Quality Improvement in VA:
The Relationship between Insertion and Care and Maintenance:
CLABSI Committee

Jack LeDonne MD, VA-BC, FACS
Disclosures

Eloquest

Ethicon

Teleflex (video license)
The **CLABSI** Committee

Must be important…note that …

**Pneumothorax** Committee

**Mechanical Complications** Comm

In 50 min…question
Life Cycle of a CVC: Standardizing Practice...at

Chain of CLABSI Prevention
The Chain of CLABSI Prevention

Suppose we could demonstrate a break in the process of CLABSI prevention?

Would we (should we) make the necessary change?
Life Cycle of a CVC: Standardizing Practice...at

The Michigan Appropriateness Guide for Intravenous Catheters (MAGIC): Results From a Multispecialty Panel Using the RAND/UCLA Appropriateness Method

Vineet Chopra, MD, MSc; Scott A. Flanders, MD; Sanjay Saint, MD, MPH; Scott C. Woller, MD; Naomi P. O’Grady, MD; Nasia Safdar, MD, PhD; Scott O. Trerotola, MD; Rajiv Saran, MD, PhD; Nancy Moureau, BSN, RN; Stephen Wiseman, PharmD; Mauro Pittiruti, MD; Elie A. Akl, MD, MPH, PhD; Agnes Y. Lee, MD, MSc; Anthony Courey, MD; Lakshmi Swaminathan, MD; Jack LeDonne, MD; Carol Becker, MHSA; Sarah L. Krein, PhD, RN; and Steven J. Bernstein, MD, MPH
MAGIC, VHP, Proper Device

Assessment

“Pre-Insertion” Actual Insertion Dressing C&M Removal

Infusate Compatibility

DIVA

Frequent Phlebotomy

Projected Duration

CKD 3b

# of Lumens

What can we do?

Rec 1: Build MAGIC into EMR
Michigan MAGIC App

Inpatient

Effective
recognition
and response

For more
information

Highlight
1. Use
   eGFR
   or
   iGFR
   to
   provide a
   real-time,
   inpatient
   eGFR
   that
   reflects
   true
   kidney
   function.

2. Use
   VAS!
   or
   VAST
   to
   assess
   the
   patient's
   need
   for
   vascular
   access.

3. Use
   the
   MAGIC
   App
   to
   guide
   the
   PICC
   placement
   decision.

- VAST RN may order Alteplase 2mg/2ml PRN to declot central line
- Scheduled Times: Hide Schedule
- Priority: Routine
- Frequency: Once
- Starting: 7/19/2016
- First Occurrence: Today 0823
- Other
  - Reason for PICC placement
    - Poor or Difficult Peripheral Access
      - Requiring Peripherally Compatible Infusates as an Outpatient
      - Medications Requiring Central Access (e.g., irritants or vesicants)
      - Frequent Phlebotomy (every 8 hours)
      - Invasive Hemodynamic Monitoring or Central Access
      - Palliative Treatment at End-of-Life
  - Duration of use
    - 1-5 days
    - 6 or more days
  - Lumens
    - Single
    - Double
    - Triple
  - Explain need for double lumen
- eGFR is equal to or >45 ml/min
- eGFR is <45 ml/min
- PICC placement cleared with nephrology service
- Dialysis/transplant patient; PICC placement cleared with nephrology
- Last Resulted:
  - Egfr, Black
  - Egfr, Non-Black
  - Time Elapsed
  - Value
  - Range
  - Status
  - Comments
Life Cycle of a CVC: Standardizing Practice...at

- **Assessment**
- **“Pre-Insertion”**
- **Actual Insertion**
- **Dressing C&M**
- **Removal**

CDC, IHI, Keystone Insertion Bundle

Hand Hygiene → Drapes
Before 2007

isolated reports that some hospitals had reduced CR-BSI to 0 generally regarded..
The **Insertion Bundle**

- **Hand Hygiene**
  
- **Chlorhexidine**

- **Maximum Barrier**

- **Daily Review of Necessity**

- **Avoid Femoral Site**
National Standard: **Insertion Bundle**

**Pros**
- It works (7.7-1.4)
- Standardizes Practice at High Level

**Cons**
- IB stops at Inconvenient Place
- Insertion not Standardized

*Saskatoon*
Life Cycle of a CVC: Standardizing Practice... at

“Insert Catheters Properly”
16 Recs

Assessment → “Pre-Insertion” → Actual Insertion → Dressing C&M → Removal

Drapes → Dressing
What Constitutes a Proper Insertion?

**Minimal Attempts** (hopefully 1)

Tip close to **CAJ**

**Sutureless Securement**

**Antimicrobial Protection**

**Dressing Stays On** (minimal-no disruption)
How does the ClabComm know if the catheter was inserted properly?

Wound Care takes Photos
Trick-LeDonne Hypothesis

Dressing is Vital

Marks the end of Insertion and start of C&M
<table>
<thead>
<tr>
<th>Profession</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgeons</td>
<td>10 min</td>
</tr>
<tr>
<td>Radiologists</td>
<td>5 min</td>
</tr>
<tr>
<td>Critical Care</td>
<td>5 min</td>
</tr>
<tr>
<td>Anesthesiologists</td>
<td>2 min</td>
</tr>
<tr>
<td>me (generously)</td>
<td>30 min</td>
</tr>
</tbody>
</table>
How long is a CVC in place on average?

6 days...8600 min
\[
\frac{30}{8640} = 0.35\% = \text{Insertion Phase}
\]
Temporal Relationship

- Assessment
- "Pre-Insertion" Bundle
- Actual Insertion
- Removal
- Dressing, C&M

1%
99%
Agreement: Optimal Location for Dressing is the Chest
Suppose, we could insert CVAD w/o insertional complications, where would you want the device?
Something went Wrong...
Do we need a paper?
67% Dressing Changes were **Unscheduled**

If a dressing was disrupted, the infection risk increased 3x.

“Subclavian” access protected from Disruption.
3 Ways to Achieve a Dressing on Chest

1. Direct Insertion Axillary Vein

2. IJV (low) and Rotate Down

3. IJV Tunnel to Chest
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>NMBS</td>
</tr>
<tr>
<td>2.</td>
<td>Where to insert?</td>
</tr>
<tr>
<td>3.</td>
<td>Flat Surface</td>
</tr>
<tr>
<td>4.</td>
<td>Axillary Vein</td>
</tr>
<tr>
<td>5.</td>
<td>Micropuncture</td>
</tr>
<tr>
<td>6.</td>
<td>No Incision</td>
</tr>
<tr>
<td>7.</td>
<td>No Hubbing</td>
</tr>
<tr>
<td>8.</td>
<td>CHG Sponge</td>
</tr>
<tr>
<td>9.</td>
<td>Sutureless Securement</td>
</tr>
<tr>
<td>10.</td>
<td>Dressing Adhesive</td>
</tr>
<tr>
<td>11.</td>
<td>Side of Bed</td>
</tr>
<tr>
<td>12.</td>
<td>Low Cervical IJV</td>
</tr>
<tr>
<td>13.</td>
<td>Rotate Down</td>
</tr>
<tr>
<td>14.</td>
<td>Tip Location</td>
</tr>
<tr>
<td>15.</td>
<td>Intraosseous</td>
</tr>
<tr>
<td>16.</td>
<td>Femoral</td>
</tr>
</tbody>
</table>
16 Recommendations

1. NMBS
2. Where to insert?
3. Flat Surface
4. Axillary Vein
5. Micropuncture
6. No Incision
7. No Hubbing
8. CHG Sponge
9. Sutureless Securement
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11. Side of Bed
12. Low Cervical IJV
13. Rotate Down
14. Tip Location
15. Intraosseous
16. Femoral
No More Blind Sticking

1. Evaluate the Vein
2. Follow the Needle
3. Check the Guidewire
So, where are we going to place these CVCs?
What is my Objection to the IJ Vein?
How long is a dressing supposed to last?

Central venous catheter dressing durability: an evaluation

Annette Richardson1, Andrew Melling2, Chris Straughan1, Lisa Simms3, Catherine Coulter3, Yvonne Elliot3, Sheeja Reji3, Natalie Wilson4, Rachael Byrne4, Catherine Desmond3 and Stephen E Wright3
Dressing Durability

Op Site\diamondsuit  43
Tegaderm\textsuperscript{TM}  46
Tegaderm\textsuperscript{TM} I.V. Advanced  40
SorbaView\textsuperscript{®}  68


OpSite\textsuperscript{TM} is a registered trademark of Smith and Nephew
Tegaderm and Tegaderm I.V. Advanced are registered trademarks of 3M
SorbaView is a registered trademark of Centurion Medical Products
Suppose we could demonstrate a break in the process of CLABSI prevention?

Would we make the necessary change?
Jenny
At what point is a **CLABSI** no longer attributed to **Insertion** but instead to **C&M**?

4-5 Days?

Only if the dressing has stayed **intact**…

Otherwise, the **Insertion** may be the cause **far longer** than 5 days
Suppose you performed **Insertion** perfectly

and **C&M (99%)** perfectly

...and a pt developed **CLABS1**

What is the name for that?
Suppose that you did not perform **Insertion** and **C&M** perfectly

...and the patient developed **CLABSI**

What is the name for that?
What Does SHEA say?
III. Independent risk factors for **CLABSI**
   (in at least 2 published studies) 20-25
   1. Prolonged hospitalization before catheterization
      A. Factors associated with increased risk.
   2. Prolonged duration of catheterization
   3. Heavy microbial colonization at the insertion site
   4. Heavy microbial colonization of the catheter hub
   5. **Internal jugular catheterization**
   6. **Femoral catheterization in adults**

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

**Recommendation 2:** Avoid IJV
2 circ (SHEA)
30cm

What antimicrobial products...?

All of the products...

3. Use a **subclavian site**, rather than a jugular or a femoral site, in adult patients to minimize infection risk for nontunneled CVC placement [50-52]. Category 1B

7. Use **ultrasound guidance** to place central venous catheters (if this technology is available) to reduce the number of cannulation attempts and mechanical complications. Ultrasound guidance should only be used by those fully trained in its techniques. [60-64]. Category 1B

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**Axillary Vein**

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3. **Subclavian + 7. Ultrasound =** Axillary Vein
Suppose the Basilic is "too" Small
Orientations for Vascular Line Placement

1. Short Axis
2. Long Axis
1. Direct Insertion
Axillary Vein
Stakeholder Level and Knowledge Gap

Level III. CEO, CMO, CQI, Dept Chairs, CNO

Level II. Physician Inserters, ID, QI, Risk Mgmt

Level I. VA RNs, IPs, CCRN

High Level Knowledge (no MD seminars)
16 Recs

1. NMBS
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3. Flat Surface
4. Axillary Vein
5. Micropuncture
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7. No Hubbing
8. CHG Sponge
9. Sutureless Securement
10. Dressing Adhesive
11. Side of Bed
12. Low Cervical IJV
13. Rotate Down
14. Tip Location
15. Intraosseous
16. ICU Question
16 Recommendations

1. NMBS
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13. Rotate Down
14. Tip Location
15. Intraosseous
16. ICU Question
Hubbing Monster
How long is a 20cm catheter?

Antimicrobial Catheter

Recommendation 8a

1.5 cm
CHG Sponge
Pre Skin Prep
Post-Prep (immediately following antiseptic application)

Prepping the skin reduces colony counts of bacteria from the surface only — it never completely disinfects the skin.
Day 2-7

Post-Prep (within 1-2 days following antiseptic application)
Resident bacteria begin to re-colonize the skin surface.

Day 0

Post-Prep (immediately following antiseptic application)
Prepping the skin reduces colony counts of bacteria from the surface only—it never completely disinfects the skin.
Why do I like the CHG Disk?

Proprietary technology provides a PROVEN sustained release of CHG for 7 days. ⁴
Is this the Era of Evidence Based Medicine?
Infection: Conflation of Ideas

Prevent

Detect

Treat

How do you prevent infection?

Visualizing the site
Why do I like the CHG Disk?
16 Recommendations

1. NMBS
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16. ICU Question
Avoid the use of tape or sutures as they are not an effective alternative to an ESD.

Subcutaneous ESDs have been successful in stabilizing PICCs and CVADs. Patient outcomes and provider satisfaction have been favorable.
Catheter Securement Devices

Recommendation

Use a sutureless securement device to reduce the risk of infection for intravascular catheters [105]. Category II
Exceptional Care & Maintenance
Dressing Durability\(^1\)

- **Op Site™**: 43
- **Tegaderm™**: 46
- **Tegaderm™ I.V. Advanced**: 40
- **SorbaView®**: 68

How can we improve duration?

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SorbaView® is a registered trademark of Centurion Medical Products
Dressing on the Chest: 3 Ways

3. Bedside Tunneled RIJ
16 Recommendations

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12. Low Cervical IJV
13. Rotate Down
14. Tip Location
15. Intraosseous
16. ICU Question
50 years ago…

Percutaneous cannulation of the internal jugular vein


From the Department of Anaesthetics, Brompton Hospital, London

In 2019, we do not have to…
Our analysis revealed that CLABSIs were most frequently associated with internal jugular vein access. In our patient population, this anatomical site distribution can be attributed to multiple factors.
Preference for IJV

Co-morbidities (i.e. coagulopathy, renal disease), which created a preference internal jugular over the subclavian vein.

1. Blamed the Patient

A quality assurance investigation of CLABSI events: are there exceptions to never?

Samantha Strickler¹, Rohit R Gupta², John T Doucette³ and Roopa Kohli-Seth⁴

What concerns me in the coagulopathic pt?
House Staff Education

The high incidence of **CLABSI** associated with **internal jugular vein** access can also be **attributed to house staff education.**

2. They blamed the **residents**

**We cannot blame suboptimal (substandard) process on House Staff Ed**

Train the residents, not **blame**
At our institution, **universal** adoption of **ultrasound**, which is most **easily** applied during cannulation of the IJ and femoral veins.

**easy** for whom?

3. Blamed the “SCV” for not being “easy”

2. They blamed the **residents**

1. Blamed the **Patient**

(trying)
72 yo pt with C.Diff Colitis

Initiate TPN

No CKD
Acceptable VADs?

72 yo pt with C.Diff Colitis
A quality assurance investigation of CLABSI events: are there exceptions to never?

Samantha Strickler¹, Rohit R Gupta², John T Doucette³ and Roopa Kohli-Seth⁴
PICC Zone Insertion Method™ (ZIM™): A Systematic Approach to Determine the Ideal Insertion Site for PICCs in the Upper Arm

Robert B. Dawson
MSA, BSN, RN, CRNI, CPUI, VA-BC
2. IJV (low) and Rotate Down

Rec 13 (mandatory)
Gravity
16 Recommendations

1. NMBS
2. Where to insert?
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11. Side of Bed
12. Low Cervical IJV
13. Rotate Down
14. Tip Location
15. Intraosseous
16. Femoral
What is, by far, the worst catheter, not the worst site, to subject a pt. to (infection)?
Rates per 1,000 Catheter Days

- PIV: 0.5
- PICC: 1.1
- DIALYSIS, CUFFED: 1.6
- CVC (CHG/SS): 1.6
- ARTERIAL: 1.7
- CVC, NON-MED: 2.7
- DIALYSIS (TEMP): 4.8

Rates per 1,000 Catheter Days

Acute HD Cath

70 yo pt in MICU

Septic Shock: MOSF
AKI, Resp Failure, DIC

Short Neck, Beard

INR = 4
16 Recommendations

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8. CHG Sponge
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10. Dressing Adhesive
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12. Low Cervical IJV
13. Rotate Down
14. Tip Location
15. Intraosseous
16. Femoral
Acute HD Teleflex
16 Recommendations

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11. Side of Bed
12. Low Cervical IJV
13. Rotate Down
14. Tip Location
15. Intraosseous
16. Femoral (outside groin)
PICC Zone Insertion Method™ (ZIM™): A Systematic Approach to Determine the Ideal Insertion Site for PICCs in the Upper Arm

Robert B. Dawson
MSA, BSN, RN, CRNI, CPUI, VA-BC
Tunneled Mid-Thigh Femoral
Femoral Tunnel ICU
What do you do to prevent CLABSI?
What can the **inserter** do?

**Insert the VADs properly**

What can the medical faculty/attending staff do?

Stop teaching suboptimal (substandard) practice
What can the RN do?

Assist the inserter (circulator)

Monitor sterile technique (not at the computer)

Notify MD if the configuration prevents a suitable dressing

Provide scrupulous C&M (99%). Prevents intra & extraluminal contamination

Document and Photograph Disrupted Dressings
What can IP do?

Analyze the **data**; spot the trends

Round, ask the **question**: does that look...

Report findings to leadership

Take **photos**, manage photos (like wound care)

Priorities for competencies or education based on annual risk assessment
What can C-suite and Nursing Leadership do?

Round on the patients

Does that look like it’s preventing an infection?

If the dressing is in an awkward location, speak with the inserter

Provide proper equipment
Infection Prevention is an organizing principle of VA

Guidelines: HH, Max Barrier

Manufacturers will sell you:

AM Caths and AM Dressings

Special End Caps

AM Caps for the End Caps
On your list of InfPrev measures

The Cost is $0

where is...

Insert the Catheters **Properly**...

and **Dress** them **Properly**
All Products Work Better, if the CVC is Inserted Properly
What is the worst thing about this?
Sum Life Cycle of a CVC: Standardizing Practice...at

What can the Inserter do?

- MAGIC, VHP
- CDC, IHI

Assessment → “Pre-Insertion” → Actual Insertion → Drape-Dress → Dressing C&M

16 Recs
Agreement: Optimal Location for Dressing is the Chest
Summary

Determine what are the “best” practices, then standardize procedures at that level.

Build MAGIC into EMR

Increase the AXV to IJV ratio

Abandon IJV directed

Dressing Disruption

CHG Sponge, dr adhesive

Multidisciplinary Rounds/Photos

Does that look like it’s preventing an infection?
Gracie

Thank You
<table>
<thead>
<tr>
<th>Vein</th>
<th>Initial Flow</th>
<th>2 Fr</th>
<th>4 Fr</th>
<th>6 Fr</th>
<th>8 Fr</th>
</tr>
</thead>
<tbody>
<tr>
<td>4mm</td>
<td>10 ml/min</td>
<td>5</td>
<td>3</td>
<td>1.5</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>28%</td>
<td>14%</td>
<td>0.5%</td>
</tr>
</tbody>
</table>

2.7 mm (Meyer)
3.0 mm (Sharp)
TunPicc (ZIM)
Stuck Pipe
Do Not Use!
60 yo man

Transferred from SNF to ER for leg soreness and mental status change

- Next day, PICC nurse calls family for consent
- Family, “He already has a Picc.” (what if...)
- CxR shows no line
- IR suggests XRay the arm
- ER Record, 17:30. IV line hanging out 1”. 1st attempt to DC line was unsuccessful due to resistance.
- 17:41. 2nd attempt successful, MD aware.