There’s More to Dialysis Than Water
Sylvia Garcia-Houchins, University of Chicago Hospitals
A Webber Training Teleclass

Hosted by Paul Webber
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There’s more to dialysis than water: what you need to know about dialysis

Sylvia Garcia-Houchins, MBA, CIC
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Infection Control Program

Hemodialysis Basics

- Access - Needles or tubing carry blood to the dialyzer and then return blood
- Dialyzer – semi-permeable membrane that removes waste and extra fluid from the blood
- Dialysate – solution that passes through the membrane that pulls waste and extra fluid from the blood.
- Patients usually dialyze 3x per week for 4 – 5 hours

Hemodialysis Basics

- Aseptic technique is essential
- Do Not Allow opportunities for cross contamination of bacteria or viruses
- Nothing should be done in “batch”
- Hepatitis B can live in dried blood for >7 days

Access

- Fistula
  - Artery and vein surgically connected causing vein to grow larger and stronger
  - Takes 6 weeks to 4 months to mature
  - Less likely to become infected or clot
- Graft
  - Artificial tubing used to connect an artery and vein
  - Usually wait 3 to 6 weeks before using

Access

- Catheter
  - 2005 National Kidney Foundation Kidney Disease Outcomes Quality Initiative (NKF-DOQI)
    - Use of 2% CHG with 70% alcohol for site care preferred
    - Disinfect catheter hubs and caps before removal with 2 swabs
    - Patient and staff wear a mask

Hemodialysis Machine

- Single Pass
- Use blood cartridges and roller system
- Monitors conductivity of dialysate

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Dialysate
- Acetate Dialysate (rare)
- Bicarbonate Dialysate requires mixing acid concentrate
  - NaCl
  - CaCl
  - KCl
  - MgCl
  - Acetic Acid
  - Dextrose (possible)
  - Bicarbonate Concentrate
- Processed Water

AAMI Water and Dialysate Standards
- Processed Water
  - Total Viable Microbial Count: <200 cfu/ml
  - Action limit: 50 cfu/ml
  - Endotoxin concentration: 1 EU/mL
- Dialysate
  - Total Viable Microbial Count: <200 cfu/ml
  - Action limit: 50 cfu/ml
  - Endotoxin concentration: 2 EU/mL
  - Action limit: 1 EU/mL

Portable Water Source
- Water source for portable machines is usually the handwashing sink
- Dialysis units and some hospital rooms have a built in spigot
- Portable water systems require the same monitoring as a central system

Hemodialysis Waste
- Machine drain lines MUST have an air gap
- Laying in water, not acceptable
- Questionable air gap, not acceptable

Dialyzer
- Majority of hemodialyzers used today are hollow-fiber, high-flux dialyzers
- Blood and dialysate compartments are separated by a potting material
- 80% of the hemodialysis units in the US reuse dialyzers more than once on the same patient

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Why Reuse Dialyzers?
- Reused dialyzers are safe and effective if all standards and requirements are followed
- Reduced hypersensitivity reactions
- Reduces biohazardous waste
- More economical for high flux dialyzers which are more porous and allow larger toxins to pass through

Reuse of Dialyzers
- Must follow the Association for the Advancement of Medical Instrumentation (AAMI) standards and recommended practices for reuse in order to be eligible for Medicare reimbursement
- Patient’s must be informed of facilities reuse practices
- ‘Complaint Investigation Record’ required

Germicides for Reuse
- peracetic acid
- formaldehyde
- glutaraldehyde
- heat disinfect with citric acid

Dialyzer Reuse Basics
- Requires taking dialyzer to a central location for rinsing, cleaning, and disinfection of the dialyzer

Dialyzer Reuse
- Outbreak of gram negative bacteremia linked to contamination of o-rings

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Dialyzer Reuse
- Leak Test
- Total Cell (fiber bundle) Volume should be over 80%
- Fill with germicide
- Disinfect outside of dialyzer
- Blood and dialysis compartment caps disinfected before attachment
- Automated system is better

Dialyzer Reuse
- Confirm presence of germicide
- Allow adequate dwell time

Dialyzer Reuse
- What should you see?
  - Dialyzer should look clean
  - No more than a few clotted fiber bundles
  - Clean tops and bottoms
  - Caps on all openings; no leaking
  - Clearly labeled with patient’s name, number of previous uses, date of the last reprocessing

Dialyzer Reuse
- What should you ask for?
  - Track Urea Reduction Value and Kt/V,
  - Fiber bundle and germicide fill should be readily available
  - Average reuses by week or month should be tracked; decreased number of uses could signal reprocessing issues

Dialyzer Reuse
- Rinse immediately prior to reuse
- Must recirculate to prevent rebound
- Check for residual germicide immediately prior to initiation of dialysis

Problems related to priming/rinsing
- 1988–1990: Dialysis blood tubing was contaminated with ultratrate waste during dialyzer setup.
- Bacteremias were controlled by halting the practice of attaching the venous tubing directly to a waste container while priming the membrane, by emphasizing glove changes and handwashing after contact with ultratrate waste and by daily decontamination of ultratrate waste container.

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Problems related to priming/rinsing
- Hemodialysis machine manufacturers responded by developing a Waste Handling Cytotox (WHC) for “Safe and effective disposal of prime fluid, eliminating the cost for waste containers, while reducing staff exposure to potentially infectious and chemical waste”

Problems related to priming/rinsing

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Problems related to priming/rinsing
- Why is the WHO a problem?

Problems related to priming/rinsing
- What is the solution?
  - Disposable waste container that is discarded after each prime/rinse
  - Reusable waste container that is disinfected between uses
  - Impeccable Aseptic Technique
  - Disinfect hub before each connection step

Problems related to priming/rinsing

Hepatitis
- Outbreaks linked to...
- Failure to identify and isolate HBV infected individuals during dialysis
  - If status unknown treat as positive
    - Cohort machine
    - Private treatment
  - Sharing of staff
  - Sharing of supplies and equipment
  - Failure to vaccinate susceptible patients
  - Inadequate Disinfection

Hepatitis
- Prevention includes...
  - If hepatitis B status unknown treat as positive
    - Cohort machine
    - Separate from others
    - Do not reprocess dialyzers
  - Do not share or batch supplies and equipment
  - Vaccinate susceptible patients and monitor response
  - Disinfect with bleach solution

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The Next Few Teleclasses

- 19 Feb. 09: Speaker: Dr. Peter Price & Dr. Cory Engleman, World Health Organization.
- 25 Feb. 09: South Pacific Teleclass Friday the 13th: An Outbreak of Lassa Fever. Speaker: Julian Teo, Princess Margaret Hospital, Christchurch.
- 03 Mar. 09: Speaker: Dr. Lynne Sebastian, CIC.
- 10 Mar. 09: Title: To be announced. Speaker: Dr. Andrew Chenn, Food Protection Agency.
- 12 Mar. 09: Title: Fundamentals of H1N1 Defenses. Speaker: Dr. Robert Garcia, Inoka, University of New York.
- 19 Mar. 09: Speaker: Lennia Lie Young, Shands Hospital, University of Florida.

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