Ensuring Patient Safety and Quality- Water Standards

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Historically Acute programs have been held to a more relaxed safety design standard for water quality than that applied to chronic programs.

In 2009 AAMI released new water standards for all acute programs.

Amendment 4- Annex C: Special Considerations for home hemodialysis
The Issue

- Normal person consumes 2 liters of water per day
- 14 liters a week
- Dialysis patient depending on time on dialysis and dialysate flow rates are exposed to 350-500 liters of water a week
Considerations

• Normal person- the GI tract separates the contaminants from the blood.
• Dialysis patients are unable to excrete, via their kidney, any contaminants taken up from the dialysate.
• The acutely ill population may have increased susceptibility to adverse reactions due to co-morbidities
Scope of Amendment

• Focuses on the equipment used to purify water for the preparation of concentrates and dialysate in the acute (hospital) setting.

• Portable water treatment systems used for bedside treatments
Training the nurses

• AAMI standards dictate testing, intervals and ranges for compliance.
• Nurses need to be trained on the standards
• Understand and internalize the importance of water quality
• Master timing of testing.
Chloramines

- Rationale: To ensure water is free of chloramines. Acute patients less capable of coping with premature chlorine/chloramine breakthrough.
- Added to municipal water to kill bacteria but they cause RBC hemolysis.
- RO membranes not effective in removing chlorammines and some membranes are actually destroyed by exposure to chloramine.
- AAMI E.3.4- 2 Carbon tanks/block with 10 minute EBCT
Considerations

• If you use reagent color strips
  - color blindness test
  - Test strips on known positive.

• If you use Hach kit
  - Controls need to be done daily and within range
  - Check for expiration dates on controls and replace
  - Bottles need to be cleaned with pure water
  - Test needs to be timed
  - Ensure using total chloramine test pillow
Considerations

- Acceptable value - less than 0.1 mg/ml
- Test from between carbon filters. If out of range test secondary tank.
- Test needs to be done BEFORE patient put on machine but AFTER system running for 15 minutes
- Repeat test between patients
- Establish a documentation form.
- Make this a CQI data collection point.
SLEDD

- Repeat test every 8 hours if actual dialysate flow rate 300ml/min and there is adequate EBCT.
- When not possible to have 10 min EBCT add Ascorbic acid and increase frequency of testing.
- Training of non-dialysis staff
Patient exposure

- Shortness of Breath
- Hypertension
- Fatigue
- RBC destruction
- Haptoglobin- binds with free Hgb
- Draw water culture
- Sequester machine and equipment
pH

• Rationale- To ensure dialysate pH is physiologic
• Ensures that bicarb proportioning pump functional

• Considerations-
  – If you use a color test strip- make sure you have a color blindness test on your nurses/tech
  – Read strip immediately
  – Range 6.9-7.6
Water Hardness

- AAMI E3.5.2
- Feed water hardness greater than 10 grains/gallon- need a softener.
- Softener prevents scaling on RO membranes by removing Ca and Mg
- Portable softening systems should not contain the brine tank
- Regeneration station should be separate
Hardness

- Accepted post softener level 1 grain/gallon.
- Test kit results relies on color-color blindness test.
- If central hospital softening system-facilities should be made aware of patient hazard with untimely regeneration of system.
Conductivity

• To ensure adequate proportioning of dialysate.
• Do quality check on conductivity meter daily.
• Ensure nurses/tech know how to calibrate equipment if out of range.
• Date and time conductivity control solutions and dispose when outdated.
• Take test at Hansons before initiating treatment
• Establish range of normal ± 5% of machine value
Water cultures

- AAMI E.4-Monthly Machine Culture
  - Bacterial counts ≤ 50 CFU/ml
  - Endotoxin ≤ 1EU/ml
- AAMI E.4-RO disinfected monthly
  - Water feed line disinfected with monthly RO disinfection and replaced annually
  - Recommendation for clear lines
- AMMI E.2 Recommends use of bacteria-and endotoxin retentive filter for dialysate
- CQI data collection point
Between treatments

• AMMI E.4

• If there is a continual supply of dialysate, clean surface of machine between patients and disinfect at the end of the day.

• “If there is no dialysate flow between treatments, the machine should be disinfected before a second treatment is performed.”
End of day

• Disinfect reusable bicarbonate jugs and uptake wands.
• Clean surface of the machine
Carbon Media

• AAMI E.4-
• Follow manufacturer’s recommendation for carbon media replacement.
• If no such recommendation – replace carbon media at least every 6 months
Quality Improvement

• Monitor test performance
• Annual skill competency
• Spot check staff
• Surveillance of controls and standards
• QI data collection point
• Communicate with City water department for notification of changes made to feed water system
• Create an environment of safety
  – Great catch award
Summary

• Chloramines
• pH
• Hardness
• Conductivity
• Water cultures
• Between treatment/end of day disinfection
• Carbon media exchange

• Establish competencies of staff, documentation and follow up procedures to ensure quality