28%) agreed to participate and provided written informed consent. Characteristics of patients both under and not under contact precautions who were ultimately enrolled are outlined in Table 1. Reasons for patients not being enrolled in the study included that they were away from their rooms, preparing for hospital discharge, refused to participate, or were unable to complete the consent process. Those patients who were approached and those who were enrolled had similar characteristics, which argues against significant selection bias among those patients who agreed to participate (Table 1).

Of the 528 participants, 238 participants (45%) were under contact precautions at hospital admission. On hospital day 3, 298 participants (56%) remained in the hospital, including 149 (50%) under contact precautions. On hospital day 7, 55 subjects (10%) remained, of whom 28 (51%) were under contact precautions. We successfully contacted 88 patients

(17%) for postdischarge telephone interviews, including 37 (42%) who had been under contact precautions.

### Assessment of Patient Perception of Care

Study subjects reported a total of 135 perceived problems with care. After adjusting for confounding variables, contact precautions were associated with more frequent perceived problems with care overall (OR, 2.05 [95% CI, 1.31–3.21];  $P < .01$ ; Table 2). Patient reports of perceived care were sorted into predetermined domains on the basis of Weingart et al.<sup>11</sup> Patients under contact precautions generally perceived that their care suffered from poor coordination ( $P = .02$ ) and a lack of respect for patient needs and preferences ( $P = .001$ ; Table 3).

Examples of poor coordination of care in patients under contact precautions included the following: “The transplant team came by a little after 9 for discharge but nursing states that there are no discharge orders. So the nurse hung a bag that would take four hours to finish. Nothing is organized and I was so frustrated.” Another patient stated that “The doctor says one thing but the medication hasn’t been [ordered] yet so the nurse can’t give it to you or it hasn’t come up yet ... everyone needs to get together.” Patients under contact precautions also perceived a lack of respect for needs and preferences. Examples included the statement that “Nobody understood why I was so upset or anxious. I didn’t get the emotional support I needed and nobody cared that that is what I really wanted and maybe needed.” Still another patient remarked that “I am isolated here. When people put on the gowns, I feel dirty and alone... [They] even had to wear them when I was being wheeled around for tests.” A complete collection of direct patient reports of perceived issues with care is available from the authors upon request.

All 88 patients who agreed to the postdischarge telephone survey were administered the HCAHPS survey. There were no statistically significant differences between patients under contact precautions and those not under contact precautions in global hospital ratings or any of the 23 HCAHPS survey items (Table 4). After adjusting for potential confounders, there was no association between contact precautions and hospital top global rating (OR, 1.79 [95% CI, 0.65–5.00];  $P = .27$ ; Table 2).

### Discussion

In this prospective cohort of patients admitted to an acute care hospital, those under contact precautions reported perceived problems with care twice as frequently as those not under contact precautions. Patients under contact precautions perceived worse coordination of care and lack of respect for patient needs. In the subsample of patients reached for telephone follow-up, the global rating on the HCAHPS survey was lower for patients under contact precautions, but the difference was not statistically significant.

Past studies of patient satisfaction involving patients under contact precautions have found mixed results. A large chart review of unsolicited patient complaints found patients under contact precautions were much more likely to offer patient satisfaction complaints.<sup>5</sup> More recently, a study with 43 case patients and 43 control subjects that used HCAHPS in a

nontraditional manner (while patients were still hospitalized) found no difference in global hospital rating.<sup>8</sup> Using HCAHPS results collected clinically among patients with different reasons for contact precautions (but notably not contact precautions for MRSA), Vinski et al<sup>9</sup> found worse HCAHPS scores for those patients who were isolated, although these patients also had longer lengths of stay and possibly more comorbidities. These studies are difficult to reconcile, because patients under contact precautions had longer hospital stays than those not under contact precautions, which would presumably lead to more complaints<sup>5</sup> and worse patient satisfaction.<sup>8,9</sup> Using a qualitative approach, we found that patients under contact precautions were twice as likely to have perceived issues with poor coordination of care and lack of respect for patient needs and preferences. After correcting for length of stay, we still found that patients under contact precautions had worse perceptions of care.

On standardized HCAHPS testing of 88 patients, we found no difference in patient satisfaction scores. This secondary outcome had a similar number of patients and results to Gasink et al.<sup>8</sup> Although the HCAHPS assessment did not find a significant result, it showed a size effect and direction similar to that seen for the primary outcome of perceived issues with care. The more pointed nature of the standardized interview technique may have been able to more specifically target perceived issues of care as opposed to a more “general satisfaction” elicited with the HCAHPS tool. This is suggested by patients offering complaints specifically regarding issues related to gown and glove use without having any knowledge of the study hypotheses.

It is unclear whether patients perceived care that was truly worse or whether the experience of being under contact precautions changed their perception of standard care. It would be of greater concern if the former were true, as suggested by past studies.<sup>5</sup> However, even if care was standard, diminished perception of the quality of care can impact patient satisfaction and ultimately hospital reimbursement related to hospital HCAHPS scores.<sup>17</sup> How hospitals can improve patient perception of care is unknown. The Centers for Disease Control and Prevention (CDC) recommends that, for patients under contact precautions, hospitals should “counteract possible adverse effects on patient anxiety, depression, and other mood disturbances; perceptions of stigma; reduced contact with clinical staff; and increases in preventable adverse events,”<sup>2(p70)</sup> and the Society for Healthcare Epidemiology of America recommends that it is necessary to determine “the safety of isolation and optimizing practice to ensure the best outcome of patients.”<sup>18(p256)</sup> A simple start with few downsides is staff education to correct for fewer patient visits and patient education to help patients better understand the reasons for contact precautions. Although standard CDC training is already implemented at our hospital regarding patient education about contact precautions, there is limited conversation regarding the positive and negative effects of contact precautions. Ultimately, if interventions cannot improve actual patient care and perceptions of care of those patients under contact precautions, a cost-benefit assessment may be necessary to determine when contact precautions have an overall beneficial effect for patients and should be used.

This study should be interpreted in light of the following limitations: (1) we relied on the Charlson comorbidity score to adjust for comorbidities in patients under and not under contact precautions and were unable to adjust for severity of illness; (2) it was impossible to



blind interviewers to contact precaution status and the potential bias for nonverbal prompts (however, those providers that coded complaints were blinded); (3) we did not record the number of providers who visited each patient or the number of procedures performed for patients enrolled in our study, which are variables that may be associated with more frequent report of issues with service quality and lower HCAHPS scores; (4) it is unclear whether asking open-ended interview questions throughout the hospital stay and after discharge in any way biased patients in their answers to specific HCAHPS items; (5) the study was done at a single center; and (6) only a small portion of the cohort completed the postdischarge HCAHPS survey. This was likely related to few patients who were discharged to the community having working telephones and telephone numbers. Although the number of patients included in the HCAHPS portion of the study was small, it was approximately the same as the one previous study that prospectively administered HCAHPS to patients who were still hospitalized.<sup>8</sup>

Strengths of our study include that it was a prospective cohort study that adjusted for other explanatory variables. It measured both qualitative and quantitative effects of contact precaution on patient satisfaction and perception of care with validated measures.<sup>11–14</sup> Finally, this study is 5 times larger than the other prospective study of the effects of contact precautions on patient perceptions of care.

In conclusion, patients placed under contact precautions were more likely to perceive poor coordination of care and lack of respect for patient needs and preferences. These findings were significant even after adjusting for potential confounders, including length of stay, education, and comorbidities. Our findings suggest that patients under contact precautions, compared with those not under contact precautions, perceive their care to be worse. Interventions should be developed to ensure that patients under contact precautions experience the same high-quality care as those patients who are not under contact precautions.

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**Table 1**

Demographic and Baseline Information for Patients under Contact Precautions and Patients Not under Contact Precautions

Variable	Contact precautions		P
	Yes (n = 238)	No (n = 290)	
Age, years, mean ( $\pm$ SD)	52.4 $\pm$ 13.4	52.9 $\pm$ 14.8	.69
Female	44.3 (105)	52.0 (151)	.08
Education (some college)	36.6 (87)	49.1 (142)	<.01
Married or living with partner	36.7 (87)	43.5 (126)	.11
Own home	44.3 (105)	57.4 (166)	<.01
History of depression	40.3 (96)	30.9 (89)	.09
History of anxiety	31.5 (71)	24.7 (75)	.08
History of schizophrenia	2.1 (5)	2.8 (8)	.61
History of bipolar disorder	8.4 (20)	6.3 (18)	.34
History of substance abuse	28.2 (67)	14.6 (42)	<.01
Previous psychiatric admission	18.9 (45)	11.5 (33)	.02
Current smoker	33.2 (79)	25.3 (73)	.05
Charlson comorbidity score, median (IQR)	1.0 (3.0)	1.0 (2.0)	.07
Admission to an intensive care unit during hospitalization	5.0 (12)	6.6 (21)	.46
Length of hospital stay, mean days ( $\pm$ SD)	3.8 $\pm$ 4.9	3.0 $\pm$ 3.4	<.01

Note. Data are no. (%) of patients, unless otherwise indicated. IQR, interquartile range; SD, standard deviation.

**Table 2**

Effect of Contact Precautions on Measures of Patient Perception of Care and Patient Satisfaction after Adjusting for Confounding Variables

Variable	OR (95% CI)	P
Influence on patient perception of poor care		
Patient isolation	2.05 (1.31–3.21)	<.01
Charlson comorbidity score 2	1.28 (0.82–2.00)	.27
Length of stay (per day)	1.03 (1.00–1.07)	.07
Education (some college or more)	1.78 (1.14–2.78)	.01
Influence on HCAHPS top box global hospital rating <sup>a</sup>		
Patient isolation	1.79 (0.64–5.00)	.27
Charlson comorbidity score 2	0.93 (0.33–2.61)	.89
Length of stay (per day)	1.05 (0.93–1.19)	.40
History of depression	1.39 (0.51–3.78)	.51
Education (some college or more)	4.11 (1.47–11.52)	<.01

Note. CI, confidence interval; HCAHPS, Hospital Consumer Assessment of Healthcare Providers and Systems; OR, odds ratio.

<sup>a</sup>The lack of a top box global rating.

**Table 3**

Perceptions of Care among Patients under Contact Precautions versus Not under Contact Precautions

Perceived issues with care	No. (%) of patients		P
	Under contact precautions (n = 238)	Not under contact precautions (n = 290)	
Overall (all issues with care)	80 (33.61)	57 (19.66)	<.001
Waits and delays	9 (3.78)	13 (4.48)	.69
Poor communication	17 (7.14)	16 (5.52)	.44
Environmental issues	3 (1.26)	5 (1.72)	.74
Poor coordination of care	16 (6.72)	7 (2.41)	.02
Poor interpersonal skill and unprofessional care	9 (3.78)	7 (2.41)	.36
Lack of respect for patient needs and preferences	26 (10.92)	9 (3.10)	.001

**Table 4**

## Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) Response

HCAHPS question	Patients who gave top box answers, %		P <sup>a</sup>
	Under contact precautions (n = 37)	Not under contact precautions (n = 51)	
Nurse communication			
Nurses treat with courtesy and respect	83.78	88.24	.55
Nurses listen carefully	81.08	84.31	.69
Nurses explain things in understandable way	81.08	82.35	.88
Composite score	81.98	84.97	---
Top box for all nursing communication <sup>b</sup>	72.97	76.47	.71
Doctor communication			
Doctors treat with courtesy and respect	89.19	82.35	.38
Doctors listen carefully	83.78	82.35	.86
Doctors explain things in understandable way	78.38	86.27	.33
Composite score	83.78	83.66	---
Top box for all doctor communication <sup>b</sup>	72.97	72.55	.97
Staff responsiveness			
Received help after pressing call button	45.71	64.44	.10
Received help in bathroom/bedpan use	66.67	68.75	1.00
Composite	56.19	66.60	---
Top box for all staff responsiveness <sup>a</sup>	8.70	28.00	.14
Pain management			
Pain well controlled	70.00	78.05	.44
Hospital staff help with pain	70.00	75.00	.64
Composite	70.00	76.53	---
Top box for all pain management <sup>b</sup>	66.67	68.29	.89
Medication communication			
Before giving new medicine, hospital staff tells what it is for	80.00	80.00	1.00
Before giving new medicine, hospital staff describe side effects	66.67	40.00	.25
Composite	73.34	60.00	---
Top box for all medication communication <sup>b</sup>	60.00	40.00	.45
Discharge information			
Spoken with about having necessary help after discharge	83.87	88.37	.73
Written information on symptoms/problems to look for after discharge	90.00	95.45	.39
Composite	86.94	91.91	---
Top box for all discharge information <sup>b</sup>	80.00	88.10	.51
Hospital room and bathroom kept clean (individual)	72.97	72.55	.97
Area near room quiet at night (individual)	64.86	62.00	.79
Recommend hospital to friends and family (global)	66.67	79.59	.18
Overall hospital rating (global)	58.33	70.00	.27

Note. Data are percentage of patients who scored the hospital as a 9 or 10 on a 10-point score.

<sup>a</sup>  $\chi^2$  test.

<sup>b</sup> Percentage responding with top box for all represents the proportion of patients that gave the highest or “top box” responses for all questions within the category.