

## Original Article

# Centers for medicare and medicaid services hospital-acquired conditions policy for central line-associated bloodstream infection (CLABSI) and catheter-associated urinary tract infection (CAUTI) shows minimal impact on hospital reimbursement

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### Abstract

**Objective:** In 2008, the Centers for Medicare and Medicaid Services (CMS) stopped reimbursing for hospital-acquired conditions (HACs) not present on admission (POA). We sought to understand why this policy did not impact central line-associated bloodstream infection (CLABSI) and catheter-associated urinary tract infection (CAUTI) trends.

**Design:** Retrospective cohort study.

**Setting:** Acute-care hospitals in the United States.

**Participants:** Fee-for-service Medicare patients discharged January 1, 2007, through December 31, 2011.

**Methods:** Using inpatient Medicare claims data, we analyzed billing practices before and after the HAC policy was implemented, including the use and POA designation of codes for CLABSI or CAUTI. For the 3-year period following policy implementation, we determined the impact on diagnosis-related groups (DRG) determining reimbursement as well as hospital characteristics associated with the reimbursement impact.

**Results:** During the study period, 65,205,607 Medicare fee-for-service hospitalizations occurred at 3,291 acute-care, nonfederal US hospitals. Based on coding, CLABSI and CAUTI affected 0.23% and 0.06% of these hospitalizations, respectively. In addition, following the HAC policy, 82% of the CLABSI codes and 91% of the CAUTI codes were marked POA, which represented a large increase in the use of this designation. Finally, for the small numbers of CLABSI and CAUTI coded as not POA, financial impacts were detected on only 0.4% of the hospitalizations with a CLABSI code and 5.7% with a CAUTI code.

**Conclusions:** Part of the reason the HAC policy did not have its intended impact is that billing codes for CLABSI and CAUTI were rarely used, were commonly listed as POA in the postpolicy period, and infrequently impacted hospital reimbursement.

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To encourage hospitals to invest in quality improvement, the Centers for Medicare and Medicaid Services (CMS) made changes to the Hospital Inpatient Prospective Payment System (IPPS) in 2008. Under these changes, CMS stopped allowing diagnosis codes for hospital-acquired conditions (HACs), such as central line-associated bloodstream infections (CLABSIs) and catheter-associated urinary tract infections (CAUTIs), to qualify for Medicare reimbursement.<sup>1</sup> Under IPPS rules, reimbursement for an inpatient hospitalization is determined by the relative weight of billing codes used to assign diagnosis-related groups (DRGs).<sup>2</sup>

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By ceasing additional reimbursement for codes associated with CLABSI and CAUTI, it was hypothesized that hospitals would be driven to quickly reduce their HACs.<sup>3</sup>

Prior work, however, found that the CMS HAC policy did not impact already declining national rates of CLABSIs and CAUTIs.<sup>4</sup> While the CMS HAC policy did get the attention of hospital leadership and focused attention on healthcare-associated infections,<sup>5,6</sup> surveys found that more effort was focused on the documentation of conditions present on admission (POA) rather than on implementing practice changes.<sup>5</sup> Concern was also raised that differences across hospitals were more a reflection of differences in coding practices rather than differences in quality.<sup>7</sup>

To further understand why the CMS HAC policy may not have had its intended outcome, we studied the impact of this policy on the DRG assignment for Medicare hospitalizations with coded CLABSI and CAUTI events. Furthermore, we examined changes in coding practices following the implementation of the CMS HAC policy.

## Methods

### Study population

To examine billing trends for CLABSI and CAUTI among Medicare fee-for-service enrollees, we used Medicare Provider and Analysis Review (MedPAR) inpatient (Part A) claims data from January 1, 2007, through December 31, 2011. We included data from acute-care, nonfederal US hospitals, excluding critical access hospitals, long-term care hospitals, Maryland waiver hospitals, cancer hospitals, and children's inpatient facilities not subject to the IPPS rule.<sup>1</sup> We identified diagnosis codes indicative of either a CLABSI (*International Classification of Disease, Ninth Revision* [ICD-9] code 999.31 from 2007 to 2010 and 999.31, 999.32, and 999.33 for 2011) or a CAUTI (ICD-9 code 996.64) and examined whether these codes were submitted with a POA designator. CMS required hospitals to submit POA information on all coded diagnoses for inpatient discharges occurring on or after October 1, 2007.<sup>8</sup> Under the HAC policy rules, coded diagnoses listed as POA = "Yes" were not counted against a hospital as preventable complications, but those listed as POA = "No" could not be used to qualify for additional payment because they were preventable complications. For CAUTIs, the ICD-9 HAC code 996.64 also excluded the following codes from being used to qualify for additional payment: 112.2, 590.10, 590.11, 590.2, 590.3, 590.80, 590.81, 595.0, 597.0, and 599.0. These additional codes were excluded due to their association with CAUTIs.

### Billing trends

For each year from 2007 through 2011, we determined the number and percentage of Medicare discharges with an HAC code for CLABSI or CAUTI, as well as the number and percentage by POA status. This was done to determine the frequency of use for these codes, as well as the POA designators. If hospitals rarely used these codes or commonly designated these codes as POA, this might explain the lack of impact of the CMS HAC policy shown in prior work.<sup>4</sup>

### Impact on diagnosis related group assignment

To evaluate the impact of the CMS HAC policy on payment, we focused on payments during the 3-year period following policy implementation. The policy went into effect on October 1, 2008, and we analyzed discharges from January 1, 2009, through December 31, 2011. For discharges that had an ICD-9 code for either CLABSI or CAUTI that were listed as not POA, we estimated the proportion of admissions for which inclusion of the ICD-9 code for these conditions would have resulted in a higher DRG assignment. This analysis was conducted using MS-DRG Grouper software.<sup>9</sup>

We then compared the characteristics of hospitals with DRG changes based on HAC coding to the characteristics of hospitals with no DRG changes based on HAC coding by linking to the 2011 America Hospital Association (AHA) annual survey.<sup>10</sup> Using the  $\chi^2$  test, we compared the following hospital characteristics: region, city size, hospital bed size, type of ownership, and teaching status.

## Results

### Study population and trends

We analyzed data from 65,205,607 Medicare fee-for-service discharge records across 3,291 acute-care, nonfederal US hospitals from January 1, 2007, through December 31, 2011. Table 1 shows the Medicare fee-for-service discharges with CLABSI and CAUTI HAC diagnosis coding by year and by POA status. Over these 5 years, the CLABSI HAC code was used in only 0.23% of Medicare discharges, and the CAUTI HAC code was used in only 0.06% of Medicare discharges. When comparing data from 2007 to 2008 with data from 2009 to 2011, a marked increase in the classification of these 2 HAC codes as POA = Yes (ie, present on admission) was observed. This finding is important because only those diagnoses that were designated POA could be used by a hospital to qualify for additional payment.

**Table 1.** Medicare Fee-for-Service Discharges with CLABSI and CAUTI HAC Diagnosis Coding by Year and by Present on Admission Status

HAC	Year	Total Medicare Fee-for-Service Discharges, No.	Discharges with HAC Diagnosis Coding, No. (%) <sup>a</sup>	HAC Code Designated as Present on Admission, No. (%) <sup>b</sup>	HAC Code Designated as Not Present on Admission, No. (%) <sup>b</sup>	HAC Code Missing POA Designation, No. (%) <sup>b</sup>
CLABSI	2007	10,639,236	6,600 (0.06)	59 (0.9)	6,541 (99.1)	0 (0)
	2008	13,290,281	27,272 (0.21)	9,805 (36.0)	17,379 (63.7)	88 (0.3)
	2009	13,741,204	36,332 (0.26)	30,673 (84.4)	4,906 (13.5)	753 (2.1)
	2010	13,796,697	37,708 (0.27)	30,754 (81.6)	6,280 (16.7)	674 (1.8)
	2011	13,738,189	43,206 (0.31)	33,221 (76.9)	9,290 (21.5)	695 (1.6)
CAUTI	2007	10,639,236	6,172 (0.06)	14 (0.02)	6158 (99.8)	0 (0)
	2008	13,290,281	7,450 (0.06)	3,395 (45.6)	4,050 (54.4)	5 (<0.1)
	2009	13,741,204	8,940 (0.07)	8,147 (91.1)	738 (8.3)	55 (0.6)
	2010	13,796,697	10,228 (0.07)	9,341 (91.3)	824 (8.1)	63 (0.6)
	2011	13,738,189	6,448 (0.05)	5,716 (88.6)	693 (10.7)	39 (0.6)

NOTE. CLABSI, central line-associated bloodstream infection; CAUTI, catheter-associated urinary tract infection; HAC, hospital-acquired condition; POA, present on admission.

<sup>a</sup>Percentage of total Medicare fee-for-service discharges.

<sup>b</sup>Percentage of discharges with HAC diagnosis coding.

**Table 2.** Characteristics of Hospitals Impacted and Not Impacted by CMS HAC Policy

Hospital Characteristic	CLABSI			CAUTI		
	No DRG Changes, No.	≥ 1 DRG Changes, No. (%)	P Value	No DRG Changes, No. (%)	≥ 1 DRG Changes, No. (%)	P Value
<b>Region</b>						
Midwest	494 (23)	17 (27)	.05	217 (26)	33 (32)	.06
Northeast	396 (19)	17 (27)		171 (21)	27 (26)	
South	784 (37)	13 (21)		266 (32)	30 (29)	
West	431 (20)	16 (25)		179 (21)	12 (12)	
<b>City size<sup>a</sup></b>						
Metropolitan	1,766 (84)	54 (86)	.47	722 (87)	88 (86)	.72
Micropolitan	290 (14)	9 (14)		96 (12)	11 (11)	
Rural	49 (2)	0 (0)		15 (2)	3 (3)	
<b>Hospital bed size</b>						
< 100	250 (12)	4 (6)	< .01	66 (8)	10 (10)	.75
100–399	1,440 (68)	35 (56)		516 (62)	60 (59)	
400+	415 (20)	24 (38)		251 (30)	32 (31)	
<b>Type of ownership</b>						
For profit	381 (18)	7 (11)	.27	106 (13)	16 (16)	.29
Not for profit	1,447 (69)	49 (78)		645 (77)	72 (71)	
Public	277 (13)	7 (11)		82 (10)	14 (14)	
<b>Teaching status<sup>b</sup></b>						
Graduate teaching	418 (20)	10 (16)	< .01	207 (25)	24 (24)	.86
Major teaching	245 (12)	17 (27)		138 (17)	20 (20)	
Minor teaching	162 (8)	5 (8)		68 (8)	7 (7)	
Nonteaching	1,280 (61)	31 (49)		420 (50)	51 (50)	

NOTE. CMS, Center for Medicare and Medicaid Services; HAC, hospital-acquired condition; CLABSI, central line-associated bloodstream infection; CAUTI, catheter-associated urinary tract infection; DRG, diagnosis-related group.

<sup>a</sup>Metropolitan has a population >50,000. Micropolitan has a population of 10,000–50,000. Rural has a population <10,000.

<sup>b</sup>Graduate teaching hospital has a residency training program approved by the Council for Graduate Medical Education, Major teaching hospital is a member of the Council of Teaching Hospitals, Minor Teaching Hospital has a medical school affiliation reported to the American Medical Association, and all others classified as nonteaching.

### Coding following implementation of the CMS HAC policy

From 2009 to 2011, a total of 117,246 of 41,276,090 Medicare discharges (0.28%) had an HAC code for CLABSI. The CLABSI HAC code was designated as POA in 94,648 of the 117,246 discharges (80.7%) where it was used. Similarly, over these same 3 years, a total of 25,616 of 41,276,090 Medicare discharges (0.06%) had an HAC code for CAUTI. The CAUTI HAC code was designated as POA in 23,204 of the 25,616 discharges (90.6%) where it was used.

Between 2009 and 2011, only 22,598 Medicare discharges had a CLABSI HAC coded as either POA=No (N=20,476) or POA=Missing (N=2,122), and only 2,412 Medicare discharges had a CAUTI HAC coded as either POA=No (N=2,255) or POA=Missing (N=157). Thus, CLABSI and CAUTI coding with the potential to impact the DRG assignment was a rare event. Overall, only 0.05% of Medicare discharges had a CLABSI code listed as not POA (or missing POA status), and 0.006% of

Medicare discharges had a CAUTI code listed as not POA (or missing POA status).

### Impact on diagnosis-related group assignment

We were able to determine MS-DRG assignments for 20,213 of the 20,476 Medicare discharges with a CLABSI HAC code that was not POA and for 2,204 of 2,255 Medicare discharges with a CAUTI HAC code that was not POA. Not reimbursing for a CLABSI HAC code dropped the DRG assignment in only 92 of the 20,476 admissions (0.4%) for which the code was not POA. Similarly, not reimbursing for a CAUTI HAC code dropped the DRG assignment in only 129 of the 2,255 admissions (5.7%) where the code was not POA.

Between 2009 and 2011, there were 2,168 acute-care, non-federal US hospitals with at least 1 discharge containing a CLABSI HAC code, and 63 of these hospitals (2.9%) had the DRG assignment impacted for at least 1 discharge. For this same

period, there were 935 acute care, nonfederal US hospitals with at least 1 discharge containing a CAUTI HAC code, and 102 of these hospitals had the DRG assignment impacted for at least 1 discharge. Table 2 compares the hospital characteristics between the hospitals with DRG changes and those with no DRG changes.

For CLABSI, the following characteristics were significantly more common among hospitals impacted by the CMS HAC policy: hospital in the Northeast region ( $P=0.05$ ), bed size  $\geq 400$  ( $P<.01$ ), and major teaching status ( $P<.01$ ). For CAUTI, no characteristics were significantly more common among hospitals impacted by the CMS HAC policy, although hospitals in the Northeast region appear to have been impacted the most ( $P=0.06$ ), similar to CLABSI.

## Discussion

One of the main reasons that the 2008 CMS HAC policy may not have accelerated the rate of decline in central line-associated bloodstream infections and catheter-associated urinary tract infections is that the financial penalties were minimal. Billing codes for CLABSI and CAUTI were rarely used, were commonly listed as present on admission in the post-policy period, and infrequently impacted the DRG assignment determining hospital reimbursement.

Based on billing for CLABSI and CAUTI not POA in the postpolicy period, an average of ~6,800 Medicare discharges per year (2009–2011) had a hospital-acquired CLABSI and ~750 Medicare discharges per year (2009–2011) had a hospital-acquired CAUTI. To put this into context, US estimates for annual CLABSI infections range from 60,000 to 92,000, and estimates for annual CAUTI infections range from 63,000 to 450,000.<sup>11,12</sup> Even accounting for the fact that Medicare pays for only 39% of US hospitalizations,<sup>13</sup> these numbers suggest that claims identified a much lower number of infections than published surveillance data. This finding is consistent with prior findings in a statewide analysis looking at the use of the CAUTI HAC code.<sup>14</sup>

Our finding that the majority of HAC codes submitted for reimbursement shifted to being coded as POA in the postpolicy period deserves further investigation. One study looking at coding practices for CAUTI found that at least one-third of infections listed as POA actually met criteria as hospital-acquired infections.<sup>15</sup> This result calls into question the accuracy of the POA designation.

Delving into this further, our finding that major teaching hospitals were most impacted by the HAC policy for CLABSI was actually predicted based on an analysis of coding practices in academic medical centers.<sup>16</sup> In fact, a prior CAUTI study looking at data through 2009 showed that teaching hospitals were more impacted by the HAC policy than nonteaching hospitals, with private, for-profit hospitals having the greatest decline in coded, non-POA CAUTIs in the year following the policy.<sup>17</sup> In the context of a profit incentive, earlier adoption of changes in coding practice may have occurred for certain hospitals.

When determining hospital reimbursement based on DRG assignment, other diagnosis codes may be submitted for reimbursement, limiting the magnitude of change due to ICD-9 codes selected to identify CLABSI and CAUTI.<sup>15,18</sup> In addition, the position of a given HAC code in the list of submitted diagnoses may impact the likelihood of change in DRG assignment.<sup>19</sup>

Thus, recognizing the limitations of HAI performance metrics based on claims for CLABSI and CAUTI, there has been a shift

toward collecting data using clinical surveillance definitions. The current Hospital-Acquired Condition Reduction Program tracks outcomes for CLABSI and CAUTI based on data self-reported by hospitals to the Centers for Disease Control and Prevention's National Healthcare Safety Network (NHSN).<sup>20,21</sup> It is hoped that this will lead to better accountability and will increase efforts to reduce preventable healthcare-associated infections. At the same time, concerns have been raised about the impact of financial incentives on the adjudication of which cases are publicly reported. Time will tell if this new HAC Reduction Program has a positive impact on patient outcomes.

As for the 2008 CMS HAC policy targeting CLABSI and CAUTI, the financial disincentives were minimal due to coding practices. Therefore, it is not surprising that there was not a significant impact on reported CLABSI and CAUTI trends based on clinical surveillance definitions. However, our study has a few limitations. First, we only analyzed data through 2011 (3 years postpolicy), although there is no reason to suspect that coding practices have changed. Second, we took the diagnosis codes in Medicare claims to be true, although it is possible that non-device-associated infections could have been erroneously coded as CLABSI or CAUTI (ie, false positives). Third, we only included hospitals subject to IPPS rules, excluding cancer hospitals with a potentially higher risk of both CLABSI and CAUTI.

With the evolution of the HAC Reduction Program, hospitals ranked in the worst quartile based on NHSN reported rates of CLABSI and CAUTI take a percentage reduction on their entire Medicare reimbursement for the year, rather than just on a single encounter. While this has definitely attracted the attention of hospital leadership, it will be important to be vigilant about the impact of these policies on patient outcomes and to monitor for unintended consequences as these payment policies continue to evolve.

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