Let’s Trace a Dialysis Patient!

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Certified Black Belt Lean/Six Sigma
Certified Change Agent
Objectives

- Recall two elements that should be assessed for compliance during a dialysis tracer.

- Identify one methodology that could be implemented to improve safety during dialysis.
1. Continuous Renal Replacement Therapy (CRRT) – takes place in the ICU on patients who are too hemodynamically unstable for hemodialysis.

2. Peritoneal Dialysis (PD)

3. Hemodialysis (HD)

Over 780 dialysis units based in hospitals

Let’s Trace the Hemodialysis Patient!
Hemodialysis

- High concentration of toxins, electrolytes, and fluid in the blood are removed by circulating the patient’s blood through a permeable membrane (hemodialyzer) to a solution with a lower concentration (dialysate).
Hemodialysis and The Machine

- Most stable patients usually receive treatment 3 times per week for approximately 4 hours.
- The machine uses sterile blood cartridges and roller system to move blood from patient through the blood pathway of the dialyzer and then back to the patient.
- Discards waste into a drain.
Dialyzer

- Dialyzer is capable of causing inflammatory reactions, itching, back or abdominal pain, rhinorrhea, etc.
- In order to prevent, these reactions adequate pre-rinsing (priming) of the dialyzer according to manufacturer’s instructions is performed or the dialyzer is “re-processed before first use”.
- Re-processing (aka reuse) of hemodialyzers has been practiced since 1960’s.
Reuse of Dialyzers

- Dialysis facilities that reuse dialyzers must follow strict guidelines set forth by the Association for the Advancement of Medical Instrumentation (AAMI). The AAMI guidelines make provisions for patient safety, among them:
  - A dialyzer must be clearly labeled with the patient’s name and only used for the same patient.
  - A dialyzer must be tested after each use to make sure it is working properly.
  - A dialyzer must be tested after rinsing for any traces of disinfectant that may remain.
  - Patients must be monitored for any reactions due to reuse.
Dialysate Component: Bicarbonate

- Purchased as a powder that must be mixed with processed water.

- Bicarbonate provides an EXCELLENT media to support bacterial growth.

- Three ways to mix bicarbonate.
Ways to Mix Bicarbonate

1. Water is measured into the jug and the correct amount of sodium bicarbonate is added to the water. The jug is closed and shaken until the bicarbonate has been dissolved.
   - Jugs must be disinfected between uses.
   - Best practice is to sanitize, rinse with processed water, and invert to dry.
Ways to Mix Bicarbonate

2. Tank equipped with mechanical mixing devices is filled with processed water to a pre-determined volume and sodium bicarbonate is added from packages of known weight, and then mixed until dissolved.

- Must drain and sanitize at regular intervals. (check this documentation on tracer)
- Culture on a routine basis. (Review cultures)
Ways to Mix Bicarbonate

3. A cartridge with a pre-measured amount of sodium bicarbonate, sufficient for one treatment, is attached directly to the dialysis machine and a processed water line is feeds the cartridge With cartridge. this system, the bicarbonate concentrate is mixed at the point of use.

- discard between dialysis treatments
- not be allowed to sit on the machine overnight
Dialysate: Processed Water

- Most water treatment systems consist of:
  - break tank
  - water softener
  - carbon filters
  - particulate filters
  - reverse osmosis and/or deionizers
  - filters and ultrafilters

- Some also have ultraviolet (UV)
Purity of water used for hemodialysis or concentrate preparation is **CRITICAL**!

- Systems should be designed to remove the anticipated chemical and biologic impurities found in the potable water in the location where it is installed.
- Knowing the quality of feed water will help identify potential problems. **Tracer Question?**
Processed Water: Water Softener

- Exchange calcium and magnesium ions in incoming water for sodium ions.
- Facility may use permanent water softeners which must be periodically regenerated or portable softeners that are replaced on a regular schedule. **Tracer Question?**
- Bacterial contamination of portable exchange softeners has been reported.
Tracer Questions/Observations:

- How long are the strips good for? Is the expiration date written on the bottle?
- Explain how you test the water using these strips?
- Is there a requirement for quality control (positive and negative) to be completed? Check package insert. Does hospital policy match package insert? Do you document the testing of the water and the quality control of the strips? Show me the documentation.
- Have you been tested for color blindness? Show me the results for this staff member.
Processed Water: Carbon Filters

- Because of the risk of cross contamination and inadequate disinfection, granular-activated carbon should be used and replaced, not regenerated, when carbon filters become exhausted.

- Sample ports should be located after each tank and chloramine testing should be conducted at least every 4 hours while patients are undergoing Hemodialysis.

**Tracer Question?**
Tracer Questions/Observations:

• How long are the strips good for? Is the expiration date written on the bottle?
• Explain how you test the water using these strips?
• Is there a requirement for quality control (positive and negative) to be completed? Check package insert. Does hospital policy match package insert? Do you document the testing of the water and the quality control of the strips? Show me the documentation.
• If the quality control is done by the manufacturer on each lot number, does the department have a copy of the results? Does the lot number on the result page match the strips that are being utilized?
• Have you been tested for color blindness? Show me the results for this staff member.
Processed Water: Particulate (sediment) filters

- Should be monitored for pressure drops across the filter.
- Filter Filters should be replaced or disinfected according to the manufacturer's recommendations; if a disinfection method is used, ensure it is compatible with the hemodialysis water system. **Tracer Question?**
Processed Water: Reverse Osmosis (RO)

- Important measures of RO performance
- Percentage of rejection
- Product water recovery
- Reasons for decreases in percentage of rejection include bacterial or chlorine-related degradation of the membrane, fouling of the membrane, and leaks.
- Cleaning and restoration of semipermeable membranes should be done according to manufacturer's recommendations.

Tracer Question?
Processed Water: Deionizers

- Exceeding flow rates or water volume recommended by the manufacturer can result in water that does not meet the standards for water quality and has led to patient death.
- A temperature-compensated resistivity monitor that audibly and visually alarms at a resistivity of less than 1 megohm-cm should follow the deionizers.

Tracer Questions?
Processed Water: Ultra-filters and/or UV Light

- Ultraviolet light irradiation may be ineffective in killing some bacteria and does not remove endotoxin.
- Only ultrafiltration is capable of bacteria and endotoxin removal. Therefore, an ultrafilter should be placed in the water processing system after UV lights.
- Because no system should be considered 100% effective at removing bacteria and/or endotoxin, use of ultrafilters does not eliminate the need for monitoring of bacterial and/or endotoxin contamination. **Show me____________?**
All piping (including water lines between the processes water out and the back of the dialysis machines) and storage tanks must be disinfected at intervals adequate to prevent bacterial growth.

Evidence of disinfection?
Disinfection of the Dialysis Machine

- How often does heat disinfection occur?
- How often does bleach disinfection occur?
- Is there evidence of this?
- How long can a machine set idle before disinfection occurs?

Check operator’s manual of machine. This is usually 48 hours.
- If the unit is closed on the weekend, how does this occur?
- Is there greater than 48 hours between disinfection? Is a time captured on the log to show this? If it is greater than 48 hours, does heat disinfection occur before they use the machine on a patient?

*Usually see that this occurs at end of shift so there may be a risk at this point.*
The Dialysis Machine and Preventative Maintenance (PM)

- Who owns the machine/s?
- Who does the PM’s?

If an outside vendor owns the machine/s or does the PM’s, what role does the hospital’s biomedical department play? They need to have the oversight, even if the machines are not owned by the hospital. Best Practice includes sticker placed by biomed to oversee this process.
Review of Cultures

- Who reviews the cultures? Does the Infection Preventionist have a role in this?

- Do the results get reported to a committee?

- Review the cultures and norms. Are there any problematic areas? Failures? What was done?
The Record in Dialysis

- Review orders for dialysis. Are these orders written prior to starting the patient on dialysis? Are these orders written or taken verbally?

In the past, nurses would record on the order sheet the runs from the outpatient centers and then record as taken from that record or record as a verbal order, when a verbal order was not given.
The Record in Dialysis

- Is there a consent for dialysis and does this match the organization’s policy?

  A consent should be obtained minimally for each admission.

- Review the flow sheet. Ask the nurse the requirements of assessment prior to starting on dialysis. Does this include a pain assessment? Is a pain reassessment completed prior to discharge from dialysis?

  Usually find that policy requires a reassessment prior to leaving dialysis and not always captured on the flow sheet.
The Record in Dialysis

- What is the care planning process? Check policy to see if it matches practice.
- What is the handoff practice? Explain the process.
- Medication: Review the medication orders. Have they been reviewed by Pharmacy? Is there an indication on the record for the medication that is being administered?
The Record in Dialysis and Hepatitis Screening

- Prior to or at start of hemodialysis
  - hepatitis B surface antigen (HBsAg)
  - antibody to core antigen (anti-HBc)
  - antibody to hepatitis B surface antigen (anti-HBs)
  - antibody to hepatitis C virus (anti-HCV)
- If results are not known before treatment, the patient should be treated as if they are HBsAg positive until the results indicate otherwise.
Results of initial screening drive frequency of repeat testing
- HBV susceptible patients tested monthly for HBsAg
- Anti-HCV negative patients tested for increased monthly and anti-semi-annually.

Facilities should have policies and procedures as well as clear records of testing.
Eyewash Station

- Ask staff how many minutes they run the eyewash for during their check?
  - 2-3 minutes per ANSI standards

- Are the eye pieces in place and good condition?

- Ask the staff to test the eyewash station. Is the pressure enough to push the eye pieces off?

Sample Log Attached.
Please email me for an electronic copy – sgarcia@jcrinc.com
Sample Eye Wash Inspection Record

Eye Wash Inspection Record

1. Eye washes must be tested and inspected weekly
2. Run the eye wash for 2-3 minutes
3. Ensure the water has sufficient water flow
4. Ensure that there is tepid water running through the eye wash
5. Note whether the hands-free mechanism is functioning
6. Outlet heads (lids covering where water flows from) should be kept closed when not in use. These lids should pop off upon activation of the water
7. Initial the appropriate box below to document a passing inspection
8. If inspection fails, notify all users and call Plant Operations immediately at ____________________.

Should an exposure occur, flush the affected eye(s) for 15 minutes.
To ensure adequate flushing, hold eyelid(s) open and roll the eyeball

<table>
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<tr>
<th>Month/Year</th>
<th>Week 1</th>
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<th>Week 4</th>
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Supervisor/Manager Monthly Review: ________________

Note: Preventative Maintenance will occur annually to check for problems such as valve leakage, clogged openings and lines and adequacy of fluid volume (.4 gallons per minute for 15 consecutive minutes). These records will be kept within Plant Operations.
Crash Cart

- Ask the patient’s nurse to show you how to check a crash cart.

  *Problematic when charge nurse only checks the crash cart.*

- Is the defibrillator plugged into a red plug (life support)?

- Are the medications on the cart identified as high alert, sound a like look a like (SALA)?
Hazardous Medications

- Does the department have these medications?
- What is the process?
- Security of the bins?
Is it an Infection?

- Certain adverse reactions may be difficult to distinguish from infections and may be as life threatening as infections.
  - pyrogenic and allergic reactions
  - fluoride intoxication
  - chloramine exposure
- The dialysis staff must be aware of these conditions so that prompt action can be taken.
Infection Risk Related to Hemodialysis

Infections and adverse reactions may result from –

- inadequate dialysis systems or procedures
- breaks in established procedures
- intrinsic contamination of any component of the dialysis system
- lack of monitoring for known contaminants
- inadequately trained or unknowledgeable staff

Show me the competencies – Is the person signing the competency, competent to do so?
Infection Risk Related to Hemodialysis

- Infection Risk reduced by:
  - strict adherence to aseptic technique during all dialysis procedures.
  - strict adherence to procedures for use, disinfection, and maintenance of equipment.
  - knowledgeable, well-trained staff that understands the implications of deviating from established Procedures.
Infection Risk Related to Hemodialysis

Infection Risk reduced by:

– careful monitoring of all procedures in which bacterial or chemical contamination can occur.
– an effective patient education program that includes teaching patients and their families their role in the prevention of dialysis-related complications, including health maintenance and prevention of dialysis-associated infections.
Infection Risk Related to Hemodialysis

- Infection Risk reduced by:
  - routine monitoring and follow-up of patients undergoing dialysis, including an active infection surveillance and prevention program.
  - Any temperature over 37.8° C (100° F) taken orally chills, or other unexplained symptoms occurring after onset of hemodialysis should be evaluated for relationship to water treatment, dialysis equipment, and dialysis procedures.
Contracted Service?

Second Generation Tracer

- Pull a contracted staff file. Does it look like yours? If not, why not?

*Primary source verification is usually problematic for the contractor.*

- Does the contract have performance indicators in the contract? Who monitors these indicators?
**Contract Grid**

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<th>Item</th>
<th>Expectations</th>
<th>Monitoring</th>
<th>Evidence of Monitoring</th>
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<td>Risk Reduction</td>
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<td>Staff Competence</td>
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<td>Performance Improvement</td>
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Note: Contracts may be evaluated based upon each item above and if each item has expectations, monitoring and evidence of monitoring. Once identified in contract, cross off those letters. Those letters remaining should be addressed.
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Dialysis is a Complex and High Risk Process.

Have you traced a dialysis patient lately?
Questions?
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