Improving Quality Managing Vascular Access Device Thrombosis Risk

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Defining Thrombosis



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Incidence and Risk

- ► 2-6 % symptomatic national benchmark
- >38% asymptomatic incidence suspected
- Catheter size and composition
- Catheter to Vein Ratio
- Tip position

Incidence

Risk Factors

Treatment Costs

Deep Vein Thrombus

Pulmonary Embolus \$ 9956.00

\$7712.00

American Journal of Health-System Pharmacy. 2006;63(20):S5-S15



Potential Sequelae

Deep Vein Thrombosis



- Extremity Edema
- Venous Sclerosis
- Pulmonary Embolus
- Complete loss of vessel function

Virchow's Triad



Tip Position

- Optimal terminal tip location
 - in the lower 1/3 of the SVC at the Junction of the SVC and Right Atrium
 - Laminar flow physiology
 - Midclavicular Placement
 - Practice Advantages



Suboptimal tip location more than doubles thrombosis risk (Lobo 2009)

PICC Upper Portion SVC





Distal SVC





xlbrooklyn.blogspot.co m/2009/03/i-ran-allway

Practice Problems Identified

- Routine placement of Midclavicular catheters
- Antecubital insertion sites
- Insertion by palpation without benefit of vessel assessment
- Overuse of stiff polyurethane catheters based on convenience rather than clinical indication



Stakeholder Selection

- ICU Medical Directors
- Vascular Access Team Nurses
- Director of Clinical Practice
- Pharmacy
- Information Technology
- Radiology Leadership



Benchmarking and Literature Review

- Collection of National Benchmark Data
- Infusion Nurses Society National Nursing Network
- Journal of Infusion Nursing
- Journal of the Association for Vascular Access
- Journal of Vascular and Interventional Radiology
- > 2–6% symptomatic DVT rate
- 5% Duke Hospital specific rate



Barriers to Change

- Radiology Volume Increase
- Increase in work load for Vascular Access
 Nurses
- Increase in time from catheter order to availability for use
- Knowledge deficits for and resistance to ultrasound technology use
- Traditional culture



Adjusting Culture

- Physician Education
 - Collaboration with Vascular Radiology
 - ICU Medical Director communication to House staff
 - CPOE revision
 - Just in time training
- Nursing Education
 - PICC tip determination training
 - Clinical Practice Council Information Dissemination
 - New Employee orientation



Capital Improvements

- Upgrade of ultrasound equipment for bedside
 PICC insertion
 - Ability to measure vein diameter
 - Improved resolution



Courtesy of mksforum.net



Courtesy of scielo.br



Clinical Practice Improvements

- Placement of either PICC or midline catheters
- Removal of Midclavicular catheter order set option from CPOE
- Measurement of catheter to vein ratios prior to insertion
- Use of ultrasound to assess vasculature
- Placement of catheters above the antecubital space
- Revision of Nursing Documentation
- Unit Based Protocol Development

Improvement Quantified



PICC Thrombosis Rate Reduction







Sustaining Outcomes

- Dissemination of Evidence Based Research
- Continued use of both silicone and polyurethane catheters
- Using catheters with small reverse tapers
- Nursing Participation on the National Council for Education with INS
- Ongoing outcomes measurement of catheter related thrombosis rates



Future Improvements

- Potential use of EKG technology for bedside catheter tip determination
- Evaluation of Antithrombotic catheter technology



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- Stephen Olsen MD, Chief Medical Officer
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- Judy Prewitt, MSN, Duke Hospital Director of Clinical practice
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- Duke Hospital Clinical Practice Council

Changing systems to meet the demand...

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