Disclosure

Contact hours are awarded after attending the educational activity and completion of the educational activity evaluation

There is no conflict of interest for anyone with the ability to control content for this activity except for Mary Duncan, MSN, RN, CIC who disclosed she is a member of the 3M Clinical Advisory Group and a 3M Consultant. Conflict of interest resolved

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Peripheral Intravenous Catheters: A QI Project

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INS NATIONAL ACADEMY
San Diego, CA | November 1-3, 2019

Learning Outcomes

After the session, attendees will be able to discuss the details of a quality improvement project on a bundled approach to decrease infections related to peripheral intravenous catheters.

EAST COMMUNITIES

Mercy Hospital St. Louis
615 S. New Ballas Road
Saint Louis, MO 63141

FY16 Hospital Statistics:

900+ Staffed Beds
5,822 Co-workers
628 Integrated Physicians
150 Integrated Advanced Practice Providers
37,072 Inpatient Discharges
980,561 Outpatient Visits
79,887 ED Visits
9,019 Births
37,693 Surgeries

MERCY HOSPITAL SAINT LOUIS

Comprehensive Services

- Behavioral Health
- Cardiovascular
- Critical Care
- Emergency Medicine
- Neurology
- Obstetrics
- Oncology
- Orthopedics
- Pediatrics/NICU
- Rehabilitation
- Skilled Nursing
- Surgery
- Women's Health
- Low Risk Birthing Center

U.S. News & World Report ranks Mercy Hospital St. Louis No. 6 in Missouri and No. 3 in the St. Louis region for its 2014/15 Best Hospitals List

Truven Top 100 Hospital

Mercy

Overview

- Standardization of central line insertion and maintenance practices have greatly reduced central line associated bloodstream infections
- In contrast, there has been very little standardization of practices for PIVs

Identification of the Problem

- New IV flush order set with carrier bag process from the Ministry
  - **INS, CDC, Lippincott state: “if infusion is intermittent, change tubing and bag every 24 hours”**
- No standard for Primary or Intermittent tubing at Mercy St. Louis
  - change only secondary tubing every 24 hours,
  - change bag and both tubings every 24 hours
  - change tubing every 96 hours
- Confusion about what is considered continuous and what is intermittent

Identification of the Problem

- The practice council suggested to change all IV tubing every 96 hours
- Infection control had concerns regarding guidelines and the number of blood stream infections
- Current IV practices were reviewed and house-wide audits revealed:
  - IV hubs were not scrubbed appropriately before accessing
  - Disconnecting the IV tubing for convenience
  - Not protecting the tubing appropriately when it is disconnected
    - Supplies not readily available

Identification of the Problem

- To quantify potential harm to patients, the number of primary bloodstream infections over a 6 month period were identified (January 2015 – June 2015)
  - 45 patients identified
    - 39 only had a PIV
    - 6 had a central line
    - This translates into 0.56-1.06 infections/1000 patient days
  - Cost of a peripheral primary bloodstream infection is between $10,000 and $20,000
    - Kilgore, M; Brossette, S. “Cost of bloodstream infection”. AJIC, 2008 Dec;36(10)

Potential Solution

- If needleless connectors, IV tubing ports and disconnected IV tubing are protected with alcohol impregnated devices that prevent contamination, the number of primary bloodstream infections will decrease.
- If the ports and tubing are protected with alcohol impregnated caps and tips, it is safe to change intermittent tubing every 96 hours.

Which practice do you see most often for tubing tips (a.k.a. male luers) at your facility?

a) Looping

b) Cover with end cap

c) Cover with disinfecting cap

d) Get really creative

e) Other

Study

- Scope of Project
  - The use of a standardized peripheral IV maintenance bundle will decrease primary bloodstream infections
- Goals
  - Decrease primary bloodstream infections to <0.3/1000 patient days in all inpatients >18 years of age except Labor and Birth, Mother/Baby, and Behavioral Health by implementing a peripheral maintenance bundle.
  - Achieve and sustain >90% compliance on PIV maintenance bundle elements

New IV Care and Maintenance Bundle

All Inpatient Adult Units (excluding L&B, Mother Baby, Psych)

- Change all IV tubing every 96 hours
- Prohibit disconnecting IV tubing for convenience (i.e. bathing, walking, going for tests, etc.)
- Alcohol impregnated cap on all ports (central and peripheral)
- Alcohol impregnated tip (i.e. disinfecting cap for male luers) on all tubing that is disconnected

Methods

- Timeline
  - September – October 2015 – A point prevalence audit on all patients with peripheral and central lines completed to obtain a baseline on how lines and sites were maintained
  - October 2015 – Nursing units educated on the PIV maintenance bundle
  - November 2015 – Started using alcohol impregnated caps and tips
  - December 2015 -May 2016– Audits completed by unit managers, supervisors, clinical educators, shared governance, infection preventionists, and bedside RNs. Bloodstream infection data collected.
  - February and May 2016– Point prevalence audit repeated

PIV Bundle

The Peripheral Intravenous (PIV) Maintenance Bundle

1. Check the clinical indication why the PIV is in place, and remove all unnecessary PIVs.
2. Assess IV site: Look for signs and symptoms of ***phlebitis*** – **pain/tenderness** at the tip of and proximal to the venous access device, **redness** at the tip of the cannula and along the vein, **swelling** over the vein, warmth, purulent drainage. If s/s of phlebitis are present, remove PIV.
3. Document appropriately by using the appropriate SmartPhrase (.phlebitis, .infiltration, .extravasation).
4. Notify physician for grade two or greater.
5. Reassess IV sites with every catheter access/infusion — and a minimum of twice per day if locked.
6. Assess that dressing is dry, occlusive, intact and dated. If non-occlusive or if blood is present under dressing, remove dressing, clean site with chlorhexidine, allow to dry and place new dressing.
7. Place Curos caps on all open ports.
8. Minimize IV tubing disconnections.
9. Place a Curos tip on line if tubing must be disconnected.

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Maintenance Audit Tool

Peripheral/Central Line Maintenance Audit Tool Date _____ Unit/Shift_____

Name of Auditor _____

***AC** = antecubital **FA** = forearm **W** = wrist **H** = hand **O** = other **UA** = upper arm **SC** = subclavian **IJ** = internal jugular **FE** = femoral **P** = port

****curos** tip, looped, saline cap, white male tip, secondary tubing cap, no tubing present, nothing, other

Auditor: If tubing is not dated and/or disconnected without a curos tip in place, discard tubing and notify RN. Review all non-compliant elements with RN for correction. For questions on completing the audit, call Infection Prevention at 314-251-6332.

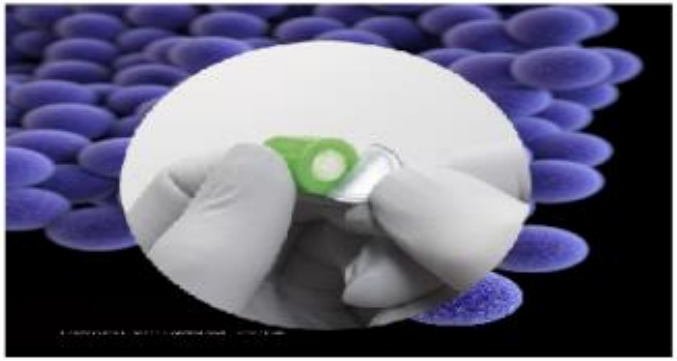
Each unit to audit 10 IV lines per week. Please send completed forms to Infection Prevention by Friday: **fax 314-251-7724 or email Mary.Duncan@Mercy.net**

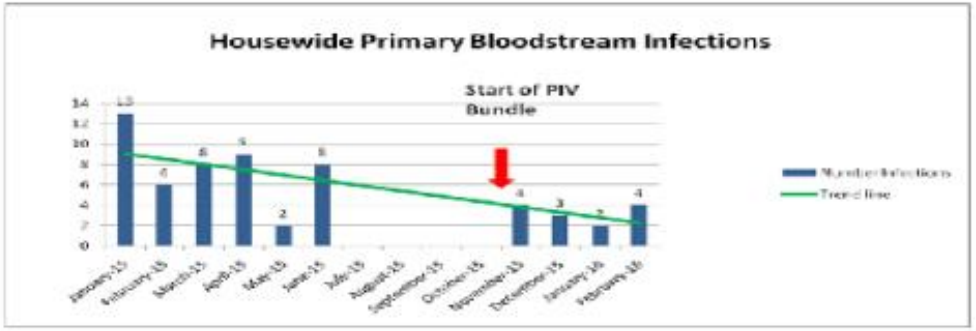
Room	Line Type Peripheral Central **PICC PORT**	Date inserted	Dressing dry/intact/ occlusive **Y/N**	Dressing dated? **Y/N**	Claves clean? **#clean/ #total**	Location * **AC FA W H O UA SC IJ FE P**	Site with Redness Swelling Pain OR WDL	Curos caps **#curoscaps present/ #ports**	Tubing dated? **#dated/ #lines**	Is primary line infusing?**(Y/N)** If not infusing, **how is IV tubing protected****	If disconnected, why? Other comments

Mercy

Results

- The point prevalence audit in February, 2016 showed the following:
  - 317 lines were audited
  - 100% of disconnected IV tubing were protected. Of these 73% were protected by an alcohol impregnated tip
  - 93% of ports on tubing and needleless connectors had an alcohol impregnated cap in place
- Increased compliance due to significantly decreased nursing time – product was available at point of care





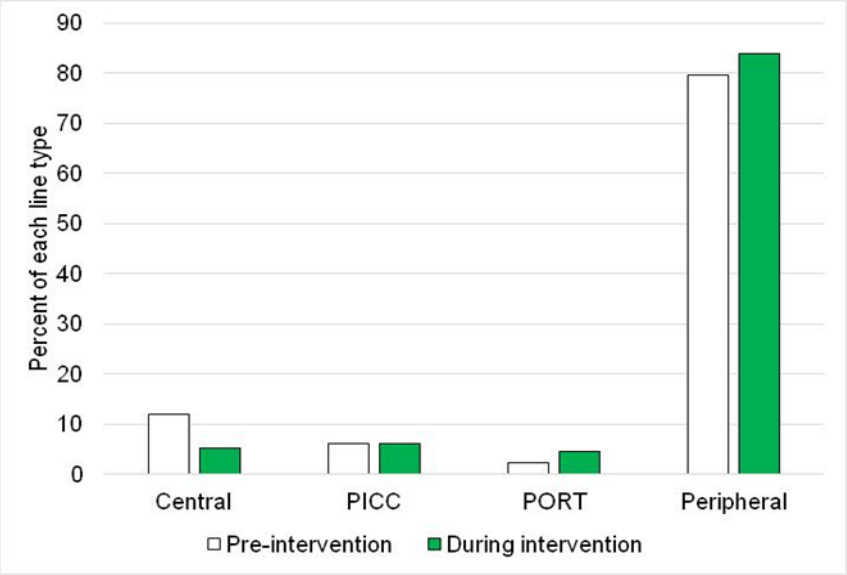
Green Means Clean

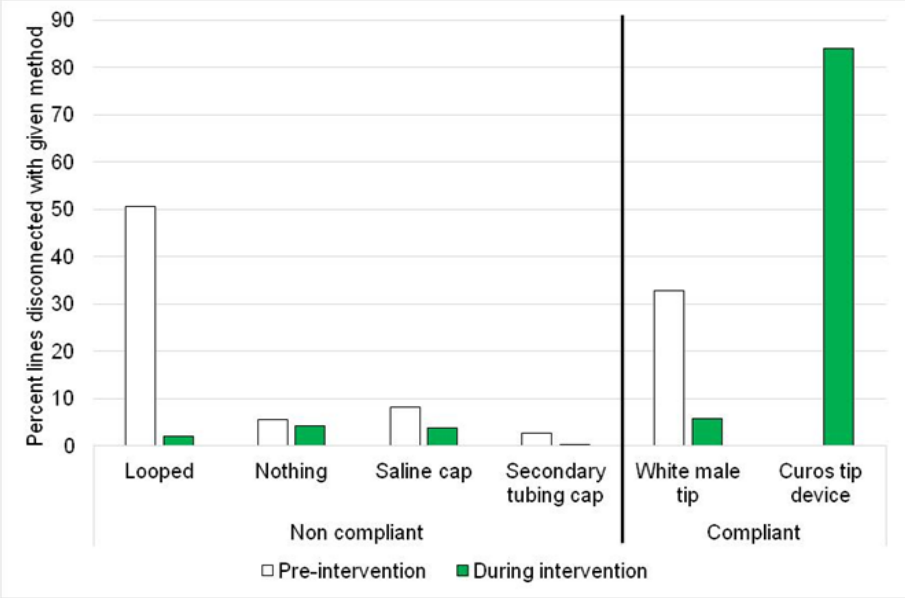
Neuro						
Month	Dressing dry and intact	Dressing dated	Claves clean	Curos Caps Pre-sent	Tubing dated	Disconnected tubing capped with Curos
November	92.59%	66.67%	98.18%	86.32%	87.50%	100%
December	94.12%	63.24%	95.71%	91.80%	87.10%	80.00%
January	100%	57%	100%	88.75%	76.32%	88%
February	100%	90%	100%	91.30%	100%	100.00%

Results

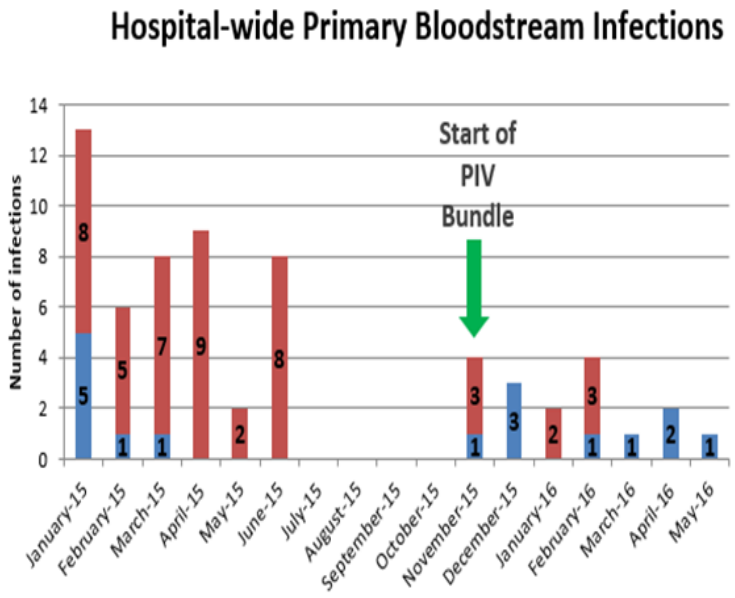
- The point prevalence audit in May, 2016 showed the following:
  - 311 lines were audited
  - 90% of disconnected IV tubing were protected. Of these 88% were protected by an alcohol impregnated tip
  - 94% of ports on tubing and needleless connectors had an alcohol impregnated cap in place

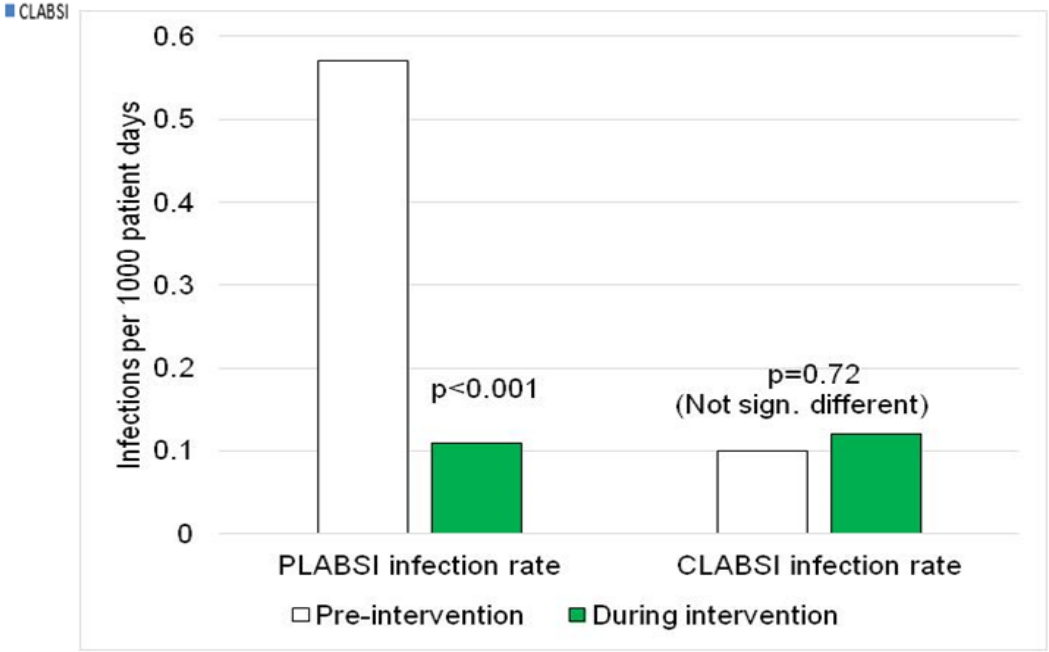
Results


90
80
70
60
50
40
30
20
10
0
Percent of each line type
Central
PICC
PORT
Peripheral
Pre-intervention
During intervention


90
80
70
60
50
40
30
20
10
0
Percent lines disconnected with given method
Looped
Nothing
Saline cap
Secondary tubing cap
White male tip
Curos tip device
Non compliant
Compliant
Pre-intervention
During intervention

Results

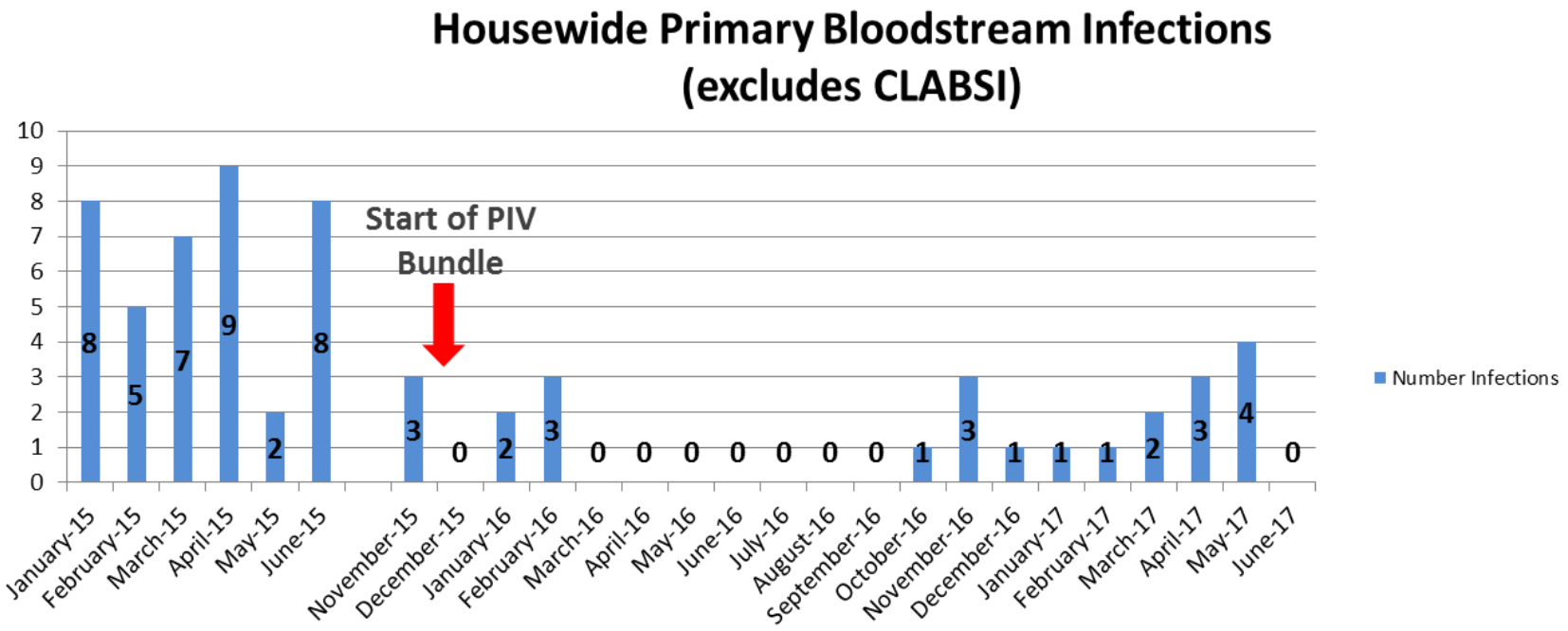

Hospital-wide Primary Bloodstream Infections
Number of infections
Start of PIV Bundle
PIV
CLABSI
January-15
February-15
March-15
April-15
May-15
June-15
July-15
August-15
September-15
October-15
November-15
December-15
January-16
February-16
March-16
April-16
May-16


Infections per 1000 patient days
p<0.001
p=0.72
(Not sign. different)
PLABSI infection rate
CLABSI infection rate
Pre-intervention
During intervention

Results

- Significant decrease in primary bloodstream infections in patients with peripheral lines
  - **39** pre-intervention
  - **5** post-intervention
  - Potential savings: $340,000 – $680,000 avoided expense
- Decrease in Lab ID MRSA Bacteremia
  - 2015 – 13 cases (only 1 in December)
  - 2016 – 2 cases

Results



How do you make a sustainable change?

- Key to achieving sustainable, actionable bloodstream infection reduction is to:

  - ***Combine adaptive cultural changes with evidence-based practices***

How to build an adaptive culture

- **Create a sense of crisis and a need for change and new direction**
  - share the data with administration
  - convince co-workers that we were harming patients with current practices
  - present proven best practices to reduce infections
  - engage frontline & senior leadership champions in process and outcome improvement plan

How to build an adaptive culture

- **Communicate consistently and broadly**
  - Have administration talk about the rates at meetings
  - tell the same story from leadership at the top all the way down to the frontline co-worker
  - everyone needs to believe that improvement is possible

How to build an adaptive culture

- **Reinforce the importance of innovation**
- **Build and maintain an "insiders" credibility**
  - create working groups to come up with practices (think outside the box)
  - lots of education on "what to do" and "why we need to do it"
    - Have nursing committees help create the policies and education and roll it out
  - use products that are proven to prevent the colonization or contamination of vascular access devices

How to build an adaptive culture

- **Establish leadership or the ability to produce change as an important focus at ALL levels**
  - hold staff accountable to following the policies
  - Audits by managers and supervisors
  - Administration to talk to staff when they do their rounds
  - Unit-based recognition of achievement of low rates, or the length of time between bloodstream events

How to build an adaptive culture

- **Decentralize decision making where possible**
  - frontline co-workers as part of the change
  - co-workers help identify practices and products

5 Practical Keys to Success

1. Use several interventions that function in different ways to shape a culture of commitment to doing better in practice
   - New products to address areas of concern
   - Audit and share information with frontline staff
2. Celebrate unit's successes at the unit level, hospital level and Board level
   - days infection free
   - increased compliance with processes

5 Practical Keys to Success

3. Reframe primary bloodstream infections as a patient safety problem that can be eliminated
4. Share data with frontline staff regarding infections and what it means for patients
   - Send questionnaire to nurses involved with patient who developed a primary bloodstream infection
5. Work with frontline staff to identify and remove barriers to do what is right
   - Collaborate with different departments
   - Add products where needed

What We Have Learned…

- Practical risk reduction strategies enable consistent application of evidence-based recommendations for vascular access insertion and maintenance (i.e. disinfectant caps, proper dressings, Dressing Change kits)
- Healthcare workers must be educated and engaged in a culture of safety to achieve consistent application of these recommendations

Photos courtesy of 3M

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What We Continue to Learn…

- Constant vigilance is necessary to assure continued success
- Educate, audit, educate, audit, repeat…
- Look at all of the variables when analyzing the data
- Success is a journey not a destination

There are two primary choices in life:

to accept conditions as they exist,

or accept the responsibility for changing them.

References

- Mary Duncan, Patricia Warden, Stéphanie F. Bernatchez, and Dan Morse (*2018*) A Bundled Approach to Decrease the Rate of Primary Bloodstream Infections Related to Peripheral Intravenous Catheters. Journal of the Association for Vascular Access: Spring 2018, Vol. 23, No. 1, pp. 15-22.
- Kilgore, M; Brossette, S. “Cost of bloodstream infection”. AJIC, 2008 Dec;36(10)