Reduce PIV Complications and Costs Using the Five Rights Approach

MAVAN Conference, June 5th, 2019

By Lee Steere, RN, CRNI, VA-BA – Unit Leader, IV Therapy Services
Hartford Hospital, Connecticut
Lee Steere Bio

RN / 23 years
Hartford Hospital, Unit Leader IV Therapy Services /14 years

- Member of the hospital’s HAI committee since 2007 / Chair, 2 years
- Co-chair of the hospital’s Clinical Quality Value Analysis committee
- Member of the hospital’s Purposeful Hourly Rounding Committee
- Local and national Speaker for INS and AVA meetings on LEAN IV Therapy, CLABSI prevention, and CVAD occlusion management
- Prior experience in Critical Care, hyperbaric medicine
- Two prior Nurse manager positions - inpatient Medical Units

Recent Peer Review Publications:
1. Lean Six Sigma for Intravenous Therapy Optimization: A Hospital Use of Lean Thinking to Improve Occlusion Management/ March 2017 JAVA
Financial Disclosures

1. Disclosure of Relevant Financial Relationships

I have the following financial relationships to disclose:

Consultant for: Nexus Medical, BBraun
Past consultant for: Teleflex
Speaker’s Bureau for: Nexus Medical, Entrotech life sciences
Past Speaker for: Ivera Medical
Honoraria from: Nexus Medical, Entrotech LifeScience
Employee of: Hartford Hospital

2. Disclosure of Off-Label and/or investigative Uses

I will not discuss off label use and/or investigational use in my presentation.
Learning Objectives

✓ Verbalize, after literature review, the reasons why PIV failure is over 50% in the USA with a focus on infiltrations and occlusions

✓ Describe the peripheral bundle with the 5 RIGHTS that were utilized for this randomized controlled study to achieve successful outcomes

✓ Demonstrate how the results of this study can be utilized to establish a business model for the value of the IV team
Acknowledgments
Hartford Hospital IV and Leadership Team

Cheryl Ficara, RN, MS, NEA-BC
VP, Patient Care Services

Michael Davis, RN, MBA
Director of Nursing: Medicine, Oncology, IV Therapy
Hartford Hospital, Hartford CT

- Built in 1854 – only level 1 trauma center in CT
- 867 licensed beds
- 6 ICU’s comprising total of 94 beds
- Over 7025 employee’s
- Air Ambulance Service - Lifestar
- ED visits : 104,698
- Transitions from Inpatient Care: 43,831
Integrity  We Do the Right Thing

Caring  We Do the Kind Thing

Safety  We Do the Safe Thing

Excellence  We Do the Best Thing
Opening Questions

▪ Does anyone truly know their annual cost per bed for IV Therapy?

$7968 annual cost per bed
Hartford Hospital
The Journey to Clinically Indicated...

- Are nurses assessing peripheral IV sites well enough to leave in until clinically necessary?
The Journey to Clinically Indicated...

- Are nurses assessing peripheral IV sites well enough to leave in until clinically necessary?
  - They were not at Hartford Hospital

Evidenced Based?

Best Practice?
The Journey to Clinically Indicated

- We are now using a Vascular Access Team and a Best Practice Bundled Approach with all PIVC insertions
- **Safety** *We Do the Safe Thing*
The Journey to Clinically Indicated

- We are now using a Vascular Access Team and a Best Practice Bundled Approach with all PIVC insertions
- **Safety** *We Do the Safe Thing*
The One Invasive Procedure Common to Most Hospitalized Patients
The One Invasive Procedure Common to Most Hospitalized Patients
The One Invasive Procedure Common to Most Hospitalized Patients
The United States

2018 Population = 327M

2018 PIV Catheters Sold = 350M

*GHX Data
53% Chance you Make it Home?
The known causes of IV failures are avoidable if PIVC’s are inserted using...

Evidenced Based, Best Practice
Past, Current and Future State

A3 to define past, current and future state of PIVC insertions

Past State
- All RN’s hired where PIVC’s inserted, validated by IV educator

Current State
- All RN’s hired where PIVC’s inserted, validated by IV RN

Future State
- Centralize all IV insertions by a trained IV expert using a Best Practice Bundle
Lean Healthcare

**PIVC Insertions using Best Practice Bundle:**
Study Protocol Designed to Deliver Better Patient Care, Better Patient Outcome and Long Term Economic Results

<table>
<thead>
<tr>
<th>D</th>
<th>M</th>
<th>A</th>
<th>I</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Define</td>
<td>Measure</td>
<td>Analyze</td>
<td>Improve</td>
<td>Control</td>
</tr>
<tr>
<td>1 PIVC per Stay</td>
<td>past published studies 13 years of direct IV placement voice of our patient LOS data hours spent training new hires CLABSI rates avg wait time for IV</td>
<td>Publications and data collected</td>
<td>IRB approval &amp; data collection by research RN with CITI Training using an app with pictures taken of each assessment performed</td>
<td>Study completed in 15 months Presentation to CNO → results of presentation Study tools locked each day – downloaded daily</td>
</tr>
</tbody>
</table>
Aim

2016 INS Standards of Practice
- Leave PIVC’s in until clinically indicated

- Aim of our study
  - 1 PIVC per admitted patient

Lean Six Sigma DMAIC approach - created a best practice bundle and made it standard work amongst our team.

The results exceeded our goal and defined objectives
Outcome Variables

Primary Outcome(s)

- PIVC Dwell Time
- PIVC Success Rate (from insertion to discharge without complications)

Secondary Outcome

- Complications (Phlebitis, Occlusion, Infiltration, Infection, Dislodgement)
- Patient Satisfaction
Design, Setting, Recruitment

- IRB approved → prospective, multi-modal comparator study
  - November 2016 → February 2018
- Setting → 47 Bed Medical Unit
- Recruitment →
  - All new admits placed in an empty bed
  - Able and willing to consent or have a LAR who could consent for the patient
  - Exclusion criteria → patient has a central line or patients transferred in from another unit or patients transferred off the unit
Assigned to One of Two Groups
Standard Care (Control) vs. VAST Using Bundled Approach (Experimental)

<table>
<thead>
<tr>
<th></th>
<th>Control Standard Care</th>
<th>Experimental Best Practice Bundle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inserter</td>
<td>RN, ER/EMT</td>
<td>RN, IV Proficient</td>
</tr>
<tr>
<td>USG/Vein Viewer</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Site Location</td>
<td>Hand/Wrist/AC</td>
<td>Forearm</td>
</tr>
<tr>
<td>Catheter Type</td>
<td>20g/1”</td>
<td>22g/1.75”</td>
</tr>
<tr>
<td>Needleless Connector</td>
<td>Neutral connector</td>
<td>Anti-Reflux connector</td>
</tr>
<tr>
<td>Dressing and Securement</td>
<td>Standard dressing + Tape</td>
<td>CHX antimicrobial bordered securement + Chevron, Change as needed or e. 7d</td>
</tr>
<tr>
<td>Kit Used</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Assessment</td>
<td>No</td>
<td>1-2x/day (5 minutes)</td>
</tr>
</tbody>
</table>
Data Collection Tool

Daily Assessment and data collection

- Cloud Based iPad app (COMMAND APP)
  - Amazon Warehouse Server (HIPAA compliant)
- Min. of 54 data inputs per PIVC insertion – Took less than 10 minutes to complete
  - +21 data inputs for every assessment thereafter – Took less than 5 minutes to complete
- Picture records for every patient when the IV was placed and during assessments (1-2x/day)
Data Collection Tool – Calibrated scales for Consistency
Data Collection Tool – Site Selection Verification
Data Collection Tool – Drug Library

4 Reference Screens:
- Continuous
- Intermittent
- Bolus
- Maintenance
Data Collection Tool – Bar Scan & Survey Capabilities

![Image of Data Collection Tool](image_url)
The study was powered for 210 sites (included 5% anticipated loss rate for post enrollment exclusions)

- *A priori* alpha level of 0.05 (p<0.05)

- 85% power

- Students t-test or Mann-Whitney U (M-W-U) test for comparison and Spearman non-parametric test for correlation to success rates

- SPSS v. 21 utilized for Statistical Analysis
<table>
<thead>
<tr>
<th>Evidence Based Solution: PIV 5-Rights</th>
</tr>
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<tbody>
<tr>
<td><strong>To get the right results, you need the right approach!</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Right Proficiency</strong></th>
<th><strong>Description</strong></th>
<th><strong>Reference(s)</strong></th>
<th><strong>Research</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>USG Trained; Site Assessment Decision Making; Demonstrates 1st Stick Success</td>
<td>10 publications</td>
<td>Carr, Cochrane Review, INS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Right Insertion</strong></th>
<th><strong>Description</strong></th>
<th><strong>Reference(s)</strong></th>
<th><strong>Research</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Use of USG or Vein Viewer for 100% success</td>
<td>53 Publications</td>
<td>Gregg, Constantino</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Right Vein &amp; Catheter</strong></th>
<th><strong>Description</strong></th>
<th><strong>Reference(s)</strong></th>
<th><strong>Research</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Forearm, Distance from Valve, V:C Ratio (diameter &amp; length)</td>
<td>22 Publications</td>
<td>Moureau, Piper, INS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Right Supplies &amp; Technology</strong></th>
<th><strong>Description</strong></th>
<th><strong>Reference(s)</strong></th>
<th><strong>Research</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Procedural kit for compliance</td>
<td>44 Publications</td>
<td>Marsh, Hull, INS</td>
</tr>
<tr>
<td></td>
<td>2. 22g / 1.75” catheter (forearm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Anti-reflux needleless connector (7d)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Alcoholic chlorhexidine skin preparation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Antimicrobial bordered securement dressing (7d)</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Right Review &amp; Assessment</strong></th>
<th><strong>Description</strong></th>
<th><strong>Reference(s)</strong></th>
<th><strong>Research</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Alcohol cap for hub disinfection, Flushing, and Assessment for dressing change</td>
<td>13 Publications</td>
<td>Hadaway, INS</td>
</tr>
</tbody>
</table>
P = Right Proficiency
I = Right Insertion
V = Right Vein & Catheter

Medial, upper arm, basilic and brachial veins avoided
P = Right Proficiency
I = Right Insertion
V = Right Vein & Catheter

- Avoid placement in a point of flexion
  - One of the major contributors to IV related complication

- Target Zone – cephalic vein, 20-40 mL/min
  - Vein depth 0.5-0.75 cm → avoid greater then 1 inch deep
    - Longer catheter → Introcan 1.75 inch
Step by Step
“Aseptic USG IV”

Step 1: Disinfect Probe
Step 2: Wash Hands
Step 3: Don Non-Sterile Gloves
Step 4: Open IV Kit
Step 5: Open catheter
Step 6: Apply non-latex tourniquet
Step 7: Prep skin (ChloraPrep)
Step 8: Apply pea size drop of Non-Sterile Ultrasound gel to probe
Step 9: Assess vein
Step 10: Hold probe in place, guide needle into vein
Step 11: Check for Blood return
Step by Step “Aseptic USG IV”
Step 12: Thread Catheter
Step 13: Open new Chloraprep
Step 14: Clean area and let dry
Step 15: Remove CHX Dressing Release Liner
Step 16: Apply Dressing around IV
Step 17: Remove Dressing Liner
Step 18: Remove Needle from Catheter
Step 19: Attach Anti-Reflux Tube Set
Step 20: Check for blood return
Step by Step “Aseptic USG IV”

Step 21: Flush Site
Step 22: Clamp Tube Set
Step 23: Add Tape Strip below Hub
Step 24: Tent Tape Strip above Hub
Step 25: Loop the IV Set and Tape It
Step 26: Add additional strip over hub and looped IV Set
Right Supplies and Technology:
Pure Chlorhexidine (CHX) impregnated bordered IV securement dressing

Rapid Onset of Action
Consistently maintains high efficacy levels from day 1 through day 7

Effective against gram positive and gram negative bacteria and yeasts commonly found at catheter sites
Right Supplies – CHX Dressing Protecting the Site From Bacterial Invasion
Right Supplies – Preventing Blood Reflux 24/7
Goal: protect the Tunica Intima
- Trauma
  - mechanical (pistoning)
  - “blowing the clot” out of the tip of the catheter

Anti-Reflux Needleless Connectors → Keeps blood out of the catheter 24/7
- Success with tPA reduction by greater then 50%
- Not People Dependent – No Clamping Sequence!
- Clear, Straight Fluid Pathway
- 360 Degree Compressible seal
Results – Participants, Insertion Technique, Vein Utilized

- Control Group = 94 sites
  - 51 male (54%)
  - 43 female (46%)
  - 91% between ages 41-100
  - 100% placed by EMS, ED RN, Floor RN without u/s
  - 61% → 20G, 1.25 inch
  - 15% → 22G, 1 inch
  - 37% cephalic
  - 32% forearm
  - Various dressings, needleless connectors

- Experimental Group = 113
  - 56 male (50%)
  - 57 female (50%)
  - 90% between ages 41-100
  - 87% placed by IV RN using u/s
  - 90% → 22G, 1.75 inch
  - 89% cephalic
  - 91% forearm
  - Same supplies
## Results - Catheter Removal

<table>
<thead>
<tr>
<th></th>
<th>Control N=94</th>
<th>Experimental N=113</th>
<th>Total N=207</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Success</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- End of Treatment/Patient Discharge</td>
<td>14 (15%)</td>
<td>101 (89%)</td>
<td>115 (56%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>Lost Catheters (primary complication)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Per policy (Location/other)</td>
<td>27 (29%)</td>
<td>0</td>
<td>27 (13%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>- Per policy – deviation from standard of care</td>
<td>15 (16%)</td>
<td>0</td>
<td>15 (7%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>- Per policy (Primary Complication)</td>
<td>38 (40%)</td>
<td>12 (11%)</td>
<td>50 (24%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>Breakdown of Primary Complication</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Inadvertent Removal</td>
<td>1 (1%)</td>
<td>1 (1%)</td>
<td>2 (1%)</td>
<td>NS</td>
</tr>
<tr>
<td>- Catheter Occlusion</td>
<td>8 (9%)</td>
<td>0</td>
<td>8 (4%)</td>
<td><strong>0.002</strong></td>
</tr>
<tr>
<td>- Infiltration</td>
<td>7 (8%)</td>
<td>4 (4%)</td>
<td>11 (5%)</td>
<td>0.212</td>
</tr>
<tr>
<td>- Phlebitis</td>
<td>13 (14%)</td>
<td>5 (5%)</td>
<td>18 (9%)</td>
<td><strong>0.017</strong></td>
</tr>
<tr>
<td>- Pain</td>
<td>9 (10%)</td>
<td>2 (2%)</td>
<td>11 (5%)</td>
<td><strong>0.013</strong></td>
</tr>
<tr>
<td>- CLABSI</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>NS</td>
</tr>
<tr>
<td>- Other/Unknown</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>NS</td>
</tr>
</tbody>
</table>

Values in red are statistically significant at p<0.05; NS=not significant/too few cases to evaluate
Main Objective of Study Demonstrated

- Mean dwell time (± SD)
  - Experimental Arm (n=113)
    - 71.4 ± 58.8 hours (333.21 hours)
  - Control Arm (n=94)
    - 29.6 ± 18.0 hours (110.98 hours)
Main Objective of Study Demonstrated

- Mean dwell time (± SD)
  - Experimental Arm (n=113)
    - 71.4 ± 58.8 hours (333.21 hours)
  - Control Arm (n=94)
    - 29.6 ± 18.0 hours (110.98 hours)

2.5 Fold Improvement in Dwell Times
Study Outcomes

- **Primary Objective:**
  - Control Arm: 15% lasted till end of therapy
  - Experimental Arm: 89% lasted till end of therapy

- **Secondary Objectives:**
  - Control Arm: 40% complication rate
  - Experimental Arm: 11% (p<0.001).
Control Group

- Wide variance
- 40% of patients had a complication
- 15% success rate with 1 PIVC/patient
Current State: Waste, Variability, Defects
Experimental Group

- Consistent approach
- 11% of patients had a complication
- 89% success rate with 1 PIVC/patient
Future State: Standard Work (PIV5R’s), EVB-Best Practice, Bandwidth
The control group findings were comparable to nationally published failure rates. The experimental group demonstrated a 2-10x improvement across all categories of IV complications.

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<tbody>
<tr>
<td></td>
<td>Prospective Randomized Controlled Studies, 1990-2014 (Mean Complication Rates)</td>
<td>Rickard: Routine Replacement Change Group (n=177)</td>
<td>Rickard: Clinically Indicated Change Group (n=185)</td>
<td>Steere: ER Control Group (N=94)</td>
</tr>
<tr>
<td>Primary:</td>
<td>IVD complications per patient, n (%)</td>
<td>46%</td>
<td>36%</td>
<td>41%</td>
</tr>
<tr>
<td></td>
<td>IVD complications per 1000 days*</td>
<td>n/a</td>
<td>66.0</td>
<td>67.8</td>
</tr>
<tr>
<td>Secondary:</td>
<td>Phlebitis, n (%)</td>
<td>15.4%</td>
<td>7%</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>Infiltration, n (%)</td>
<td>23.9%</td>
<td>30%</td>
<td>33%</td>
</tr>
<tr>
<td></td>
<td>Occlusion, n (%)</td>
<td>18.8%</td>
<td>3%</td>
<td>2%</td>
</tr>
<tr>
<td></td>
<td>Accidental removal, n (%)</td>
<td>6.9%</td>
<td>6%</td>
<td>9%</td>
</tr>
<tr>
<td></td>
<td>IVD-related BSI, n (%)</td>
<td>0.2%</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

2. Rickard C, McCann D, McGrail M. Routine resite of peripheral intravenous devices every 3 days did not reduce complications compared with clinically indicated resite: a randomised controlled trial. BMC Medicine. 2010;8:53.
3. *Calculation: The rate of catheter complications per 1,000 catheter days was calculated as follows: the total number of complication events divided by the total number of device days multiplied by 1,000 (Moureau, N. et al. Central Venous Catheters. SIR. 2002. Total Device Days (969, 1121, 114.9, and 330)
PATIENT CASE STUDIES
Case Study 1: Patient 27

69 year old FEMALE admitted to the ER

**diagnosis:** pneumonia  
**drugs:** Vanco, cefepime, solumedrol  
**total IV duration:** 14.07 DAYS

Control PIVC: 0.95 days
- PIVC removed for pain per policy

Experimental PIVC: 13.12 days
- Lasted until therapy complete; no complications
No. 027

<1d: “Per policy / pain with palpation” “Pain“ “Pain with touch”

No. 027-1

13d: “Therapy complete“ 1x dressing change
Case Study 2: Patient 12

70 year old MALE admitted to the ER

diagnosis: Endophthalmitis of left eye

drugs: Cefepime, hydrazaline, Zyvox

total IV duration: 6.22 DAYS
  Control PIVC: 0.39 days
  - PIVC removed for non-sterile covering and blood in hub

  Experimental PIVC: 5.83 days
  - Lasted until needed; no complications
No. 012

0.39d “Patient came out of ED with IV site only covered with paper tape” “Blood in Cath Hub”

No. 012-1

5.83d “No longer needed”
Case Study 3: Patient 84

62 year old FEMALE admitted to the ER

diagnosis: alcohol withdrawal

drugs: Maintenance IVF’s

total IV duration: 3.91 DAYS

Control PIVC: 0.86 days
- PIVC removed for infiltration, occlusion, phlebitis, dressing soiled

Experimental PIVC: 3.05 days
- Lasted until therapy complete; no complications
No. 084
<1d: "Blood in Cath Hub", "Inability to Flush / Occluded", "Infiltration", "Pain", "Swelling"

No. 084-1
>3d: "Pt discharge home"
Case Study 6: Patient 22

68 year old MALE admitted to the ER via ambulance

diagnosis: pneumonia
drugs: heparin, vanco, cefepime
total IV duration: 12.22 DAYS

Control PIVC: 1.32 days
- PIVC removed for phlebitis, blood in cath hub, pain

Experimental PIVC: 10.90 days
- Lasted until therapy complete; no complications
No. 022

1d: “Blood in Cath Hub” “Occlusion” “Pain” “Loose Dressing”

No. 022-1

10d: "Therapy complete"
Getting the Team Back

Making the business case for centralizing and increasing the role of IV Therapy at Hartford Hospital
Our CEO’s Vision of One

One Admission, One Registration, One Bill

Elliot Joseph, CEO of Hartford Healthcare
Our CEO’s Vision of One

Elliot Joseph, CEO of Hartford Healthcare

One Admission, One Registration, One Bill

I would add...

One PIVC per hospitalization inserted on the first attempt 92% of the time
How much money are we actually saving Hartford Hospital? Can we put a dollar figure to this initiative?

I pose the question - How could 1 catheter per patient visit impact LOS, Patient Satisfaction? Costs?

Direct Cost
- Fewer restarts = cost savings
- No more time training bedside RNs

Indirect Cost
- CLABSI Prevention
- Treating fewer IV adverse related events
- Patient Satisfaction Scores
- Needlesticks #6 Top Fears of Patients Being Hospitalized
- LOS impact – less delays in treatment interruptions

I think this equates to MILLIONS OF DOLLARS!!
# HH PIVC Yearly Stats: ALL CATHETERS

<table>
<thead>
<tr>
<th>Catheters Purchased¹</th>
<th>ADMITS FY18</th>
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</thead>
<tbody>
<tr>
<td>247,000</td>
<td>44,648</td>
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<thead>
<tr>
<th>IV Time³</th>
<th>HH Nurse Minutes</th>
<th>HH Nurse Hours</th>
<th>HH Nurse FTE equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 Minutes</td>
<td>4,940,000</td>
<td>82,300</td>
<td>40 2080h/yr. per FTE</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Patient Communication</th>
<th>Gather Supplies</th>
<th>Assesses Site</th>
<th>Vein Selection</th>
<th>Catheter Selection</th>
<th>Prep the Site</th>
<th>Insert the Catheter</th>
<th>Clean the Site</th>
<th>Secure &amp; Dress the Site</th>
<th>Label &amp; Document</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Labor Cost⁴</th>
<th>Supplies Cost¹</th>
<th>Cost per Placement</th>
<th>Total Cost (pre drug admin)</th>
<th>$7,968 /Bed per year ($6.9M/867 beds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$16.17 RN @ $48.50/hr.</td>
<td>$11.80 Catheter, Tubing, Connectors/Caps, Kit</td>
<td>$27.97</td>
<td>$6,908,590 247k*27.97</td>
<td></td>
</tr>
</tbody>
</table>

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1. Hartford Hospital 2018 Annual Report and Internal Data Sources, including GPO data report.
2. Definitive Health Care Data, 2017
3. Rickard, et al. Reported data on time to successfully place a PIVC including all steps.
4. Glassdoor.com (Hartford, CT; Avg RN) + HH Benefits
**HH PIVC Yearly Stats: ADMIT CATHETERS ONLY**

<table>
<thead>
<tr>
<th>Catheters Adj for ADMITS only</th>
<th>ADMITS Adj. IV only FY18</th>
<th>CATHETERS PER PT VISIT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>148,200</strong> Admits represent 60% of 247,000 catheters purchased</td>
<td><strong>33,486</strong> 75% of admits get catheter Includes: ER admits, PACU, Ortho, Womens, Adult ICU; Excludes IOL, Newborn, Direct</td>
<td><strong>4.4</strong> 148,200 ÷ 33,486</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IV Time</th>
<th>HH Nurse Minutes</th>
<th>HH Nurse Hours</th>
<th>HH Nurse FTE equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>20 Minutes</strong></td>
<td><strong>2,964,000</strong></td>
<td><strong>49,400</strong></td>
<td><strong>23.75</strong> 2080h/yr. per FTE</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Labor Cost</th>
<th>Supplies Cost</th>
<th>Cost per Placement</th>
<th>Total Cost (pre drug admin)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$16.17 RN @ $48.50/hr.</td>
<td>$11.80 Catheter, Tubing, Connectors/Caps, Kit</td>
<td>$27.97</td>
<td><strong>$4,145,154</strong> 148,200k*27.97</td>
</tr>
</tbody>
</table>

$4781 /Bed per year ($4.1M/867 beds)

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1. Hartford Hospital 2018 Annual Report and Internal Data Sources, including GPO data report.
2. Definitive Health Care Data, 2017
3. Rickard, et al. Reported data on time to successfully place a PIVC including all steps.
4. Glassdoor.com (Hartford, CT; Avg RN) + HH Benefits
$2.9M per Year (ADMTS)

<table>
<thead>
<tr>
<th></th>
<th>Admissions</th>
<th>Catheters PIV5R</th>
<th>Time Needed</th>
<th>TOTAL COST</th>
<th>TOTAL SAVINGS vs. Current Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admissions</td>
<td>33,486</td>
<td>36,835</td>
<td>736,700</td>
<td>$1,218,502</td>
<td>$2,926,652</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.1*33,486</td>
<td>36,835*20 minutes</td>
<td></td>
<td>4,145,154 – 1,218,502</td>
</tr>
</tbody>
</table>

- $18.68 PIV5R Labor Cost
- $14.40 PIV5R Supplies Cost
- $33.08 PIV5R Cost per Placement

IV-Trained RN @ $56.03/hr
Adds better technology

- $1,405 Per bed per yr
- $3,376 Savings per bed per year

Savings do not include other added benefits such as reduced PIV-CLABSI, Patient Satisfaction, etc which may also contribute to avoided costs, savings or reimbursement.
Lean IV Team

We are growing:
FY 2018 budget of 12 FTE’s
FY 2019 preliminary budget of 18 FTE’s

June 3, 2019
All Inpatient Units
7.55 FTE’s for Insertions, Assessments

**Insertion: 20 Minutes**

1. Patient Communication
2. Gather Supplies
3. Assess Site
4. Vein Selection
5. Catheter Selection
6. Prep the Site
7. Insert the Catheter
8. Clean the Site
9. Secure & Dress the Site
10. Label & Document

**Assessment: 5 Minutes**

1. Patient Communication
2. Site Review
3. Check IV Pump & Tubing
4. Re-Dress Site per policy
5. Document

**Key Model Inputs:**
- 20min Insertion; 5min assess
- Beds per Unit + Occupancy Rate (84% avg)
- New Admits/ day (17% avg)

**IV Insertions Per Day Analysis**

<table>
<thead>
<tr>
<th>Analysis</th>
<th>HH - All Hospital Units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(a.) # beds/ day</td>
</tr>
<tr>
<td></td>
<td># IV Site Checks/ day</td>
</tr>
<tr>
<td>High 12</td>
<td>46</td>
</tr>
<tr>
<td>North 11</td>
<td>15</td>
</tr>
<tr>
<td>Center 11</td>
<td>6</td>
</tr>
<tr>
<td>Center 10</td>
<td>26</td>
</tr>
<tr>
<td>North 10</td>
<td>26</td>
</tr>
<tr>
<td>North 9</td>
<td>10</td>
</tr>
<tr>
<td>North 9 SD</td>
<td>9</td>
</tr>
<tr>
<td>North 8</td>
<td>27</td>
</tr>
<tr>
<td>CB5</td>
<td>47</td>
</tr>
<tr>
<td>CB4</td>
<td>25</td>
</tr>
<tr>
<td>CB3</td>
<td>26</td>
</tr>
<tr>
<td>CB2 - Oncology Unit</td>
<td>26</td>
</tr>
<tr>
<td>Bliss 11 SD</td>
<td>15</td>
</tr>
<tr>
<td>Bliss 11E</td>
<td>9</td>
</tr>
<tr>
<td>Bliss 10 SD</td>
<td>9</td>
</tr>
<tr>
<td>Bliss 10E</td>
<td>14</td>
</tr>
<tr>
<td>Bliss 9 SD</td>
<td>9</td>
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<tr>
<td>Bliss 9E</td>
<td>16</td>
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<td>Bliss 8</td>
<td>42</td>
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<td>Bliss 5</td>
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<tr>
<td>Bone and Joint Institute</td>
<td>29</td>
</tr>
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**Total (non-ICU, Non L&D)**: 536

| Number of FTE's Annually | 7.55 |
## Budget Increase Request

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<th>FTE Description</th>
<th>Total FTE’s</th>
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<td><strong>Present State</strong> (does not include replacement)</td>
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<td>11.2</td>
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| **Future State** (does not include replacement) | 7.55 FTE for all IV Starts  
1.75 FTE for DHT Insertions  
1.75 FTE for PICC Insertions  
1.25 FTE for Transfusion Room  
0.75 FTE for IV Insertion Training  
1.0 FTE for Assistant Manager | 14.05       |
| **Total FTE Increase**                        |                                                                                | 2.85        |

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Capital Investment = $92,000 (one time investment)
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**IS 2.85 FTE'S GOING TO BE ENOUGH?**

**Capital Investment = $92,000 (one time investment)**
Attempting to Institute a Plan

- Once CNO approval received
  - Communication went out in many forums
    - Email
    - Nursing Council
    - Performance Practice Council
    - Manager/Director Meeting
- Kept short
- Expectations and timelines were presented
Phase I: Validation phase of process and cost estimates:
- After standardizing all PIVC insertions using the 5-RIGHTS by a trained IV RN, we will evaluate by asking:
  - Did we get achieve our goal of 1 insertion per patient visit?
  - Did we allocate enough resources (FTE’s) for effective and safe implementation?
  - Any barriers identified?
  - Any successes/barriers identified by staff in the unit huddles?
  - Do we need to modify any part of the plan moving forward?

Ph I: Conklin Building – Sept → Dec 2018 (Future State)
Ph II: Bliss Building – February → March 2019
Ph III: North Building – April → May 2019
Ph IV: Center Building – June → July 2019
Ph V: Bone & Joint – August 2019
Ph VI: ?? Do we try and do something in the ED at the end of FY 2019
CULTURE EATS STRATEGY FOR BREAKFAST
I’m Not Doing It – That’s Your Job Now
If “Plan A” didn’t work, keep your cool. The alphabet has 25 more letters.
“The plan you start out with is never the plan that actually works.”

— Joe Pulizzi, founder of Content Marketing Institute
GIVING UP ON YOUR GOAL BECAUSE OF ONE SETBACK IS LIKE SLASHING YOUR OTHER THREE TIRES BECAUSE YOU GOT A FLAT
1. Repeat study on a larger scale, hopefully multicenter
2. Future presentations of the PIV5R approach
3. At the hospital:
   * Partnering with ED during evening hours
   * Partnering with Pre-op
   * Discussions with CNO and Medical Director on options to support ICU’s
4. Recognition
   * Publish results of study with CNO as co-author
   * 2018 Finalist for Clinical Team of the Year
Cheryl Ficara, RN, MS, NEA-BC
VP, Patient Care Services

Co-author of PIV5R Study Manuscript

“In God we trust. All others must bring data.”
- Dr. W. Edwards Deming

WITHOUT DATA
YOU'RE JUST ANOTHER PERSON WITH AN OPINION
W. EDWARDS DEMING
Less Waste, Higher Satisfaction
Conclusion/Key Takeaways

Hartford Hospital achieved an 89% success rate at 1 PIVC catheter per patient after implementing the Five Rights Best Practice IV Approach.

As IV professionals, we should be taking a leadership role in improving outcomes, reducing variability for IV Therapy.
Thank you.

Questions?
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860-614-8254