A Renewed Look at Evidence-Based Guidelines

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Objectives

• Review guidelines and compendium recommendations set forth by:
  – Centers for Disease Control and Prevention (CDC)
  – Society for Healthcare Epidemiologists of America (SHEA)
  – Infusion Nurses’ Society (INS)

• Provide some of the evidence used to formulate these recommendations

• Compare and contrast the CDC, SHEA and INS recommendations
How Big of a Problem are Healthcare Associated Infections (HAIs)?

- Point Prevalence Survey; National Healthcare Safety Network (NHSN) N=183 hospitals, 2011
- Patients at risk = 11,282
  - 452 (4.0%) with ≥ one HAI
  - Distribution by site – see pie chart
  - C. difficile = 70% of GI infections

- Nationwide estimates:
  - 648,000 patients with 721,800 HAIs/year and of these the three most frequent sites are pneumonia, surgical site and gastrointestinal infections.

% HAIs

- Pneumonia
- SSI
- GI
- UTI
- BSI
- ENT
- LRI
- SST
- CV

Magill SS et al. NEJM 2014;370:1198-208
Who Gets HAIs? 1/25 on any given day in U.S. hospitals; many are older adults

44% are 65 or older

1 in 9 die
Progress Report for Prevention of HAIs, U.S.

**CLABSIs**
- 46% lower compared to nat'l baseline
- Central Line-Associated Bloodstream Infections
- When a tube is placed in a large vein and not put in correctly or kept clean, it can become a way for germs to enter the body and cause deadly infections in the blood.
- U.S. hospitals reported a significant decrease in CLABSIs between 2012 and 2013.
- Among the 2,389 hospitals in U.S. with enough data to calculate an SIR, 9% had an SIR significantly worse than the national SIR of 0.54.

**CAUTIs**
- 6% higher compared to nat'l baseline
- Catheter-Associated Urinary Tract Infections
- When a urinary catheter is not put in correctly, not kept clean, or left in a patient for too long, germs can travel through the catheter and infect the bladder and kidneys.
- U.S. hospitals reported a significant increase in CAUTIs between 2012 and 2013.
- Among the 2,781 U.S. hospitals with enough data to calculate an SIR, 12% had an SIR significantly worse than the national SIR of 1.06.

**MRSA Bacteremia**
- 8% lower compared to nat'l baseline
- Laboratory Identified Hospital-Onset Bloodstream Infections
- Methicillin-resistant *Staphylococcus aureus* (MRSA) is bacteria usually spread by contaminated hands. In a healthcare setting, such as a hospital, MRSA can cause serious bloodstream infections.
- U.S. hospitals reported a significant decrease in MRSA Bacteremia between 2012 and 2013.
- Among the 2,002 U.S. hospitals with enough data to calculate an SIR, 7% had an SIR significantly worse than the national SIR of 0.92.

**SSIs**
- Surgical Site Infections
- See page 3 for additional procedures
- **SSI: Abdominal Hysterectomy**
  - 14% lower compared to nat'l baseline
  - U.S. hospitals reported no significant change in SSIs related to abdominal hysterectomy surgery between 2012 and 2013.
  - Among the 765 U.S. hospitals with enough data to calculate an SIR, 6% had an SIR significantly worse than the national SIR of 0.86.
- **SSI: Colon Surgery**
  - 8% lower compared to nat'l baseline
  - U.S. hospitals reported a significant increase in SSIs related to colon surgery between 2012 and 2013.
  - Several changes to the NHSN 2013 SSI protocol likely contributed to an increase in the national and some state-specific colon surgery SIRs compared to 2012.
  - Among the 2,030 U.S. hospitals with enough data to calculate an SIR, 7% had an SIR significantly worse than the national SIR of 0.92.

**C. difficile Infections**
- 10% lower compared to nat'l baseline
- Laboratory Identified Hospital-Onset C. difficile Infections
- When a person takes antibiotics, good bacteria that protect against infection are destroyed for several months. During this time, patients can get sick from *Clostridium difficile* (C. difficile), bacteria that cause potentially deadly diarrhea, which can be spread in healthcare settings.
- U.S. hospitals reported a significant decrease in C. difficile infections between 2012 and 2013.
- Among the 3,557 U.S. hospitals with enough data to calculate an SIR, 13% had an SIR significantly worse than the national SIR of 0.90.
2011 HICPAC Guidelines
The Centers for Disease Control and Prevention (CDC)

Intended to provide evidence-based recommendations for preventing intravascular catheter-related infections

2011 CDC Guidelines

5 major areas of emphasis:

1. Education of healthcare professionals

2. Use maximal sterile precautions (MSP)

3. Use of > 0.5% CHG skin prep

4. Avoiding routine replacement of CV catheters as a strategy to prevent infections

5. Use antiseptic/antibiotic impregnated catheters and CHG impregnated sponge dressing (If rate of infection not decreasing despite adherence to above 4 strategies)

Targets elimination of CRBSI from ALL patient care areas

2011 HICPAC Guidelines

Guideline Categorization

- **Category IA.** Strongly recommended for implementation and strongly supported by well-designed experimental, clinical, or epidemiologic studies.

- **Category IB.** Strongly recommended for implementation and supported by some experimental, clinical, or epidemiologic studies and a strong theoretical rationale; or an accepted practice (e.g., aseptic technique) supported by limited evidence.

- **Category IC.** Required by state or federal regulations, rules, or standards.

- **Category II.** Suggested for implementation and supported by suggestive clinical or epidemiologic studies or a theoretical rationale.

- **Unresolved issue.** Represents an unresolved issue for which evidence is insufficient or no consensus regarding efficacy exists.

Selection of Catheters and Sites

- Avoid using the femoral vein
- In hemodialysis patients & patients with advanced kidney disease, avoid subclavian access
  - Use a fistula or graft
- Use a chlorhexidine/silver sulfadiazine or minocycline/rifampin-impregnated CVC
  - in patients whose catheter is expected to remain in place >5 days if, after successful implementation of a comprehensive strategy to reduce rates of CLABSI, the CLABSI rate is not decreasing

Hand Hygiene & Aseptic Technique

• Sterile gloves should be worn for the insertion of arterial, central, and midline catheters.

• Prepare clean skin site with > 0.5% chlorhexidine with alcohol
  – before central venous catheter and peripheral artery catheter insertion
  – during dressing changes.
  – If there is a contraindication to chlorhexidine, tincture of iodine, an iodophor, or 70% alcohol can be used as alternatives.
2011 HICPAC Guidelines
Category 1A Recommendations
Highlights

Dressings, Antiseptics, & Antibiotics

• Use either sterile gauze or sterile, transparent, semipermeable dressing to cover the catheter site.

Administration sets, port/connector disinfection

• Scrub access ports with an appropriate antiseptic
  – Chlorhexidine
  – Povidone iodine
  – Iodophor or 70% alcohol

• Access ports only with sterile devices.

Selection of Catheters and Sites

• Use ultrasound guidance to place CVCs
• Use a CVC with the minimum number of necessary ports or lumens
• Do not administer routine systemic antimicrobial prophylaxis prevent CRBSI
• Use a subclavian site
  – Avoid jugular or femoral site
• Replace the catheter as soon as possible (within 48 hours)
  – When adherence to aseptic technique cannot be ensured
  – Catheters inserted during a medical emergency
Hand hygiene, Skin Prep and Site Care

• Antiseptics should be allowed to dry
  – according to the manufacturer’s recommendation prior to placing the catheter.

• Use maximal sterile barrier precautions for the insertion of CVCs, PICCs, or guidewire exchange.
  – cap, mask, sterile gown, sterile gloves, and a sterile full body drape
Skin Prep and Site Care

• 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, use of chlorhexidine skin antisepsis, and MSBP.

No recommendation is made for other types of chlorhexidine dressings. Unresolved Issue

• Monitor the catheter sites visually when changing the dressing or by palpation through an intact dressing on a regular basis, depending on the clinical situation of the individual patient.
  – If patients have tenderness at the insertion site, fever without obvious source, or other manifestations suggesting local or bloodstream infection, the dressing should be removed to allow thorough examination of the site.

Peripheral IVs

• There is no need to replace peripheral catheters more frequently than every 72-96 hours to reduce risk of infection and phlebitis in adults.

• Replace peripheral catheters in children only when clinically indicated.

• Remove peripheral venous catheters if the patient develops signs of phlebitis (warmth, tenderness, erythema or palpable venous cord), infection, or a malfunctioning catheter.

Peripheral Artery Catheters

• A minimum of a cap, mask, sterile gloves and a small sterile fenestrated drape should be used during peripheral arterial catheter insertion.

No recommendation can be made regarding:

- A preferred site of insertion to minimize infection risk for a **tunneled** CVC
- The necessity for any dressing on well-healed exit sites of long-term cuffed and tunneled CVCs.
- The frequency for replacing needles to access implantable ports.
- The length of time a needle used to access implanted ports can remain in place
2011 HICPAC Guidelines

Unresolved Issues

Highlights

No recommendation can be made regarding

- Using chlorhexidine preparations with alcohol vs. povidone-iodine in alcohol to prepare clean skin

- The safety or efficacy of chlorhexidine in infants aged <2 months

- The use of other types of chlorhexidine dressings

SHEA Compendium 2014 Update

Strategies to Prevent Central Line-Associated Bloodstream Infections in Acute Care Hospitals: 2014 Update

SHEA Compendium
2014 Update

• Intent
  – Highlight practical recommendations in a concise format
designed to assist acute care hospitals in implementing and
prioritizing their (CLABSI) prevention efforts.

• Update to
  – “Strategies to Prevent Central Line–Associated Bloodstream
   Infections in Acute Care Hospitals”(2008)

• Sponsored By
  – Society for Healthcare Epidemiology of America (SHEA)
  – In Collaboration with
    • Infectious Diseases Society of America (IDSA)
    • American Hospital Association (AHA)
    • Association for Professionals in Infection Control and
      Epidemiology (APIC)
    • The Joint Commission (TJC)
# Grading of the Quality of Evidence

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<thead>
<tr>
<th>Grade</th>
<th>Definition</th>
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<tr>
<td>I. High</td>
<td>Highly confident that the true effect lies close to that of the estimated size and direction of the effect. Evidence is rated as high quality when there is a wide range of studies with no major limitations, there is little variation between studies, and the summary estimate has a narrow confidence interval.</td>
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<tr>
<td>II. Moderate</td>
<td>The true effect is likely to be close to the estimated size and direction of the effect, but there is a possibility that it is substantially different. Evidence is rated as moderate quality when there are only a few studies and some have limitations but not major flaws, there is some variation between studies, or the confidence interval of the summary estimate is wide.</td>
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<tr>
<td>III. Low</td>
<td>The true effect may be substantially different from the estimated size and direction of the effect. Evidence is rated as low quality when supporting studies have major flaws, there is important variation between studies, the confidence interval of the summary estimate is very wide, or there are no rigorous studies, only expert consensus.</td>
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**Note.** Based on Grades of Recommendation, Assessment, Development, and Evaluation (GRADE)\textsuperscript{257} and the Canadian Task Force on Preventive Health Care.\textsuperscript{258}

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**Not all recommendations within this publication were accompanied by a quality grade**

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Rationale and Statements of Concern

• Besides central venous catheters (CVCs), peripheral arterial catheters also carry a risk of infection.

• Factors associated with increased risk of CLABSI includes heavy microbial colonization at the insertion site.

• Patients at risk: non-ICU population: ... Majority of CLABSIIs occur in hospital units outside the ICU or in outpatient units.
Rationale and Statements of Concern

• Infection prevention and control efforts should include... patient receiving hemodialysis through catheters.

• Outcomes associated with hospital-acquired CLABSI... cost variance $3,700 - $39,000.
Background – Strategies to Prevent CLABSIs

- The recommendations in this document focus on CVCs unless noted otherwise. These recommendations:
  1. are not stratified on the basis of catheter type (e.g., tunneled, implanted, cuffed, noncuffed or dialysis catheters)
  2. may not be applicable for prevention of bloodstream infections with other intravascular devices.
Basic Strategies for preventing and monitoring CLABSI
Recommended for all acute care hospitals

• The optimal choice of antiseptic agents is unresolved for children under 2 months of age.
  – However, chlorhexidine is widely used in children under 2 months of age.
  – A U.S. survey found that in the majority of neonatal ICUs (NICUs) chlorhexidine products are used for catheter insertion in this age group
  – Some institutions have used chlorhexidine-containing sponge dressings for CVCs and chlorhexidine for cleaning CVC insertion sites in children in this age group with minimal risk of such reactions.
  – Providers must carefully weigh the potential benefit in preventing CLABSI in children under 2 months.
Special approaches for preventing CLABSI

• Use antiseptic- or antimicrobial-impregnated CVCs in adult patients. (quality of evidence: I)

• Use chlorhexidine-containing dressings for CVCs in patients over 2 months of age. (quality of evidence I)

• Use an antiseptic-containing hub/connector cap/port protector to cover connectors. (quality of evidence I)
Examples of Implementation Strategies

• Changes of products, devices or technology used in the insertion and care of CVCs require adequate device training for all healthcare personnel expected to use the product(s).
  – This training follows a period of device evaluation and its impact on CLABSI.
  – Most device manufacturers employ personnel with clinical experience to provide product training, and this resource should not be overlooked.
Examples of Implementation Strategies

• Process measurement includes, but is not limited to
  – compliance with insertion bundles
  – CVC utilization by insertion site or type (e.g., femoral catheters vs. other CVC sites, PICCs vs. centrally inserted lines)
  – the condition of CVC dressing and timely dressing changes
  – integrity and appropriate management of needleless connectors, other add-on-devices and intravenous administration sets.
Examples of Implementation Strategies

• Accountability is an essential principle for preventing HAI…begins with the chief executive officer and other senior leaders
  – Making HAI prevention an organizational priority
  – Senior leadership is accountable for providing adequate resources needed for effective implementation of an HAI prevention program.
  – These resources include necessary personnel (clinical and nonclinical), education, and equipment.
"The Infusion Nurses Society (INS) is recognized as the global authority in infusion nursing… The Infusion Nursing Standards of Practice will be invaluable to guide decision making and for developing patient-centered plans of care."

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

References and Ratings

- “Searches were limited to English-language, peer-reviewed journals published between 2009 and July 2015.”… “Classic papers were included as needed.”

- The rating scale for the strength of the body of evidence ranges from the highest rating of “I,” representing a meta-analysis and other research on research to the lowest rating of “V.”
SECTION ONE:
Standard 6. Quality Improvement

E. “Evaluate adverse events from peripheral catheters for infiltration, phlebitis, and/or bloodstream infections in identified populations through incidence, point prevalence, reports from electronic medical records, or International Classification of Diseases (ICD) codes…”

E6. “Consider monitoring bloodstream infection rates for peripheral catheters, or vascular catheter associated infections (peripheral) regularly (IV)”
SECTION TWO: PATIENT AND CLINICIAN SAFETY

Standard 12. Product evaluation, integrity, and defect reporting

12.1 “Clinician end users are involved in the evaluation of infusion related technologies, including clinical application, expected outcomes, performance, infection prevention, safety, efficacy, reliability, and cost.”
SECTION FIVE: VASCULAR ACCESS DEVICE (VAD) SELECTION AND PLACEMENT


Practice Criteria III. Central Vascular Access Devices

E: “When used intermittently, ports have a lower incidence of catheter-related bloodstream infections (CR-BSI); however, continuous port access has infection rates that are similar to other long-term CVADs (IV).”
Standard 27. Site Selection

Practice Criteria I. Peripheral Venous Access via Short Peripheral Catheters

A1. “Use the venous site most likely to last the full length of the prescribed therapy, using the forearm to increase dwell time, decrease pain during dwell time, promote self-care, and prevent accidental removal and occlusions. Consider veins found on the dorsal and ventral surfaces of the upper extremities, including metacarpal, cephalic, basilic, and median veins. (IV)”

Practice Criteria VII. External Jugular Vein Access

B. “When a short peripheral catheter is inserted into the external jugular vein and infusion therapy is expected to exceed 96 hours, collaborate with the LIP for an alternative vascular access site as soon as possible (V).”
D3. “There is insufficient evidence to recommend an optimal time for replacement of non-coring needle when the implanted vascular access port is used for continuous infusion. (V)”

G. “Use a transparent semipermeable membrane (TSM) dressing or gauze dressing that covers the noncoring needing and access site when the port is accessed. Change the TSM dressing every 5-7 days and gauze dressings every 2 days. When gauze is used under the TSM to support wings of an access needle and does not obscure the access site, change the TSM dressing every 5-7 days. (IV)”
SECTION FIVE: VASCULAR ACCESS DEVICE (VAD) SELECTION AND PLACEMENT

Standard 33. Vascular Access Site Preparation and Device Placement

Practice Criteria I. General

F. “Make no more than 2 attempts at short peripheral intravenous access per clinician, and limit total attempts to no more than 4. Multiple unsuccessful attempts can cause patient pain, delay treatment, limit future vascular access, increase cost, and increase risk for complications… (IV)”
E1. “Use a new pair of disposable, nonsterile gloves in conjunction with a “no-touch” technique for peripheral IV insertion, meaning that the insertion site is not palpated after skin antisepsis. (V)”

E2. “Consider increased attention to aseptic technique, including strict attention to skin antisepsis and the use of sterile gloves, when placing short peripheral catheters….”

F. “Consider the use of maximal sterile barrier precautions with midline catheter insertion. (V)”
SECTION SIX: VASCULAR ACCESS DEVICE (VAD) MANAGEMENT

Standard 34. Needleless Connectors

G. “Use of disinfection caps on peripheral catheters has limited evidence but should be considered.”

G3. “After removal, multiple accesses of the VAD may be required... and require additional disinfection before each entry. Scrubbing time, technique, and agents for disinfection of the needleless connector between subsequent connections are unknown due to a lack of research. Consider using vigorous 5-15 second scrub time with each subsequent entry into the VAD, depending upon the needleless catheter design (Committee Consensus).”

H. “Change the needleless connector no more frequently than 96-hour intervals. Changing at more frequent time interval adds no benefit and has been shown to increase the risk of CLASBI.”
INS 2016 Standards Highlights

SECTION SIX: VASCULAR ACCESS DEVICE (VAD) MANAGEMENT

Standard 37. Vascular Access Devices (VAD) Stabilization

37.1 “Stabilize and secure vascular access devices (VADs) to prevent VAD complication and unintentional loss of access.”

37.2 “Methods to stabilize the VAD will not interfere with assessment and monitoring of the access site and will not impede vascular circulation or delivery of the prescribed therapy.”

B. “Avoid the use of tape or sutures as they are not effective alternatives to an ESD (Engineered Stabilization Device)....Sutures are associated with needle-stick injury, in addition to supporting the growth of biofilm and increasing the risk of catheter-related blood stream infection. (II, Regulatory)”
SECTION SIX: VASCULAR ACCESS DEVICE (VAD) MANAGEMENT

Standard 37. Vascular Access Devices (VAD) Stabilization

D. “For peripheral catheters, consider two options for catheter stabilization: (1) in integrated stabilization feature on the catheter hub combined with a bordered polyurethane securement dressing or (2) a standard round hub peripheral catheter in combination with an adhesive ESD. Both have demonstrated equivalent complication rates, although complication rates for both types were not greatly reduced with either type of ESD.”

Standard 41. Vascular Access Devices (VAD) Assessment, Care, and Dressing Change

I. “Perform dressing changes on short peripheral catheters if the dressing becomes damp, loosened, and/or visibly soiled and at least every 5 to 7 days (V, Committee Consensus)”
F4. “Use chlorhexidine with care in premature infants and infants under 2 months of age due to risks of skin irritation and chemical burns. (IV)”

J2. “Use chlorhexidine-impregnated dressing with caution in premature neonates and among patients with fragile skin and/or complicated skin pathologies; contact dermatitis and pressure necrosis have occurred. (V)”

INS 2016 Standards Highlights

SECTION SIX: VASCULAR ACCESS DEVICE (VAD) MANAGEMENT
Standard 41. Vascular Access Devices (VAD) Assessment, Care, and Dressing Change
J. “Use chlorhexidine-impregnated dressings over CVADs to reduce infection risk when the extraluminal route is the primary source of infection. Even when organizations show a low baseline central line-associated bloodstream infection (CLABSI) rate, further reduction in CLABSI rate has been demonstrated with use of chlorhexidine impregnated dressings…”

M. “Consider the use of chlorhexidine-impregnated dressings with peripheral arterial catheters as an infection reduction intervention. (III)"
SECTION SIX: VASCULAR ACCESS DEVICE (VAD) MANAGEMENT

Standard 44. Vascular Access Device Removal

44.1 “The clinical need for each peripheral and non-tunneled central vascular access device CVAD is assessed on a daily basis.”

44.2 “Vascular access devices VADs are removed upon unresolved complication discontinuation of infusion therapy or when deemed no longer necessary for the plan of care.”

44.3 “VADs are not removed based solely on the length of dwell time because there is no known optimal dwell time.”
SECTION SIX: VASCULAR ACCESS DEVICE (VAD) MANAGEMENT

Standard 44. Vascular Access Device Removal

A. “Remove the short peripheral catheter if it is no longer included in the plan of care or has not been used for 24 hours or more. (V)”

E. “Notify the LIP about signs and symptoms of suspected catheter related infection and discuss the need for obtaining cultures (e.g. drainage, blood culture) before removing a peripheral catheter (refer to standard 49, Infection).”
SECTION SIX: VASCULAR ACCESS DEVICE (VAD) MANAGEMENT
Standard 44. Vascular Access Device Removal
Practice criteria I: Short Peripheral and Midline Catheters

B. “Remove short peripheral and midline catheters in pediatric and adult patients when clinically indicated based on findings from site assessment and or clinical signs and symptoms of systemic complications (e.g., Bloodstream infection). Signs and symptoms of complications with or without infusion through the catheter include but are not limited to the presence of (I) “

1. Any level of pain and or tenderness with or without palpation
2. Changes in color erythema or blanching
3. Changes in skin temperature hot or cold
4. Edema
5. Induration
6. Leakage of fluid or purulent drainage from the puncture site
7. Other types of dysfunction (e.g., resistance when flushing, absence of the blood return)”

Infusion Therapy Standards of Practice, Journal of Infusion Nursing. 2016, V39 (1S)
SECTION SEVEN: VASCULAR ACCESS DEVICE-RELATED COMPLICATIONS

Standard 49. Infection

C. “Remove a peripheral venous catheter if the patient develops symptoms of infection (e.g. erythema extending at least 1 cm from the insertion site, induration, exudate, fever with no other obvious source of infection) or the patient reports any pain or tenderness associated with the catheter. (IV)"

K6. “Consider the use of chlorhexidine impregnated dressings for patients with an epidural access device. A significant reduction in epidural skin colonization and catheter tip colonization has been demonstrated with their use. (III)”
## Comparison of Recommendations

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<thead>
<tr>
<th>Recommendation</th>
<th>CDC</th>
<th>SHEA</th>
<th>INS</th>
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<tr>
<td>Maximum Sterile Barrier (CVC insertion)</td>
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<tr>
<td>Use of Ultrasound Guidance</td>
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<td>Antiseptic/antimicrobial catheters</td>
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<td>Inclusion of PIV related BSIs in surveillance activity</td>
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Hierarchy of Medical Evidence

- Systematic Reviews and Meta-analyses
- Randomized Controlled Trials
- Cohort Studies
- Case Control Studies
- Case Series
- Case Reports
- Ideas, Editorials, Opinions
- Animal Research
- In Vitro (‘Test Tube’) Research

http://library.downstate.edu/ebm/2500.htm
Summary Points

• A continued focus on CLABSI prevention

• Emerging evidence is impacting practice guidelines

• The role of the clinician end user in practice evaluation, policy revisions, product selection and outcome evaluation is crucial

• Accountability is an essential principle for preventing HAIs…begins with the chief executive officer and other senior leaders who provide the imperative for HAI prevention, thereby making HAI prevention an organizational priority¹

• Senior leadership is accountable for providing adequate resources needed for effective implementation of an HAI prevention program. These resources include necessary personnel (clinical and nonclinical), education, and equipment¹

Questions