Patient Safety In Hospital Renal Replacement Therapy

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Safety From Both Directions

Proactivity ↔ Reactivity
Safety From Both Directions

Proactivity
Preparation to avoid errors and to practice safely

Reactivity
Safety From Both Directions

**Proactivity**
Preparation to avoid errors and to practice safely

**Reactivity**
Recognizing an error, analyzing it and rectifying the cause
Safety From Both Directions

Proactivity  Reactivity

Emil Paganini’s definition of experience: Recognizing something as a mistake the second time you make it.
Infections in HD Catheters Premption and Safety
Figure 1. Probability of not having *Staphylococcus aureus* pericatheter skin isolates. $P < 0.001$ for comparison between curves. The number of patients at risk at each time interval is shown at the bottom of the graph.

Figure 2. Probability of not developing *Staphylococcus aureus* bacteremia (confirmed or probable). $P = 0.001$ for comparison between curves. The number of patients at risk at each time interval is shown at the bottom of the graph.
Randomized, double-blinded, placebo-controlled trial over 6 months in 169 Canadian HD pts, incident and prevalent

Chlorhexidine cleansed site, application of study ointment after each dialysis for 2 weeks then once weekly or PRN

Polysporin treated group had significantly better outcomes (RR) such as: At least 1 infection (0.35), At least 1 bacteremia (0.4), # infections/1000 cath days (0.25), # bacteremias/1000 cath days (0.25), At least 1 hospitalization (0.3), At least 1 cath removal (0.36), Death (0.22)
RCT Topical Exit Site Mupirocin With Tunneled, Cuffed HD Catheters
Johnson et al NDT 17:1802, 2002

- 27 on mupirocin, 23 controls with equal demographics and comorbidities, thrice weekly application of 2% ointment at Quinton PermCath exit site
- Fewer (7 vs. 35%) catheter related bacteremia episodes in mupirocin group (p < 0.01)
- Longer time to first infection (p< 0.01) with mupirocin
- Entire beneficial effect was attributable to reduction in staph infections
Antibiotic Catheter Locks

- May lead to resistance
- Might be toxic
- False sense of security
- What organism do we target against?
  - ~80% are staph
  - ~20% Gram negatives
- Does it have anti-coagulant effect?
  - Macrae CJASN 3:369, 2008 showed that 4% citrate = heparin in preventing thrombosis
Genatimicin + Citrate Lock

- Blood donation bag with citrate
  - Anti-coagulates 250 mL of whole blood
- Add _ liter saline
- Add 80 mg gentamicin
- Gentamicin concentration about 320 mg/L (µg/mL)
- 2.6 mL in each lumen
- < 900 µg (0.9 mg) in each lumen
- Lock drawn out at each catheter use
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<th>G-C lock</th>
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## Antibiotic Catheter Locks

**Presentation**

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Antibiotic Catheter Locks
Moran et al (Satellite Healthcare) 2008
ASN Presentation

% Pts without bacteremia

Months to bacteremia

p = 0.0079
Antibiotic Catheter Locks
Moran et al (Satellite Healthcare) 2008
ASN Presentation

% Pts without bacteremia? sequela of placement?

Months to bacteremia

p = 0.0079

gentamicin-citrate
heparin

0 1 2 3 4 5 6 7 8 9 10 11 12
Antibiotic Catheter Locks
Moran et al (Satellite Healthcare) 2008
ASN Presentation

% Pts without bacteremia

Months to bacteremia

p = 0.0079

benefit of the lock

gentamicin-citrate

heparin
tPA For Infection Prevention

Hemmelgarn et al NEJM 364:303, 2011

- 225 HD catheter pts randomized tp either:
  - 5000 units heparin/mL in each lumen thrice weekly
  - Same heparin twice weekly and the third time instead using tPA 1 mg/lumen

- Findings:
  - Catheter related bacteremia significantly less frequent in tPA group 4.5% versus 13%
  - Reduced infection risk to a third
Some Key Components

- People
- Places
- Equipment
- Services
- Systems
People Attributes

- Educated
- Curious
- Honest
- Brave
- Confident
Education

- Training
- Credentialing
- Ongoing testing and competencies
- Continuing education courses
- In-servicing
- Research
• What is wrong with this patient?
• How does that illness affect what I am doing?
• Why this way versus that way?
• How does it work?
• Why does it work?
Did what we do work?
Did we do it correctly?
Was correct really correct?
I did as instructed but it may not have been right
What is my role in this problem?
The only thing I can control is what I do
Brave and Confident

- We are competent
- Something went wrong
- We can find out what and why
- We can fix it
- We are not afraid of this problem
- We are competent
Places in the Hospital

• Dialysis unit
• Ward Rooms
• Intensive care units
• Special places
  – Radiology procedure rooms
  – Recovery room
  – Operating room
  – Emergency room
  – Isolation rooms
Equipment

- Water
- RRT machines
  - Variety (many) versus one type
- Monitors
  - Leak detectors
  - On-line hematocrit monitoring
- Catheters
Services

• Nursing coverage/staffing
• RRTs
  – Many types versus a few
• Solution preparation
  – Pharmacy versus ward staff
  – Commercial versus formulated locally
  – Delays
  – Fallibility
• Interventional radiology
• Nephrology
• Intensivists
Systems

- Governance
- Grass roots
- CQI
- Safety monitoring committee
- Reporting
- Individual responsibility
- Rounding to observe and help
- Pass-offs (sign out/sign in)
Pass-Offs Case 1
Failure to Appreciate Finding

• Chronic peritoneal dialysis patient has open heart surgery, does well except slow to wean off ventilator. Low volume frequent PD exchanges performed by CV ICU nurses

• Fibrin strands appear in PD effluent. Observation not passed on to the next shift for >36 hours

• Drainage becomes sluggish. Patient absorbs fluids, delays extubation

• Nephrologists recommend bowel cleansing, which helps a little
Pass-Offs
Case 1 continued

• Nephrologist hears CV ICU nurse mention fibrin
• tPA placed in catheter
• All drainage problems resolved
• Patient does well
• The Paganini definition of experience
  – Recognizing something as a mistake the second time you make it
Pass-Offs Case 2
It Is Not My Problem

- Young man with meningo-encephalitis SIRS, and AKI requiring CRRT
- CRRT is “walk away SLED” where a dialysis nurse rotates among up to four simultaneous SLED treatments all within reasonable proximity and ICU nurse is in each room
- Patient extubated as sedation weaned, but is intermittently agitated
- SLED nurse does not observe agitation
Pass-Offs
Case 2 continued

• Dialysis nurse is rounding in another room when the ICU nurse is asked to help briefly in the next room

• Nephrologist walks into room, empty except for patient thrashing around with a femoral vein catheter in a precarious situation

• ICU nurse felt SLED catheter was dialysis nurse concern, and vice versa
Pass-Offs
Case 2 continued

• On rounding the SLED nurse and ICU nurse must communicate about the patient’s condition. ICU nurse does not mention the agitation developing

• Dialysis nurse does not anticipate an access threat because ICU nurse is always there
Pass-Offs Case 3
This is important So Hear Me Now!

- ESRD patient acutely ruptures mitral valve and goes into pulmonary edema, intubated, emergently dialyzed, improves but remains intubated
- Dialyzed daily through a fistula
- Mildly hypothermic so placed on a heating blanket
- Dialysis nurses insist that fistula be exposed when on HD and pass this off one to another
Pass-offs

- Both parties must be fully engaged in that conversation and must not be preoccupied or distracted
- Use check off lists
- Use notes made during previous observations
- Include all observers’ input e.g.
  - Respiratory therapist
  - Physical therapist
  - Dialysis nurse
  - Consultants
  - Primary team
CRRT Pass-Offs

- Overall patient status: lungs, volume, BP, rhythm, mental status, bleeding, skin
- Anticoagulation
- Access
- UFR
- Acid base and Electrolytes
- Lab draws
- Other procedures
- Shift goals
- Daily goals
Brave and Confident

• We are competent is the starting point
• Something went wrong or may go wrong
• We can find out what and why or we can anticipate it
• We can fix it before it happens
• We are not afraid of this problem and accept the challenge
• Because we are competent
Questions?
Q: Can you name the first ten presidents?

A: No.

There's one correct answer.