Quality Initiative Aimed at Reduction of Peripherally Inserted Central Catheter Associated Thromboses and Line Dysfunction

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Background

• Central line use common
• Risks associated include
  – Infection
  – Thrombosis
• Wilmot experience
  – Success with significant reduction in CLABSI
  – Continued to have unacceptable rate of PICC-associated thromboses and use of alteplase for line occlusion
Reducing Central Line Related Infections in Adult Hematology-Oncology Patients

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Background
Central line-associated bloodstream infections (CLABSIs) are a major cause of patient morbidity, increased length of stay, and higher costs. In 2008, the University of Rochester Medical Center (URMC) Wilmot Cancer Center Inpatient Oncology unit participated in the New York State CLABSI Collaborative/Department of Health study. Data was prospectively collected for the Inpatient Oncology units as well as Strong Memorial Hospital (SMH). An interdisciplinary task force led by oncology nurses was formed to identify factors contributing to an unacceptable rate of CLABSIs and to identify and implement strategies to reduce this preventable adverse event. In addition to the methods and interventions described below, the group also conducted:

- Focused literature reviews regarding the use of central lines, CLABSI rates, and prevention in the neutropenic adult hematology patients
- Benchmarking and direct communication with other centers

Methods

Intervention Bundle 1
In 2008 a hospital wide central line initiative was introduced which included:
- Implementation of the safety nurse role
- Revision of the policy and procedure for central line care

Intervention Bundle 2
In 2010 Intervention Bundle 2 was undertaken:
- RCA of every incidence
- Patient/family education
- Bedside nursing handoffs including comprehensive central line assessment
- Daily rounding with providers including determination of need

Intervention Bundle 3
In 2011 strategies implemented in addition to those from Bundles 1 & 2 included:
- Trials and acquisition of preferred catheter, preferred site of PICC placement, and preferred needleless access device (neutral fluid displacement)
- Routine demonstration of staff competency in dressing and line changes
- Development and implementation of Central Line Selection SOP and Febrile Neutropenia SOP
- Dissemination of results of central line audits to staff

Results
Following Intervention Bundle 1 a 50% reduction in CLABSI rates was achieved in patients with peripherally inserted central catheter (PICCs) and with implanted venous access devices (IVADs); CLABSI rates in patients with tunneled central venous catheters (TCVs) remained above the National Healthcare Safety Network (NHSN) benchmark of 1.9 per 1,000 line days.

Following Intervention Bundle 2 inpatient Oncology Unit CLABSI rates remained above the established threshold.

Following Intervention Bundle 3 CLABSI rates declined another 60% in this population putting the rate below the NHSN benchmark.

This evidence validates the necessity of a multi-factorial approach for reducing CLABSI rates in this vulnerable population.

Future Directions
Although the number of CLABSIs continues to remain below NHSN benchmark, the use of alteplase for declotting PICCs and PICC associated DVTs remain higher than acceptable.

In February 2014 a trial of a PICC that is both antimicrobial and antithrombogenic was initiated. The incidence of CLABSI will continue to be monitored along with the use of alteplase and the incidence of PICC associated DVTs.

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OVERALL CLABSI RATES 2009-2013

- **Rate/1000 line days**
- **Intervention Bundle One***: 6.20
- **Intervention Bundle Two**: 3.30
- **Intervention Bundle Three**: 3.00
- **2009**
- **2010**
- **2011**
- **2012**
- **2013**
Purpose

• To determine if the implementation of an anticoagulant coated PICC product would reduce the incidence of thromboses and/or line occlusion while maintaining a low CLABSI rate
Method

• Identified a PICC with pre-clinical data claiming antithrombogenic and antimicrobial properties

• 75 patients admitted to the Adult Leukemia and Bone/Marrow Transplant (ALBMT) services received study PICC
  – Only exclusion was known sensitivity to chlorhexidine

• Retrospective study on 75 patients from ALBMT services who received standard PICC in the preceding 2 years
Method

• The new PICC line was inserted by the PICC team utilizing standard procedures for line insertion with one exception; the new PICC lines were not trimmed to a uniform length as was usual practice for the insertion of other PICCs
Objectives

• Primary objectives
  – Decrease use of TPA due to line occlusion
  – Decrease incidence of line-associated DVT

• Secondary objectives
  – Maintain low CLABSI rate
  – Determine if antithrombogenic PICC increased incidence of bleeding on insertion
Data Points

• Secondary objectives
  – Frequency of CLABSI as defined by the CDC for each cohort
  – Frequency of bleeding associated with insertion

• Primary objectives
  – Use of alteplase in each cohort
  – Frequency of line associated thrombosis (verified by ultrasound)
<table>
<thead>
<tr>
<th>Feature</th>
<th>Trial PICC</th>
<th>Standard PICC</th>
</tr>
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<tbody>
<tr>
<td>Median Age</td>
<td>58</td>
<td>57</td>
</tr>
<tr>
<td>Male</td>
<td>47</td>
<td>40</td>
</tr>
<tr>
<td>Female</td>
<td>28</td>
<td>35</td>
</tr>
<tr>
<td>Acute Leukemia</td>
<td>33</td>
<td>50</td>
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<tr>
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<td>12</td>
</tr>
<tr>
<td>Multiple Myeloma</td>
<td>25</td>
<td>10</td>
</tr>
</tbody>
</table>
Results

• Secondary objectives
  – CLABSI rate no different for either cohort
  – Line associated bleeding at insertion no different for either cohort
Results

55% of the trial PICCs needed alteplase for occlusion compared to 58% of the standard PICCs

17% of the trial patients developed catheter-related thrombosis compared to 9% of the standard patients (p<.001 via chi squared test for independence)
Conclusion

• No change in standard PICC device warranted
  – No difference CLABSI incidence compared to historical CLABSI controls
  – No difference in insertion issues
  – No difference in TPA use
  – Lower incidence of DVT compared to new device
  – Anecdotally, higher staff satisfaction with performance & ease of use with standard PICC

• Consider trial of another antithrombotic PICC if available
References

• *In vitro* data on file. Teleflex incorporated


Thank you

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- URMC Hematology/Oncology and Blood and Marrow Transplant Medical and Nursing Staff
- URMC Line Insertion Team
Questions