



# Case Study

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## Bronson Methodist Hospital: Reducing Central Line Bloodstream Infections in Critical Care Units and Beyond

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### **Vital Signs**

*Hospital:* Bronson Methodist Hospital

*Location:* Kalamazoo, Michigan

*Type:* A 405-bed, private, nonprofit hospital with a medical intensive care unit, surgical intensive care unit, trauma care unit, cardiothoracic surgery unit, burn unit, and pediatric intensive care unit.

*Distinction:* Zero central line-associated bloodstream infections (CLABSIs) in its medical intensive care unit. See [Appendix D](#) for full methodology.

*Timeframe:* January through December 2009

This case study describes the strategies and factors that appear to contribute to the low incidence of CLABSIs at Bronson Methodist Hospital. It is based on information obtained from interviews with key hospital personnel, publicly available information, and materials provided by the hospital from November 2010 to February 2011.



Bronson Methodist Hospital's efforts to reduce central line-associated bloodstream infections (CLABSIs) date back to 1981, when the hospital established a specialized team of providers to oversee the insertion of central line catheters by following evidence-based guidelines. The first team was created by Bronson surgeon James Heersink, M.D., who believed that the risk of infection would decline when a small, select group of providers performed a specific task such as inserting a central line or peripherally inserted central catheter (PICC).

Bronson currently has a designated team, known as the Vascular Access Specialist Team (VAST), comprising about 10 registered nurses who have a minimum of two years of nursing experience and are specially trained in central line insertion techniques, ultrasound guidance, and Centers for Disease Control and Prevention (CDC) infection prevention guidelines. VAST nurses help to ensure

adherence to the hospital’s evidence-based protocol, which includes proper hand-washing; use of a hat, a mask, a sterile gown, and sterile gloves; and the use of sterile towels/drapes and a sterile custom procedure tray (Appendix A). The VAST nurses bring the necessary supplies and set up the sterile field for all scheduled and emergency central line insertions. In addition, they obtain patients’ consent and educate them about the procedure and its risks. (If a VAST nurse is not available, another staff person trained in infection prevention procedures steps in.)

The VAST nurses are also responsible for ensuring that the physicians who insert central lines follow this protocol; they are empowered to stop the procedure if any aspect is not followed. To perform central line insertions, physicians must confirm that they will follow procedure. Residents, who perform 60 percent to 70 percent of all central line insertions in the hospital, must be observed several times before they are approved to handle the procedure.

The VAST nurses work closely with a small group of employed intensivists, upon whom the hospital relies to provide continuity of care and ensure tracking of infections in the intensive care units. “Intensivists are able to focus exclusively on the most appropriate care for the ICU patient,” says Gabriel E. Pedraza, M.D., adult critical care medical director. “This contributes to improved outcomes and decreases in morbidity, mortality, and length of stay.”

To support these efforts, Pedraza reaches out to physicians who fail to comply with the central line insertion protocol. These conversations are nearly always enough to promote compliance. The hospital uses other means to reinforce the importance of following evidence-based protocols, including checklists that are built into the electronic health record (Appendix B). “Daily Goals” sheets, used by the ICU team on patient rounds to document daily expectations for the patient, remind staff to review whether a catheter is still necessary.

### WhyNotTheBest.org CLABSI Series

Between 4 percent and 5 percent of hospitalizations result in a health care–associated infection (HAI), at tremendous cost to individuals who become infected and those who fund health care. One of the most common and preventable HAIs is the central line–associated bloodstream infection (CLABSI), which can result when a central venous catheter is not inserted cleanly or maintained properly. An estimated 43,000 CLABSIs occurred in hospitals in 2009 and nearly one of five infected patients died as a result. This case study is part of a series that describes practices used by four leading hospitals that eliminated CLABSIs in their ICUs. The profiled hospitals are extending these strategies to other hospital units and to other HAIs. A synthesis report summarizing lessons from these high-performing institutions is available at <http://www.whynotthebest.org/contents/view/249>. Comparative performance data on CLABSIs and other measures of health care quality, safety, outcomes, and patient experience for these four hospitals is available at <http://www.whynotthebest.org/reports/view/null/4214>.

## EDUCATION

Training is an important element of Bronson’s infection prevention efforts. All VAST members complete a computer-based learning module—which was developed in-house—and all team members are tested on central line insertion and management. VAST nurses educate other members of the nursing staff, including critical care nurses (upon hire and at annual skills fairs) on the management of infusions and central lines.

Patients and their families also receive training in CLABSI prevention techniques. This is especially important for patients who are going home with the central line still inserted. Bedside nurses reinforce this instruction with educational materials that are printed out based on the patient’s diagnosis prior to discharge.

They use the “teach back” method whereby patients are asked to repeat instructions in their own words to demonstrate comprehension.

## **MONITORING AND OVERSIGHT**

To ensure compliance with evidence-based protocols, a strategic oversight team determines tactics to reduce hospital-acquired infections, allocates resources, and ensures results. Chaired by an executive team member, the team monitors infection rates and related process measures, and is ultimately accountable to the hospital board’s quality oversight committee.

For each hospital-associated infection, staff identify the organism and investigate the cause, trends, and whether anything could be done differently to reduce the risk of future infections. The hospital conducts a similar root cause analysis if a Medicare report identifies a hospital-acquired condition for which Medicare reimbursement is denied.

When the organization is not meeting its goals, multidisciplinary committees, overseen by the clinical excellence strategic oversight team, use the Plan–Do–Check–Act model to problem-solve and initiate change. More specific issues are addressed through department or stakeholder teams with an executive champion. When reported data indicate unfavorable performance three months in a row, the nurse manager of the unit must create an action plan to address it, drawing on input from the entire care team.

Physician champions continue to lead many quality improvement efforts and stimulate change by holding their colleagues accountable. “You need a strong physician champion that can take the lead and has responsibility and accountability for implementation and continued focus,” says Cheryl Knapp, M.B.A., R.N., vice president of accreditations and quality standards. “Physician champions can make sure a hospital sticks with the changes it makes to improve quality.”

## **COLLABORATIVE EFFORTS**

The hospital expanded its infection control efforts when in 2004 it joined the Keystone: ICU project, through the Michigan Health and Hospital

Association’s Keystone Center for Patient Safety and Quality. Keystone: ICU is a voluntary, statewide collaborative to reduce CLABSIs and ventilator-associated pneumonia in Michigan intensive care units. The collaborative provided Bronson and other hospitals with additional prevention strategies, enhanced the hospital’s data collection efforts, and gave it the opportunity to compare data and share best practices with other hospitals. The Keystone initiative also encouraged teamwork among physicians and nurses to improve outcomes and created a feeling of ownership of the process and pride in its successes.<sup>1</sup>

## **PERFORMANCE MEASUREMENT**

Data on CLABSI rates are collected by VAST members and tracked on various organizational scorecards. Staff update the data monthly and compare them against established goals, historical trends, a national database of peer ICUs, and other benchmarks.<sup>2</sup> Bronson’s performance scorecard is reviewed quarterly by the board of directors, executive team, clinical excellence strategic oversight team, leaders, and staff (Appendix C). Infection data are also posted on the hospital intranet and reported monthly at unit staff meetings and through the hospital committees.

The organization’s initial goal was for each critical care unit to be in the top 25th percentile of comparable hospitals (using Centers for Disease Control and Prevention’s surveillance system) for device-related infection rates. Since the adult critical care areas consistently attained this target for CLABSIs, the bar was raised to the top 10th percentile. ICU leaders report that they never imagined they could eliminate CLABSIs entirely, but they set attainable goals, reached them, and then set higher goals.

## **RESULTS**

Bronson’s infection rates have been declining since 1987. Some of the more significant declines have occurred after introducing a new protocol. For example, Bronson’s infection rate dropped from 11.2 percent in 1989 to 6.8 percent in 1991, when VAST nurses assumed care of central line dressing changes

**Exhibit 1. Bronson Methodist Hospital: CLABSI Rate Per Central Line Days, 2005–10**

	MICU	PICU	SICU	TCU	CSU
2005	0.6	0.0	0.0	1.2	0.0
2006	0.0	0.0	0.0	0.0	0.0
2007	0.5	0.0	0.8	0.0	0.0
2008	0.4	1.7	0.4	0.9	3.6
2009	0	0	0	0	1.2
2010	0.7	0	0	0.8	1.1

MICU=medical intensive care unit; PICU=pediatric intensive care unit; SICU=surgical intensive care unit; TCU= trauma care unit; CSU=cardiothoracic surgery unit.  
Source: Bronson Methodist Hospital, 2011.

on adult parenteral nutrition patients. When Bronson staff began using catheters treated with colonization-resistant chlorhexidine and silver sulfadiazine, the hospital's infection rate dropped from 2.8 percent in 1992 to 1.96 percent in 1993.

Bronson began the Keystone: ICU project in 2004. By 2005 it was performing in the top 10th percentile, according to CDC comparative data, and has maintained low rates. Figure 1 tracks CLABSI rates in each critical care unit from 2005 through 2010, and while the hospital has not eliminated CLABSIs in all of its critical care units, the rates are well below the means (2009 pooled mean was 1.65 according to the National Healthcare Safety Network). The hospital continues to investigate the source of each infection, and has reinforced its prevention bundle and other strategies described in this report.

Exhibit 2 illustrates a decline in Bronson's catheter-related infection rates among some of its most complex patients—total parenteral nutrition (TPN) patients, or those receiving nutrition intravenously.

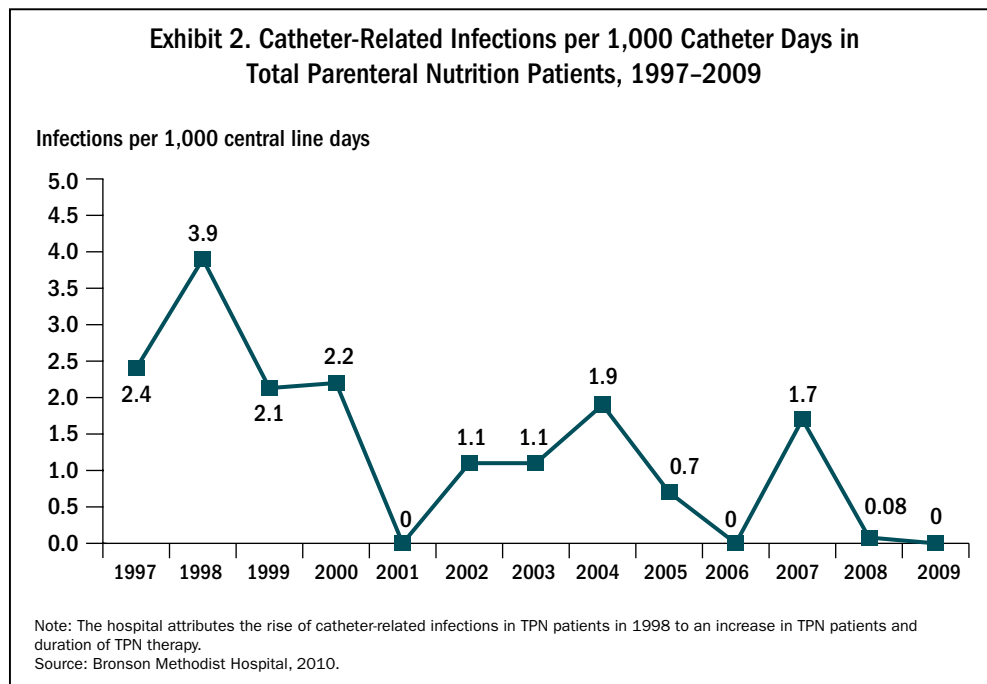
### **SPREAD WITHIN THE HOSPITAL**

Building on success in the medical ICU, Bronson is trying to prevent CLABSIs and other infections throughout the organization. Other units have adopted some form of the practices originally established in the ICU, but not all have achieved the same success. The practices seem to translate best in other high-risk units where a dedicated team is involved.

Through extensive committee and subcommittee work, Bronson decided to extend the infection control practices of the medical ICU, as well as its Daily Goals sheets, to other units in the hospital. These units included the surgical ICU and the cardiothoracic surgery unit. The units now apply consistent, evidence-based practices in preventing infections. Reaching consensus on what those practices should be was initially challenging. However, by focusing on what was best for the patient, as supported by the medical literature and the medical ICU's past success, the units eventually reached agreement.

### **WORK ON OTHER HOSPITAL-ACQUIRED INFECTIONS**

Bronson is working to reduce and eventually eliminate ventilator-associated pneumonia (VAP). It has implemented nursing protocols and a “wake up and breathe” protocol to wean the patient off the ventilator. Staff must record daily on an ICU Sedation and Delirium Data Collection Tool whether each patient is on mechanical ventilation, the type of ventilator, when ventilator use began, and whether a “sedation awakening trial” was performed. In addition, the critical care units have implemented oral care kits in 2010 that have increased provision of oral care for ventilated patients every two hours—reducing the risk of infection from oral bacteria. The kits hang at the bedside and contain products and tools for performing oral care over a 24-hour period of time. The convenience



and accessibility of these materials have increased compliance.

Bronson has also implemented strategies to reduce surgical site infections, such as using the anti-septic chlorhexidine all over the patient's body, as opposed only to the surgical site, prior to surgery. To reduce staph infections, which Bronson reports are the driver of 50 percent of surgical site infections, the hospital performs nasal cultures on surgery patients pre-operatively to see if they are carrying the staph organism. If they are a carrier, the patient is treated with ointment before surgery.

Bronson has so far found it a challenge to reduce catheter-associated urinary tract infections (CAUTIs), particularly in its emergency department, which treats more than 85,000 patients a year. Catheters are labor-saving devices, and can be over-used in units such as a busy emergency department that may have a limited number of restrooms. Another unique challenge in battling CAUTIs is that patients may be admitted with an existing urinary tract infection that is not detected or reported upon admission and is not related to catheter use.

Bronson believes the most effective strategy in reducing CAUTIs is to reduce the use of catheters. The hospital has developed a nurse-driven protocol that encourages the removal of catheters when not

indicated and helps nursing staff assess the risk versus benefit of using a urinary catheter in the first place. Bronson adult ICUs have instituted new products, such as a collection device and barrier cloths that decrease the occurrence of incontinent dermatitis, which can cause bacterial infection, skin ulcerations, and extreme discomfort. These products enable the nurses to remove a urinary catheter, while still preventing the risk of skin breakdown for incontinent patients.

When CDC released its hand-washing guidelines in 2002, Bronson initiated a major hand hygiene initiative. This initiative included two major changes:

1. Bronson installed waterless, alcohol-based sanitizer in every patient room to increase hand hygiene compliance. The waterless sanitizer is less drying than washing with soap and water, and preferred by nurses.
2. Bronson began auditing the hand-washing practices of its staff. The auditors spend two hours on each patient floor per day watching and reporting the hand-washing practices of staff. At the end of the month, data are tallied and reported to all hospital leaders. Staff know they are being monitored and managers address issues with noncompliant staff.

Each year the hospital sets a hand-washing goal; in 2010, it was to achieve compliance 85 percent of the time. Though exceeding this goal during many months, the hospital does not set 100 percent compliance as its goal because there will always be emergency situations where it is not clinically indicated for staff to wash their hands. Bronson has not had a major infection outbreak since the hand-washing initiative began.

Finally, Bronson attributes reduction in infections to its exclusive use of private patient rooms since the hospital was redesigned in 2000. It reports a positive return on investment, whereby the additional construction costs were recouped after a couple of years in the form of operational savings from fewer patient transfers related to infection control, incompatible roommates, and changes in the availability of rooms.

Bronson is performing relatively well in its efforts to reduce hospital-acquired infections, but there are clearly areas in which to improve. Its performance scorecard of hospital-acquired infection rates indicates that for 2010, the hospital met or exceeded its targets during most months ([Appendix C](#)). However, many measures including hand hygiene, VAP, and CAUTI in the medical intensive care unit failed to meet goals in some months. As described above, Bronson has initiated efforts to improve in these areas.

## **PUBLIC REPORTING**

Bronson leaders find that public reporting of hospital performance—both within the hospital and on public Web sites such as *Consumer Reports*' Hospital Ratings and The Commonwealth Fund's [WhyNotTheBest.org](#)—ensures accountability. In particular, reporting is useful when there is agreement on the definitions, process-related measures, and evidence-based protocols such as now exist for CLABSIs.

“[Public reporting of performance data] keeps everyone on their toes,” says Knapp. “The public has a right to know.”

## **LESSONS**

Hospitals wishing to reduce CLABSIs and other hospital-acquired infections, as well as improve patient safety overall, could learn from Bronson's adoption of evidence-based protocols, specialized teams, and supportive culture. The use of intensivists and dedicated central line teams has also facilitated the adoption of evidence-based protocols. Empowering nurses to challenge physicians is also critical. Checklists and Daily Goals sheets provide additional reinforcement.

While these tools and practices have helped to prioritize infection control efforts in the minds of staff, the reporting of data has also driven change. Bronson compares its performance to benchmarks, shares it with all levels of staff and leadership—from frontline staff to the board of directors—and uses the data to create action plans.

The hospital's participation in the Keystone: ICU project further helped to energize staff and created an opportunity to learn from other hospitals tackling similar issues. Whether it is through an organized collaborative or informal relationships, hospitals should keep open lines of communications and collaborate by sharing best practices and future plans, talking through issues, and discussing what does and does not work.

## **FOR FURTHER INFORMATION**

For further information about Bronson's quality improvement initiatives, contact Cheryl Knapp, M.B.A., R.N., vice president of accreditations and quality standards, [KNAPPC@bronsonhg.org](mailto:KNAPPC@bronsonhg.org).

## NOTES

- <sup>1</sup> The Center is funded by the Michigan Health and Hospital Association (MHA), the Agency for Healthcare Research and Quality (AHRQ), Blue Cross Blue Shield of Michigan, the Centers for Disease Control and Prevention (CDC), and the Michigan Department of Community Health (MDCH). Other Keystone initiatives have targeted strokes, hospital-acquired infections, surgery, and obstetrics. Multiple patient care units at Bronson have participated, and continue to participate, in these initiatives. For an overview of the MHA Keystone: ICU project, see [http://www.mhakeystonecenter.org/icu\\_overview.htm](http://www.mhakeystonecenter.org/icu_overview.htm).
- <sup>2</sup> Benchmarks based on The Joint Commission, the National Nosocomial Infections Surveillance System, the National Hospital Safety Network program, and Centers for Disease Control and Prevention.

## Appendix A. CR-BSI Protocol

### CATHETER RELATED BLOOD STREAM INFECTIONS

-CR-BSI are associated with increased morbidity, mortality, cost of care & length of stay (LOS).

-CR-BSI are estimated to occur in **3-7%** of catheters used.

-CR-BSI may affect more than **200,000** patients in the United States annually and causes as many as **11 deaths/day**.

-Estimated mid-range cost \$45,254.00 per CR-BSI.

-CR-BSI are a **preventable** complication.

#### **Interventions:**

Appropriate hand hygiene

Chlorhexidine for skin preparation

Use of full-barrier precautions during central line insertions

For all **central line, femoral & axillary arterial lines**, the MD inserting the line & any direct assistant to line insertion must wear a cap, mask (eye protection preferred), sterile gown, sterile gloves & fully drape the patient.

For all **radial arterial lines**, the MD inserting the line & any direct assistant to line insertion must wear a cap, mask (eye protection preferred), sterile gloves, patient insertion site draped with sterile towels is acceptable.

All others in the room (except the patient) must wear a cap & mask during the line insertion.

A subclavian site is preferred for infection control purposes.

Catheters inserted in the Internal Jugular (IJ) or Femoral veins are associated with a higher risk for infection than catheters inserted in the subclavian vein.

Femoral catheters are associated with a higher incidence of DVT than IJ or subclavian catheters.

IJ is preferred over the subclavian vein for dialysis catheters due to an increased incidence of subclavian vein stenosis with dialysis.

Remove unnecessary central catheters (ask daily with Daily Goals/rounds).

Reduce complexity by the use of a central line cart.

Nurses implement a checklist for line insertion to ensure adherence to evidence-based guidelines for the prevention of CR-BSIs.

Empower the nurses to **stop** line placement for a correction & to **stop** MD line insertion if the MD does not comply (unless it is an emergency).

Source: Bronson Methodist Hospital, 2010.



**Appendix B. CR-BSI Checklist**

**Medical Intensive Care Unit  
Catheter-Related Blood Stream Infection  
Care Team Checklist**

**Purpose:** To work as a team to decrease patient harm from catheter-related blood stream infections.

**When:** During all central venous or central arterial line insertions or re-wires.

**By Whom:** The RN assisting with the procedure.

- **If there is an observed violation of infection control practices, line placement should stop immediately and the violation should be corrected.**
- **If there are any concerns, the nurse assisting with the procedure should contact Dr. Pedraza directly.**

1. Today's Date:	_____ / _____ / _____		
	month	day	year
2. Room Number:	_____		
3. Procedure:	Arterial	New Line	Rewire
4. Site:	L/R_____	Subclavian_____	IJ_____
	Femoral_____	Axillary_____	Radial_____
5. Permit Obtained:	Yes	No	
6. Is the procedure:	Elective	Emergent (code)	
7. <b>Before the procedure</b> , did the housestaff:	Yes	Yes, with correction	
• Wash hands (chlorhexidine or soap) immediately prior	<input type="checkbox"/>	<input type="checkbox"/>	
• Sterilize the procedure site	<input type="checkbox"/>	<input type="checkbox"/>	
• Drape the entire patient in a sterile fashion	<input type="checkbox"/>	<input type="checkbox"/>	
8. <b>During the procedure</b> , did the housestaff:	Yes	Yes, with correction	
(see guidelines in notebook on line cart)			
• Use sterile gloves	<input type="checkbox"/>	<input type="checkbox"/>	
• Use hat, mask and sterile gown	<input type="checkbox"/>	<input type="checkbox"/>	
• Maintain a sterile field	<input type="checkbox"/>	<input type="checkbox"/>	
• Did all personnel assisting with the procedure follow the precautions (as appropriate)	<input type="checkbox"/>	<input type="checkbox"/>	
9. <b>After the procedure</b> :	Yes	Yes, with correction	
• Was a sterile dressing applied to the site	<input type="checkbox"/>	<input type="checkbox"/>	

Comments/Issues \_\_\_\_\_

**Signature of Person Completing Report** \_\_\_\_\_

Please leave the completed checklists in the line care notebook.

Reviewed 6/1/09

### Appendix C. Infection Control Scorecard

Infection Control 2010 Scorecard	WEIGHT	SOURCE	RISK	MODERATE	MEETS	EXCEEDS	FAIR/EXCEEDS	BEST PRACTICE BENCHMARK	LAST YEAR	January	February	March	April	May	June	July	August	September	October	November	December	Year to Date
> Hand hygiene compliance-enterprise		TJC	<80%	>80%	>85%	>90%	>95%	100%	77%	80%	82%	85%	91%	75%	72%	78%	77%	97%	97%	98%	96%	84%
< Ventilator-associated pneumonia (VAP) rate (w/1000 device days), SICU		CDC	>3.8	<3.8	<1.8	0.0	0.0	0.0	1.4	9.3	11.8	0.0	0.0	0.0	0.0	0.0	15.4	0.0	0.0	18.2	0.0	4.8
< Ventilator-associated pneumonia (VAP) rate (w/1000 device days), TCU		CDC	>10.0	<10.0	<5.2	<2.1	<0.7	0.0	10.5	9.7	82.5	18.5	0.0	0.0	11.8	0.0	0.0	13.3	0.0	14.7	8.2	15.2
< Ventilator-associated pneumonia (VAP) rate (w/1000 device days), MICU		CDC	>1.3	<1.3	0.0	0.0	0.0	0.0	1.8	0.0	0.0	4.1	0.0	0.0	8.1	0.0	0.0	0.0	0.0	0.0	0.0	0.8
< Catheter-associated urinary tract infection rate (w/1000 device days), MICU		CDC	>6.3	<6.3	<4.1	<2.1	<0.0	0.0	5.5	0.0	3.4	8.1	0.0	0.0	7.7	3.8	0.0	4.8	0.0	0.0	3.8	2.8
< Clostridium difficile infection rate (nosocomial infections/10,000 patient days)		CDC	New measure in 2010					0.0	1.7	0.0	2.2	4.4	0.0	0.0	1.1	4.3	1.1	2.2	4.0	3.4	2.4	2.1
< MRSA surgical site infections			New measure in 2010					0	11	0	0	2	0	0	1	2	1	1	0	2	1	10
< Reduce CNS non-removable infections: catheter-associated urinary tract, vascular catheter, and surgical site infections		CNS	>9	9	7	5	3	0	8	9	3	0	0	1	1	2	0	2	1	0	0	18

Source: Bronson Methodist Hospital, 2011.

## Appendix D. Purpose and Methodology for CLABSI Case Study Series

To better understand how some hospitals have succeeded in eliminating CLABSI in their ICUs, The Commonwealth Fund supported Health Management Associates in conducting an analysis of high-performing hospitals. The authors examined:

- how CLABSI prevention techniques were implemented and sustained;
- whether and how CLABSI prevention practices were extended beyond the ICU to other units and hospital floors;
- whether the infection prevention framework was extended to other health care–associated infections;
- what challenges hospitals faced in implementing and/or extending infection control interventions; and
- what organizational and cultural factors supported the successful adoption and continuation of best infection control practices.

To select the hospitals for study, the authors reviewed data made available to The Commonwealth Fund by a special arrangement with *Consumer Reports Health*, which integrated data from 15 states that require hospitals to report CLABSIs, and the Leapfrog Group, which collects infection data voluntarily reported by hospitals in 45 states. In all, the authors examined data from some 964 hospitals. These hospital-specific data are available on The Commonwealth Fund's [WhyNotTheBest.org](http://WhyNotTheBest.org) Web site.

The authors selected four hospitals from approximately 100 with zero CLABSIs and a standardized infection ratio of zero in calendar year 2009. The standardized infection ratio (SIR) represents total reported infections divided by total predicted infections. For CLABSI data, a SIR of 1.0 indicates that a hospital is performing just as would be predicted from national rates. A SIR greater than 1.0 indicates the hospital had more infections than predicted from national rates, and a SIR of less than 1.0 indicates it had fewer infections than predicted. Individual hospitals tend to report CLABSI rates (i.e., number of infections per 1,000 central line days), rather than SIRs.

The final selection was based on preferences for: hospitals with the highest number of central line days (indicating more opportunities for infections); those that are not well below average in mortality or readmission rates; and those with scores around the national average or better on measures of patient experiences and adherence to recommended care processes for pneumonia, heart attack, heart failure, and surgery as reported on [WhyNotTheBest.org](http://WhyNotTheBest.org). The selected hospitals also reflect a diversity of facilities, in terms of size and type of operating environment.

The authors gathered information through semistructured interviews (by telephone and through site visits) with key hospital leaders and staff knowledgeable about the hospital's infection control methods and history, and through reviews of hospital data, reports, and other materials made available by the hospital or obtained through Internet searches.

This methodology has some limitations. First, it is based on self-reporting, with a mix of unaudited and audited data. There is variation in self-reported CLABSI data, which means the findings may overreport success. Second, other unmeasured factors may affect CLABSI rates. Third, the sample is small and it is inadvisable to generalize to all hospitals based on such a small sample, or assume that hospitals in different circumstances have the capacity to adopt similar strategies. However, by [synthesizing findings](#) across the four hospitals and identifying common themes, challenges, innovations, and lessons, the authors offer other hospitals insights and options for reducing health care–associated infections.

### ABOUT THE AUTHORS

Sharon Silow-Carroll, M.B.A., M.S.W., is a managing principal at Health Management Associates. She has more than 20 years of experience conducting research and analysis of local, state, and national health system reforms; strategies by hospitals to improve quality and patient-centered care; public–private partnerships to improve the performance of the health care system; and efforts to meet the needs of underserved populations. Prior to joining Health Management Associates, she was senior vice president at the Economic and Social Research Institute, where she directed and conducted policy analysis and authored reports and articles on a range of health care issues. Ms. Silow-Carroll earned a master of business administration degree at the Wharton School and a master of social work degree at the University of Pennsylvania.

Aimee Lashbrook, J.D., M.H.S.A., is a senior consultant in Health Management Associates’ Lansing, Mich., office. Ms. Lashbrook has seven years of experience working in the health care industry with hospitals, managed care organizations, and state Medicaid programs. She provides ongoing technical assistance to state Medicaid programs, and has played a key role in the development and implementation of new programs and initiatives. Since joining HMA in 2006, she has conducted research on a variety of health care topics. Ms. Lashbrook earned a juris doctor degree at Loyola University Chicago School of Law and a master of health services administration degree at the University of Michigan.

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The aim of Commonwealth Fund–sponsored case studies of this type is to identify institutions that have achieved results indicating high performance in a particular area of interest, have undertaken innovations designed to reach higher performance, or exemplify attributes that can foster high performance. The studies are intended to enable other institutions to draw lessons from the studied institutions' experience that will be helpful in their own efforts to become high performers. It is important to note, however, that even the best-performing organizations may fall short in some areas; doing well in one dimension of quality does not necessarily mean that the same level of quality will be achieved in other dimensions. Similarly, performance may vary from one year to the next. Thus, it is critical to adopt systematic approaches for improving quality and preventing harm to patients and staff.

