Water Quality and Its Impact on the Decontamination Process

Understanding water treatment options and the methods used to monitor performance

by Scott Lyon, BS

Many thanks to the team at 3M Health Care for working with *Managing Infection Control* to provide the following accredited course. IAHCSMM has awarded one (1) contact point for completion of this continuing education lesson toward IAHCSMM recertification. The CBSPD has preapproved this inservice for one (1) contact hour for a period of five (5) years from the date of publication, and to be used only once in a recertification period. This inservice is 3M Health Care Provider approved by the California Board of Registered Nurses, CEP 5770 for one (1) contact hour. This form is valid up to five (5) years from the date of publication. Instructions for submitting results are on page 96.

Managing Infection Control and 3M Health Care will be working collaboratively to provide continuing education courses in monthly editions of *Managing Infection Control*.

Objectives

After completion of this self-study activity, the learner will be able to:

1. Identify common water impurities and describe their impact on the decontamination process.
2. Describe the water treatment options commonly used in healthcare sterile reprocessing departments.
3. Discuss the water quality required for each of the common steps in the decontamination process.
4. Design a quality control process for water treatment systems.

Test Questions

True or False. Circle the correct answer.

1. Calcium and magnesium are inorganic impurities in water that can form hard water deposits, commonly called scale.
   A. True B. False
2. Distillation systems use a semipermeable membrane to remove water impurities.
   A. True B. False

3, Monitoring water systems is not the responsibility of sterile processing professionals.
A. True B. False

4. Deionization systems remove inorganic impurities but do not remove organic and microbial impurities.
A. True B. False

5. Chloride ions cause surface staining but do not induce corrosion on medical instrumentation.
A. True B. False

6. When reprocessing instruments that will come into contact with the eye, bloodstream or cerebrospinal fluid, water containing high levels of bacterial endotoxins should be used for the final rinse.
A. True B. False

7. The four categories of water defined by the Association for the Advancement of Medical Instrumentation Water for the reprocessing of medical devices AAMI TIR34:2007 are potable, softened, deionized and high-purity water.
A. True B. False

8. Potable or tap water should not be used for any step of the decontamination process.
A. True B. False

9. A water softener utilizes the process of ion exchange to replace hard water ions, like calcium and magnesium with sodium ions.
A. True B. False

10. Purified water holding tanks are susceptible to microbial contamination and should be monitored on a regular basis.
A. True B. False

Introduction

Water impurities can jeopardize patient health, decrease decontamination effectiveness and shorten the useful life of instrumentation. Automated reprocessing equipment functionality, effectiveness and life span are also negatively impacted by impurities commonly found in water. The quality and consistency of the water used in a sterile processing department is critical. It is necessary for central service professionals to have a basic knowledge of various water impurities and their effects on instrument reprocessing. Additionally, by understanding the common water treatment options and the methods used to monitor these systems' performance, sterile processing professionals can ensure that appropriate water is being used in their decontamination process.

The majority of the earth's surface is water. It is a molecule essential for life and carefully studied by science. Water can be found in three separate physical states. The liquid state is the most common form associated with water. The solid state of water is called ice and the gaseous state is called water vapor or steam. Most chemicals exist in these three states, but water is unique in its physical properties. The liquid state of water is actually more dense than the solid state of water. Water is the only non-metallic substance to expand when it freezes. This may seem like a nice feature of water when looking at an ice cube floating in a drink, but it is an essential requirement for aquatic life living in a lake that has frozen. This layer provides protection from extremes in temperature and allows aquatic life to survive changing seasons.

Water is an amazing solvent. A solvent can be defined as a liquid or gas that dissolves another substance (a solid, liquid or gas) into it. Solvents make it possible for two separate substances to become one solution. In general, water will dissolve almost anything to which it is exposed. Nature uses this phenomenon in many different types of reactions that are essential to life. The human body uses water to transport nutrients to cells and then uses it again to remove waste. A glass of lemonade is another example, in which water is used as a solvent to combine water, sugar and lemon juice into one liquid. In the decontamination process for reusable medical instruments, water acts as a solvent to remove contamination from soiled instrumentation, preparing it for further treatment and ultimately reuse. Water's ability to act as a solvent is critical to life and also the reason it is rarely found in a pure form.

The source of the water used in a facility will largely determine the impurities and treatment required for its use. Potable water or tap water, as it is commonly referred to, can be collected from groundwater aquifers and/or surface water supplies. Groundwater aquifers are areas in the earth's surface where water saturates the soil. Wells are drilled down to this level and water is pumped to the surface for use. Rivers, lakes, ponds and even the ocean are all sources for surface water. The hydrologic cycle is the process by which water is purified through evaporation and then recontaminated after returning to the earth's surface. The point at which water is collected in the cycle will largely determine the impurities present in the water. As an example, water collected from rivers and lakes will contain a larger amount of organic and undissolved material, while water collected from groundwater sources will have a greater mineral content with less organic material. Once the water has been collected, its final use will determine the treatment required. Greater purity is required for water used in the manufacturing process of flavored cola versus water being used to irrigate farm fields.

The same principles apply to water being used in the decontamination process. The water purity requirements are different for water being used as a final rinse in an automated washer versus water being used in the manual cleaning process. The Association for the Advancement of Medical Instrumentation (AAMI) published the Technical Information Report (TIR) 34: 2007 *Water Reprocessing for the Reprocessing of Medical Devices* to provide information and guidance around the water quality and monitoring requirements for the decontamination process. The level of acceptable impurities is determined by the potential for that impurity to negatively impact the instrumentation, processes and ultimately the patient's health.

Sterile processing departments use two common methods to deal with water impurities.

Sterile processing departments use two common methods to deal with water impurities. The first utilizes a water treatment system to reduce or remove impurities prior to use. The second involves the addition of chemicals, typically detergents, to address water impurities during the decontamination process. When focusing just on the cleaning and decontamination, water quality has a significant impact on the automated washing process. A standard instrument reprocessing cycle for an automated washer has several steps, each requiring the machine to fill and empty with new wash water. Several of these steps involve the addition of chemicals, while others do not. Figure 1 illustrates that water treatment is the only way to control water impurities during every step in the automated washing process. This is an important point because it explains why a facility struggling with issues associated with water impurities cannot address all their problems with a new detergent or product. Water impurities remaining in the rinse and thermal rinse steps will still interact with the instrumentation.

Figure 1. Areas of Chemical Addition to Control Water Impurities in a Typical Automated Instrument Wash Cycle

	Prewash	Enzyme Wash	Wash	Rinse	Thermal Rinse
Detergent Addition		√	√		

Ultimately, the water treatment system available to a facility will largely determine the quality of water available for reprocessing. TIR 34:2007 will allow sterile processing professionals a common language to plan for future water needs and discuss current water quality issues with their facilities groups. This document contains the information sterile processing professionals need to ensure the water quality supplied to their department is appropriate for the reprocessing conducted by their facility. Before discussing the four general categories of water quality as defined by TIR 34:2007 it is important to understand the common types of water impurities and the negative impact they can have on the decontamination process.

Figure 2. Scale on the Inside of a Cart Washer

Water Impurities

Water hardness is a common impurity that can negatively impact the decontamination process. Water hardness is typically defined by the level of calcium or magnesium dissolved in it. Calcium and magnesium ions, like other inorganic impurities, form insoluble compounds when water is heated, evaporated or the pH is increased by a detergent without sufficient water conditioners to prevent deposits. These insoluble complexes are often called hard water deposits or scale and appear as a white film on the surface of instruments or the inside of washing equipment.

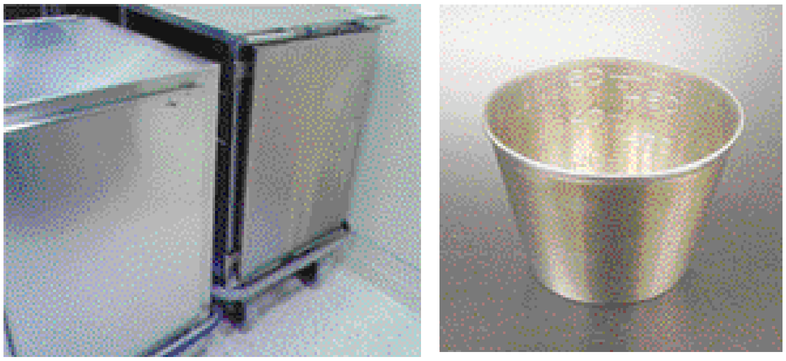
Scale is more than just a visual annoyance, as seen in the inside of the cart washer chamber pictured in Figure 2 on page 86.

Scale can impede cleaning and sterilization. It can decrease a washer's functionality by clogging spray nozzles and internal piping. Scale buildup on the heating element of automated washers can significantly increase cycle times by reducing the heating efficiency of the washer. Detergent efficacy is also negatively impacted by water hardness. When hard water scale is present, surfactants (cleaning chemicals in detergents) are tied-up interacting with it, which leaves less detergent available for cleaning. Finally, hard water molecules can also have a negative impact on the active ingredients in some disinfectants and liquid sterilants.

Scale is water insoluble and requires the use of acidic products for its removal from instrumentation and washing equipment. The products used in this type of application are called stain removers or descalers. The repeated use of acidic solutions decreases process efficiency by adding additional steps and can shorten the life span of valuable equipment and instrumentation. The ability to prevent the development of scale should be a critical requirement when selecting detergents and the water quality used in automated washing applications.

Other inorganic impurities can cause visual changes to instrumentation and equipment. Green films, grey patches, blue streaks and iridescent discolorations can all be the result of impurities such as iron, copper and manganese.

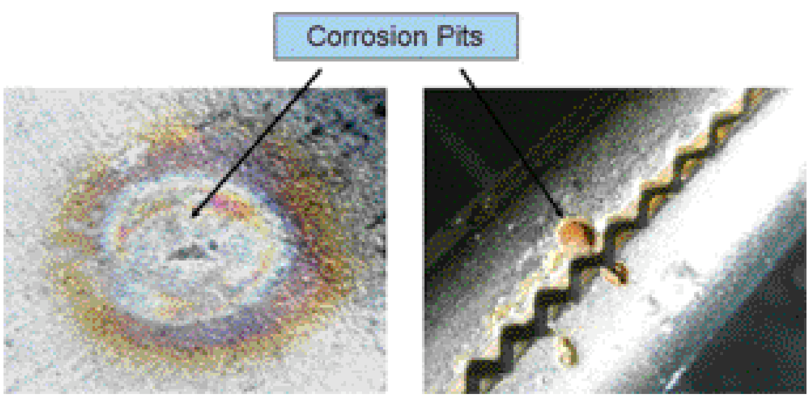
Figures 3 and 4. Inorganic Staining on a Case Cart and Medicine Cup



Surface staining can occur even when the inorganic impurities exist in small quantities. In general these stains or discolorations are harmless and nothing more than a thin layer deposited on the surface of instrumentation or washing equipment. Although this layer appears undesirable, it has been shown to be relatively harmless to instrumentation and not a source of corrosion.[1] Again, these stains typically form in situations where water is heated, evaporated or the pH is increased by a detergent without the sufficient water conditioners to prevent deposits. These surface stains can generally be removed by acid stain removers (see Figures 3 and 4).

Chlorides are ions of particular concern for instrument reprocessing. Unlike the previous inorganic impurities discussed, chlorides have been shown to induce corrosion. While the previous impurities deposit a film on the surface of equipment and instrumentation, chlorides actually break down the metal leaving holes in the surface called pits (see Figures 5 and 6).

Figures 5 and 6. Examples of Corrosion Pits on Instrumentation



These pits can harbor soil and microorganisms during reprocessing and sterilization.[2] Pits can also weaken and jeopardize the functionality of instrumentation.

There are several areas in the decontamination process in which chlorides can facilitate corrosion. These instances occur when substances containing chlorides come into contact with the surface of instrumentation for an extended period of time. The sources of chlorides could be saline used during surgery to irrigate a wound, an inappropriate detergent used as a presoak, or even the soils deposited on the instrumentation during surgery. Small amounts of chlorides can initiate corrosion during extended wash cycles at elevated temperatures or in a final rinse that is allowed to dry on the surface of instrumentation. Unlike the deposits formed by iron, copper and manganese, the damage caused by chlorides cannot be removed by acid stain removers. Damaged instruments may appear improved because the iron staining commonly associated with corrosion is removed, but the holes in the surface of the instrument still remain.

Microorganisms exist in water. While municipalities add chlorine to tap water to prevent their replication, this does not eliminate their presence or their potential impact to the decontamination process. It is necessary to determine the level of microbial contamination for water being used in the reprocessing of medical devices to determine if it is acceptable.[3] In general, water used for cleaning should have a lower level of microorganisms than the soil it is trying to remove. Microorganisms in rinse water should be considered a source of contamination. Most decontamination processes involve additional disinfection or sterilization before reuse, thus minimizing the concern of this contamination. Sterile processing professionals should consult with the manufacturers of high level disinfectants and liquid sterilants to determine the appropriate water for final rinsing after utilizing these products.

Bacterial endotoxins are fragments of the cellular wall of bacteria. When they are introduced into the body they can cause adverse reactions. These organic compounds are not produced by the bacteria, but rather created when the bacteria die and the cellular membrane is broken apart. These pieces of the cell wall are not destroyed during disinfection or sterilization so reducing their level in final rinse water is required. This issue is a special concern for instrumentation used in the eye, bloodstream or cerebrospinal fluid.[4]

Dealing with Water Impurities

Hospitals use a combination of chemical addition and water treatment systems to deal with water impurities. Chemical addition can address many of the negative effects water impurities cause during the reprocessing cycle, but water treatment is the only option for all areas where water is used.

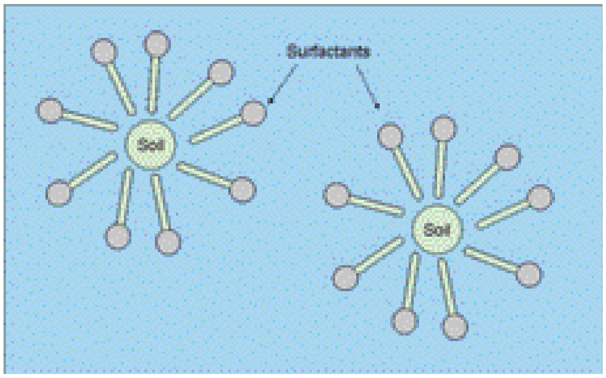
Chemical Addition

Detergents are formulated to improve the cleaning ability of water and reduce the negative effects of common water impurities during the washing process. Surfactants are an important component of detergent formulations. A surfactant is a molecule which has two distinct regions: a hydrophobic end (water hating) and hydrophilic end (water loving). This split personality allows surfactants to act as a bridge between soil and water. Surfactants allow soils that are normally insoluble in water to become soluble. Surfactants form balls or micelles around the soil, suspending it in solution and preventing it from depositing back on the surfaces of instrumentation (see Figure 7).

A surfactant also interacts with hard water impurities in a similar manner. As the amount of water impurities increase, the amount of surfactant available for cleaning decreases. This requires sterile processing professionals to use more detergent or in some cases very aggressive detergent to compensate for poor water quality.

Detergent manufacturers recognize the limitations of using surfactants to deal with water impurities. By adding chemicals specifically formulated to deal with water impurities, like chelating agents, more surfactants are available for cleaning. Chelating agents are designed to sequester hard water molecules and prevent the formation of insoluble complexes. As the water temperature and pH increase during the washing processes (assuming an alkaline detergent is used) the chelating

Figure 7. Surfactant Micelles



agents prevent scale formation thus improving the effectiveness of the decontamination process.

Corrosion inhibitors are another chemical added to detergents to reduce the corrosive nature of water and increase the life span of equipment. These chemicals are designed to protect materials susceptible to corrosion and extend the time instruments can remain in solution without damage.

Chemical addition can only address water impurities in areas of the process that utilize detergent. Detergent is not added to the final rinse leaving water treatment as the only solution for facilities with poor water quality.

Water Purification Systems

A hospital can use many different types of water purification systems to improve the quality of their potable water. All of these systems have limitations on what they can and cannot remove. Some require large areas for equipment and water storage while others require less space for operation. The initial cost of one may be higher while another requires a greater ongoing cost for maintenance. In the end, the desired purity level, water demand, cost, space limitations, and maintenance requirements should all be considered when determining which water purification system is appropriate.

The most common form of water treatment is water softening. A water softener utilizes the process of ion exchange. In this system ions like calcium and magnesium are replaced with sodium ions. Since calcium and magnesium are required to form scale, their replacement with sodium molecules reduces the water's potential to negatively impact the decontamination process.

The water softening system is composed of an exchange tank, controller, and brine tank. The exchange tank is filled with a resin that facilities the exchange of calcium and magnesium ions for sodium ions. The resin is initially bound to sodium ions, but has a great affinity for ions like calcium and magnesium. When water containing these ions passes through the exchange tank, the resin releases the sodium ions and binds to the calcium and magnesium ions. Over time the resin reaches a point where there is no longer sodium available to exchange. At this point calcium and magnesium ions will pass through the exchange tank and the potable water is no longer softened. The controller is designed to initiate a process referred to as regeneration before this occurs. During regeneration, the exchange resin is flooded with a concentrated salt solution stored in the brine tank. The resins affinity for the hard water ions is overcome by the high concentration of sodium ions. The resin releases the calcium and magnesium ions and replaces them with sodium ions. The water containing these hard water ions is then released from the system and directed to the drain. At the conclusion of this regeneration process the exchange resin is ready to soften water again.

It is critical to understand that water softening does not remove impurities, but rather exchanges them. The sodium ion does not have the ability to form an insoluble film, making it more desirable then calcium and magnesium. High levels of sodium can still generate water soluble films on the surface of instrumentation and the inside of automated washing equipment. It is also important to know how the regeneration process of softeners is controlled. If this process occurs at a rate that is incompatible with the water usage requirements, hard water ions may pass through a saturated exchange bed until the next regeneration occurs. This can result in sporadic scale formation and inconsistent cleaning results. The addition of new washing equipment or a change in decontamination processes that requires an increase in water consumption should be communicated to the group responsible for water softening.

A deionization (DI) system utilizes the process of ion removal to purify water. In this system two types of resins are used to remove the positively and negatively charged ions from the water being processed. Positively charged ions, called cations, are replaced with hydrogen ions (H^+). Negatively charged ions, called anions, are replaced with hydroxide ions (OH^-). These two components H^+ and OH^- combine to form H_20_2, water.

This process of ion removal can occur in separate tanks or in one tank depending on the type of DI system. These exchange tanks can also be referred to as exchange beds. In a two-bed system, one tank is filled with a resin designed to remove cations and a second tank is filled with a resin designed to remove anions. A mixed-bed tank is one tank filled with both types of resins. At some point both of these systems will run out of capacity to remove ions. When this occurs, ions will travel through the tanks and into whatever application the purified water is currently being used in. Unlike water softeners, regeneration of DI tanks does not typically take place at the facility. The old tanks are exchanged for new tanks by a service company. The old tanks are taken to an offsite facility to be regenerated.

DI systems are very effective at removing inorganic impurities but do not remove microorganisms or organics. In some cases, deionization tanks can actually become a source of microbial contamination and should not be used if microbial and organic contamination is critical.[5]

DI systems are commonly used in hospitals because the startup costs are low and the space required for the equipment is minimal. A DI system does not require a holding tank for the purified water so just enough room to store the exchange tanks is all that is required. The majority of the cost associated with this type of purification system is in replacing exhausted cylinders.

Distillation systems remove impurities by the process of evaporation. Water is heated and converted into a gas. The impurities are concentrated as the water evaporates out and is condensed in a pure form into a separate holding tank. Distillation is effective in removing inorganic and organic impurities, microorganisms, and bacterial endotoxins from water. Distillation systems are not cost effective options for water purification in most hospitals.

Reverse osmosis (RO) is purification using a semipermable membrane. In a RO system, water is pumped through a semipermable membrane to remove or reduce the impurities in it. This water is then collected in a holding tank prior to being used in the decontamination process. The impurities that are not allowed to travel through the membrane are collected in waste water and disposed of down the drain. Water passing through the membrane is referred to as permeate, while water flowing to the drain is referred to as concentrate. A simplistic way to look at a reverse osmosis system is to think of it as splitting the source water into two separate streams. The impurities are concentrated in the concentrate and sent down the drain, while pure water is generated and sent to a holding tank for use in the decontamination process. By moving the impurities out of the membrane and down the drain, RO systems are able to prevent the membranes from clogging. Even with this design RO membranes will clog over time, resulting in more water going down the drain and less water being collected for use. Utilizing water treatment systems like filtration, carbon exchange, and water softening, prior to RO treatment can increase the life span of RO membranes by controlling the level of impurities entering the membrane. RO systems are effective at removing inorganic and organic impurities, microorganisms, and bacterial endotoxins.

The initial cost and size of a RO system has been an issue in the past, but advances in membrane technologies have allowed these systems to become smaller and a more cost competitive option. Unlike DI systems, RO systems do not require tank exchanges.

Water Categories

There are four categories of water as defined by AAMI TIR 34:2007. They are potable, softened, deionized and high-purity water. Potable or tap water comes directly from the municipality or a well. This water will vary in its level of contamination and should be examined by the facility to determine if additional treatment is required before being used in the decontamination process. It is also worth noting that potable water quality can change over time depending on the source and treatment conducted by the municipality. Testing may need to be conducted at multiple times to understand these fluctuations. Softened water is potable water that has been treated by a water softening system. The hard water ions have been replaced by sodium ions but the microbial and organic contaminates still remain. Deionized water is either softened or municipal water that has been further treated to remove inorganic impurities. Organic and microbial impurities will still remain in deionized water. Finally high-purity water is softened, municipal, or deionized water that is further treated with a reverse osmosis system or distillation system to ensure that all microorganisms, inorganic and organic matter has been removed.

High purity water is recommended for the final rinsing of devices that will contact the bloodstream or sterile areas of the body. Potable, softened, and deionized water can be used for the majority of the decontamination process, as long as the impurities are within the acceptable levels as described by TIR 34:2007. All facilities should evaluate their water sources to determine which water should be used for each step in the decontamination process. In general, final rinsing steps will require the highest purity. Washing steps can utilize

Table 1—Categories of water quality for medical device reprocessing

	Potable Water[1, 2]	Softened Water[2]	Deionized Water[2]	High-purity Water (treated by RO or distillation)[2]
Primary uses for medical devices Critical Semicritical Noncritical	Precleaning, cleaning Precleaning, cleaning, rinsing[5] Precleaning, cleaning, rinsing	Precleaning, cleaning Precleaning, cleaning, rinsing[6] Precleaning, cleaning, rinsing	Precleaning, cleaning, rinsing[3, 4] Precleaning, cleaning, rinsing[6] Precleaning, cleaning, rinsing	Rinsing[4] Rinsing[6]
Primary uses for reprocessing methods	Pasteurization (if recommended by the device manufacturer) Input water for some types of washer-disinfectors	Pasteurization Input water for some types of washer-disinfectors	Pasteurization Input water for some types of washer-disinfectors Input water for steam, ethylene oxide, and ozone sterilizers	Input water for some types of washer-disinfectors

Characteristics typically associated with water quality categories[7]

	Potable Water[1, 2]	Softened Water[2]	Deionized Water[2]	High-purity Water (treated by RO or distillation)[2]
Bacteria (cfu/mL)	< 200 8	< 200 8	< 200 8	< 10
Endotoxin (EU/mL)	NA	NA	NA	< 10 9
Total organic carbon (mg/L)	< 1.0	< 1.0	< 1.0	< 0.05
pH	6.5–8.5	6.5–8.5	NA	NA
Water hardness (ppm CaCO3)	< 150	< 10.0	< 1.0	< 1.0
Resistivity (MΩ-cm)	NA	NA	> 1.0	> 1.0
Total dissolved solids (mg/L CaCO3)	< 500	< 500	< 0.4	< 0.4
Ionic contaminants Chloride (mg/L) Iron (mg/L) Copper (mg/L) Manganese (mg/L)	 < 250 < 0.3 < 0.1 < 0.1	 < 250 < 0.3 < 0.1 < 0.1	 < 1.0 < 0.2 < 0.1 < 0.1	 < 0.2 < 0.2 < 0.1 < 0.1
Color and turbidity	Colorless, clear, no residues	Colorless, clear, no residues	Colorless, clear, no residues	Colorless, clear, no residues

NOTE 1—If the potable water does not have these characteristics, then softened or deionized water should be used in those stages of medical device reprocessing in which potable water would have been used.

NOTE 2—Submicron filtration may be needed for some applications.

NOTE 3—Rinsing critical devices with deionized water is acceptable if there is no endotoxin issue.

NOTE 4—If water of this quality is used for rinsing after liquid chemical sterilization, the water must also be filtered with a submicron filter or sterilized by a validated treatment method.

NOTE 5—See 5.3.3 regarding the use of this category of water for rinsing after high-level disinfection.

NOTE 6—This category of water quality is acceptable for rinsing high-level disinfected semicritical devices if the water is filtered with a submicron filter. See 4.2, 5.3.3, and Table 3.

NOTE 7—Many of these characteristics should be monitored on an ongoing basis. See Section 7, Table 6, and Annex B.

NOTE 8—The bacterial level in these types of water would normally be expected to be < 200 cfu/mL. Bacterial levels should be determined when systems are installed, modified, or repaired. Routine monitoring is required only if problems are identified. Once a problem has been corrected and the microbial level has been shown to be stabilized (i.e., the level is < 200 cfu/mL), then routine monitoring would no longer be required.

NOTE 9—If microbial levels in water are monitored by viable count, ATP assessment, TOC, or other appropriate tests, endotoxin levels need to be determined only when the system is installed, modified, or repaired. (It should be noted that low levels of viable organisms do not guarantee endotoxin levels less than or equal to 10 EU/mL.) If problems are identified in any of the routinely monitored water characteristics, assessment of endotoxin levels may be needed as part of the problem investigation. Routine endotoxin monitoring is not necessary.

treated water to decrease detergent use and reduce staining and deposits. Table 1, taken from the AAMI TIR 34:2007, provides the types of devices, primary uses and characteristics of the four water quality categories.[3] This table can be used to assess a facility's current water usage and quality.

Monitoring Water Systems

Water systems need to be monitored. A facility should work with their water treatment system manufacturer to determine an appropriate sampling plan to ensure the systems are working correctly. Water softening systems can fail to remove hard water molecules or over-add chloride ions thus increasing the risk of instrument corrosion. Deionizers can become exhausted and allow inorganic impurities to pass directly through the system. Even high-purity water can become contaminated if the equipment is not properly maintained.[6]

Monitoring water quality does not need to be complicated. Many of the water treatment systems have a red light or alarm that triggers if the water exiting the system does not meet the required specification. This alarm only works if the personnel in the department understand what the alarm indicates. A worker could assume the red light on a DI system indicates the system has power and allow the decontamination process to continue with a failed purification system. Even looking at the inside of the washing equipment and examining the instrumentation can be used as a way to monitor water impurities. If a sterile processing professional knows the signs

Figure 8. Example of a Water Monitoring Checklist.

Water Quality Shift Startup Checklist

- ❑ Check deionization system to ensure the red light is not on.
- ❑ Check equipment water filters for a pressure drop or increase across the filter.
- ❑ Look at the inside of the automated washers for films or staining.

Sterile Process and Distribution CEU Information

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The CBSPD (Certification Board for Sterile Processing and Distribution) has pre-approved this inservice for one (1) contact hour for a period of five (5) years from the date of publication. Successful completion of the lesson and post test must be documented by facility management and those records maintained by the individuals until recertification is required. **DO NOT SEND LESSON OR TEST TO CBSPD.**

For additional information regarding Certification contact: CBSPD, 121 State Hwy 31N, Suite 500, Flemington, NJ 08822 or call 908-788-3847 or visit the Web site at www.sterileprocessing.org.

IAHCSMM has awarded one (1) Contact Point for completion of this continuing education lesson toward IAHCSMM recertification.

Nursing CE Application Form

This inservice is approved by the California Board of Registered Nurses, CEP 5770 for one (1) contact hour. This form is valid up to one year from the date of publication.

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for a failed water treatment system, they are able to address the problem quickly and reduce downtime.

Several monitoring tools and test strips are available to examine the quality of water used in a department. These tools and products can examine water hardness, pH, temperature, resistivity and even microbial contamination. Establishing a baseline for the water quality in a facility is the first step in monitoring water quality. By understanding what the values should be for a functioning system, failures are easily identified. Figure 8 on page 95 is an example of a shift startup checklist that could be used to monitor water quality in decontamination. This plan would require additional testing above and beyond these visual observations. TIR 34:2007 provides examples of the methods and intervals that can be used to monitor water treatment systems.

The sterile processing professional must ensure that the water quality utilized by a facility matches the intended output of the system. Even if these systems are serviced and maintained by the facilities group within a hospital, the sterile processing department should have an open communication about their sampling plan and procedures for those water systems. In addition, a communication and action plan should be put into place for situations when the water sampling identifies a water system failure. The sterile processing department should determine the impact to their decontamination process if a water purification system fails before it actually does.

ANSWERS

1. A	6. B
2. B	7. A
3. B	8. B
4. A	9. A
5. B	10. A

Summary

Water impurities can jeopardize patient health, decrease decontamination effectiveness and shorten the useful life of valuable instrumentation. Water impurities also impact the functionality, effectiveness and life span of automated reprocessing equipment. Sterile processing professionals must have a basic understanding of types of water impurities and their effect on instrument reprocessing. Additionally, by understanding water treatment options and the methods used to monitor their performance, sterile processing professionals can ensure the appropriate water is being used throughout the decontamination process. ✛

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