



# AVOIDING HARM DURING VASCULAR ACCESS PROCEDURES

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**NO DISCLOSURES**

Gen



- Vas  
L38



CP  
58

M1  
0.5

229



3.9

## WE WILL COVER...

- Impact on care and costs
- Compare complication rates
- Step-by-step look at:
  - Catheters
  - Insertion sites
  - Insertion technique
- Review evidence-based best practices

# CENTRAL VENOUS CATHETERS

- 5 million annually<sup>1</sup>
- Complications
  - Morbidity: 2-26%<sup>2</sup>
    - 10% infection rate
  - Mortality
    - Attributable mortality: 12-25%<sup>3</sup>
    - % of hospital deaths: 20.4%<sup>4</sup>
- Expensive!

1. Raad I. Lancet 1998;351:893-8.

2. Sznajder JI et al. Arch Intern Med 1986; 146:259-61.

3. Kluger DM et al. American Society for Microbiology, 1999.

4. Mermel LA. Ann Intern Med 2000 Sep 5;133(5): 395.

LET'S DO THE MATH!

$$250,000 \times \$25,000 =$$

**\$6.25 Billion**

# ARE WE A PART OF THE PROBLEM?

- Retrospective chart review
- Academic, urban ED setting
- 656 central venous catheter insertions
- 7 central line associated blood stream infections
  - 8% of all hospital central line infections
- Infection rates:
  - ED: 1.93 infections per 1,000 catheter days
  - Admitted to ICU: 3/601 (0.4%)
  - Admitted to the Ward: 4/55 (7%)
- Comparable to National ICU rate?



**EMERGENCY MEDICINE**

**Are Central Lines Placed in the  
ED Associated with Higher Risk  
for Bloodstream Infections?**

*The rate of bloodstream infections for  
central lines placed in a single emergency  
department was comparable to the rate  
for lines placed in the intensive care unit.*

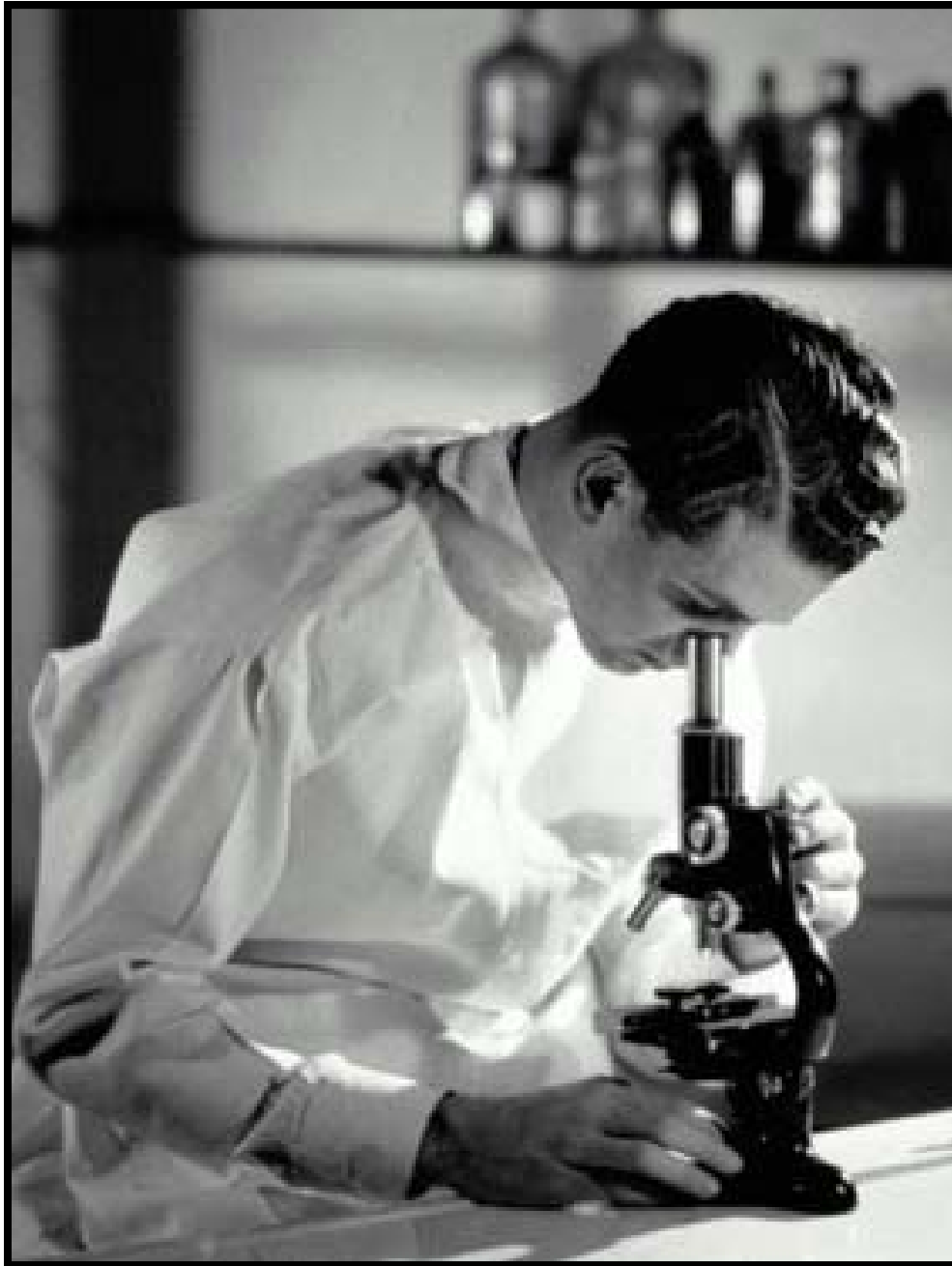
We have the same problem as the ICU...

# COMPLICATIONS

- Steele et al<sup>6</sup>...

Complication	Complication Rate	(CI)
Pneumothorax	12/643 (1.9%)	(0.3, 2.0)
Hematoma	7/643 (1%)	(1.0, 3.2)
Misplacement	3/643 (<0.1%)	(0.002, 0.01)

10%



Who is  
paying  
attention?

## POLITICS & THE NATION

# Basic practices could help prevent hospital infections

Survey finds lack of knowledge, resources leads to needless deaths

BY N.C. AIZENMAN

Deadly yet easily preventable bloodstream infections continue to plague American hospitals because facility administrators fail to commit resources and attention to the problem, according to a survey of medical professionals released Monday.

An estimated 80,000 patients per year develop catheter-related bloodstream infections, or CRBSIs — which can occur when

tubes that are inserted into a vein to monitor blood flow or deliver medication and nutrients are improperly prepared or left in longer than necessary. About 30,000 patients die as a result, according to the Centers for Disease Control and Prevention, accounting for nearly a third of annual deaths from hospital-acquired infections in the United States.

Yet evidence suggests hospital workers could all but eliminate CRBSIs by following a five-step checklist that is stunningly basic: (1) Wash hands with soap; (2) clean patient's skin with an effective antiseptic; (3) put sterile drapes over the entire patient; (4) wear a sterile mask, hat, gown and gloves; (5) put a sterile dress-

ing over the catheter site.

The approach also calls for clinicians to continually reconsider whether the benefits of keeping the catheter in for another day outweigh the risks and to use electronic monitoring systems that allow them to spot infections quickly and assemble a rapid response team to treat them.

A federally funded program implementing these measures in intensive-care units in Michigan hospitals reduced the incidence of CRBSIs by two-thirds, saving more than 1,500 lives and \$200 million in the first 18 months. Similar initiatives across the country helped bring the overall national rate of these and related bloodstream infections down by

18 percent in the first six months of 2010, according to the CDC.

"Our research shows that the cost of implementing [such programs] is about \$3,000 per infection, while an infection costs between \$30,000 to \$36,000," said Peter Pronovost, a professor at Johns Hopkins University School of Medicine who led the program. "That means an average hospital saves \$1 million."

So why aren't hospitals leaping to adopt these best practices?

The survey released Monday, which was conducted by the Association for Professionals in Infection Control and Epidemiology and funded by Bard Access Systems, a maker of catheters, pointed to ignorance and neglect

at the top.

More than half of the 2,075 respondents, most of whom were infection control nurses employed by hospitals, reported that they use a cumbersome paper-based system for tracking patients' conditions that makes it harder to spot infections in real time. Seven in 10 said they are not given enough time to train other hospital workers on proper procedures. Nearly a third said enforcing best practice guidelines was their greatest challenge, and one in five said administrators were not willing to spend the necessary money to prevent CRBSIs.

Pronovost said part of the problem was that many hospital chief executives aren't even aware of

their institution's bloodstream infection rates, let alone how easily they could bring them down.

When hospital leaders decide to create a culture in which preventing infections is a priority, he added, nurses feel empowered to remind physicians to follow the checklist when inserting catheters, physicians are provided antiseptic soaps as part of their catheter kits and infection control personnel have the best tools to monitor patients.

"If anyone in that chain of accountability doesn't work, you won't get your [infection] rates down," he said. "But it's the hospital's senior leadership that is ultimately responsible."

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IHI.org

A resource from the  
Institute for Healthcare Improvement

PROTECTING

**5 Million** *lives*

FROM HARM

SOME IS NOT A NUMBER. SOON IS NOT A TIME.



Accreditation Program: Hospital

National Patient Safety Goals

Effective July 1, 2010

**2011**

**Hospital**

**National Patient Safety Goals**

**\*USE PROVEN GUIDELINES TO  
PREVENT INFECTION OF THE  
BLOOD FROM CENTRAL LINES**

# CATHETER TYPE

- Single-lumen vs multi-lumen<sup>7</sup>
- Anti-microbial impregnated catheters
  - ↓ risk of infection<sup>8</sup>
  - ↓ cost<sup>9</sup>
- Consider if catheter-related infection rate > **2%**



7 Farkas JC et al. 1992;93:277-82

8. Raad I et al. Ann Intern Med 1997;127:267-74.

9. Veenstra DL et al. JAMA 1999;282:554-60.

# INSERTION SITES

- Risk factors for difficult subclavians<sup>10</sup>
  - Failed attempts
    - Prior major surgery
    - BMI >30 or <20
    - Previous catheterization
  - Complications
    - Number of needle passes
      - Single pass = 4.3% complication rate
      - >2 passes = 24%



# INSERTION SITES

- Choose subclavian<sup>11</sup>
  - Infection: 1.2 vs 4.5 infections/1000 catheter days
  - Mechanical complications
- Subclavian = IJ
- Thrombosis risk
  - Femoral: 20%
  - IJ: 4 times the risk of subclavian<sup>12</sup>

11. Merrer J. JAMA 2001;286:700-7.

12. Timset JF et al. Chest 1998;114:207-13.

# INSERTION TECHNIQUE

- Cleaning the site
  - Chlorhexidine outperforms:<sup>13</sup>
    - Povidone-iodine
    - Alcohol
  - Scrubbing
    - 30 seconds
    - 2 minutes
- Use maximal sterile precautions<sup>14,15</sup>
  - 6-fold decrease in infection

13. Larson EL et al. Am J Infect Control 1995;23:251-69.

14. Mermel LA et al. Am J Med 1991;91 (suppl):S197-S205.

15. Raad II et al. Infect Control Hosp Epidemiol 1994;15:231-8.

# PREVENT AIR EMBOLISM

- Flush and clamp your lines
- Keep catheter hubs occluded

**Trendelenberg**



# INSERTION TECHNIQUE

- Seek assistance from an experienced clinician<sup>16</sup>
  - **50** lines
- Ultrasound-guided IJs vs landmark<sup>17</sup>
  - Reduced
    - Time to insertion
    - Failure
    - Arterial puncture/hematoma

16. Sznajder JI et al. Arch Intern Med 1986; 146:259-61.

17. Randolph AG et al. Crit Care Med 1996;24:2053-8.

## IN SUMMARY...

- Infection poses the greatest risk
- Make subclavian your first choice
- Optimize equipment and technique
- Due diligence saves lives

