

Cost-effectiveness of a VAD team

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Cost-effectiveness of a VAD team



Current level of evidence



Cost-effectiveness (Suite versus bedside placement)



Length of stay



Complications



Experienced clinician



Final advice



It is well documented a VAD team
saves money in the literature?

The difficult situation
No randomized, controlled,
prospective studies

**Vascular access specialist
teams for device insertion
and prevention of failure
(Review) March 2018**

Cochrane Review

Carr PJ, Higgins NS, Cooke
ML, Mihala G, Rickard CM

This systematic review failed to
locate relevant published RCTs
to support or refute the
assertion that vascular access
specialist teams are superior to
the generalist model.

Carr PJ, Higgins NS, Cooke ML, Mihala G, Rickard CM. Vascular access specialist teams for device insertion and prevention of failure. Cochrane Database of Systematic Reviews 2018, Issue 3. Art. No.: CD011429. DOI: 10.1002/14651858.CD011429.pub



TRUE



FALSE

It is not well documented
that a VAD team is cost-
effective

Cost Effectiveness



High tech suite
Cost USD \$1,210



Bedside
Cost USD \$390

Cost Benefit:
Shifting PICC to
Bedside
Placement (USA)

\$820 Savings USD

Utilization of high-
tech tools

Ultrasound

Micro introducers

ECG tip confirmation

Efficiencies stated
by Robinson
(Brigham)
Advantage
dedicated team

Single center
prospective
study

94%

- Insertion success bedside with ultrasound
- Increased from 73% at start of service
- 78% overall drop in use of IR

24%

- Reduced placement costs with ultrasound
- 9% reduced placement costs start service

80%

- Reduced wait time with ultrasound
- 7 to 10 day wait time

Robinson MK: (2005) Journal of Parenteral and Enteral Nutrition 29(5) 374-379



\$415.76 AUD

IR

\$249.81 AUD

bedside

Cost Benefit
Shifting PICC to
bedside placement
(Australia)

Savings
\$165.95
AUD

Cost Benefit

Shifting PICC to bedside placement (UK)

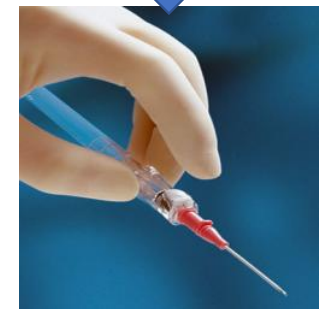
Raigmore Hospital 577 beds UK

Prospective single center cohort analysis (2012-2013)

Average patient had 6.168 cannulas prior to PICC

No early Assessment

Complication/Outcomes 4 months	MD/IR/Anesthesia (N=48) High tech suite placement	RN/Bedside (N=91) Oncology/OPAT Nurses Non dedicated team (3 RN)
Insertion Success	100%	93.1%
Infection	14.58%	4.4%
Dislodgement	8.33%	2.2%
Time to place	40.125 minutes	62.49 min. (oncology suite) 18 min. ICU (no transfer)



PIV cost's



£956.96
Theatre

£242.28
ICU

Cost Benefit
Shifting PICC to
bedside placement
(UK)

Savings
£714.68

DRG 540 Osteomyelitis w/CC (USA)



PICC Bedside

\$386.33²

\$10,109.37⁴

3.8% DRG

PICC IR Suite

\$1,469.32¹

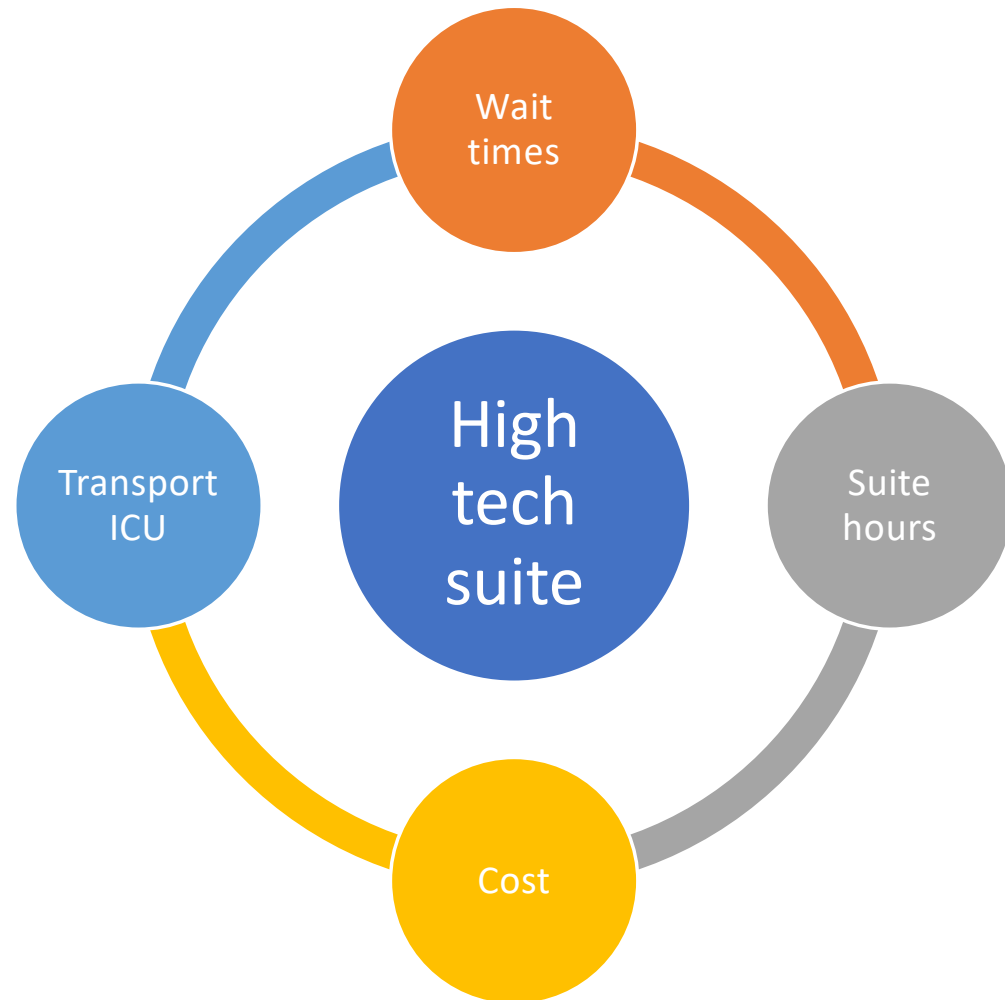
\$10,109.37⁴

14.5% DRG

¹Meyer B: (Sept/Oct 2010) Implementing and maintaining an infusion alliance JIN 33(5) 292-303 Reported data: Nationally, the average cost for PICC placement by Interventional Radiology in an Interventional Suite is \$1,210. Costs were inflated from January 2009 to May 2020 using U.S. Bureau of Labor Statistics CPI Inflation Calculator
²Naylor CL: (2007) Reduction of malposition in peripherally inserted central catheter with tip location system, JAVA 12(1) 29-31 Reported data: Cost of placing a PICC with Sherlock was \$305. Costs were inflated from January 2007 to May 2020 using U.S. Bureau of Labor Statistics CPI Inflation Calculator
³Gregory J. Watson, M.S., Watson Policy Analysis Inc. Arlington, VA.

Cost Benefit: Shifting PICC to Bedside Placement

Well established
in the literature



Kara R, Lemmon R (2015) "Sherlock 3CG® Tip Confirmation System" Bard Access Systems MC_1454_00

A photograph of a hospital room with several hospital beds lined up. The beds are light-colored with beige upholstery and have white privacy screens. Each bed has a patterned blanket draped over the head. The room has large windows with red and white striped curtains. A small table with a potted plant is visible in the background. A white circular overlay with the text "Length of stay" is positioned on the left side of the image.

Length of
stay

Clinical Study: Cost reduction (Japan)



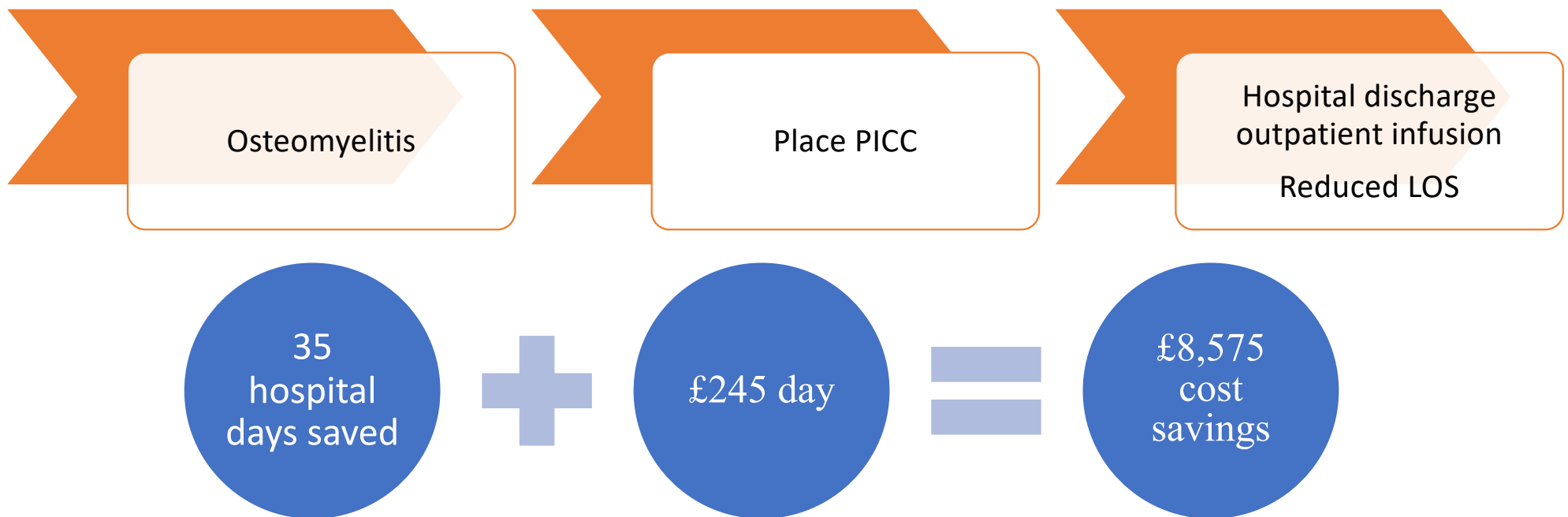
Infusion Services

- OPAT therapy with PICC
 - 10 patients
 - (5 osteomyelitis, 4 abscess, 1 endocarditis)
 - Elastomeric infusion device
 - Staph Aureus (most common)
 - Cefazolin an irritant (most common)
 - Median treatment 15 days
 - Saved 159 hospital bed days
 - Cost reduction (10) patients \$16,000 USD or \$1,600 patient

Hase R (2014) Kansenshogaku Zasshi 88(3) 269-74

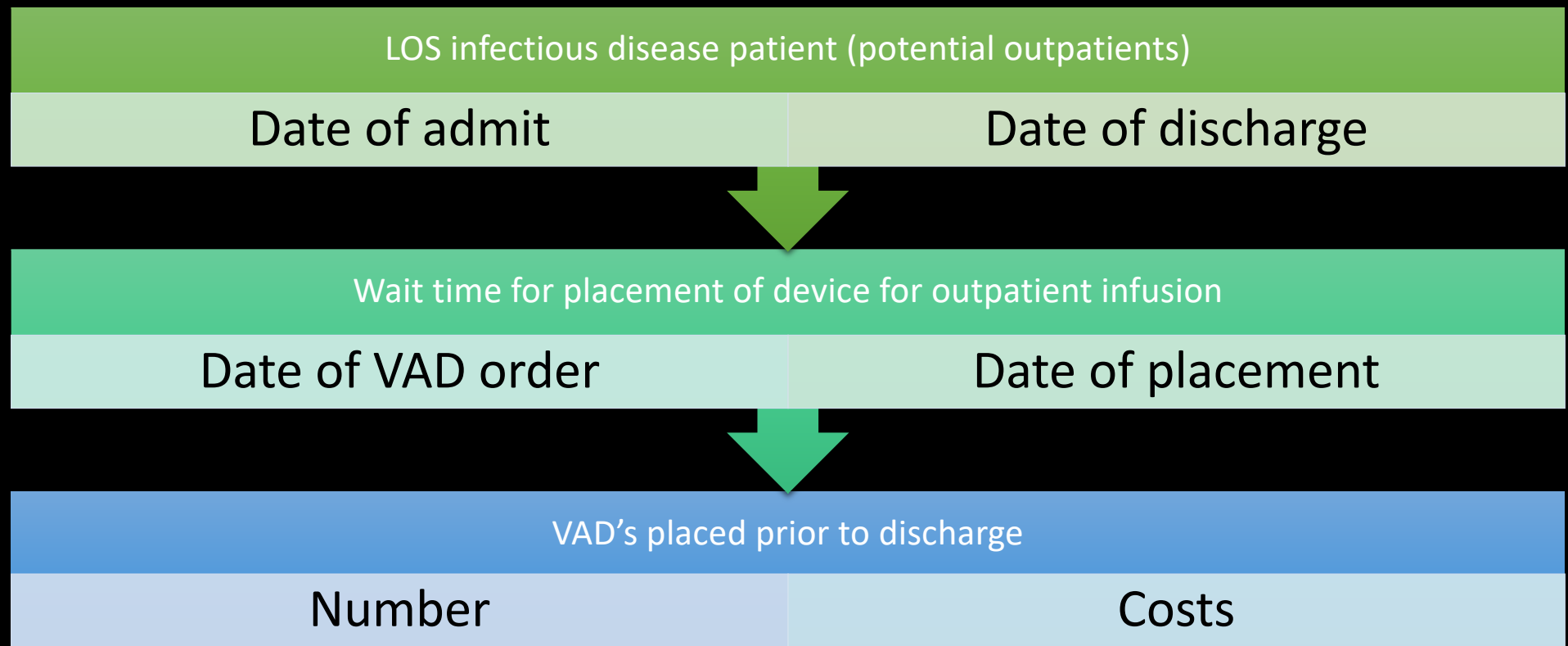
Reducing costs and complications (NHS Evidence UK)

Centralized nurse (3)-led team in radiology



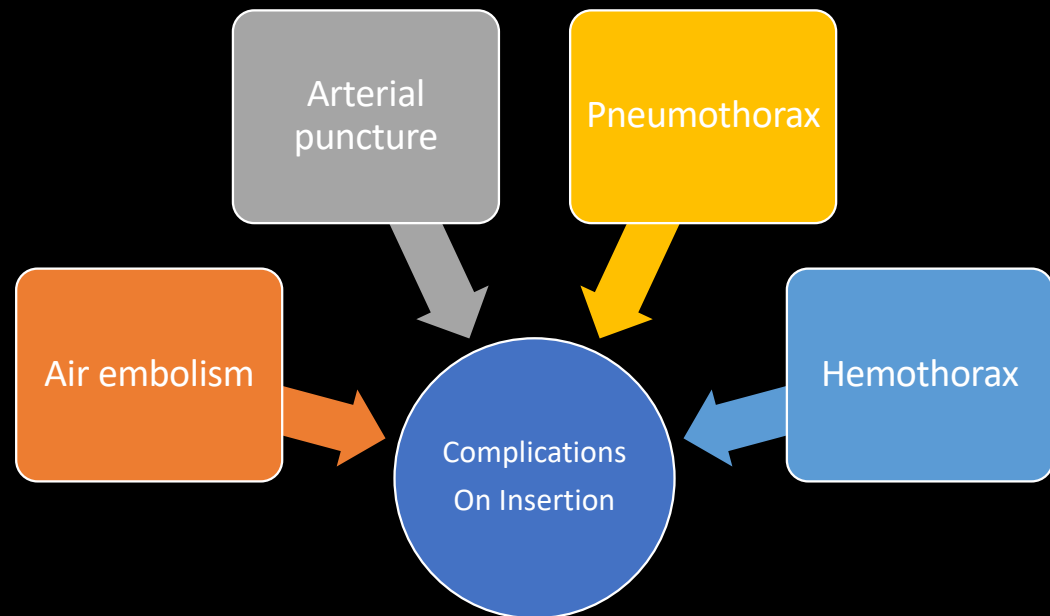
University of hospitals Leicester NHS Trust

Business analysis: LOS



Complications

Central Venous Access Complications: Insertion



Complication reduction: Ramirez (2010)

Mechanical complications

MD and RCP (respiratory care practitioners)

	MD	RCP
Lines placed	538	327
Complications	34	21

Limitations to data:

MD did not use ultrasound 100%/RCP used ultrasound 100%
MD placed femoral (FICC) and RCP did not
RCP majority placements IJ (CICC)

Complications

MD and RCP (respiratory care practitioners)

	MD	MD	RCP	RCP
Complications	IJ	All CVC	IJ	All CVC
Mechanical rate	11.04%	7.10%	2.05%	2.14%
Pulsatile blood flow	5	12	4	4
Pneumothorax		6		1
Malposition Catheter	15	21	2	2

Placement time improved from 7.05 hours to 1.53 hours

Ramirez:(2010) Evaluation of central venous catheter insertion program 15(4); 207-211

Complication reduction(CLA-BSI): Ramirez (2010)

1.84/1,000
Catheter days

- 27 months pre-program

1.04/1,000
Catheter days

- 27 months post-program
- >150 femoral (FICC) eliminated

Limitations to data:

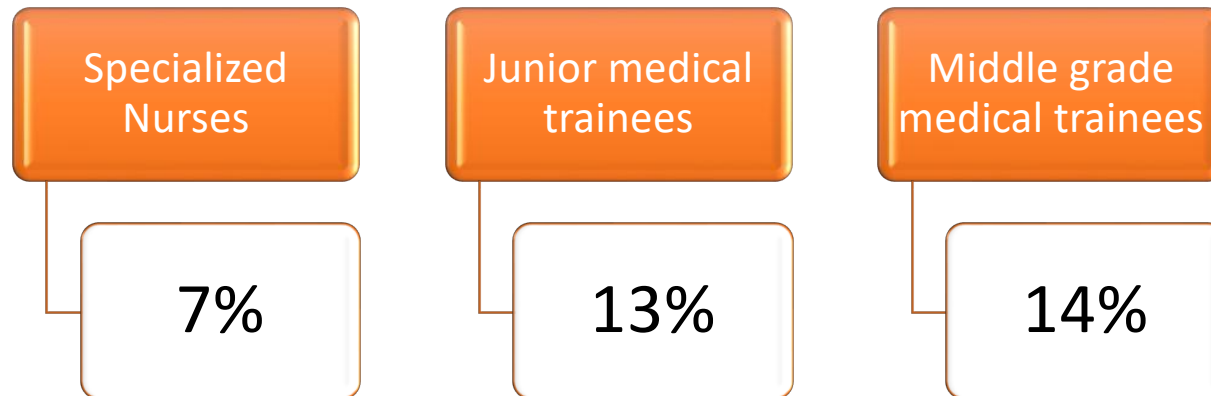
MD not 100% US use/RCP 100% ultrasound use

MD placed femoral and RCP did not

RCP majority placements IJ (CICC)

Complication reduction: University Hospital Leicester

Specialized nurses: (UK)



Central venous access performed by trained and experience staff, using ultrasound guidance, leading to significantly reduce rate pneumothorax and arterial puncture

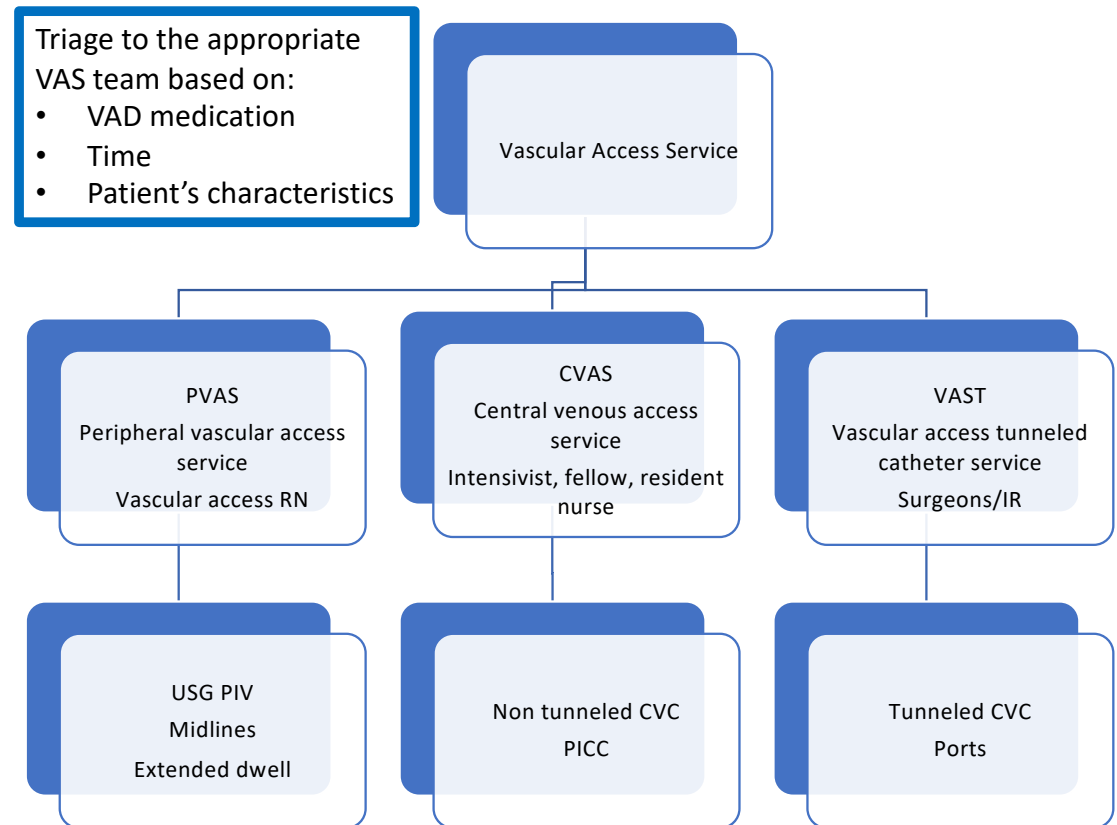
Limitation study: Nurses used ultrasound exclusively

Dedicated team with Vascular access assessment (CLA-BSI)

1.75/1,000
catheter days

1.037/1,000
catheter days

- Single center study retrospective analysis
 - (Jan 2017-Dec 2018)
- CLA-BSI rate central lines decreased
- Implemented assessment program
- **Study limitation:**
 - Multiple strategies utilized besides assessment process and dedicated placers
 - Reduction of central lines is the part of the program design to reduce CLA-BSI reporting



Martillo M: (October 8, 2019) AJIC 47(10)

Experienced Clinician

Cost losses associated with the “PICC, Stick, and Run Team” concept

Kathy Kokotis
JIN/2005



Cost training (2005)	Cost training (2005)
• 33 nurses • \$33,000 USD	• 1 nurse • \$1,100

Competency obtained by 3/33 nurses to place a PICC

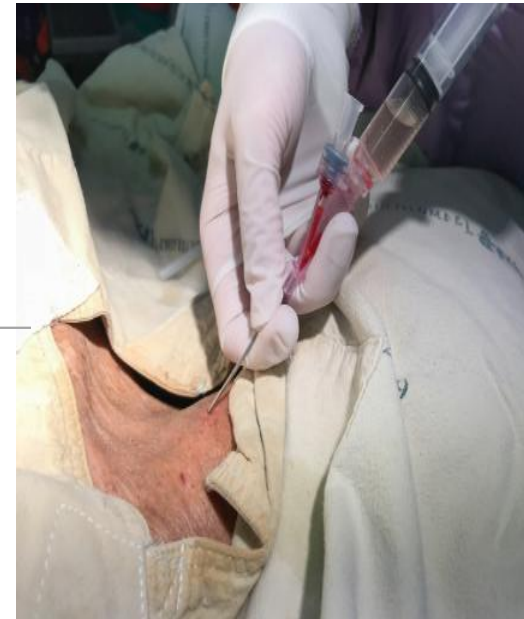
Experienced placer less complications

< 50 Catheterizations

Potential higher mechanical complication rate

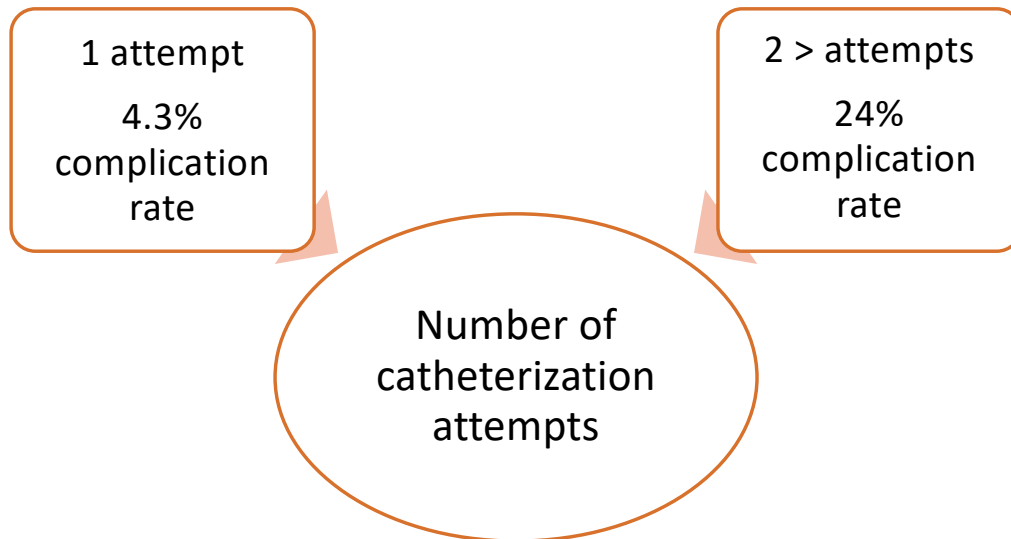
> 50 Catheterizations

Half as likely to have a mechanical complication

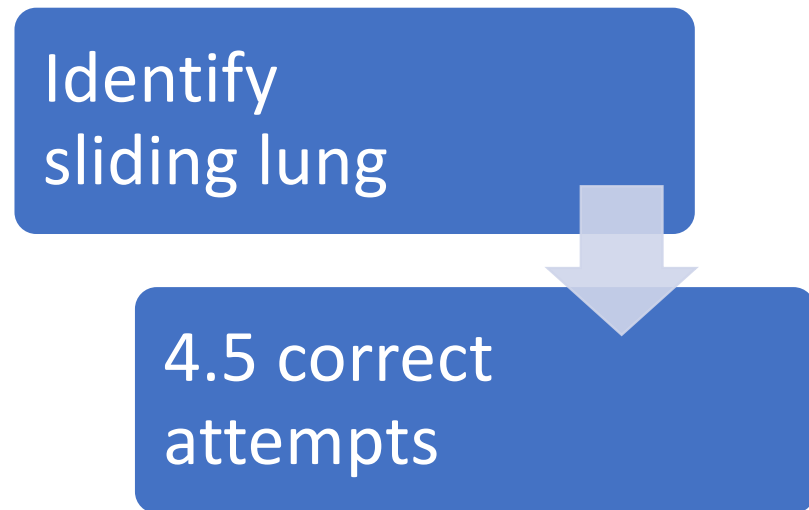


Picture purchased April 2019

Experienced placer



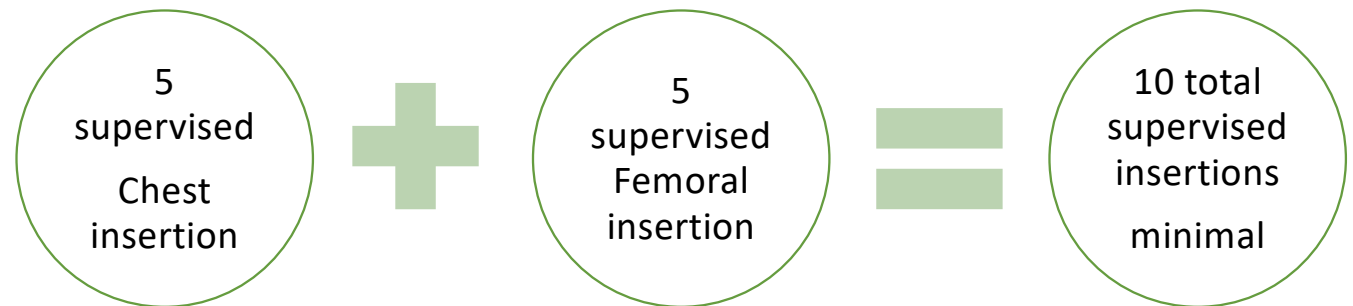
Learning Curve:
Sliding lung excludes pneumothorax



- Single institution prospective observational study in health volunteers
- (57) 4th year medical students

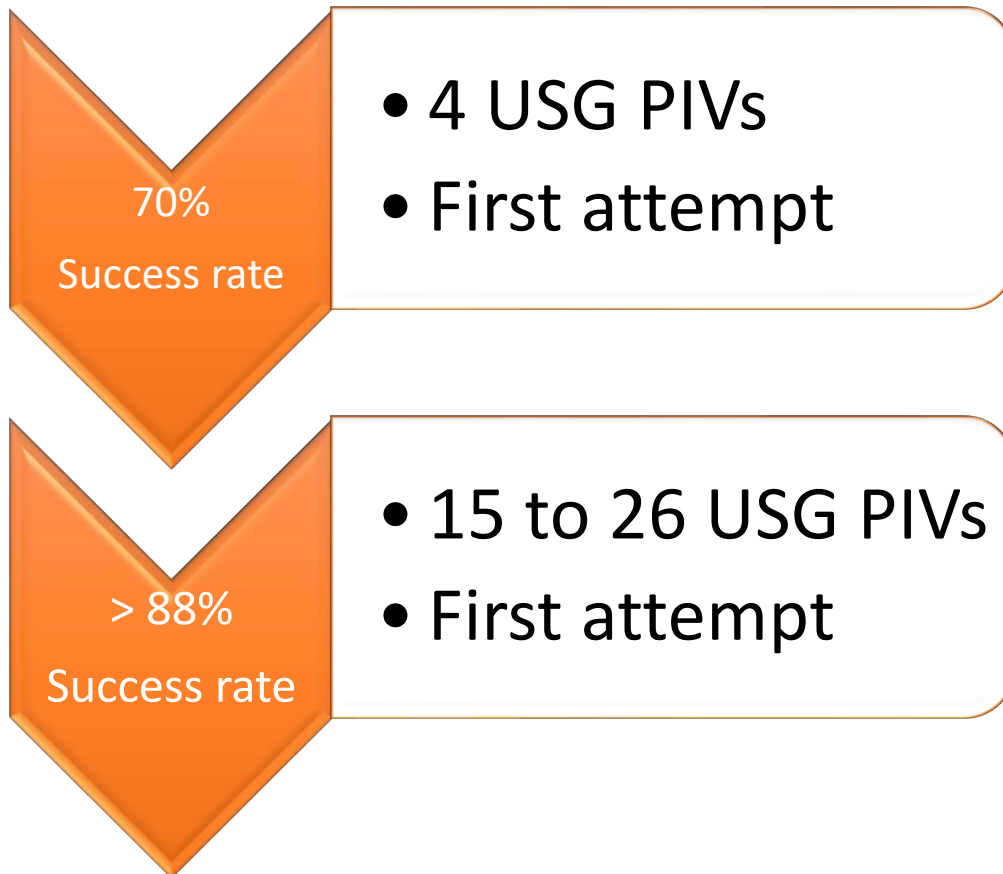
Placement recommendations for competency (JCI)

Minimum Operator
Requirements:
CICC insertion (JCI)



Obtain a qualified second operator after 3 unsuccessful sticks (unless emergent)

Learning Curve: Ultrasound Guidance Proficiency (PIV)

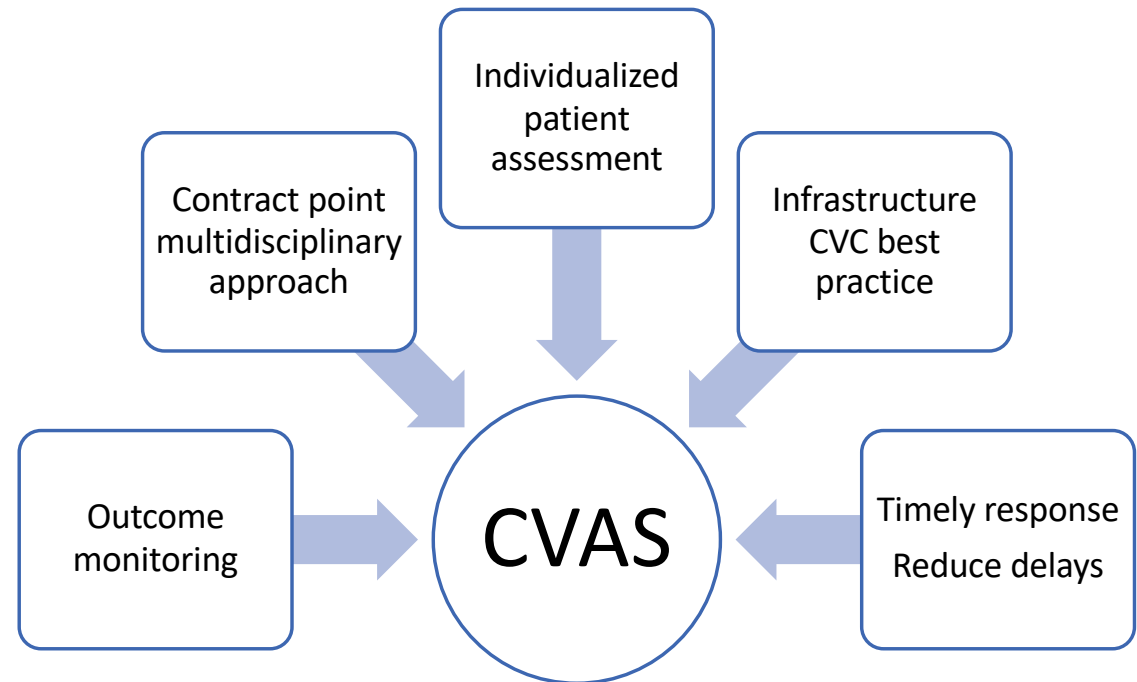


- Single institution
- Prospective observational study
- Emergency room
 - 33 placers (non-physician)
 - 1,077 PIV access attempt in 796 patients

Why a dedicated team?



There is no solid RCT or non RCT evidence that a team decreases complications but why do some institutions use a dedicated team?



Alexandrou E: (2010) JAVA 15(1) 21-27

The FTE (full time employee)
The VAD team or VAT service

Costs

Formula

- Find a problem (dressing changes, CLA-BSI, LOS, delays, insertion success, pneumothorax, suite placement)
- Analyze the cost of the problem (operational labor/materials/LOS/delays)
- Review the flow process breakdown
- Research the literature for publications to solve your problem
- Determine the cost of the solution
- Build champions in key areas (Infection control, quality, safety, MD's)
- Create a business case to present to the CFO, CEO, CNO
- Write an implementation plan and monitor your implementation for success and savings

This is a quicker process



This is a long-term process



A patient picture sends 1,000 words

Brazil (2013)

Creation of an FTE to place PICC lines

Conclusion:

Cost-
effectiveness of a
VAD team/VAT

Summarized
Dr. Mauro Pittiruti

“Unfortunately, there is no direct evidence of the benefit of a VAD team”

On the contrary, there is good evidence that some strategies are cost-effective

Bedside placement,	Use of ultrasound	Implementation of OPAT,	Implementation of PICC	Training of the staff	pre-procedural venous assessment
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“Unfortunately, all of these strategies could be theoretically implemented even without a VAD team”

“The only consideration we can offer is that the presence of a VAD team facilitates the implementation of such strategies.”