AN INTERDISCIPLINARY PROCESS CHANGE: CONVERSION OF PICC CAPPING FROM HEPARIN TO NORMAL SALINE

Angela Colella, PharmD; Brandon Bodager, MD; Frank Spezarth, RPh, BCPS; Natalie McDonough, BSN, RN, CCRN; Deb Kastenholz, MSN, RN; Paul Grebe, MD

1. Aurora St. Luke’s Medical Center, Aurora Health Care, Milwaukee, WI 2. AMG Imaging Services

BACKGROUND

HEPARIN INDUCED THROMBOCYTOPENIA (HIT)

HIT and HIT with thrombosis syndrome (HITT) develops in up to 5% of patients exposed to heparin. While rare, the condition can be devastating, leading to limb loss and death in the most extreme cases.

Any heparin exposure, even an intravenous line flush, increases the risk of HIT.

PICC LINE CAPPING

Peripherally inserted central catheters (PICC) are commonly used in hospitalized patients for whom providers desire long term venous access.

At Aurora Health Care (AHC), heparin is the current flushing and capping solution of choice with positive pressure caps; however, normal saline has demonstrated non-inferiority to heparin in maintaining PICC line patency when used with positive pressure flush patterns.

To reduce heparin use in our institution, we implemented and evaluated an interdisciplinary process change of replacing heparin with normal saline as the PICC line capping standard.

OBJECTIVES

PRIMARY OBJECTIVE

The primary objective is non-inferiority of normal saline in our institution versus historical heparin data for maintaining PICC line patency as evidenced by line exclusions measured by alteplase use.

SECONDARY OBJECTIVES

AHC system PICC capping solution policy change
• Lack of change in invasive line infection rates
• Cost analysis

METHODS

Pilot at ASLMC

• Inclusion Criteria: Adult inpatients, new PICC line, use of central line order set
• Exclusion Criteria: Outpatients, pre-existing PICCs, other types of central lines

Evaluation of Patency

• Non-inferiority calculations: Patency rate 85% from literature
• Pre-defined inferiority margin 5%
• 831 patients in each arm needed
• 80% power, Alpha = 0.05

System Change

• Recommendations per patency outcomes
• Feasible to System Nursing Council
• Adopt an AHC system PICC capping solution policy

RESULTS

PRIMARY

Pilot patency rate was 4.1% greater than baseline. Based on pre-specified non-inferiority margins of 5%, normal saline was non-inferior when used with positive pressurized caps (p=0.05).

RESULTS (CONTINUED)

INFECTION RATES

Bloodstream infection rates increased during the pilot period; however, only a small, non-contributory percentage of patients with line infections were part of the pilot.

COST ESTIMATES

Heparin costs $0.10 more per flush than normal saline, but flushing frequency is twice daily versus three times daily with normal saline. The estimated yearly cost of both capping solutions is therefore equal at approximately $3,960. As reflected in the table below, significant indirect cost savings could be realized by reducing the incidence of HIT.

<table>
<thead>
<tr>
<th>Cost Avoidance Estimates</th>
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<tr>
<td>Average additional cost per patient with diagnosis of HIT</td>
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<tr>
<td>Number of patients with PICC at our institution**</td>
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<td>Overall estimated incidence of diagnosed HIT***</td>
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<td>Potential annual cost savings</td>
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*Reflected in literature; includes treatment with direct thrombin inhibitor, reimbursement, increased length of stay
**Annually based on 2013-2014 data
***Conservative estimate of incidence of diagnosed HIT in literature

CONCLUSIONS

Normal saline has demonstrated historical non-inferiority to heparin for maintaining PICC line patency when used as the capping solution with positive pressurized caps.

Similar patency results were demonstrated at our institution.

Substantial costs could be contained by potentially reducing the risk of HIT/HITTS and its associated costs to the institution. Barriers to this project include time to educate all nursing providers, confounding factors of patency, and resistance to policy change.

REFERENCES