Pulmonary Artery Catheter Care

Donna Williams RN MS CCRN, Lana Gavin RN MS CCRN

Introduction/Problem

- The number of patients receiving a pulmonary artery catheter in our institution has increased and includes many more advanced heart failure patients. Pulmonary artery catheters are placed at the bedside in an intensive care unit, cardiac catheterization laboratory and OR.

- In January 2016, BIDMC central line committee data was shared regarding three bloodstream infections adjudicated as related to the patient’s pulmonary artery catheter. Nurse and physician representatives from the CCU, Cardiac Catheterization Laboratory, CVICU, infection control, PEVA and advanced heart failure met to discuss possible causes and potential solutions.

- Root cause analysis of the three infections revealed room for improvement in catheter management post insertion. As such, policies and procedures were reviewed related to insertion, care and maintenance of pulmonary artery lines. Practice issues were identified including: non occlusive dressings, ineffective line securement, potential for tearing of protective catheter cover, catheter movement at the site of insertion, inconsistent flushing and transducing after insertion, and presence of stopcocks in equipment for blood drawing. Opportunities for improvement were identified.

Aim/Goal

To eliminate preventable harm from a pulmonary artery catheter including bloodstream infection, clotting or dislodgement.

The Team

- Donna Williams RN MS CCRN CCU Farr 3
- Duane Pinto MD MPH CCU Director
- Stacey Smith RN MS CCRN CCU
- Lisa Menice RN BSN CCU
- Carrie Steyer RN BSN CCU
- Eric Harrington RN BSN Cardiac Cath Lab
- Robin Kalaidjian RN BSN Infection Control
- Manwa Sabe MD
- Blanche Murphy RN BSN VA-BC PEVA
- Lana Gavin RN MS CCRN Cardiac Cath Lab
- Robb Kociol MD Director Heart Failure Team
- Jenn Dear RN BSN CCU
- Margaret Miller RN BSN CCU
- Keith Tottenham RN BSN Cardiac Cath Lab
- Lisa Hird RN MS Cardiac Cath Lab
- Pam Browall RN MS CCU Farr 3
- David Yassa MD Infection Control
- John Whitlock RN MS CVICU

The Interventions

- Pulmonary Artery insertion kits reviewed by Cardiac Cath Lab teamRN and MD interventionalists. All inventory reviewed to insure all introducer sheaths had an accompanying contamination shield and locking mechanism for the PA line.
- Transducer supplies, changed to single line hemodynamic tubing with blood draw ports and no stop cocks
- All lines flushed and transduced prior to transfer from Cardiac Cath lab.
- Pulmonary artery dressing and line securement process standardized so insertion site visible at all times and PA catheter protector not torn by dressing changes, and locked and secure. Larger central line dressing used at site.
- Pulmonary Artery policy and procedures updated.
- Educational updates planned for all RN staff Cardiac Cath Lab and CCU.

Results/Progress to Date

Pulmonary artery catheter dressings at insertion site post intervention: No coiling or looping, no dressing over catheter protector. Catheter site is dressed according to central line policy and procedure. There are no dressings placed on the protective sleeve of the PA catheter. The catheter is anchored to the shoulder to prevent additional movement and drag on the insertion site.

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More Results/Progress to Date

- Practice changes identified Jan 2016
- Change in dressing and hemodynamic tubing equipment February – March 2016
- Staff education Spring 2016
- No reported pulmonary artery catheter line infections noted by infection control since Jan 2016
- No reported accidental removal of pulmonary artery lines.
- No data available on length of time catheters remained in place, or number that were re-sited.
- Dampered PA waveforms still reported on arrival to Farr 3 and CCU.

Lessons Learned

- Guideline remains to re-site all catheters with a new stick but resistance remains to mandating this as a policy statement across all ICUs.
- We were unable to gain consensus to limiting catheter repositioning post insertion or limiting PA catheter to a specific number of days.
- Stopcocks were replaced by the cath lab personnel or physicians in the CCU at the ends of some catheters for trouble shooting line integrity.
- Anesthesia oversees pulmonary artery catheterization in the OR and requires the triple set hemodynamic tubing with stopcocks be used in the post operative setting. These catheters are not in place for the same amount of time as cardiac medicine, as such these changes were not adopted in the CVICU.
- Despite these, the interventions were associated with the absence of any PA catheter line infections in the observation period.
- This finding raises the possibility that PA line management after insertion may be as or more important, with respect to infection, as insertion technique and protocols for re-resiting, variables we did not track.
- Given the low frequency of these events causal associations are difficult to make. Further work will continue to determine the influence of these interventions on not only blood borne infections but also on catheter function, the need for repositioning and patient comfort.

Next Steps

- Standardize the dressing, hemodynamic tubing improvement practices to medical units Finard 4, MICUs and cardiology Farr 3.
- Monitor length of time PA catheters are in place and relationship to infection.
- Track whether presence of stopcocks affects line integrity or infection.
- Identify how many lines are re-sited and at what point in time.
- Explore daily CHG baths on Farr 3 with PA catheter patients.
- Continue to monitor PA catheter lines for infection, dislodgement and thrombosis.

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