

## **CMS Reimbursement Rules for Hospital-Acquired Infections: How Electronic Reports Can Protect the Bottom Line**

An Institute for Health Metrics White Paper

### **Executive Summary**

Hospital-acquired infections (HAIs) cost the average community hospital over half a million dollars each year, a number that is soon to increase. As of October 1, 2008, the costs of urinary and vascular catheter-associated infections and certain surgical site infections will no longer be reimbursed by Medicare. Other types of infections are under consideration and will certainly be added to the “no reimbursement” list in the coming years.

The first and most obvious response by community hospitals will be to improve compliance with all of the evidence-based measures that have been proven to reduce infection rates. Achieving compliance with some of these measures will require improving patient monitoring. This is particularly true of patients with indwelling catheters, where each day with the device increases the risk of infection.

While achieving 100% compliance with infection control practices is an excellent target, the reality is that change takes time and intense effort. Even with 100% compliance, some infections will still occur. In the battle of human versus bacteria, the bacteria always find a way! With this in mind, the best strategy against an existing infection is to detect it early and to attack it aggressively.

Better monitoring means more work for infection control practitioners. One solution is to add more staff, but most hospitals do not have the budget to add staff. The other option is to increase the responsibilities of existing infection control practitioners. Unfortunately, most infection control practitioners are already overburdened. If they cannot keep up with monitoring, infections will slip through unnoticed, increasing costs and threatening the bottom line. The economic impact is unacceptable either way.

In this white paper, we will explore how electronic reports can automate much of the patient monitoring process, allowing existing infection control practitioners to dramatically increase productivity. Using a simple, web-based interface, infection control practitioners can quickly zero in on patients at risk. Interventions can be made quickly, in real-time, easing patient morbidity and mortality. Everybody wins: patients receive better care, the hospital saves money, and infection control practitioners have more time to implement changes, educate staff, and track success.

## **Introduction: Hospital-Acquired Infections in the Spotlight**

The era of pay for performance is here, and hospital-acquired infections are in the spotlight. In the inpatient prospective payment system (IPPS) final rule for fiscal year 2009, CMS lists a total of 11 hospital-acquired conditions (HACs) that are considered preventable through evidence-based measures. Medicare will no longer pay the additional costs associated with treating these conditions if the hospital cannot conclusively show that the condition was present on admission.<sup>1</sup> Notably, four of the 11 HACs are infections:

- Catheter-associated urinary tract infection
- Vascular catheter-associated infection
- Surgical site infection: mediastinitis after coronary artery bypass graft (CABG)
- Surgical site infections following total knee replacement, laparoscopic gastric bypass and gastroenterostomy, and ligation and stripping of varicose veins

In addition, three other infection HACs were considered for the list, but were not approved for fiscal year 2009 (Ventilator-associated pneumonia, *Staphylococcus aureus* septicemia, and *Clostridium difficile*-associated disease). It is likely that these will be added to the list in the near future.

What does this mean for the average community hospital? After studying a network of 28 community hospitals in the southeast, researchers at Duke University Medical Center found that the median cost of HAIs per hospital was over half a million dollars each year.<sup>2</sup> The landscape is changing, and hospitals must change with it or risk losing the bottom line.

## **The Scope of the Problem**

HAIs are a serious problem for healthcare in the United States. Patients who acquire an infection in the hospital are approximately 6 times more likely to die than are similarly hospitalized patients who do not acquire an infection.<sup>3</sup> In 2002, the estimated number of HAIs in U.S. hospitals was approximately 1.7 million, with associated deaths numbering 98,987. Of these deaths, 36% were from pneumonia; 31% were from bloodstream

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<sup>1</sup> “Medicare And Medicaid Move Aggressively To Encourage Greater Patient Safety In Hospitals And Reduce Never Events”. Centers for Medicare and Medicaid Services press release. July 31, 2008. Available at [http://www.cms.hhs.gov/apps/media/press\\_releases.asp](http://www.cms.hhs.gov/apps/media/press_releases.asp)

<sup>2</sup> Anderson DJ, Kirkland KB, Kaye KS, et al. Underresourced hospital infection control and prevention programs: penny wise, pound foolish? *Infect Control Hosp Epidemiol.* 2007;28:767-773.

<sup>3</sup> Hospital-acquired Infections in Pennsylvania 2006. Pennsylvania Health Care Cost Containment Council. Available at <http://www.phc4.org/reports/hai/06/>

infections; 13% were from urinary tract infections; 8% were from surgical site infections; and 12% were from infections of other sites.<sup>4</sup>

In addition to the morbidity and mortality associated with HAIs, the economic impact is staggering. In 2002 dollars, the national annual economic burden has been calculated to be \$6.7 billion per year.<sup>5</sup> Strikingly, the amount spent on infection control at the average community hospital is 10-fold less than the cost of HAIs at the hospital.<sup>2</sup> In other words, any attempts made by a hospital to cut costs by cutting down on infection control could be considered to be short-sighted.

The economic rationale for preventing HAIs is clear. “Any hospital-acquired infection that falls into the CMS categories is going to affect the bottom line,” said Colleen Abrams, Infection Control Coordinator for Blanchard Valley and Bluffton Hospitals in Findlay, Ohio. “Every hospital is going to experience less revenue.” Abrams noted that, in general, hospital administrators are focused on demonstrating cost savings when new guidelines or devices are used. Certain infection control practices, such as using chlorhexidine as a skin antiseptic or using silver-impregnated urinary catheters, do cost more upfront. In the past, it may have been difficult to demonstrate cost savings with these practices; however, the new CMS guidelines have changed the landscape. “If you consider that a single urinary tract infection costs \$3400 using conservative numbers, preventing even a small number of infections will save thousands and thousands of dollars annually,” said Abrams. Therefore, hospitals’ first goal is to prevent as many HAIs as possible.

## **The Goal: Prevent Hospital-Acquired Infections**

### *Urinary Catheter-Associated Infections*

Catheter-related urinary tract infections (UTIs) are responsible for 13% of the nearly 100,000 HAI-associated deaths occurring in the U.S. each year.<sup>4</sup> Catheter-related UTIs are also associated with increased morbidity among hospitalized patients, dramatically increasing costs. Because of the new CMS reimbursement policies, these added costs will no longer be reimbursed.

Improved training in catheter care and the use of anti-microbial materials in the catheter itself have the potential to reduce infection rates, but there are two simple, low-cost methods available to hospitals that can dramatically reduce the rate of catheter-related

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<sup>4</sup> Klevens RM, Edwards JR, Richards CL Jr, et al. Estimating health care-associated infections and deaths in U.S. hospitals, 2002. *Public Health Rep.* 2007;122:160-166.

<sup>5</sup> Haley RW. Incidence and nature of endemic and epidemic nosocomial infections. In: Bennett JV, Brachman P, editors. *Hospital infections*. Boston: Little, Brown; 1985. p. 359–374.

UTIs. First, catheters should only be used when indicated, and second, catheters should be removed as soon as possible.

The four appropriate indications for an indwelling urinary catheter in hospitalized patients are<sup>6</sup>:

1. Bladder outlet obstruction
2. Urinary incontinence in a patient with an open sacral or perineal wound
3. Urine output monitoring for a critically ill patient or a patient unable to collect urine
4. Prolonged surgical procedures with general or spinal anesthesia

Inserting a catheter for the convenience of the nursing or medical staff is rarely appropriate.

Although it seems obvious to restrict catheter use to only those patients who truly require it, the fact is that many patients undergo catheterization for inappropriate indications. In one report, researchers at the State University of New York prospectively studied 202 patients who received catheters in the medical intensive care unit and the medical floors of a tertiary care university hospital.<sup>7</sup> They found that initial catheterization was unjustified in 21% of the patients.

The second simple strategy for preventing catheter-associated UTIs is to limit catheterization to the shortest time as possible, because about 5% of patients develop UTIs per each day of catheterization.<sup>7</sup> Indeed, it has been shown that prompt removal of urinary catheters when they are no longer required results in lower UTI rates.<sup>8</sup> Yet, a frequent problem in hospitals is that, even when a catheter is inserted appropriately, it is left in too long. The study by researchers at the State University of New York confirmed this; of the 202 patients who received catheters, continued catheterization was unjustified in 47% of the patients.<sup>7</sup> In other words, nearly *half* of all the patients remained catheterized for longer than necessary.

Why are patients being catheterized inappropriately and for longer than necessary? The answer seems to be difficulty in monitoring which patients have indwelling urinary catheters. A 2008 study by physicians at the Veterans Affairs Ann Arbor Healthcare System illustrates the problem.<sup>9</sup> Written surveys were sent to infection control

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<sup>6</sup> Saint S, Lipsky BA. Preventing catheter-related bacteriuria: should we? Can we? How? *Arch Intern Med.* 1999;159:800-808.

<sup>7</sup> Jain P, Parada JP, David A, Smith LG. Overuse of the indwelling urinary tract catheter in hospitalized medical patients. *Arch Intern Med.* 1995;155:1425-1429.

<sup>8</sup> Rabkin DG, Stifelman MD, Birkhoff J, et al. Early catheter removal decreases incidence of urinary tract infections in renal transplant recipients. *Transplant Proc.* 1998;30:4314-4316.

<sup>9</sup> Saint S, Kowalski CP, Kaufman SR, et al. Preventing hospital-acquired urinary tract infection in the United States: a national study. *Clin Infect Dis.* 2008;46:243-250.

coordinators at a national random sample of 600 nonfederal US hospitals with an intensive care unit at least 50 hospital beds as well as to 119 Veterans Affairs hospitals. Three-quarters of surveys were returned. Strikingly, 56% of the hospitals did not have a system for monitoring which patients had urinary catheters placed. Further, a full 74% of the hospitals did not monitor catheter duration.

Is a monitoring system for indwelling urinary catheters really necessary? Aren't physicians aware of which of their patients are catheterized? Again, the answer seems to be "no", or at least "not always". In one study, 256 physicians and medical students responsible for patients admitted to the medical services at four university-affiliated hospitals were given a list of the patients on their service.<sup>10</sup> For each patient, the provider was asked: "As of yesterday afternoon, did this patient have an indwelling urethral catheter?" Overall, providers were unaware of catheterization for 28% of their patients. Worse still, patients who were inappropriately catheterized were more likely to be forgotten; providers were unaware of catheter use for 41% of these patients. The authors of this study concluded that "system-wide interventions aimed at discontinuing unnecessary catheterization seem warranted".

The take-home message for preventing urinary catheter-associated HAIs is monitor, monitor, monitor. Make sure patients receive catheters only for appropriate indications, and make sure the catheters are removed as soon as possible.

### *Vascular Catheter-Associated Infections*

Central venous catheters are one of the most common causes of HAI. It has been reported that catheter-related bloodstream infection (CR-BSI) affects over 200,000 patients per year in the United States.<sup>11</sup> Among patients in whom standard, non-coated central venous catheters are in place on average for 8 days, 25% will develop catheter bacterial colonization and 5% will develop CR-BSI.<sup>12</sup> Not only does this increase the risk of death for patients<sup>13</sup>, it also increases length-of-stay and cost. An episode of local catheter-related infection leads to an additional cost of approximately \$400 per patient, while CR-BSI can increase costs by nearly \$10,000.<sup>13</sup>

The evidence-based measures that have been shown to reduce rates of CR-BSI include hand hygiene, antimicrobial-coated catheters, chlorhexidine-impregnated dressings, use

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<sup>10</sup> Saint S, Wiese J, Amory JK, et al. Are physicians aware of which of their patients have indwelling urinary catheters? *Am J Med.* 2000;109:476-480.

<sup>11</sup> Maki DG. Infections caused by intravascular devices used for infusion therapy. In: Bistrot AI, F.A. W, eds. *Infections Associated with Indwelling Medical Devices*. Washington, DC: ASM Press, 1994:155-205.

<sup>12</sup> Saint S, Veentra DL, Lipsky BA. The clinical and economic consequences of nosocomial central venous catheter-related infection: are antimicrobial catheters useful? *Infect Control Hosp Epidemiol.* 2000;21:375-380.

<sup>13</sup> Pujol M, Hornero A, Saballs M, et al. Clinical epidemiology and outcomes of peripheral venous catheter-related bloodstream infections at a university-affiliated hospital. *J Hosp Infect.* 2007;67:22-29.

of a chlorhexidine preparation for a skin antiseptic prior to insertion, use of maximal barrier precautions during insertion, avoidance of routine replacement of central lines at scheduled intervals, and daily review of line necessity and prompt removal of unneeded lines.<sup>14</sup> Although national rates of compliance are not available, a study of nine hospitals in the Greater Cincinnati Health Council found the ICU compliance rate with these measures to be about 30% in 2006.<sup>15</sup> Checklists, preassembled kits, and mobile carts can improve compliance to the first six of the measures to near 100% and can dramatically reduce infection rates.<sup>16</sup>

What about the last measure—prompt removal of unneeded lines? Just as with urinary catheters, the take-home message for compliance with this practice is monitor, monitor, monitor!

### *Surgical Site Infections*

Surgical site infections are another significant problem facing hospitals today. These infections are responsible for 8% of HAI-associated deaths in the U.S. annually.<sup>4</sup> There are a number of evidence-based procedures that have been shown to reduce surgical site infection rates. These include appropriate antimicrobial agent selection, timing, and duration; normothermia; oxygenation; euglycemia; and appropriate hair removal. With improved adherence to these measures, hospitals can reduce surgical site infection rates by at least a third.<sup>17</sup>

How are hospitals doing? On average, not well. Although data on baseline compliance with most of these measures is not available, antibiotic use has been well studied. In 2005, an investigation was performed under CMS auspices in which 34,133 charts were reviewed for appropriate antibiotic use in surgical patients. The authors found that, while appropriate antibiotic selection occurred in 92.6% of cases, only 55.7% of patients received antibiotics within 60 minutes of surgery start time, and prophylactic antibiotics were discontinued within 24 hours of surgery end time for only 40.7% of patients.<sup>18</sup> Only

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<sup>14</sup> Kleinpell RM, Munro CL, Giuliano KK, et al. “Targeting Health Care-Associated Infections: Evidence-Based Strategies”. In: Hughes RG, ed. *Patient Safety and Quality: An Evidence-Based Handbook for Nurses*. Agency for Healthcare Research and Policy Publication No. 08-0043. Available at <http://www.ahrq.gov/qual/nursesfdbk>. Accessed September 10, 2008.

<sup>15</sup> Render ML, Brungs S, Kotagal U, et al. Evidence-based practice to reduce central line infections. *Jt Comm J Qual Patient Saf*. 2006;32:253-260.

<sup>16</sup> Brungs SM, Render ML Using evidence-based practice to reduce central line infections. *Clin J Oncol Nurs*. 2006;10:723-725.

<sup>17</sup> Dellinger EP, Hausmann SM, Bratzler DW, et al. Hospitals collaborate to decrease surgical site infections. *Am J Surg*. 2005;190:9-15.

<sup>18</sup> Bratzler DW, Houck PM, Richards C, et al. Use of antimicrobial prophylaxis for major surgery: baseline results from the National Surgical Infection Prevention Project. *Arch Surg*. 2005;140:174-182.

data from single-hospital surveys is available for perioperative normothermia, and these reports have found compliance rates of 60-65%.<sup>19, 20</sup>

### **When Bugs Slip Through: Minimizing the Impact of Hospital-Acquired Infections**

We have discussed a number of preventative measures that have been proven to reduce the rates of catheter-associated infections and surgical site infections. The goal, of course, is 100% compliance and infection rates that are as close to zero as possible. However, performance improvement is a process. Compliance takes time and requires hospital-wide changes that can often meet stubborn barriers. Even with 100% compliance with all infection control measures, infections will certainly still occur at some level. How can hospitals mitigate the impact of these infections, both in terms of patient morbidity and mortality as well as in terms of the economic repercussions to the hospital?

The key is to catch infections early and to treat them aggressively. For example, Jones and colleagues from the Emory School of Medicine found that patients who develop mediastinitis with septicemia after coronary artery bypass graft are 11 times more likely to die than are patients whose infection does not progress to septicemia.<sup>21</sup> The authors wrote, “This underscores the fundamental importance of early detection and treatment of sternal wound infections.” This principle holds true for all surgical site infections.<sup>22</sup>

Catching infections early requires better monitoring. Infection control practitioners must monitor patients and quickly zero in on those that are at-risk. In addition, as discussed above, preventing catheter-associated infections requires keeping close tabs on catheterized patients and those with central lines..

Monitoring sounds good in theory. Infection control practitioners can review charts, walk the floors, and talk with bedside nursing staff to keep tabs on at-risk patients and patients with devices. The problem is, of course, that infection control practitioners at small or mid-sized community hospitals have many responsibilities. With increasing demands for patient monitoring comes less time for education, implementation of improved care practices, and tracking of success. “I’d like to spend more time looking at processes, and what we need to change, as opposed to going through charts and pulling out data,” said

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<sup>19</sup> Forbes SS, Stephen WJ, Harper WL, et al. Implementation of evidence-based practices for surgical site infection prophylaxis: results of a pre- and postintervention study. *J Am Coll Surg*. 2008;207:336-341.

<sup>20</sup> Hedrick TL, Heckman JA, Smith RL, et al. Efficacy of protocol implementation on incidence of wound infection in colorectal operations. *J Am Coll Surg*. 2007;205:432-438.

<sup>21</sup> Jones G, Jurkiewicz MJ, Bostwick J, et al. Management of the infected median sternotomy wound with muscle flaps. The Emory 20-year experience. *Ann Surg*. 1997;225:766-776.

<sup>22</sup> Kirkland KB, Briggs JP, Trivette SL, et al. The impact of surgical-site infections in the 1990s: attributable mortality, excess length of hospitalization, and extra costs. *Infect Control Hosp Epidemiol*. 1999;20:725-730.

Nancy Nickos, the Infection Prevention Coordinator at Citizens Memorial Hospital in Bolivar, Missouri. “It’s very time-consuming.”

Is there a way to improve surveillance without adding staff or increasing the workload of already overburdened infection control practitioners? The best solution would be a tool that allows infection control practitioners to work more efficiently. Such software should gather pertinent patient data automatically, without additional input needed from any hospital staff, in order to save time. Patients whose diagnoses, medication use, laboratory values, symptoms, or device status put them at risk of infection should be clearly flagged in an easy-to-use format. In addition, data should be displayed in real-time so that infections can be caught early and treated aggressively.

### **Infection Alert: Monitoring Made Easier**

One such electronic solution is Infection Alert (IA), a real-time monitoring system that provides daily reports highlighting patients with early indicators of infection. IA gathers information on abnormal clinical parameters from the hospital’s MEDITECH system, then delivers the reports automatically to the infection control practitioner’s desktop twice daily (8:00 a.m and 2:00 p.m.). This program dramatically reduces the time required for manual collection of data from multiple sources. With the burden of manual data collection lifted, infection control practitioners are able to intervene in the care of vulnerable patients as their condition changes, which actively reduces their risk of infection. In addition, practitioners have more time to look for trends in care practices, to educate hospital staff, and to investigate the effects of changes in infection control procedures.

Infection Alert offers:

- Overview of patients with new high or low temperature or white blood cell count, newly ordered cultures or antibiotics
- Identification of all patients on a ventilator, central line, urinary catheter or precautions
- 24, 48 and 72 hour displays (e.g. weekend views on Monday morning using 72 hour window)
- Patient level drilldown including listing of roommates and all locations the patient was assigned during a particular hospitalization
- Monthly totals of device days and resistant organisms by unit

### **Infection Alert at Work**

How does IA work in practice? Before using IA, Colleen Abrams, Infection Control Coordinator for Blanchard Valley and Bluffton Hospitals, spent much of her time

gathering the information that would alert her to infections in the making. She manually collected information from nurses, physical charts, and computerized charts, a process that could become complicated with shift changes or by new staff members. Now, she opens IA each morning and can quickly view at-risk patients. “I can organize them by floor, so when I go up to the floor, I can zero in on the patients who may have infections brewing and not waste any time,” said Abrams. “By saving time in my job with IA, I can focus more on education.” When it comes time to gather numbers for a year-end report, IA can report the number of infections per device-day automatically, which Abrams anticipates will be a huge time-saving help, as this was done manually in the past.

Nancy Nickos, the Infection Prevention Coordinator at Citizens Memorial Hospital, has also found IA to be a time-saving tool. “It’s cut my time in half,” she said. Previously, Nickos manually read through lists of all patients and their diagnoses every day, pulling out patients who seemed questionable, then checking their charts for more information. Not only was this incredibly time-consuming, it was not completely accurate. Sometimes a diagnosis lead her to follow up on a patient who was not at risk, and the potential for missing a truly at-risk patient was always there. IA is a tool that Nickos uses every day. “What’s really wonderful is that I can choose a 24, 48 or 72 hour view,” said Nickos. “That way, I can pull up the 72 hour report on Monday morning and know what happened during the weekend. The weekend process used to be a nightmare to do manually.” In addition, Nickos has found that the real-time aspect of IA is changing things for the better at Citizens Memorial. “Before, by the time I got to data, the patients were long gone, and I couldn’t make any changes,” she said. Now she is able to make changes while those changes can still benefit the patient.

“IA is a program that is really designed for infection control practitioners by infection control practitioners,” said Shannon Davila, RN, the Infection Control Practitioner at Goodall Hospital in Sanford, Maine. “IHM has worked with infection control people and gotten feedback from them in designing the product.”

“I could not recommend it enough to people,” agreed Nickos. “It’s like getting another person!”

## **Conclusions**

Hospital-acquired infections are a pressing problem for hospitals today. Affected patients experience increased morbidity, longer hospital stays, and a higher likelihood of death. Because evidence-based preventative measures have been shown to dramatically reduce the rate of HAIs, the CMS reimbursement guidelines have been changed accordingly. Hospitals will now foot the bill for HAI-associated costs in the categories of urinary and vascular catheter-related infections as well as for a number of surgical site infections. The list of un-reimbursed infections will certainly grow in the next few years. There is no

doubt: hospitals must respond to minimize the impact of HAIs or they will risk losing the bottom line.

The ultimate goal is to achieve 100% compliance with all of the evidence-based preventative measures. This will increase the need for careful patient monitoring, particularly of those patients who have indwelling devices. Total eradication of HAIs, however, may be impossible to achieve. For the infections that slip through, the best strategy for minimizing cost and patient morbidity and mortality is to catch infections early and to treat them aggressively. Again, this means increased patient monitoring.

Infection Alert is a software tool that can help ease the burden of increased patient monitoring for infection control practitioners. IA is automated and requires no staff input. A list of at-risk patients is sent to the infection control practitioner's desktop twice daily, allowing him or her to zero in on patients who may have infections brewing. Interventions can be performed in real-time. When it comes time to gather data on a monthly or annual basis, IA can compile those numbers as well. These advantages translate into a reduced data gathering burden for infection control practitioners. The time saved can be used to research preventative strategies, design and implement changes, educate hospital staff, track compliance, and evaluate the outcomes of infection control procedures.

For more information on Infection Alert or for a product demonstration, please contact IHM today.

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