Disclaimer

The sole purpose of this text is to educate. Neither the author nor publisher warrant that the information contained herein is fully complete and shall not be responsible for errors or omissions. The author and publisher shall have neither liability nor responsibility to any person or entity with respect to any loss or damage caused, or alleged to be caused, directly or indirectly by either use or misuse of the information contained within the following pages.

If you choose to not be bound by the above disclaimer, please return this e-Book immediately for a full refund.
Message From The Central Sterile Processing Initiative Director

Thank you for purchasing this e-course, an introductory and review survey of the basics of sterile processing, Sterile Processing Basic Training: SPD Boot Camp.

Thank you, enjoy the program, and I am always just an e-mail away if you have questions or need my assistance during the course of your studies.

Sincerely,
Shane Huey,
Director

www.centralsterileprocessing.net
Preface

This e-course is neither the traditional textbook nor the typical student workbook. It is, rather, a combination of the best and most relevant of information related to the basics of sterile processing education and training presented much like a series of lecture notes with multimedia elements included for a more complete and well rounded educational experience for both sterile processing “newbies” and seasoned veterans simply seeking a comprehensive review alike.

The content is structured as a classroom lecture/text with all relevant points discussed and references provided for further information and investigation.

In this text one will be presented with material contained within the industry standard texts, current field relevant articles, and as well have workspace much like contained within the likewise standard workbooks. Herein, however, the student will find no superfluous material to bog one down unnecessarily. Covered within is only that which one needs to know as a sterile processing tech at the level 1 stage—the ESSENTIALS of sterile processing, that which every tech need know—the prerequisites of the field. References will be cited throughout the course, however, to point students in the right direction should they choose (and we are trusting that they will!) to pursue additional knowledge, training, and advancement in the field of sterile processing.

The course consists of multiple individual modules (at least 15 at the time of this printing). Please read through each module from beginning to end at least once before attempting to complete the assignments and then work your way back through the text completing the required coursework specified in the assignment directions at the end of the module (see contents).
Module 10: Basic Decontamination for Sterile Processing Professionals

Objectives

- Comprehension of the role of the SPD technician in decontamination
- Safety standards and issues
- Understanding of basic cleaning, decontamination, and disinfection procedures
- Reprocessing methodology and devices (manual and mechanical)
- Understanding of chemical cleaning and disinfection agents and their role in decontamination
- Biohazardous waste management
Module 10: Basic Decontamination for Sterile Processing Professionals

Introduction
As covered previously in the introductory and infection control modules, the decontamination area is the area in which all items in need of processing/reprocessing enter the sterile processing department.

Decontamination requires a two-fold process: cleaning (manual and/or mechanical) and decontamination (e.g., thermal or chemical disinfection).

Cleaning—removal of visible/invisible soil from contaminated item

Decontamination—reduction or complete removal of soil rendering an item safe from infectious matter

Environmental Controls in Decontamination
The physical location of the decontamination area of sterile processing should be centralized such that it provides a convenient drop point for soiled and contaminated items such as instrumentation and equipment. Soiled instrumentation/equipment should be contained such that it can be transported without risk of exposure to the transporter, other facility personnel, patients, visitors etc. Ideally, there should be a dedicated service corridor for soiled transport or a dumbwaiter which would transport the contaminated items directly to the decontamination area within sterile processing.

Specific Controls

• Minimum of 10 air exchanges per hour

• Negatively pressurized area

• Temp range of 64–72°F
• Humidity of 35-70%

Temperature and humidity must be monitored at least daily (preferably on each shift) and logged in a record book.

Workflow traffic must be limited to essential personnel (refer to previous module concerning workflow and traffic considerations). Personal protective equipment (PPE) should be donned at all times while working in the decontamination area and should be supplied to all visitors to the area as well.

The decontamination area must be equipped with handwashing stations (separate and distinct sinks from the decontamination sinks as well as have provided for an emergency eye wash station and chemical exposure shower.

As the decontamination area is a high-traffic area for contaminated items bio-burden/microbial counts will be high. Therefore:

• Removal of biohazardous waste should occur on a regular schedule over the shift by appropriately trained personnel

• All surface areas should be wiped down with an effective disinfectant at start and end of each shift

• Floors must be appropriately cleaned and disinfected (preferably each shift but at least daily)

• Cleaning implements used to clean and disinfect the decontamination area should not be used in other areas to prevent cross contamination

As discussed in previous modules and above, appropriate PPE must be worn at all times while working in the decontamination area. This is not optional. This is an OSHA requirement.

At any point during a technician's tour in decontamination should the PPE become soiled or otherwise compromised, it should be changed out. If gloves are torn while manually cleaning or otherwise during the processing procedure, the gloves should be removed, hands washed, and the gloves replaced immediately.

All rights reserved.
Prohibited in the decontamination area are:

- Food and beverage
- Artificial nails (e.g., acrylic)
- Jewelry of any kind

All facility policies and procedures for the decontamination area of sterile processing should reflect current AAMI standards as well as OSHA requirements and mandates.

PPE must be removed and discarded into a biohazardous waste receptacle upon exiting the decontamination area and hands immediately washed. The CDC 2004 guidelines for removing soiled PPE are:

1) Remove gloves
2) Removal eye/face protection
3) Remove gown
4) Remove surgical mask

Note: When removing PPE, remember that each item donned in soiled and potentially infectious. Remove such as to avoid subjecting yourself to contamination.

**Transportation of Soiled Equipment**

To minimize and prevent the possibility of exposure to the SPD technician, other facility personnel, surgeons, visitors, patients, etc., soiled instrumentation and equipment must be properly transported intrafacility.

Items contaminated (or suspected of being contaminated) should be handled via the principle of universal or standard precautions and appropriate PPE gear be donned to further minimize risk of exposure.

The bulk of items transported to the decontamination station of SPD will, approximately 90% of the time, be traveling from the OR (to include OB/GYN and other procedural suites).
Surgical instrumentation sets utilized should be reassembled best as possible by the surgical team (surgical/scrub technician and/or R.N. circulator) and placed back in the appropriate rigid container, sprayed with an enzymatic presoak agent (typically a foam or gel—liquids may slosh in transport and spill and as such should be avoided), and then returned to the case cart or other designated transport cart, appropriately sealed up, and returned to SPD decontamination. This is the basic process.

Not only must the instrumentation and/or equipment itself be cleaned, decontaminated, and reprocessed, so to must the rigid containers for instrumentation and the case carts/transport carts themselves.

**The Cleaning Process**

Just what is the primary goal of the decontamination process? Answer: To render an item (instrument, IV pole, infusion pump, etc.) safe for further handling and thus further processing if necessary. Decontamination, as a process, is essential in breaking the chain of infectious disease transmission and reducing the occurrence of nosocomial infection in the healthcare setting.

Cleaning can involve simply wiping an item down adequately with soap (or other appropriate detergent) and water, use of detergent (soap and water) followed by use of a disinfecting wipe or spray, both of the prior plus mechanical cleaning (e.g., impingement washer-disinfector), etc. Note: cleaning is the first step in the sterilization process. THOROUGH cleaning, thorough rinse,
disinfection, and further processing (where required) are essential for effective and safe sterilization outcomes. If appropriate levels of cleanliness are not obtained, microbial bio-burden can remain in the soil on an item and affect the sterilization outcome.

IMPORTANT NOTE: Soil, microbes (yes, even dead ones!), or other material remaining on a sterilized item due to insufficient and ineffective cleaning can cause fever (i.e., the material is pyrogenic), infection, and other physical reactions in patients! Take great care with this most basic yet most important first step in the reprocessing process!

IMPORTANT NOTE: Do not think in terms of visible soilage = in need of cleaning and decontamination. All items delivered to the sterile processing area (whether directly to decontamination or otherwise) should be considered soiled, inspected, and cleaned appropriately. There is no room for assumption with the health of our patients.

The Cleaning Process: Steps

- Sort soiled items and equipment
- Dispose of disposable materials and single-use items in appropriate waste bins, bags, etc. E.g., sharps in sharps box, bloody drapes in red biohazard bags/cans, etc.
- Presoak soiled instrumentation and sets (soak times set by manufacturer-lengthy exposure to moisture can initiate corrosion in many surgical instruments quite rapidly, especially in the presence of saline, which should not be used)
- Wash (with appropriate detergent, at appropriate temperature, following manufacturer's instructions)
- Rinse
- Dry
- Further processing as required by manufacturer

Note: It is imperative to know the manufacturer's specifications for cleaning and reprocessing so as to avoid doing damage to the

All rights reserved.
instrumentation or equipment unnecessarily (such equipment is quite costly and when down due to damage, impacts patient care and surgeon satisfaction, not to mention the departmental budget). Manufacturers include a spec sheet with cleaning, decontamination/disinfection, and sterilization parameters with new purchases of equipment. If such information is needed (being unavailable at your site), your local rep can obtain for you or you could, perhaps, locate online via the respective company website.

Some companies which provide instrumentation tracking and productivity software to sterile processing departments also allow for such information to be uploaded into their systems such that SPD techs, while working, can immediately access this information at their workstation. One such company is Care Fusion and their system is IMPRESS.

NOTE: As discussed above, the presoak component of cleaning is an important step but must be completed per the OEM's instructions for their instrumentation/equipment. The importance of the presoak is to loosen biomaterials that may have begun to adhere strongly to the item's surface in the interim between use in a patient care area such as OR and transport to and sorting in SPD decontamination. As these items sit and adherence is strengthened, cellular substances can become encased in biofilms, groups of microbes bound tightly together via cellular and extracellular materials that, in a sense, encase microbial populations rendering these populations difficult to eradicate. Some estimates indicate that bacterial populations housed within biofilm can be up to 1,000 fold more difficult to eradicate via disinfectants (Chobin, 93).

**Water Quality**

There is more to water than meets the eye and, as such, not all water is created equal. The quality of water in a facility's sterile processing department is an integral factor in the effectiveness of the overall cleaning process. Water quality, consisting of such factors as pH, hardness, mineral and other substance content, can greatly impact cleaning effectiveness either positively or negatively (e.g., detergent effectiveness depends upon particular water quality parameters being met).

**pH**

pH refers to the acidity or alkalinity of a solution and is measured on a scale of 1-14. 7 is neutral, while a substance having a pH of
less than 7 is acidic, greater than 7 alkaline.

Low alkalinity detergents are often used in sterile processing decontamination to removal gross soils, most often composed of proteins. Some surgical instrumentation, containers, and other medical devices must be cleaned with a neutral detergent (e.g., products manufactured from anodized aluminum) to avoid possibility of rapid corrosion. Mechanical impingement washers typically rely upon high alkaline detergents. pH can impact detergent effectiveness and thus sterility end product quality.

**Water Hardness**

Water typically contains a number of inorganic substances, each of which, in sufficient concentrations can negatively impact detergent effectiveness and cleaning outcomes, e.g., calcium, magnesium, pipe particulates, other minerals, etc.

Such substances can be pyrogenic if in sufficient concentration to remain on items processed after washing, rinsing, and sterilization; can corrode instrumentation and equipment and, as mentioned above, can negatively hamper the overall reprocessing process.

Water quality should be regular tested by a hospital's facilities department or an outside contractor for particulate matter (as concentrations can change frequently). It is recommended that all
manual wash stations, sonic washers, impingement washers, and sterilizers in the sterile processing department be prefitted with a water treatment system.

Several effective and popular water treatments include: reverse osmosis, deionization, or distillation.

NOTE: Water testing should be completed (for both pH and water hardness) prior to installation of new equipment or addition of changes to cleaning chemistries.

Some key terms...

**wetting agent** - a substance which allows for penetration of a liquid on to a solid surface to maximize cleaning potential and thus soil removal

**sequestering agent** - an agent that binds to and removes particulate matter from a water sample

**Detergents**

“Detergents are cleaning agents that lower surface tension, dislodging soils and dissolving or suspending them in the solution so that they can be removed by washing and rinsing” (Chobin, 95).

Detergent selection factors:

- water quality (including pH and hardness)
- type of bio-soil to be removed
- means of cleaning (manual vs. mechanical)
- manufacturer's recommendations for item(s) to be cleaned

Detergents come in several forms: liquid, solid, and powdered. The liquids tend to be most effect, typically, as they do not need to dissolve and are instantly and readily active in water. Liquids are also less likely to clog small detergent pump and feed lines and cake and corrode.

Detergents may be dosed and dispensed either manually or mechanically. It is imperative that dosing be accurate. A certain
amount of detergent must be placed into a certain amount of water, the water being of a particular temperature, in order for the detergent to be of maximum cleaning effectiveness. Too much detergent residue remaining on an item post rinsing can be pyrogenic and a danger to patients if not removed.

There are two primary detergent types utilized in sterile processing decontamination: 1) enzymatic detergents and, 2) high-alkaline detergents.

Enzymatic detergents contain organic enzymes specific for breaking down various bioagents such as proteins, lipids, and carbohydrates to aid in removal. Such detergents may contain only one particular enzyme or be multi-enzymatic. The three typical enzymes are: protease (for the breaking down of proteins), amylase (carbohydrates), and lipase (lipids or fats). It is recommended that, particularly for manual wash stations, that a multi-enzymatic detergent be utilized for maximum effectiveness.

Wash stations (particularly manual stations) should include water temperature monitoring as enzymatic detergents work optimally at specific temperatures. The ideal water temperature for most organic enzymes in terms of overall effectiveness is 140°F. Above this temperature, and the enzymes will be damaged. Enzymes typically become less active at temperatures below 109°F as well.

The higher alkaline detergents are utilized in, most typically, impingement mechanical washers. After the alkaline cleaning, a cycle of acidic detergent rinse typically occurs to neutralize the alkaline detergent. High-alkaline detergents are not compatible with aluminum, and other, easily degraded materials such as plastics, synthetics, or rubber materials. Aluminum sterilization containers should be run through a washer utilizing a neutral pH detergent. As always, see manufacturer's instruction set.
Cleaning Tips (Chobin, 97-98)

- Every surface area of an instrument should come into contact with cleaning solution
- All items bearing hinges should be opened to allow maximum surface exposure to cleaning agent and mechanical/manual action
- Multi-component items should be disassembled per manufacturer's instructions
- Larger sets should be first broken down into smaller sections to facilitate effectiveness of cleaning process
- Delicate items are to always be placed on top of heavier instrumentation
- Avoid the mixing together of various metal types as this can cause corrosion via electrolysis (e.g., do not mix anodized aluminum with copper or stainless steel)

Manual Cleaning
Manual cleaning is a two-fold procedure. It is utilized to decontaminate items prior to placement in either an ultrasonic washer or other mechanical unit. It is also the sole method of decontamination for many items which cannot be placed into a mechanical washer system (e.g., equipment with electronic components, moisture/heat sensitive items, etc).

For manual cleaning, the technician will most often rely upon soft-bristle brushes and clothes to remove soil. Abrasive implements are to be avoided due to possible damage inflicted on instrumentation and equipment.

Soak...Wash...Rinse...Dry--This is the process.

Ensure adequate detergent dispensing/dosage and water temperature. Water must be changed when the solution has become soiled and/or when the temperature drops below 110° F.
Mechanical Cleaning
There are two primary mechanical units most typically relied upon in sterile processing decontamination areas: 1) the ultrasonic washer and, 2) the mechanical washer-disinfector.

Ultrasonic washers are automated systems which operate via the principle of cavitation. Electronic transducers are utilized in a water and detergent solution which transmit sound waves throughout the washer chamber. The emitted sound waves create tiny bubbles which attach to items in the unit that then implode, pulling away soil and debris, which are sequestered by the detergent. Cavitation is this process.
There are several types of ultrasonic units in use. They can be single-chambered, multi-chambered, or be setup to processing cannulated and other items with lumens.

It is important that the correct detergent is selected for an ultrasonic unit (see manufacturer's instructions). Ideally this detergent should be low foaming, of a neutral pH, and having excellent surfactant properties (i.e., binds well with particular soil type to facilitate cleaning and removal of soil).

---

**Notes on Ultrasonic Cleaning:**

- ✔ As always, consult manufacturer's guidelines prior to use and for usage guidelines
- ✔ Water to be changed in unit when visibly soiled and between shifts
- ✔ The unit should be cleaned and disinfected daily (run a cycle with an empty load containing detergent, drain, then wipe down with alcohol or other disinfectant—consult unit manual for detailed and unit-specific instructions)
- ✔ Instrumentation should be placed such that all pertinent areas are exposed for effective cleaning
- ✔ Do not stack instrumentation or otherwise overload system
- ✔ Typically, ultrasonic cleaning is followed up with processing via mechanical washer-disinfector prior to being forwarded to assembly area for further processing as ultrasonic units do not provide for terminal disinfection
The Mechanical Washer-Disinfector
The washer-disinfector is the current *de facto* standard for mechanical washers in the modern sterile processing decontamination area.

Below are images of washer units by Getinge and Steris respectively.

[Getinge washer-disinfector](#)

[Steris unit](#)

*All vendor specific images used by permission.*

Washer-disinfector units provide for cycles of initial
rinse/preclean, cleaning, rinse, and disinfection. The washer-disinfector process, upon successful completion, provides for an end product safe to handle for further processing.

Each washer unit also provides, most typically, for various preset settings, e.g., delicate cycles, quick cycles, extended cycles, heavy soil cycles, etc. to adequately meet the processing needs of a decontamination department.

Washer systems may be configured as stand-alone units or as tunnel or conveyor-styled units (in which multiple loaded racks of instrumentation to be processed can flow through the machine in automated fashion). Stand-alone units and conveyor units are currently the preferred choice in hospital SPDs.

Initial individual pre-rinse and standard cleaning cycles of the total cycle setting utilize water temperatures at below 140° F and the final sanitizing cycle at above 180° F.

Another type of mechanical washer is also utilized in SPD decontamination frequently. This is the cart washer. Cart washers are large washer units in which are placed case carts and racks containing sterilization containers. Other alternatives to the cart washer are steam rooms in which such items are steamed via steam gun (often with included detergent) for cleaning and then disinfected by hand, and, alternatively, such items (with the exception of case carts) may be run through the washer-disinfector (pending of course appropriate detergents are used).
AERs (automated endoscopic reprocessors) are another type of “washer-disinfector” unit utilized frequently in decontamination and endoscopy departments for the cleaning and reprocessing of flexible endoscopes. Though such scopes must be cleaned manual prior to insertion into the AER, upon exit, the equipment is considered highly disinfected and available for point of use (POU) utilization.

Final Notes on Decontamination
Beyond the scope of this module (and course even) are specific criteria sets for the cleaning of specialized instrumentation such as robotic equipment, laparoscopic instrumentation, etc. Much of this will be necessarily learned on the job as there is in fact a “hands on” component that cannot be conveyed via this particular medium.

Also of great importance in the decontamination area of sterile processing is the issue of quality assurance and performance improvement. There are monitoring tools available for each process in the chain of decontamination in sterile processing. Enzymatic efficacy can be measured, sonic cavitation effectiveness, washer-disinfector temperatures measured and detergent efficacy in mechanical washers, just to name a few. These should be checked, preferably, each shift, but daily to ensure compliance to standard and quality metrics.

Biohazardous waste is also a concern to the sterile processing technician working in the decontamination area. Throughout a shift in decontamination, the technician is constantly affronted with infectious matter. The importance of PPE has already been discussed.
The SPD technician working in decontam may be exposed to general disposable items (which will be transported to municipal processing stations), infectious and hazardous waste (e.g., blood, body fluids) which must be red bagged and disposed of per federal regulation, and, possibly, radioactive materials (when this occurs, the radiology officer of the facility should be notified to advise and assist with handling and disposal).

“Sharps” (e.g., needles, drill bits, etc.) are also a hazard and, can oftentimes (and quite sadly) be found in trays sent to SPD for decontamination by nurses from OR and the floor. As such, great must be taken when sorting instrumentation. Dispose of all sharps in approved sharps containers.
Required Readings, Recommended Readings, and Other Resources

**Required Reading**
Module 10

**Recommended Reading**


**Recommended Links**
N/A
Module Assignments

Module 10 Assignments

1) Read the module in its entirety from cover to cover at least once.

2) Do a survey of the web for entries on surfactants and provide a 2-3 paragraph summary of your findings as relates to the module.

3) Look up the “TOSI” test and Steris “All Clean” test. In one paragraph for each item, describe the items and what they are used for as related to this module and the decontamination area more generally.

4) Independently, find 3 additional articles online related to the module and summarize (provide web link).

5) Find at least one online video on SPD decontamination. Summarize content and provide link to video content for verification.

6) Look up on Google or other search engine “Steris System One.” Ascertail the issue with the product, locate the FDA's most recent statements, and discuss in 3-5 paragraphs as it relates to decontamination and sterile processing more generally (hint: particular issue of patient safety). Bonus question: What is an approved (FDA approved) alternative to the Steris System One?

7) Complete the module quiz (posted online separately 3-5 days after posting of this module). Submit with above documents to info@centralsterileprocessing.net. In subject line, type “Module 5 Assignments.” In body of e-mail, submit full name.
END MODULE 10