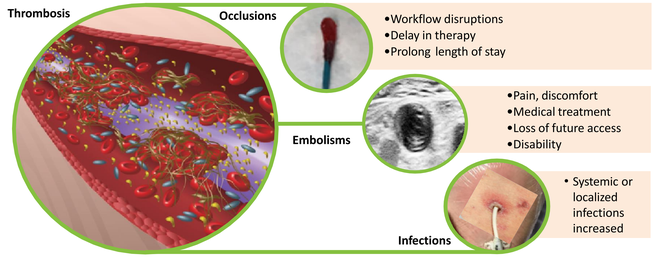
Economic Impact of Catheter Material for Complication Reduction[1]

Nancy L Moureau, PhD, RN, CRNI, CPUI, VA-BC, PICC Excellence, Inc., Hartwell, GA USA

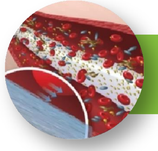
Introduction

- **Occlusion and thrombosis**: two common complications that cause inability to infuse, infection, pulmonary embolism, post thrombotic syndrome and diminish vessel availability
- Complications drive up healthcare costs and worsen patient outcomes



- Application of practice changes and **material modifications** have resulted in a **decline in occlusion and thrombosis rates.**

Hydrophilic biomaterial (HBM) catheters constructed of a thromboresistant hydrogel polymer

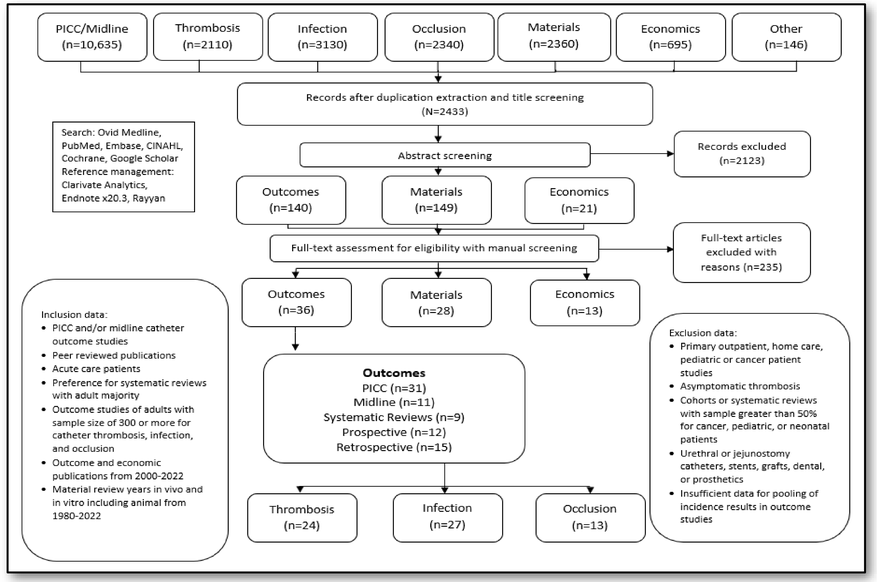


Plasma is 90% water, HBM acts as a camouflage to the body to prevent cell adhesion and thrombotic formation

Results

Application of an HBM PICC and midline catheter in acute care, with a modest 50% reduction in all complications, **projected savings of nearly $1.8 million dollars annually** for a typical 1000-bed acute care facility

Integrative Literature Review Flow Diagram



- Primary review (36 outcome studies) average incidence of CRT for PICCs = 3.45% and midline catheters = 2.48%, CABSI PICCs = 2.25%; midlines = 0.67%, and PICC occlusion = 8.3% and midlines at 3.6%.
- Catheter materials: polyurethane, silicone, hydrophobic and hydrophilic impregnation, coating, and composite material.
- Economic evaluation integrated PICC ICD-10 cost for CRT, $12,982 for infection, and $624 for occlusion, an average of $24,558 dollars per complication
- Total national complication cost of $4.5 billion dollars annually.

Methods

This literature review was performed for catheter occlusion, venous thrombosis, catheter material, catheter coatings, blood adherence, and economic analysis of complications. Definitions for occlusion, superficial and deep venous thrombosis were established as they applied to peripheral veins of the extremities. The economic impact of catheter material modifications on complications was analyzed.

Economic Analysis

- Results compared with 2022 list of ICD-10 codes or published cost when needed (i.e. replacement)
- Inclusion/exclusion for economic analysis:
  - Number of discharges
    - Discharges meeting criteria for rate-setting process
    - Comprised of 100% Fee-for-service inpatient discharges following data cleaning
    - Basis for cost calculations
  - Diagnosis not present at time of inpatient admission
  - Calculation of LOS - charges, and estimated costs
  - Length of stay – Basis for total length of stay as reported in the data
  - Total charges – Basis for total charges as reported in the data

Conclusion

- This is the first integrative literature review to evaluate the pooled incidence of PICC and midline CRT, CABSI, occlusion, catheter materials, and the economic impact of complication reducing materials.
- More research is needed to confirm clinical results of hydrogel composite material for PICC and midline catheter projected cost savings with reduction of complications.
- Limited clinical research on the hydrophilic catheter material suggests a remarkable and cost-effective reduction in the incidence of common catheter complications.

REFERENCES:

1. All references available upon request form the author.