HEALTHCARE PURCHASING NEWS

SELF-STUDY SERIES Sponsored by STERIS

A Technician's Guide to Water Quality Testing

by Pamela Carter, BSN, RN, CNOR, AGTS, CRCST, CER, ASQ-CQIA

March 2024
This self-study lesson was developed by STERIS. Lessons are administered by Endeavor Healthcare Media.

Earn CEUs

After careful study of the lesson, complete the examination online at educationhub.hpnonline.com. You must have a passing score of 80% or higher to receive a certificate of completion.

Certification

The CBSPD (Certification Board for Sterile Processing and Distribution) has pre-approved this in-service for one (1) contact hour for a period of five (5) years from the date of original publication. Successful completion of the lesson and post-test must be documented by facility management and those records maintained by the individual until recertification is required. DO NOT SEND LESSON OR TEST TO CBSPD. For additional information regarding certification, contact CBSPD–148 Main Street, Suite C-1, Lebanon, NJ 08833 • www.cbspd.net.

HSPA (Healthcare Sterile Processing Association, https://myhspa.org) has pre-approved this in-service for 1.0 Continuing Education Credits for a period of three years, until January 29, 2027.

For more information, direct any questions to Healthcare Purchasing News editor@hpnonline.com.

LEARNING OBJECTIVES

1. *Identify aspects of ANSI/AAMI ST108 that apply to processing technicians*
2. *Describe the test methods that a processing technician would perform*

Sponsored by: STERIS

What is used most when processing reusable medical devices? Water. Yet for years, the quality of water was not important unless there was staining, scaling, or pitting. Water has a broad impact on processing. It can damage instrumentation, cause cleaning equipment to fail, and transfer bacteria to medical devices resulting in infectious outbreaks. The knowledge of water in medical device processing is rising and with it there are quality expectations. Processing technicians now have new responsibilities to ensure the quality of water.

What's New In Water Quality

In the past, water quality became a concern after medical device processing issues arose. Facilities would spend thousands of dollars each year in repair costs before realizing it was poor water quality. Though the Association for the Advancement of Medical Instrumentation provided information on key components of water impurities in its technical document TIR34, it was not a standard. This changed in 2023 as the first water quality standard for processing medical devices was published, ANSI/AAMI ST108 Water Quality for Medical Device Processing. ANSI/AAMI ST108 builds on the former technical information report TIR34.

The new standard identifies three types of water (utility, critical, and steam), sets quality specifications for sixteen impurities commonly found in water, and defines four properties of water that can be detrimental to medical devices, cleaning equipment, steam sterilizers, and patient health. The specific quality expectations for water will depend upon the stage of medical device processing and the potential risks.

Utility Water is general purpose water used during the first rinse, cleaning, and intermediate rinses of medical device processing, unless otherwise directed by the manufacturer's instruction for use. Utility water may be used to create point of use treatment solutions for flushing endoscopes. Utility and Tap water are different types of water. Tap water may not meet the requirements of utility water and require added water treatment steps before it can be used as utility water.

Critical Water is highly treated water that removes ionic impurities and keeps bacteria levels low. Critical water is not sterile water. The final rinse of the cleaning process and all rinses for manually high level disinfected medical devices use critical water.

Steam, or rather its condensate, is the last type of water specified within ANSI/AAMI ST108. Steam is the most common sterilant used in sterile processing.

With quality specifications comes the need to test. First, quality is proven through validation testing after which routine testing shows the water still meets the necessary requirements to be safe for medical device processing.

Validation testing requires frequent testing of all impurities and water properties after water treatment and at each location that the water is used. This can last an entire year as incoming water quality changes throughout the year.

After validation is complete, routine testing reduces the frequency and location of testing. The types and frequency of routine testing are based upon the results of the validation. ANSI/AAMI ST108 gives minimum recommendations for both. See tables 1 and 2.

As with any equipment, maintenance is an important part of good water quality. The water treatment system, remote water treatment equipment, and the water delivery system, including all storage tanks, must be maintained per manufacturer's instructions for use. Parts that could harbor bacterial biofilms are regularly disinfected. This could include storage tanks, water lines, and certain point of use filters. Disinfection frequency will be dependent upon the facility's unique water conditions and systems.

The frequency is established during the validation of the water treatment system.

The Processing Technician's Role in Water Quality Assurance

Developing the water management program and ensuring compliance is the role of the water management committee. The diverse backgrounds of the multidisciplinary committee supply the expertise needed to develop and oversee the water management program. Medical device processing technicians may be asked to join the committee. Considering device processing occurs in multiple areas, the committee may encompass technicians from endoscope processing, emergency room, satellite clinics, ambulatory surgery, and gastroenterology centers. As committee members, they help to ensure that all water use locations for medical device processing is listed in the water management program.

Routine water monitoring uses many types of tests. Some tests require specialized equipment to be utilized in order to complete the test. Others use test strips or readers. Technicians may be asked to collect water samples, read and interpret meters, and perform testing. Facility policies and procedures will dictate the technician's role, responsibility, and required training.

Technician's Role in Routine Water Quality Testing

Water treatment systems use a variety of filters to remove water impurities. Systems are maintained and tested by facilities or the water treatment system's vendor. Technicians may be asked to check gauges, read conductivity meters, or look for warning lights or messages each day of operation. All performance checks should be documented with a quality system in place to manage alerts and failing measurements.

Of the three water types, technicians may be involved in utility and critical water testing at the point of water use. The points of water use are locations where the water is dispensed for immediate use. This includes utility sinks, washer disinfectors, and cart washers, for example.

Visual evaluation is completed by looking at the water without cleaning chemistries or high-level disinfectants. The water should be clear, not cloudy, and colorless. Each sink faucet, washer disinfector, cart washer, and automated endoscope reprocessor should be observed. It may be necessary to observe the water used in mechanical cleaning and high-level disinfection processors during first fill, intermediate rinse, and/or final rinse depending upon the timing of cleaning agent and disinfectant dispensing.

Utility Water	Critical Water	
Quarterly	Daily	Monthly
Conductivity	Conductivity	pH
pH		Total Alkalinity
Total Alkalinity		Total Hardness
Total Hardness		Bacteria
		Endotoxin

Table 1: Routine monitoring of Water Treatment System

Conductivity and pH testing may also be performed by technicians at the points of water use. Water samples are collected from the point of water use into a glass or polypropylene bottle. The conductivity meter's probe is placed within the bottle and the measure taken. It is especially important to rinse the probe with deionized water prior to placing it in the water sample. Residual water from earlier testing or any other ionic contamination can be carried into the water sample and create a failing test result.

After conductivity testing is complete, a pH test strip can be used to measure the pH of the water. Always do this after the conductivity measurement. The pH strips can introduce ionic contaminants that can alter the conductivity reading. Follow the pH strip's instructions for use for the test requirements and interpretation.

Typically, a test laboratory completes alkalinity and water hardness testing. However, test strips are available for routine monitoring. As before, the water sample used for conductivity measurements can be used for alkalinity and water hardness test strip testing. Follow the test strip's instruction for use. Test strips are available for routine monitoring.

Bacterial count and endotoxin testing requires specialized skill and laboratory equipment to perform. Technicians will not be asked to do this type of testing but may be asked to collect water samples for the test. Proper water sample collection and handling is critical. Always wear fresh, clean gloves when collecting water samples. Change gloves if they become contaminated. Additionally, be sure to

Daily	Utility Water	Critical Water		Steam
	Quarterly	Daily	Monthly	Quarterly
Visual	Conductivity	Visual	pH	Conductivity
	pH		Total Alkalinity	pH
	Total Alkalinity		Total Hardness	Total Alkalinity
	Total Hardness		Bacteria	Total Hardness
	Bacteria		Endotoxin	

Table 2: Routine monitoring at Point of Water Use.

Self-Study Test Answers: 1.A, 2.D, 3.D, 4.B, 5.C, 6.B, 7.D, 8.C, 9.A, 10.A

Figure 1: Test strips are available for routine monitoring of pH, water hardness, and some chemical impurities found in water.

wear proper personal protective equipment as defined for the work area.

Water samples used to measure water properties and chemical impurities should be a representation of the water delivered to the point of use. For faucets, the water is collected from the water faucet after it has been allowed to run for a specified amount of time. Running the water clears the faucet of environmental contamination that may have collected in and on the faucet during use. It also clears the line of stagnant water that could create a false result. Spray heads may require an added step that cleans and rinses the surface with a specific water type prior to flushing.

After flushing, the water's flow should be reduced to the width of a pencil. This reduces the force of the water, preventing splashing during water collection. Use a fresh glass or polypropylene bottle. If the collection vessel is reusable, clean and rinse three times with deionized water prior to each use. While holding the base of the bottle, carefully remove the lid as to not touch the sides of the bottle. Place the bottle base beneath the flow of water. Fill the bottle to allow sufficient coverage of the conductivity probes and test strips then place the lid onto the bottle. If more than one bottle is needed, collect the next water sample.

Testing should be done right after sample collection. If the sample needs to be shipped to a test laboratory, it should be labeled and stored refrigerated until shipped to the test lab. Follow the test lab's instructions for collection volumes and ship times. Many require sample shipment on ice and within a specific time.

Mechanical equipment may have specialized adapters or require the use of the emergency stop to collect water samples. Consult the equipment manufacturer for collection procedures.

Bacterial and endotoxin samples require a little more. Bacterial and endotoxin testing is sensitive to contamination from the environmental surfaces, technician hands, the sample bottle, and many other potential sources. Use meticulous care to collect samples.

Faucets, spray heads, and sample ports may require external disinfection followed by sterile water rinsing prior to water flushing to prevent sample contamination from environmental bacteria. Mechanical equipment may have additional needs. Consult the bacterial test lab and mechanical equipment manufacturer for specific requirements.

Samples are collected into sterile bottles specifically designed for bacterial and endotoxin testing. Using a non-sterile bottle or one that is not suited for endotoxin sample collection could negatively affect the results. Bacterial testing often requires larger volumes of water than other water test samples with a typical sample collection size of 100 ml or approximately 0.4 cups. Care should be taken when collecting samples to avoid touching the bottle lip during collection and when reapplying the lid. Do not place the lid on any surfaces. Contact with surfaces could transfer contaminants to the lid.

All samples should be labeled and refrigerated. Testing should begin as soon as possible. Endotoxin levels decline due to degradation over time, but bacteria levels increase as bacteria replicate within the sample. Often samples are shipped overnight to the test laboratory.

Closing Thoughts

Processing technicians play a vital role in water quality management. Their knowledge gives a comprehensive look into water usage during medical device processing. They work the most with water in their day-to-day job. They are invaluable partners ensuring the quality of processing water in every healthcare facility. HPN

References:

1. American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) (2018). ANSI/ASHRAE 188-2018 Legionellosis: Risk Management for Building Water Systems. American National Standards Institute

2. Association for the Advancement of Medical Instrumentation (AAMI) (2023) ANSI/AAMI ST108:2023 Water for the processing of medical devices. AAMI

3. Centers for Disease Control and Prevention (2021) Developing a Water Management Program to Reduce Legionella Growth & Spread in Buildings. CDC. https://www.cdc.gov/legionella/downloads/toolkit.pdf

Figure 2: Follow the test lab's instructions for collecting, labeling, and shipping of water samples to the test laboratory.

CONTINUING EDUCATION TEST • MARCH 2024

A Technician's Guide to Water Quality Testing

Circle the one correct answer:

1. **Which standard provides recommendations for water used to process medical devices?**
   A. ASNI/AAMI ST108
   B. ANSI/AAMI ST79
   C. ANSI/AAMI ST41
   D. ANSI/AAMI ST58

2. **Which type of water is used to make cleaning solutions?**
   A. Critical Water
   B. Potable Water
   C. Steam
   D. Utility Water

3. **How long can validation testing last?**
   A. 1 day
   B. 1 week
   C. 2-3 months
   D. 1 year

4. **What happens to water testing after the validation is complete?**
   A. It increases
   B. It decreases
   C. It stops
   D. It is only needed for problems

5. **What is point of water use?**
   A. It is the end of the water treatment system
   B. It is the exit of the storage tank
   C. It is the location where water is dispensed for use
   D. It is precleaning of endoscopes

6. **What is used to measure water conductivity?**
   A. pH meter
   B. Conductivity meter
   C. Test strip
   D. Visual inspection

7. **Which test uses a test strip?**
   A. Bacterial
   B. Conductivity
   C. Endotoxin
   D. pH

8. **What is the technician's role in the water management committee?**
   A. Write policies and procedures
   B. Perform water treatment system testing
   C. Lists all processing water use locations
   D. Manage the entire water program

9. **How should water samples be kept after sampling?**
   A. Refrigerated
   B. Room temperature
   C. Incubated at 55-60°C
   D. Boiled for 3 minutes

10. **Who should be consulted when developing water sampling procedures for mechanical equipment?**
    A. Mechanical equipment manufacturer
    B. Cleaning chemistry manufacturer
    C. Water treatment system vendor
    D. Infection preventionist

CONTINUING EDUCATION TEST SCORING

HEALTHCARE PURCHASING NEWS EDUCATION HUB

HPN now offers all CEU quizzes online by scanning the QR code on the right or visiting: https://educationhub.hpnonline.com. **The cost to take the quiz online remains at $10.**

As of December 1st 2023 all exams must be taken online.

Mailed in tests will no longer be accepted.

HSPA | HEALTHCARE STERILE PROCESSING ASSOCIATION

CBSPD

Approval codes are printed on successfully completed certificates at the end of each online course at https://educationhub.hpnonline.com.