Reducing the Risk of Catheter-Related Bloodstream Infections: Peripheral Arterial Catheters

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Disclosure

- This presentation reflects the technique, approaches and opinions of the individual presenters. This Ethicon sponsored presentation is not intended to be used as a training guide. The steps demonstrated may not be the complete steps of the procedure. Before using any medical device, review all relevant package inserts with particular attention to the indications, contraindications, warnings and precautions, and steps for use of the device(s).
- Amy Bardin Spencer and Russ Olmsted are compensated by and presenting on behalf of Ethicon and must present information in accordance with applicable regulatory requirements.

Is there a Risk for Arterial Catheter Infection?

Arterial catheters are not risk-free spigots*

Intensive Care Med (2008) 34:1820–1826
DOI 10.1007/s00134-008-1130-z

ORIGINAL

Raphael Khalifa
Claire Dahyot-Fizelier
Leila Laksiri

Indwelling time and risk of colonization of peripheral arterial catheters in critically ill patients

Feature Article

Continuing Medical Education Article

Infectious risk associated with central venous catheters*

Jean-Christophe Lucet, MD, PhD; Lila Bouadma, MD; Jean
Arnaud Geffroy, MD; Sebastian Pease, MD; Marie-Christine Herault,
Marie Thuong, MD; Adrien Français, RT; Maïté Garrouste-Orgeas, MD;

0.8% of arterial lines become infected

ORIGINAL ARTICLE

The Risk of Bloodstream Infection in Adults With Different Intravascular Devices: A Systematic Review of 200 Published Prospective Studies

DENNIS G. MAKI, MD; DANIEL M. KLUGER, MD; AND CHRISTOPHER J. CRNICH, MD

Int J Emerg Med (2010) 3:409–423
DOI 10.1007/s12245-010-0225-5

REVIEW ARTICLE

Systematic review of emergency department central venous and arterial catheter infection

Christopher H. LeMaster · Ashish T. Agrawal · Peter Hou · Jeremiah D. Schuur

Maki DG et al., Mayo Clinic Proc 2006;81:1159-1171.

Are You Placing Arterial Catheters?

6,000,000
arterial catheters

16,438 per day

680 every hour

Maki DG et al., Mayo Clinic Proc 2006;81:1159-1171.

48,000
arterial catheter-related
bloodstream infections

131 per day

5 patients every hour

Maki DG et al., Mayo Clinic Proc 2006;81:1159-1171.

Risk Factors

- Lack of insertion compliance
- No surveillance procedure
- No bundle specific to arterial device insertion or maintenance
- Multiple inserters with variations in skill set

Maki DG et al., Mayo Clinic Proc 2006;81:1159-1171.

Systemic Review of Intravascular Device-Related Bloodstream Infections (Maki 2006)

The Risk Of Bloodstream Infection In Adults With Different Intravascular Devices: A Systemic Review of 200 Published Prospective Studies

- Peripheral IV catheters (PIVC)
- Midline catheters
- Arterial catheters (ACs)
- Pulmonary artery catheters
- Peripherally inserted central catheters
- Central venous catheters (CVCs)
- Hemodialysis catheters (cuffed and tunneled)
- Central venous ports
- Left ventricular assist devices
- Intra-aortic balloon pumps

Maki DG et al., Mayo Clinic Proc 2006;81:1159-1171.

TABLE 3. **Rates of Intravascular Device–Related Bloodstream Infection Caused by Various Types of Devices Used for Vascular Access***

Device	No. of studies	No. of catheters	No. of IVD (d)	No. of BSIs	Rates of IVD-related bloodstream infection: Per 100 devices, Pooled mean	Per 100 devices, 95% CI	Per 1000 IVD-days, Pooled mean	Per 1000 IVD-days, 95% CI
Peripheral IV catheters								
Plastic catheters	110	10,910	28,720	13	0.1	0.1-0.2	0.5	0.2-0.7
Steel needles	1	148	350	3	2.0	0.0-4.3	8.6	0.0-18.2
Venous cutdown	1	27	111	1	3.7	0.0-10.8	9.0	0.0-26.6
Midline catheters	3	514	9251	2	0.4	0.0-0.9	0.2	0.0-0.5
Arterial catheters for hemodynamic monitoring	14	4366	21,397	37	0.8	0.6-1.1	1.7	1.2-2.3
Peripherally inserted central catheters								
Inpatient and outpatient	15	3566	105,839	112	3.1	2.6-3.7	1.1	0.9-1.3
Inpatient	6	625	7137	15	2.4	1.2-3.6	2.1	1.0-3.2
Outpatient	9	2813	98,702	97	3.5	2.8-4.1	1.0	0.8-1.2
Short-term noncuffed central venous catheters								
Nonmedicated								
Nontunneled	79	20,226	322,283	883	4.4	4.1-4.6	2.7	2.6-2.9
Tunneled	9	741	20,065	35	4.7	3.2-6.2	1.7	1.2-2.3
Medicated								
Chlorhexidine-silver-sulfadiazine	18	3367	54,054	89	2.6	2.1-3.2	1.6	1.3-2.0
Minocycline-rifampin	3	690	5797	7	1.0	0.3-1.8	1.2	0.3-2.1
Silver impregnated	2	154	1689	8	5.2	1.7-8.7	4.7	1.5-8.0
Silver iontophoretic	2	396	4796	16	4.0	2.1-6.0	3.3	1.7-5.0
Benzalkonium chloride	1	277	2493	12	4.3	1.9-6.7	4.8	2.1-7.5
Pulmonary artery catheters	13	2057	8143	30	1.5	0.9-2.0	3.7	2.4-5.0
Hemodialysis catheters								
Temporary, noncuffed	16	3066	51,840	246	8.0	7.0-9.0	4.8	4.2-5.3
Long-term, cuffed and tunneled	16	2806	373,563	596	21.2	19.7-22.8	1.6	1.5-1.7
Cuffed and tunneled central venous catheters	29	4512	622,535	1013	22.5	21.2-23.7	1.6	1.5-1.7
Subcutaneous venous ports								
Central	14	3007	983,480	81	3.6	2.9-4.3	0.1	0.0-0.1
Peripheral	3	579	162,203	23	4.0	2.4-5.6	0.1	0.1-0.2
Intra-aortic balloon pumps	1	101	414	3	3.0	0.0-6.3	7.3	0.0-15.4
Left ventricular assist devices	3	157	19,653	41	26.1	19.2-33.0	2.1	1.5-2.7

*BSI = bloodstream infection; CI = confidence interval; IV = intravenous; IVD = intravascular device.

Maki DG et al., Mayo Clinic Proc 2006;81:1159-1171.

Peripheral Artery vs. Central Venous Catheter Colonization and Infection (Koh 2008)

Objectives: Few studies have assessed the risk of colonization or infection in concurrently used arterial (AC) and central venous (CVCs) catheters. The purpose of this study was to:

1. Prospectively measure AC colonization and bloodstream infection (BSI)
2. Assess the risk for AC colonization
3. Compare AC colonization and BSI to that of concurrently used CVCs

Study Design:

1. Prospective 24-month (June 2004-June 2006) cohort study
2. Colonization or infection in peripheral AC or concurrent sited CVCs
3. 8-bed intensive care unit (ICU) 350-bed Australian teaching hospital

Outcomes measured:

1. Incidence of catheter days of colonization (>15 colonies)
2. Catheter-related bloodstream infections

Results:

321 Arterial catheters (Acs)

- Inserted in 252 patients
- Observed for 1,082 catheter days
- Average duration = 3.4 days

618 CVCs

- Inserted in 410 patients
- Observed for 4,040 catheter days
- Average duration = 6.5 days

Koh et al. CCM 2008; 36:397-402

Results

Table 1. Colonization and catheter-related bloodstream infection (CR-BSI) associated with arterial and central venous catheters

Catheter Site	No. of Catheters	Total Catheter-Days	Colonization			CR-BSI		
			No.	Rate[a]	%[b]	No.	Rate[a]	%[b]
Arterial catheters	321	1082	17	15.71	5.3	1	0.92	0.31
Central venous catheters	618	4040	68	16.83	11.0	9	2.23	1.46

[a]Unadjusted rate per 1000 catheter days; [b]percentage of catheters.

Table 2. Arterial catheter (AC) colonization when catheters were removed at different time periods

No. of Days	No. of Catheters Removed[a]	No. of Catheters Colonized	%	Mean AC Duration, Days
0–3	193	3	1.6	1.4
3–6	79	5	6.3	4.1
6–9	23	3	13	7.2
9–12	16	4	25	10.2
12–15	4	2	50	12.9

[a]In six catheters, removal time was not documented.

Koh et al. CCM 2008; 36:397-402

Peripheral Artery vs Central Venous Catheter Colonization and Infection

Conclusion: This study documents that arterial catheters are at equal risk to CVCs of colonization and BSI.

The risk of colonization is partially dependent upon:

- Location of catheter insertion (OR, ED, ICU)
- Site of insertion (IJ, SC, Femoral)
- Duration of catheterization

To reduce the risk of arterial catheter colonization and infection, more aggressive infection prevention measures are indicated

Koh et al. CCM 2008; 36:397-402

Risk of Colonization or Infection in Arterial or Central Venous Catheters (Lucet 2010)

Objectives: To compare the daily risk and risk factors for colonization and catheter-related infection between arterial catheters and central venous catheters.

Methods: Data used was from a randomized controlled trial of seven intensive care units evaluating different dressing change intervals and use of CHG-impregnated disk. The daily hazard rate and identified risk factors for colonization were determined using a marginal Cox model for clustered data.

Sample: 2,095 patients with >1 intravascular catheter. 1,636 were enrolled.

1525 patients had >1 assessable catheter

- 1,212 had >1 AC
- 1,403 had >1 CVC
- 1,090 had >1 AC plus >1 CVC

Culture and analysis of a total of:
3,532 catheters (1,617 Acs and 1,915 CVCs) with 27,541 catheter-days

Lucet, J. Infectious risk associated with arterial catheters compared to central venous catheters. Crit Care Med 2010 Vol. 38, No. 4

Risk of Colonization or Infection in Arterial or Central Venous Catheters (Lucet 2010)

Colonization rates did not differ between arterial catheters (ACs) and central venous catheters (CVCs)

- ACs: 7.9% (11.4/1000) catheter days)
- CVCs: 9.6% (11.1/1000) catheter days) respectively

AC- and CVC-related **infection** rates were:

- ACs: 0.68% (1.00/1000) catheter days)
- CVCs: 0.94% (1.09/1000) catheter days)

Lucet, J. Infectious risk associated with arterial catheters compared to central venous catheters. Crit Care Med 2010 Vol. 38, No. 4

Risk of Colonization or Infection in Arterial or Central Venous Catheters (Lucet 2010)

Conclusions:

- Risk of colonization and catheter-related infection did not differ between ACs and CVCs, indicating that AC use should receive the same precautions as CVC use
- Daily risk was constant over time for CVCs after the 5th catheter day but increase significantly over time after the 7th day for ACs
- Randomized studies are needed to investigate the impact of scheduled AC replacement

Lucet, J. Infectious risk associated with arterial catheters compared to central venous catheters. Crit Care Med 2010 Vol. 38, No. 4

Arterial Catheters as a Source of Bloodstream Infection: A Systematic Review of Meta-Analysis (O'Horo 2014)

Objectives: To evaluate the prevalence of arterial catheter-related bloodstream infection.

Study design: This was determined by pooling the observed rates of catheter infection in studies where all catheters were cultures and comparing with studies where arterial catheters were cultures only when they were suspected as a course of BSI.

Outcomes measured: The study population, site of insertion, antiseptic preparation, catheter days, and prevalence of catheter-related bloodstream infection were abstracted. Secondary endpoints included catheter infection rates observed at different sites (e.g. radial vs. femoral) and insertion techniques, such as barrier precautions, site preparations, and maintenance techniques, such as chlorhexidine-impregnated sponge dressings.

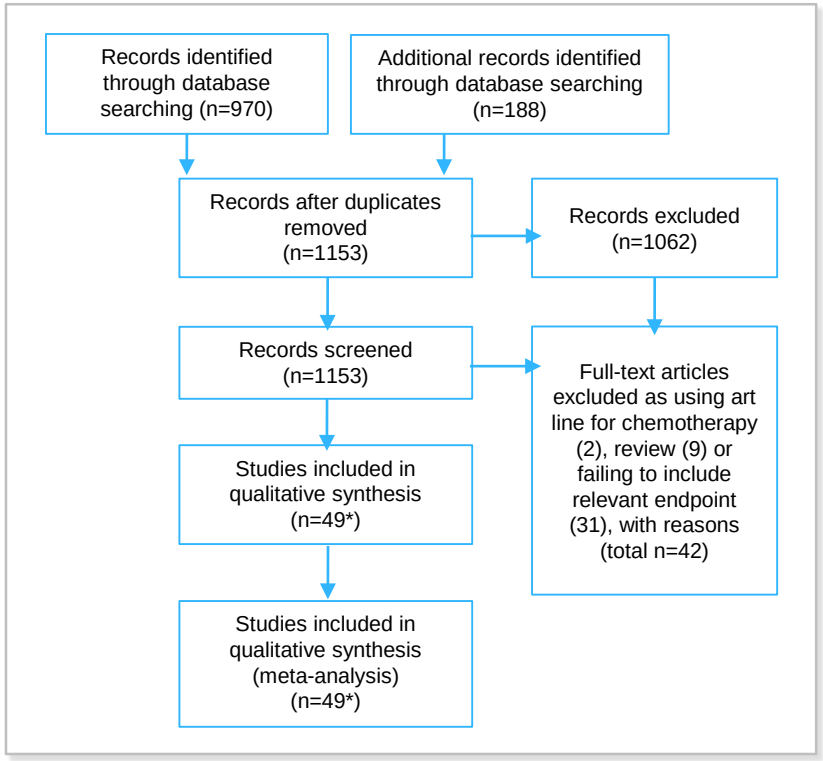
O'Horo, J. Arterial Catheters as a Source of Bloodstream Infection: A Systematic Review and Meta-Analysis. Critical Care Medicine Journal. June 2014, Vol 42, No 6

Arterial Catheters as a Source of Bloodstream Infection: A Systematic Review of Meta-Analysis (O'Horo 2014)

Results: This study documents that arterial catheters are at equal risk to CVCs of colonization and BSI

Specific outcome measures:

- **Site:**
  Radial site least risk
- **Maintenance:**
  Use of BioPatch or CHG dressing
- **Site cleansing:**
  Use of Chlorhexidine for prep
- **Sterile practices:**
  Trend to sterile full drape



1153 articles 49 included in the quantitative synthesis (meta-analysis), Fig 1

O'Horo, J. Arterial Catheters as a Source of Bloodstream Infection: A Systematic Review and Meta-Analysis. Critical Care Medicine Journal. June 2014, Vol 42, No 6

Comparative Risk of Colonization of Bloodstream Infection with Arterial or Central Venous Catheters

Reference	Colonization Rate*		BSI Rate*	
	AC	CVC	AC	CVC
Traore O, et al (2005)	9.4	12.0		
Koh DB, et al. (2008)	15.7	16.8		
Maki DG, et al. (2006)			1.4 (0.8%)	2.9
Lucet JC, et. al. (2010)	11.4	9.6	1.0 (0.7%)	1.09
Safdar N, et al. (2014)	(13.0%)		3.4 (1.3%)	5.9 (2.7%)

BSI = Bloodstream Infection, *Rate per 1,000 catheter days
AC = Arterial Catheters, CVC = Central Venous Catheters

O'Horo, J. Arterial Catheters as a Source of Bloodstream Infection: A Systematic Review and Meta-Analysis. Critical Care Medicine Journal. June 2014, Vol 42, No 6

Infection Risk Always Exist

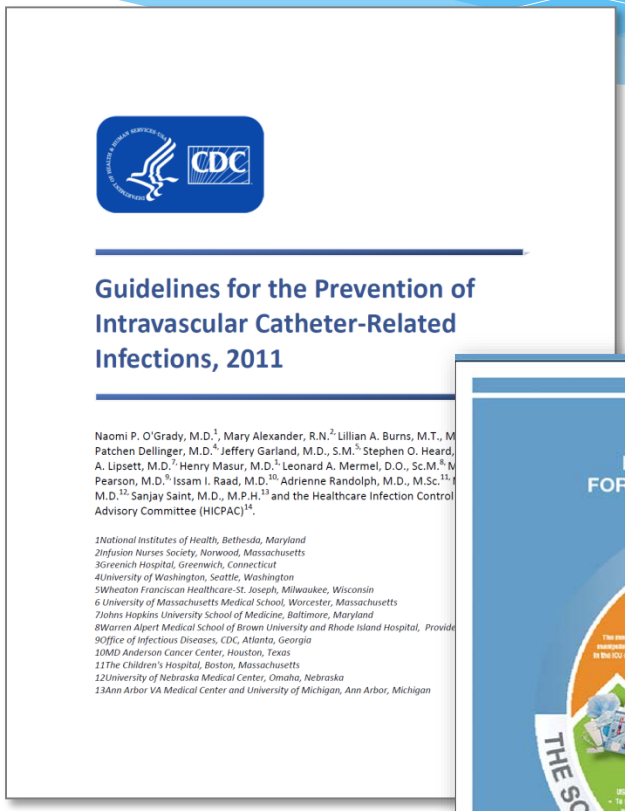
Despite this, arterial catheter prevention bundles have not been widely applied to arterial catheters.

- Publications continue to confirm a significant risk of CRBSI with arterial lines.[1]
- Arterial catheter insertion requires similar precautions as CVCs
- Poor compliance with current precautions has been reported[2]

What measures do you take to prevent the risk of infection?

1. O'Grady, et al. Guidelines for the Prevention of Intravascular Catheter-Related Infections, 2011. The Centers for Disease Control. http://www.cdc.gov/hicpac/pdf/guidelines/bsi-guidelines-2011.pdf.
2. David M. Cohen, MD et al. Arterial Catheter Use in the ICU: A National Survey of Antiseptic Technique and Perceived Infectious Risk; *Crit Care Med* 2015; 43:2346–2353

2011 CDC Guidelines for the Prevention of Catheter-Related Bloodstream Infections



CDC

Guidelines for the Prevention of Intravascular Catheter-Related Infections, 2011

Naomi P. O'Grady, M.D.[1], Mary Alexander, R.N.[2], Lillian A. Burns, M.T., M
Patchen Dellinger, M.D.[4], Jeffery Garland, M.D., S.M.[5], Stephen O. Heard,
A. Lipsett, M.D.[7], Henry Masur, M.D.[1], Leonard A. Mermel, D.O., Sc.M.[8], M
Pearson, M.D.[9], Issam I. Raad, M.D.[10], Adrienne Randolph, M.D., M.Sc.[11],
M.D.[12], Sanjay Saint, M.D., M.P.H.[13] and the Healthcare Infection Control
Advisory Committee (HICPAC)[14].

1National Institutes of Health, Bethesda, Maryland
2Infusion Nurses Society, Norwood, Massachusetts
3Greenich Hospital, Greenwich, Connecticut
4University of Washington, Seattle, Washington
5Wheaton Franciscan Healthcare-St. Joseph, Milwaukee, Wisconsin
6 University of Massachusetts Medical School, Worcester, Massachusetts
7Johns Hopkins University School of Medicine, Baltimore, Maryland
8Warren Alpert Medical School of Brown University and Rhode Island Hospital, Provide
9Office of Infectious Diseases, CDC, Atlanta, Georgia
10MD Anderson Cancer Center, Houston, Texas
11The Children's Hospital, Boston, Massachusetts
12University of Nebraska Medical Center, Omaha, Nebraska
13Ann Arbor VA Medical Center and University of Michigan, Ann Arbor, Michigan

General Practices

	STRENGTH OF RECOMMENDATION (CDC 2011)	IMPLEMENTED
1. Perform hand hygiene before/after catheter insertion, care, and maintenance.	IA	❑ Yes ❑ No
2. Use antiseptic skin prep (>0.5% chlorhexedine preparation with alcohol) before catheter insertion and site care at the time of dressing changes.	IA	❑ Yes ❑ No
3. Use all-inclusive kits for line insertion.	IA	❑ Yes ❑ No
4. Use either sterile gauze or sterile, transparent, semipermeable dressing to cover the catheter site.	IA	❑ Yes ❑ No
5. Use a chlorhexidine-impregnated sponge dressing for temporary short-term catheters in patients older than 2 months of age if the CLABSI rate is not decreasing despite adherence to basic prevention measures, including education and training, appropriate use of chlorhexidine for skin antisepsis, and MSB.	IB	❑ Yes ❑ No
6. Use a sutureless securement device to reduce the risk of infection for intravascular catheters.	II	❑ Yes ❑ No
7. Promptly remove any catheter that is no longer essential.	II	❑ Yes ❑ No

O'Grady, N.P., et al. Guidelines for the Prevention of Intravascular Catheter-Related Infections. *American Journal of Infection Control.* 2011; 39 (4 Suppl 1):S1-34.

Peripheral Arterial Catheter Specific Practices

	STRENGTH OF RECOMMENDATION (CDC 2011)	IMPLEMENTED
1. Use of Ultrasound Guidance: a. For radial artery cannulation, the use of ultrasound can improve first pass success. b. Ultrasound-guided arterial catheterization improves first-pass success and should be used routinely in adults when trained operators are available. c. Ultrasound-guided arterial catheterization improves first-pass success and should be used routinely in children and neonates.	Category A [b] Grade A [c] Grade A [c]	❑ Yes ❑ No ❑ Yes ❑ No ❑ Yes ❑ No
2. For adults, insertion in into the radial, brachial or dorsalis pedis arteries are preferred over femoral or axillary artery insertion.	IB	❑ Yes ❑ No
3. For children, the same insertion site guidelines apply with the following exceptions: The brachial artery should not be used. The posterior tibial artery may be used for insertion in pediatric patients.	II	❑ Yes ❑ No
4. Barrier Precautions: a. Peripheral arterial catheter insertion – use at minimum cap, mask, sterile gloves*, and small sterile fenestrated drape b. Axillary or femoral artery catheter insertion – use maximal sterile barrier precautions.	IB II	❑ Yes ❑ No ❑ Yes ❑ No
5. Replace arterial catheters only when clinically indicated.	II	❑ Yes ❑ No

O'Grady, N.P., et al. Guidelines for the Prevention of Intravascular Catheter-Related Infections. *American Journal of Infection Control.* 2011; 39 (4 Suppl 1):S1-34.

Peripheral Arterial Catheter Specific Practices (cont.)

	STRENGTH OF RECOMMENDATION (CDC 2011)	IMPLEMENTED
6. Do not routinely replace arterial catheters to prevent CRBSIs.	II	❑ Yes ❑ No
7. Pressure Transducers: a. Replace disposable or reusable transducers at 96-hour intervals. Replace other components of the system (including the tubing, continuous-flush device, and flush solution) at the time the transducer is replaced. b. Use disposable ultrasound transducer assemblies when possible. c. Sterilize reusable transducers according to the manufacturers' instructions if the use of disposable transducers is not feasible.	IB IB IA	❑ Yes ❑ No ❑ Yes ❑ No ❑ Yes ❑ No
8. Pressure Monitoring System: a. Minimize the number of manipulations of and entries into the pressure monitoring system. Use a closed flush system (i.e., continuous flush), rather than an open system (i.e., one that requires a syringe and stopcock) to maintain the patency of the pressure monitoring catheters. b. Keep all components of the pressure monitoring system (including calibration devices and flush solution) sterile. c. When accessing the pressure monitoring system through a diaphragm rather than a stopcock, scrub the diaphragm with an appropriate antiseptic before accessing the system.	II IA IA	❑ Yes ❑ No ❑ Yes ❑ No ❑ Yes ❑ No
9. Do not administer dextrose-containing solutions or parenteral nutrition fluids through the pressure monitoring circuit.	IA	❑ Yes ❑ No

O'Grady, N.P., et al. Guidelines for the Prevention of Intravascular Catheter-Related Infections. *American Journal of Infection Control.* 2011; 39 (4 Suppl 1):S1-34.

Practices to Maximize Compliance with the Bundle

	IMPLEMENTED
1. Educate clinicians about practices to prevent arterial line CRBSI.[2, 3]	❑ Yes ❑ No
2. Create a cart with all needed supplies to support bundle compliance. [2, 3]	❑ Yes ❑ No
3. Use a checklist to ensure compliance with all bundle elements. [2, 3]	❑ Yes ❑ No
4. Empower nurses and other clinicians to stop any caregiver (in nonemergency situations) who doesn't follow bundle practices. [2, 3]	❑ Yes ❑ No
5. Review line necessity during daily rounds. [2, 3]	❑ Yes ❑ No
6. Provide monthly/quarterly feedback to caregivers regarding the number/rate of CRBSIs.[.2]	Yes ❑ No
7. Promptly remove any catheter that is no longer essential. [1, 2]	❑ Yes ❑ No

1. John C. O'Horo, MD; Dennis G. Maki, MD, MS; Anna E. Krupp, RN; Nasia Safdar MD, PhD, *Crit Care Med*, 2014
2. Mermel LA. Arterial catheters are not risk-free spigots. *Crit Care Med*. 2008;36(2):620-622
3. Timsit JF, Mimoz O, Mourvillier B, et al: Randomized controlled trial of chlorhexidine dressing and highly adhesive dressing for preventing catheter-related infections in critically ill adults. Am J Respir Crit Care Med 2012; 186:1272–1278

2014 SHEA Compendium

- Besides central venous catheters (CVCs), peripheral arterial catheters also carry a risk of infection.
- Peripheral arterial catheters and peripheral venous catheters are not included in most surveillance systems, although they are associated with risk of bloodstream infection independent of CVCs.197,198 Future surveillance systems may need to include bloodstream infections associated with these types of catheters.

Marschall, et. al. Strategies to Prevent Central Line–Associated Bloodstream Infections in Acute Care Hospitals: 2014 Update. ICHE, Vol. 35, No. 7 (July 2014), pp. 753-771

2016 INS Infusion Therapy Standards of Practice

- Consider use of visualization technologies to aid in artery identification and selection
- Perform skin antisepsis using the preferred skin antiseptic agent of >0.5% chlorhexidine in alcohol solution. If there is a contraindication to alcoholic chlorhexidine solution, tincture of iodine, an iodophor (povidone-iodine), or 70% alcohol may also be used
- Wear a cap, mask, sterile gloves, and eyewear, and use a large, sterile fenestrated drape when placing a peripheral arterial catheter
- Employ maximal sterile barrier precautions when placing pulmonary artery and arterial catheters in the axillary or femoral artery
- Consider use of chlorhexidine-impregnated dressings with peripheral arterial catheters as an infection reduction intervention

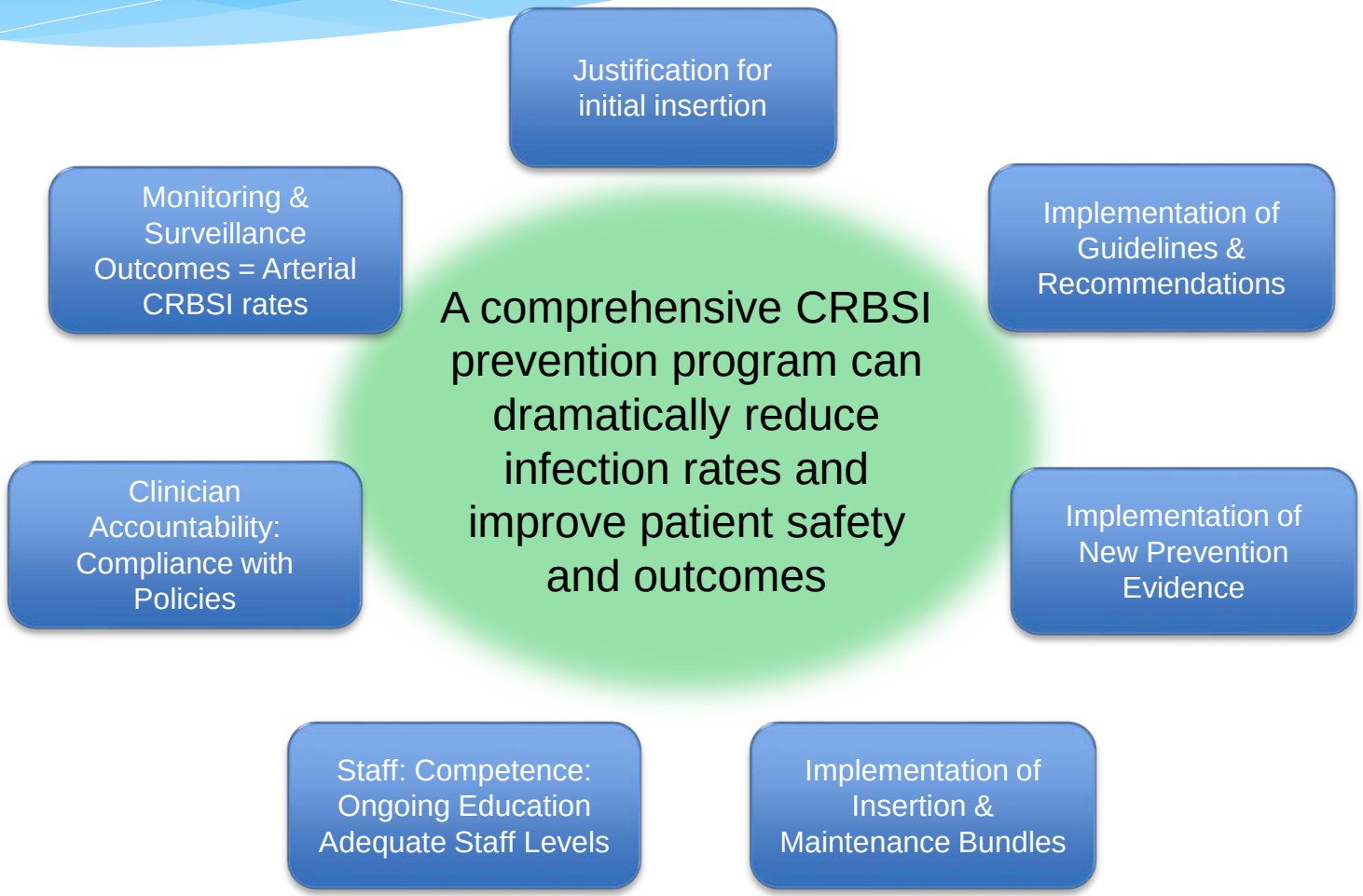
Infusion Therapy Standards of Practice, Journal of Infusion Nursing. 2016, V39 (1S)

Compliance

Do you currently:

- Follow the current evidence-based recommendations
- Use an all inclusive insertion tray?
- Use a procedure cart?
- Formal training program that includes didactic and simulation training?

Prevention of Arterial CRBSI Requires a Multi-factorial Approach



Top Concerns of Hospital CEOs

Issue	2014	2013	2012
Financial challenges	2.5	2.4	2.5
Healthcare reform implementation	4.6	4.3	4.7
Governmental mandates	4.6	4.9	5
Patient safety and quality	4.7	4.9	4.4
Care for the uninsured/underinsured	5.5	5.6	5.6
Patient satisfaction	5.9	5.9	5.6
Physician-hospital relations	5.9	6	5.8
Population health management	6.8	7.6	7.9
Technology	7.3	7.9	7.6
Personnel shortages	7.4	8	8

The average rank given to each issue was used to place issues in order of concern to hospital CEOs, **with the lowest numbers indicating the highest concerns.** (American College of Healthcare Executives)

http://www.ache.org/pubs/research/ceoissues.cfm Accessed 9/8/2016

Affordable Care Act

Medicare has begun implementing penalties and/or offering incentive payments for improved patient outcomes, so choosing evidence based products with proven clinical outcomes has never been more important

Value Based Purchasing (VBP)

http://www.cms.gov/Outreach-and-Education/Medicare-Learning-NetworkMLN/MLNProducts/downloads/Hospital_VBPurchasing_Fact_Sheet_ICN907664.pdf Accessed 9/8/2016

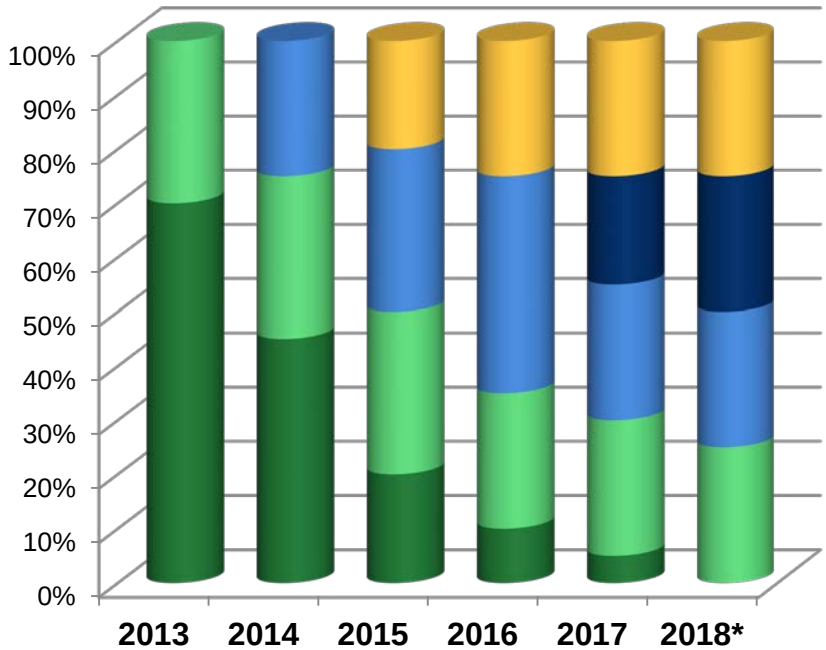
Value Based Purchasing (VBP)

- Value Based Purchasing is a CMS initiative designed to ensure quality patient outcomes.
- Under VBP, CMS withholds a portion of Medicare reimbursement which a hospital could earned back by performing well on a set of metrics
- **Value Based Purchasing is NOT about purchasing the lowest price items**
- **VBP is about Patient OUTCOMES and IMPROVEMENT**

The Advisory Board Company, Healthcare Industry Committee. Hospital Value-Based Purchasing. C-Suite Cheat Sheet Series. August 2013.

The Affordable Care Act

Value Based Purchasing Timeline



FY 2018 Value Based Purchasing Domains*	Baseline Period	Performance Period
Efficiency	Jan. 1, 2014 – Dec. 31, 2014	Jan. 1, 2016 – Dec. 31, 2016
Safety: CAUTI / CLABSI / SSI/C. Diff/MRSA	Jan. 1, 2014 – Dec. 31, 2014	Jan. 1, 2016 – Dec. 31, 2016
Safety: ***AHRQ PSI-90***	Oct. 1, 2011 – June 30, 2013	Oct. 1, 2014 – June 30, 2016
Outcome: Mortality	Oct. 1, 2011 – June 30, 2013	Oct. 1, 2014 – June 30, 2016
Patient Experience of Care	Jan. 1, 2014 – Dec. 31, 2014	Jan. 1, 2016 – Dec. 31, 2016
Clinical Process of Care		

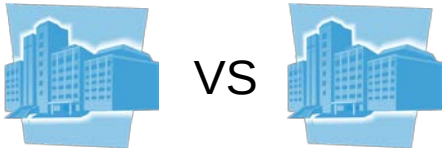
Clinical process gives way to outcomes and efficiency over time as the model becomes more Pay for Performance

The Advisory Board Company, Healthcare Industry Committee. Hospital Value-Based Purchasing. C-Suite Cheat Sheet Series. August 2013.
http://www.stratishealth.org/documents/FY2017-VBP-fact-sheet.pdf Accessed 9/8/2016
https://www.cms.gov/Newsroom/MediaReleaseDatabase/Fact-sheets/2015-Fact-sheets-items/2015-10-26.html Accessed 9/8/2016

Value Based Purchasing Scoring: 2 Ways

Improvement

- Hospitals will be assessed on how much their ***current performance changes from their own baseline period performance***
- **YOU MUST CONTINUALLY IMPROVE AGAINST PREVIOUS YEARS**



Achievement

- Hospitals measured based on how much their *current performance differs from all other hospitals' baseline period performance*
- **YOU MUST CONTINUALLY IMPROVE OVER YOUR NEIGHBORS**

Total Performance Score (TPS)

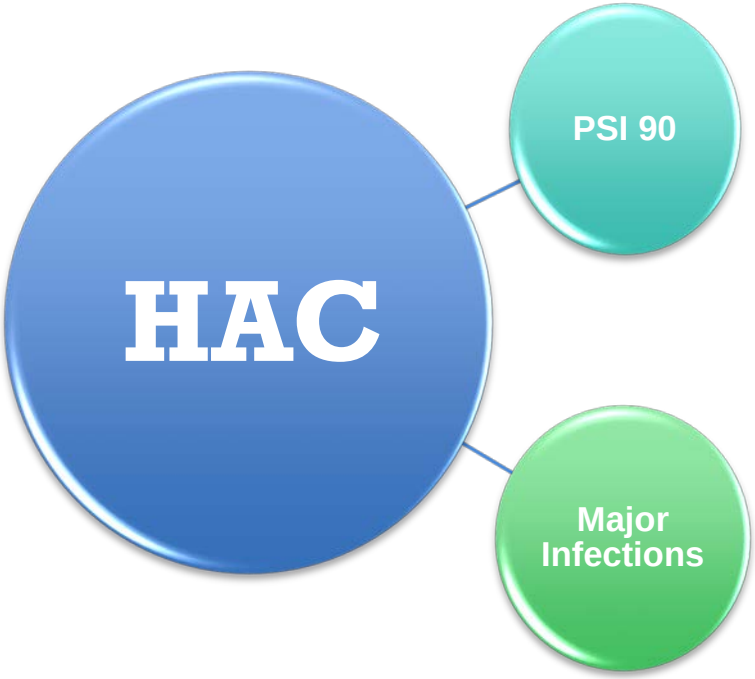
- TPS calculated by combining the greater of the hospital's achievement or improvement points on each measure to determine a score for each domain, multiplying each domain score by the proposed domain weight and adding the weighted scores together

1. http://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/hospital-value-based-purchasing/index.html?redirect=/hospital-value-based-purchasing/ Accessed on August 31, 2016

Hospital Acquired Condition (HAC) Reduction Program

- Requires CMS to reduce hospital payments by 1% for hospitals that rank among the lowest performing 25 percent with regard to HACs (beginning in FY 2015)

- The 2 Domains of this program are:
  - Domain 1 (35%)
    - Patient Safety Indicators (PSI) PSI 90 composite measure
  - Domain 2 (35%)
    - Major Infections



http://www.cms.gov/newsroom/mediareleasedatabase/fact-sheets/2013-fact-sheets-items/2013-08-02-3.html Accessed 9/8/2016

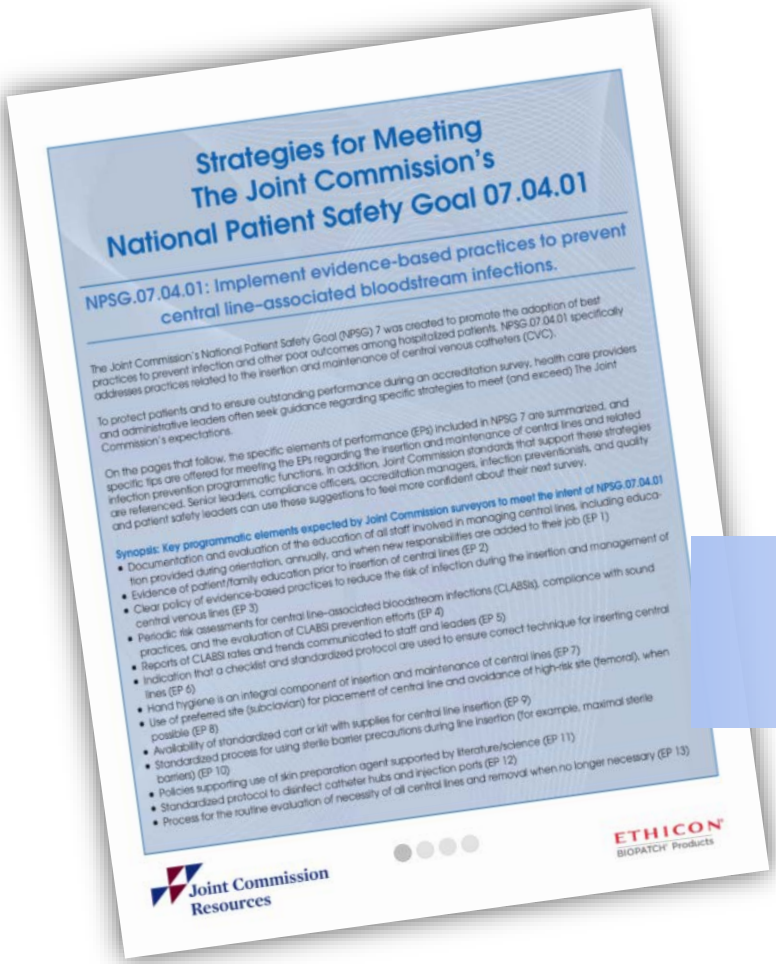
Major Infections

Upcoming Changes to the HAC Program

Metric	FY 2015	FY 2016	FY 2017
CLABSI	✓	✓	✓
CAUTI	✓	✓	✓
SSI – Colon		✓	✓
SSI- Abd Hysterectomy		✓	✓
MRSA			✓
C. Difficile			✓

The Advisory Board Company, Healthcare Industry Committee. Hospital-Acquired Condition Reduction Program. C-Suite Cheat Sheet Series. August 2013.

Goal of this new Healthcare Environment



Strategies for Meeting The Joint Commission's National Patient Safety Goal 07.04.01

NPSG.07.04.01: Implement evidence-based practices to prevent central line–associated bloodstream infections.

The Joint Commission's National Patient Safety Goal (NPSG) 7 was created to promote the adoption of best practices to prevent infection and other poor outcomes among hospitalized patients. NPSG.07.04.01 specifically addresses practices related to the insertion and maintenance of central venous catheters (CVC).

To protect patients and to ensure outstanding performance during an accreditation survey, health care providers and administrative leaders often seek guidance regarding specific strategies to meet (and exceed) The Joint Commission's expectations.

On the pages that follow, the specific elements of performance (EPs) included in NPSG 7 are summarized, and specific tips are offered for meeting the EPs regarding the insertion and maintenance of central lines and related infection prevention programmatic functions. In addition, Joint Commission standards that support these strategies are referenced. Senior leaders, compliance officers, accreditation managers, infection preventionists, and quality and patient safety leaders can use these suggestions to feel more confident about their next survey.

Synopsis: Key programmatic elements expected by Joint Commission surveyors to meet the intent of NPSG.07.04.01

- Documentation and evaluation of the education of all staff involved in managing central lines, including education provided during orientation, annually, and when new responsibilities are added to their job (EP 1)
- Evidence of patient/family education prior to insertion of central lines (EP 2)
- Clear policy of evidence-based practices to reduce the risk of infection during the insertion and management of central venous lines (EP 3)
- Periodic risk assessments for central line–associated bloodstream infections (CLABSIs), compliance with sound practices, and the evaluation of CLABSI prevention efforts (EP 4)
- Reports of CLABSI rates and trends communicated to staff and leaders (EP 5)
- Indication that a checklist and standardized protocol are used to ensure correct technique for inserting central lines (EP 6)
- Hand hygiene is an integral component of insertion and maintenance of central lines (EP 7)
- Use of preferred site (subclavian) for placement of central line and avoidance of high-risk site (femoral), when possible (EP 8)
- Availability of standardized cart or kit with supplies for central line insertion (EP 9)
- Standardized process for using sterile barrier precautions during line insertion (for example, maximal sterile barriers) (EP 10)
- Policies supporting use of skin preparation agent supported by literature/science (EP 11)
- Standardized protocol to disinfect catheter hubs and injection ports (EP 12)
- Process for the routine evaluation of necessity of all central lines and removal when no longer necessary (EP 13)

Joint Commission Resources

ETHICON BIOPATCH Products

To Ensure Optimal Reimbursement by Delivering First Class Care

NPSG 07.04.01
Implement evidence-based practices to prevent central line-associated bloodstream infection[1]

1. http://www.jointcommission.org/assets/1/18/NPSG_Chapter_Jan2013_HAP.pdf
Accessed on September 8, 2016

So…are products the solution to healthcare associated bloodstream infections?

Standards and Guidelines – The **Dos**

- Use US guidance for arterial puncture and catheter placement[1]
- In adults, the radial, brachial or dorsalis pedis sites are preferred to reduce the risk of infection[1,2]
- Perform skin antisepsis using the preferred skin antiseptic agent of >0.5 chlorhexidine in alcohol solution. If there is a contraindication to alcoholic chlorhexidine solution, tincture of iodine, an iodophor (povidone-iodine), or 70% alcohol may also be used[1,2]
- A minimum of a cap, mask, sterile gloves and a small sterile fenestrated drape should be used during peripheral arterial catheter insertion[1,2]
- During pulmonary catheter or axillary or femoral artery catheter insertion, maximal sterile barriers precautions should be used[1,2]
- Replace arterial catheters only when there is a clinical indication[2]
- Consider use of chlorhexidine-impregnated dressings with peripheral arterial catheters as an infection reduction intervention.[1]

1. Infusion Therapy Standards of Practice, Journal of Infusion Nursing. 2016, V39 (1S)
2. http://www.cdc.gov/hicpac/BSI/BSI-guidelines-2011.html Accessed 9/8/2016

Standards and Guidelines– The **Don't**s

- Do not routinely replace arterial catheters to prevent catheter-related infections[1,2]
- Do not administer infusion therapy in peripheral arteries via peripheral arterial catheters[1]
- Do not administer dextrose-containing solutions or parenteral nutrition fluids through the pressure monitoring circuit [2]

1. Infusion Therapy Standards of Practice, Journal of Infusion Nursing. 2016, V39 (1S)
2. http://www.cdc.gov/hicpac/BSI/BSI-guidelines-2011.html Accessed 9/8/2016

No products are endorsed by the CDC

- Types of products are endorsed by the CDC but never brands
  - Sometimes there is only one manufacturer of a product
  - Similar products may come to market
- What product is cited in the supporting literature used by the CDC?
  - Can I extrapolate to all products or not?
  - “Class Effect” does not apply to medical devices

Evidence You Should Ask For…

- ✓ Cleared Indication for Reduction of CRBSI
- ✓ Highest Level of Evidence/ Studies
- ✓ National Guideline Recommendations

It's up to you to decide what fits best in your hospital's protocol

Cleared Indications

- Products on the market will have a Cleared Indication.
- It is important to understand exactly ***what*** *is the intended use for the product*
  - **Read the Product Insert, under "Indication for Use"**

FDA Resources

- FDA MAUDE

(Manufacturer & User Facility Device Experience)

  - http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfMAUDE/search.CFM

- Search all of the FDA

  - http://www.fda.gov/MedicalDevices/Safety/AlertsandNotices/ucm181502.htm

Products Need to be Viewed Holistically

- Patient Safety
  - *Infection risks*
  - *Potential for errors*
  - *Compatibility of devices*
  - *Special population needs*
  - *Unintended side effects/complications*
- Employee safety
  - *Injury*
  - *Exposures*
- Financial
  - *Purchase Price*
  - *Additional equipment or materials needed*
  - *Impact of Efficacy (or non-efficacy)*
- Employee satisfaction
  - Level of difficulty
  - Impact on workload

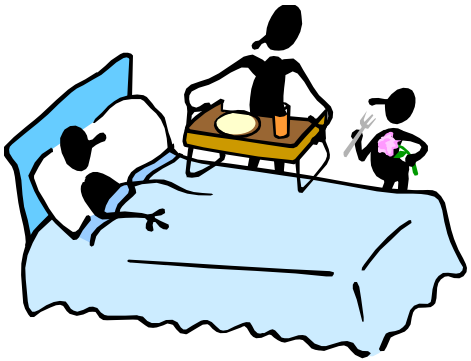
Impact on Facility/Staff

- What are the legal/safety/ quality implications for using/not using this product?
- What is the greatest priority for my staff?
- Is there an increased risk of exposure/harm to staff?
- How is it better than what we use today?

- Who else is using it?
- Who has stopped using it and why? What are the educational needs for staff?
- Where else will the patient go with the device?
  - Both in house (areas of hospital) and post discharge

Impact on Patient Outcomes

- What is the quality of the product?
  - Cleared indication
  - Review recalls and FDA citations



- Does this address the greatest threat of real harm to my patients?
- Are there potential unintended side effects/complications of using this product?

Program Summary

- A comprehensive CRBSI prevention program can dramatically reduce infection rates and improve patient safety and outcomes
- Patient outcomes equal hospital income, and evidence based products can improve patient outcomes
- When evaluating products, choose products that are solution oriented and evidence based to help support the needs of the changing healthcare landscape