Standardization and Implementation of a Central Line Associated Blood Stream Infection Prevention Bundle

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Penn Medicine

The Hospital of the University of Pennsylvania (HUP)

- Located in Philadelphia, PA
- 789 bed quaternary academic medical center*

Adult Admissions	34,691
Outpatient Visits	1,696,718
ED Visits	61,250
Births	4078
Physicians	1,968
Professional Nurses	1,800+

- Part of the University of Pennsylvania Health System
- Magnet designated since 2007
- Annually recognized as one of the nations best by *U.S. News & World Report* in its Honor Roll of best hospitals.

*Penn Medicine Facts and Figures, 2016

Objectives

- **Review central line associated blood stream infection (CLABSI)**
  - Definition
  - Risk factors for developing
  - Prevention strategies
- **Review bundle development**
- **Review one institution's implementation**

What is a BSI?

- **Primary Bloodstream Infection (BSI)**
  - A laboratory confirmed bloodstream infection that is not secondary to an infection at another body site (CDC 2018)
- **Secondary BSI**
  - A BSI thought to be seeded from a site-specific infection at another body site

What is a BSI?

- **Mucosal Barrier Injury BSI**
  - A newer definition
  - Accounts for the susceptibility of immunosuppressed patients to certain infections
- **Preventable healthcare associated infection (HAI)**

What is a central line?

- **An Intravascular catheter that terminates at, close to the heart, or in one of the great vessels that is used for infusion, withdrawal of blood, or hemodynamic monitoring** (CDC, 2017)
- **Eligible for CLABSI when in place for more than 2 consecutive calendar days**

CLABSI Prevalence

- **Over 30,000 CLABSI occur in acute care facilities annually** (CDC, 2018)
- **About 50% decrease from 2008-2016**
  - Rates from 1.00 to 0.56 (CDC, 2018)
- **ICU**
- **Non-ICU**
- **Neonatal**

CLABSI Impact

- **Morbidity/mortality**
  - Mortality ranges 12-25% (CDC, 2011)
- **Cost**
  - CLABSI cost to an institution $6,400-$29,000 per patient (Scott, 2009)
  - Estimates up to $46,000 per case (Haddadin & Regunath, 2017; Wilson et al., 2014, Kaye, et al., 2014)
  - Increased length of inpatient stay (Kaye, et al., 2014)
  - Increased antibiotic use

CLABSI Risk Factors (TJC, 2013)

- **Intrinsic→ nonmodifiable**
  - Age
  - Gender
  - Co-morbid conditions
- **Extrinsic→ modifiable factors**
  - Extraluminal versus intraluminal
  - Parenteral nutrition
  - Site selection
  - Timing of insertion
  - Number of lumens

Bundle Development

- Not a new concept
- Insertion and maintenance bundles

- Centers for Disease Control and Prevention
- The Joint Commission
- Infusion Nursing Society
- Infectious Diseases Society of America
- Michigan Appropriateness Guide for Intravenous Catheters

Our Approach

- Literature and Clinical Practice Guideline review

- Think tank of CNS/CPLs

- Multidisciplinary

- Focus on nursing's contribution

Nursing Impact

Insertion	Maintenance	Early Removal
• Maximum sterile barrier precautions • Use of time out	• Use of evidence based interventions • EMR review of documentation • In person assessment	• Daily review of necessity • Multidisciplinary approach

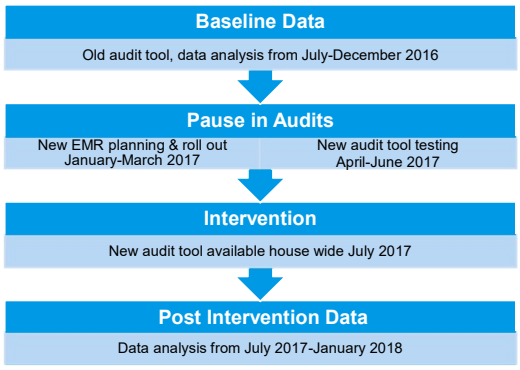
Focus on Maintenance Bundle

- **EMR review:**
  - Dressing
  - Needleless connectors
  - Tubing
  - Insertion site
  - Chlorhexidine bathing
- **In person review:**
  - Dressing dated
  - Tubing labeled
  - Disinfecting caps

Implementation

- **Development of bundle focused audit tool**
- **Creation of easy to use database for audit entry**
- **Increased data availability at unit and hospital wide level**
- **Nursing engagement**
- **Accountability contracts for participating and dissemination of data**
- **Education**

Timeline



Analysis Overview

	Pre Intervention*	Post intervention
Average percent of units participating each month	50% (n= 12)	83% (n=20)
Average # audits entered monthly	267	388
Rate compliant	32%	45%

- **Rate ratio = 1.43**
  - 95% confidence interval [1.31, 1.55]

*Pre-intervention data does not include disinfecting cap compliance

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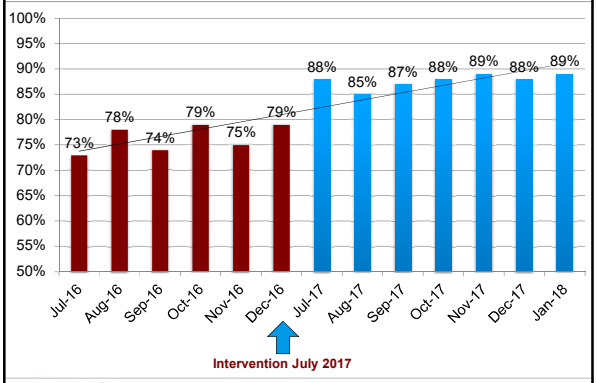
Overall Bundle Compliance



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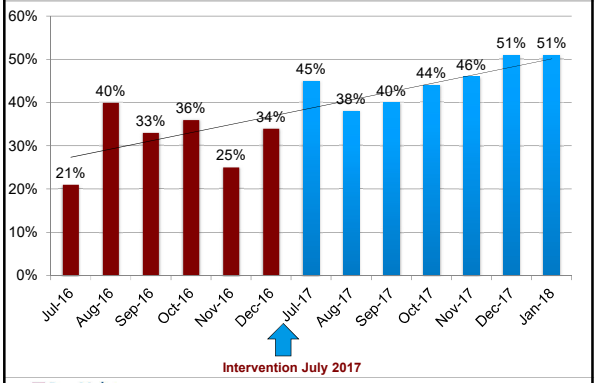
Percent Audits at 100% Compliance



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Lessons Learned

- **Multifactorial healthcare associated infection**
- **Development of consistent message**
- **Engagement**
- **Closing the loop**

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Thank You