Certified Hemodialysis Water Specialist
Detail of Examination Content

DOMAIN I: Water Quality Standards (15%)

- **A. Safe Drinking Water Act (SDWA) (1975)**
  1. SDWA Amendments: "The Lead Laws" (1996)
  2. EPA Drinking Water Standards, i.e. MCLPrimary
     a. Secondary
     b. Other
- **B. FDA Regulations**
  1. CFR Part 820 Quality System Regulation
  2. GMP/CGMP
  3. 510k
  4. Guidance Documents
  5. Pharmaceutical Water Standards-US Pharmacopeia
- **C. ANSI/AAMI/ISO Standards & Recommended Practice**
  1. RD Guidance Documents
  2. ISO/IEC Documents
  3. TIR
- **D. Centers for Medicare and Medicaid Services (CMS)**
  1. Conditions for Coverage
     a. Medical Director Responsibilities
     b. Governing Body Responsibilities
     c. Clinical Manager Responsibilities
     d. Biomedical Technician Responsibilities
  2. Interpretive Guidelines
  3. Water Treatment System Survey – V Tags
- **E. Water Quality Associations**
  1. WQA
  2. UWQA
  3. NSF
  4. AWWA
  5. ASTM
- **F. Other Standards**
  1. IAMPO Universal Plumbing Code (UPC)
  2. NFPA Life Safety Code
  3. OSHA
  4. American Hospital Building Code
  5. State Plumbing Boards
  6. Local Plumbing Boards and Sewer Authorities

DOMAIN II: Water Treatment Terminology and Acronyms (5%)

- **A. Introduction**
- **B. Terminology and Acronyms**

C. Units of Measure/Formulas

DOMAIN III: Basic Water and Water Quality (15%)

A. Hydrologic Cycle
B. Meteoric Water
C. How Water Acquires Impurities
1. Environmental Factors

D. Chemistry
1. Physical and Chemical Changes
2. Elements
3. Compounds and Mixtures
4. Atoms and Molecules
5. Nuclear Atom
6. Electrons
7. Bonds
    a. Ionic
    b. Valence
8. Redox Reactions
9. Ions
10. pH
11. Acids
12. Bases
13. Salts

DOMAIN IV: Risks & Hazards Associated with Inadequately Treated Water (15%)

A. Contaminants with Documented Toxicity in Hemodialysis
1. Organic
2. Inorganic
3. Microbiological
4. Radioactive Contaminants

B. Source Water Characteristics
1. Types of Source Water
2. Municipal Source Water Suppliers
3. Communication with Municipal Source Water Suppliers
    a. Identifying and Contacting
    b. Assessing Worse-Case Scenario

C. Surveillance

DOMAIN V: Water Purification Equipment (20%)

A. Materials of Construction/Compatibility
B. Backflow Prevention
C. Tempering Valves
D. City Water Booster Pumps
E. Filtration
F. Carbon Adsorption

G. Softening
1. Ion Exchange
2. Descaling

H. Primary Purification Method
1. Reverse Osmosis
    a. Central RO
    b. Portable RO (PRO)
    c. Membranes
2. Ion Exchange
    a. Mixed Bed Deionizers
    b. Dual Bed Deionizers

I. Other Equipment
1. UV Systems
2. Chemical Injection Systems
3. Organic Scavangers
4. Dealkalizers
5. Heat Exchangers
6. Chillers
7. CIP Tank

J. Treated Water Distribution Systems
1. Types
    a. Direct
    b. Indirect
2. Coponents
    a. Piping
    b. Storage Tanks
    c. Repressurization Pumps
    d. Ultrafilters
    e. Wall Stations
    f. Di Bypass Systems

K. Dialysis Water System Design
1. Feed Water Onsite Analysis
2. Evaluation of Feed Water Quality
3. Seasonal Variations
4. Worse-Case Scenario Considerations
5. Equipment Selection and Sizing
6. Final Configuration

L. Selecting a Medical Device Water Treatment Equipment Vendor
1. Preparing a Request For Proposal (RFP)
    a. Quality and Quantity Requirements
    b. Feed Water Quality Analysis
    c. Preferred System Configuration
    d. Proposed Equipment and System Features
    e. Installation, Validation, Training, and Support Services
    f. Evaluation of Bids Submitted

g. Conclusions

DOMAIN VI: Water System Performance and Monitoring (15%)

A. Water Contaminants

1. Chemical Contaminants
    a. Organic
    b. Inorganic
2. Microbiological Contaminants
    a. Bacteria
    b. Viruses
    c. Algae
    d. Mold
    e. Fungus
    f. Biofilm

B. Standard Test Methods

1. Microbiological Assays
2. Titration
3. Colorimetric
4. Amperometric
5. Polargraphic
6. Other Assays
7. Test Interferences

C. Types of Monitoring

1. Automated vs. Manual
2. Online Monitoring
3. Off-line Monitoring
4. Sample Collection

D. Evaluation of Equipment Performance

1. Tempering Valve
2. City Boost Pump
3. Filtration
4. Activated Carbon Filtration
5. Ion Exchange Softener
6. Reverse Osmosis Device
7. Other Devices
    a. Injection Systems
    b. Organic Scavengers
    c. UV Systems
    d. Ultrafilters
    e. Distribution Pumps
8. Evaluation of Water System Performance - Trending
9. Monitoring Schedules
10. System Failures

DOMAIN VII: Disinfection Strategies and Prevention Practices (15%)

- **A. Installation**
  1. Partnering with Water Equipment Vendor
- **B. Prevention: Getting a Good Start**
- **C. Partnering with the Lab**
  1. Identification
     a. Bacteria
     b. Viruses
     c. Algae
     d. Fungus
     e. Molds
     f. Normal Skin or Body Organisms
  2. Validating the System Disinfection Schedule
  3. Verifying the Effectiveness of Disinfectant
  4. Proper Sample Collection Procedures
- **D. Methods of Disinfection**
  1. Chemical
  2. Heat
  3. Ozone
- **E. Standard Disinfection**
- **F. High Level Disinfection**
- **G. Presence Testing**
- **H. Residual Testing**
- I. **Remediation: Waterman to the Rescue**