Catheter-Related Thrombosis

A Catalyst of Complications
Catheter-Related Occlusions

- Most common non-infectious complication in the long-term use of CVCs, and in particular PICCs
- Approximately 1 in 4 CVCs may become occluded
- 3 types of Occlusions:
  - Biological
  - Mechanical
  - Physical
Economics of Thrombotic Occlusions

* Based on anecdotal reports Fall 2014

What is the cost of inefficient delivery of IV therapy?

- Cost of ER visit or readmit
- Cost of Catheter Exchange
- RN $35-50/hour
- TPA $120/dose

NAVM 2810
• 3,723 patients with PICCs
• 40% received TPA
• The adjusted odds of developing CLA-BSI 3.59 times greater in those patients that received TPA compared with those who did not
• There is a positive correlation between the use of alteplase for malfunctioning catheters and the development of CLABSI^6
VTE, DVT, UEDVT

• **VTE = Venous ThromboEmbolism**
  – A condition that includes both deep vein thrombosis (DVT) and pulmonary embolism (PE).

• **DVT = Deep Vein Thrombosis**
  – The formation of a blood clot in a deep vessel. The deep veins follow the course of the arteries. They are generally arranged in pairs, and are situated on either side of the artery, and connected at intervals by short transverse branches

• **UEDVT = Upper Extremity Deep Vein Thrombosis**
  – Deep vein thrombosis occurring in the upper extremities
• Symptomatic PICC related DVTs = 3-20% incidence
• Asymptomatic + symptomatic PICC related DVTs = 60-72% incidence
• Median time to thrombus: 8 to 12 days
• Financial impact of one DVT = Avg. $10,000 - $15,000

72% Rate of Asymptomatic PICC Related DVTs and thrombosis
3 - 20% Rate of Symptomatic PICC Related DVTs
UEDVT Risk Factors

- History of DVT
  - History of venous thrombosis was the strongest risk factor for developing a PICC-related thrombosis
- Catheter tip placement
  - Correct positioning significantly lowered the risk of catheter-related thrombosis
  - Non-central PICC tip location was associated with a 2.34-fold higher risk of thrombosis development
- Infection
  - Catheter-related thrombosis and infection are significantly correlated in multiple studies
- Cancer
  - The presence of cancer and a CVC increase the risk of UEDVT 18-fold
- Hypertension (HTN)
  - 70% of patients who developed UEDVT had a history of HTN
UE-DVT Risk Factors

- Infection
- Cancer
- Osteomyelitis
- Obesity
- HTN
- Diabetes
- History of DVT
- Use of anticoagulants
- Insertion attempts
- Catheter tip location
- Size of the catheter

- Vein selection
- Solution infused
- Provider who places the PICC
- Major surgery
- Pregnancy
- Contraception
- Hormone replacement therapy
- Age
- Gender
- Smoking
- Immobility
The 3 P’s of CRT\textsuperscript{16,17}

\begin{itemize}
  \item Patient
    \begin{itemize}
      \item Cancer
      \item Previous DVT
      \item Hypertension
    \end{itemize}
  \item Provider
    \begin{itemize}
      \item Tip termination location
      \item Catheter: Vein ratio
      \item Determination of necessity
    \end{itemize}
  \item PICC
    \begin{itemize}
      \item Diameter
      \item # of lumens
      \item Anti-thrombogenic technology
    \end{itemize}
\end{itemize}
Infection is linked to thrombosis

Post-mortem evaluation of 72 cancer patients with CVCs showed a strong correlation between CR-sepsis and CVC thrombosis

- Fibrin layer present on ALL catheters
- CR-Thrombosis present in 38% of cases**
- 23% of these had sepsis**
- All patients with sepsis had thrombosis
Patients with cancer are at high risk for developing venous thromboembolism (VTE) due to disease state & treatment factors. The presence of a central venous catheter (CVC) further increases this risk. Thrombosis and Infection are serious complications and more common in patients with cancer. There is a 47-fold increase in the risk of mortality from VTE in cancer patients with a CVC.
• Each year as many as **1.2 Million** Americans suffer from Venous Thromboembolism (VTE), which includes Deep Vein Thrombosis (DVT) and Pulmonary Embolism (PE)\(^{(CDC)}\)

• At least **120,000 deaths** per year are directly related to VTE

• It is among the **top 5 causes of death** in the US

• VTE is the leading cause of **preventable**, in-hospital deaths affecting more people annually than highway fatalities, breast cancer and AIDS combined

• 74% of people surveyed have little or **no awareness** of DVT symptoms

• Cost to treat (mean) **$9,247/patient/year**
Impact of PICC-Related DVT

- Interrupts treatment
- Increased LOS
- Increases cost
- Morbidity
- Risk of Mortality
Healthy People 2020

Surgeon General’s Call to Action

About 10 percent of people with DVT die from pulmonary embolism...making DVT the most common preventable cause of death in hospitals.

- 54.3 persons per 10,000 population aged 18 and older developed VTE in 2007
- TARGET: 48.9 per 10,000

www.healthypeople.gov
DATA

Collect It
Understand It
Use It to improve your practice!
Use it to improve your outcomes!
References

References (con’t)


