

WET PACKS - PROACTIVE SOLUTIONS

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****This in-service has been Approved by the CBSPD, Inc. for 1 CEU.**

Steam sterilization is the most common form of sterilization used today in both hospitals and Ambulatory Surgery Centers. However, over the years many things have changed with steam sterilization and consequences have resulted.

When steam sterilizers were first approved, the type of packaging material used was muslin. Muslin was relatively easy to dry. The instrument sets were comprised of basic instruments and weighed about 16 pounds. This is how the sterilizer was tested by the manufacturer; to dry a 16 pound instrument set wrapped in muslin. However, as the years passed, healthcare changed to disposable wraps, first crepe paper, then plastic based wrap, then rigid containers.

With the change in larger, heavier sets (especially Orthopedic sets) and the newer wrapping materials, sterile processing departments have seen an increase in wet packs. Remember, the newer packaging materials, especially heavy duty wraps and containers, make drying the contents more difficult. Most rigid container systems recommend a minimum 30 minute dry time because of this fact.

Wet Packs - Wet packs represent one of the greatest problems in sterility maintenance. Both AORN and AAMI recommend against the use of an item that is wet or contains visible moisture inside the set even if it is inside a rigid container (ANSI /AAMI ST79; AORN 2009). Wet packs can be caused by a number of problems, including:

- Clogged drain lines
- Poor steam quality
- Improperly drained steam supply lines
- Incorrect loading of the sterilizer (e.g., items are packed too tightly on the cart or placed incorrectly on the cart)
- Incorrect packaging materials or methods
- Insufficient drying time
- Sets or trays that are too heavy
- Improper density of set/pack
- Incorrect configuration of instrument sets

- Use of incorrect tray liners or instrument protective devices
- Incorrect sterilizer installation (Perkins)
- The type of container being used (material, weight), design
- Non-compliance with environmental controls for the preparation and packaging area
- How packs/trays are handled after sterilization (allowed to cool completely? Placed on a cold surface?)
- The environmental conditions and location of the cool down area (e.g. location of air conditioning vents)

Whenever wet packs occur, a complete investigation of the causes must be conducted and corrective actions implemented. Some of the information to be collection includes:

- Date of wet pack(s)
- Time of day
- Load configuration (number of trays)
- Number and description of trays that were reported as wet
- Selected cycle time (gravity or dynamic air removal)
- Cycle temperature and exposure time
- Packaging material used for set(s) that were wet
- Type of containment device used (e.g. Mayo Tray, metal mesh basket)
- Person(s) who prepared/wrapped sets
- Inventory list for set (to consider set configuration and weight of set)

Wet Packs

So, what is a wet pack? Any pack which is still wet after sterilization and drying is considered wet. There are three possible scenarios;

- visible moisture on outside of packs;
- moisture inside pack (e.g. moist towel)

- visible water inside tray



Photo of wet pack after removal from the steam sterilizer

AAMI and AORN consider all of the above contaminated.

Most CS/SPDs are faced with heavy and/or multi-level sets, which make drying difficult. The use of containment systems (e.g. rigid containers and multi-level organizing trays) and heavy-duty wrapping materials can also impede drying. It is the responsibility of the facility to ensure that sets and other packaged items can be dried after sterilization in the sterilizers being used. This is part of product testing. After sterilization, the packages should be cooled, opened and inspected for evidence of moisture on the instruments or materials used inside the package such as a towel or visible water. None of these scenarios is acceptable.

What are some of the causes? The first reaction is to think there is a problem with the steam and that maybe the cause. However, it is important to understand that when room temperature metal instruments come in contact with hot steam, condensate will form. The colder the instruments and the more mass of metal, the greater the amount of condensate. Too much condensate may result in a wet pack at the completion of the drying cycle. If a problem is noted, check or adjust the following:

- Assembly of instruments in the set (are the instruments well distributed in the set, is there too much metal mass in the set?) Were high density items (e.g. weighted vaginal speculums) wrapped in absorbent material to help reduce condensate?
- How was the set packaged? Was the wrapper too large (traps condensate inside set)? Was the package taped too tightly (traps condensate inside package)?
 - Size of peel pouches for load contents (is there too much metal mass in the pouch?)
 - Basin packaging (are basins nested with non-linting absorbent material between the basins?)

- Loading techniques (consider reducing the metal mass in the load, are linen items on the top rack and metal items on the bottom rack?) Sterilizers should never be overloaded. There should be sufficient space between items to allow for steam to permeate around the package.
- **Linen packs should be placed on edge.** If sterilizing multiples of the same type (e.g. towel packs), you should be able to fit your fist between the packages; if not, they are loaded too tightly.
- **Metal items** - in a mixed load (linens and metal goods) metal items should be on bottom and peel packages and linens on top.
- **Rigid containers** - should be spaced about one inch apart from each other. Stacking should not be performed unless the container manufacturer gives specific information on this process. Place containers beneath other items since they produce condensate.
- **Solid Mayo trays** (including those with small holes) - must be placed on edge to permit condensate to fall off.
- **Mesh bottom baskets (wrapped)** - lay flat on sterilizer cart.
- **Peel packs** - should be placed on their edge in a peel pack separator or basket. If a basket is used, run your hand over the packages and they should move freely.
- **Basins and other items that could retain water** - place on their side (edge) so condensate can run out.
- Weight of trays - Steam sterilizers were validated to sterilize and dry 16 pound sets. When we exceed that weight, problems can develop in drying the excess condensate that forms. AAMI now requires that Orthopedic loader sets weight no more than 25 pounds including the container. While this will take some time for the loader companies to implement, we should restrict our sets to 25 pounds as well.
- Rigid containers - rigid containers add metal mass and weight to sets. Most container manufacturers recommend a 30 minute dry time to compensate for this. Some containers are made of plastic. Plastic is not as good at retaining heat as metal so the drying may not be as good in a plastic container as a metal one. What weight limit did your container manufacturer recommend; e.g. 16-25 pounds of instruments?
- Use of other materials on set: Sometimes departments want a rolled towel on the sets so they can easily pick up the stringer with instruments. However, it is very difficult to dry a rolled up towel; it forms too many layers. Use of non-absorbent wicking materials can also contribute. This includes using disposable wrap inside trays (this is also prohibited because you have placed twice the amount of packaging recommended), silicone mats (difficult to dry), etc.
- Steam quality - This needs to be evaluated by the Engineering Department
- Selection of cycle parameters (have you selected the correct sterilization cycle for the load contents, check with the medical device manufacturer?)
- Drying time (are you using the correct drying time cycle for the load contents, check with the medical device manufacturer, do you need to increase the time because of the amount of metal mass in the load?)

- Unloading and cooling (is the room temperature appropriate and there are no air-conditions or other cold-air vents close?)

Continue troubleshooting until the problem is solved. Wet packs should not be used but sent back to CS/SPD for reprocessing. Consider opening other packs in the questionable load to check for moisture and/or recalling all items from the load.

Removal of Items From the Sterilizer - Items/packs removed from the sterilizer **should be visibly dry**. If moisture is noted on top of the packages, this is probably due to condensate from the autoclave rack. Lining the autoclave cart with absorbent cloths usually resolves this. The cloths (blankets) need to be changed each shift.

Avoid directly touching items while hot. AAMI and AORN recommend that items remain, untouched, on the autoclave rack for a minimum of 30 minutes to two hours depending on the weight of the device. A peel package will be cooled in 30 minutes but an Orthopedic tray may require 2-4 hours. Never place hot items on cool surfaces; condensate will form. Allow to fully cool before handling. It takes practice and judgment to know when packs are cool enough to handle. There are now infrared thermometer guns to verify the temperature of packs without handling them. This permits knowing if the packs are cool enough without handling them, which can cause contamination. Most people release the packs when they reach ambient temperature (70-72 ° F.)



INFRARED THERMOMETER GUN TO DETERMINE TEMPERATURE OF PACKS

It is also important to remember that steam vapor remaining in packs can cause condensate to form so items should not be handled before cooled.

In Ambulatory Surgery Centers where autoclave racks are not usually used, this presents problems because the items need to be removed so another cycle can be run. In these circumstances, it is recommended that when the items are being removed; prepare a cart that is lined with bath blankets. Apply sterile gloves and carefully transfer the packages to the cart for cooling.

Cooling of Items - The old myth that the door of the steam sterilizer had to be cracked at the end of the cycle simply does not apply today. Items should be completely dry when the door is opened. This practice, while not contraindicated if the items are dry, will add additional time to the overall process time. If your department has the time, fine. Otherwise, the door should be opened and the cart removed for cooling at the end of the cycle. Items being cooled should be in a low traffic area with no air conditioners or other cold-air vents near-by. The actual time for cooling should be based on professional judgment, experience and the environmental conditions of the area.

Ability to Dry - AAMI puts the responsibility on the facility to demonstrate they can effectively dry their sets (wrapped or containers). Therefore, it is the responsibility of the facility to verify their ability to dry sets under facility conditions. Dry studies are performed as part of AAMI's Product Testing Protocol. To determine the effectiveness of the sterilization drying process, perform a series of dry tests. Document the results and retain on file to verify that drying effectiveness is being monitored. The density and weight of instrument trays affect drying capability. AAMI and AORN recommend that the weight of sets be determined by the ability of the staff to handle the set and the ability of the facility to dry the set at the completion of the steam sterilization cycle.

Dry tests are performed following these guidelines:

- Study the largest, heaviest, most dense trays.
- Sterilize the trays using the usual drying time.
- Allow the trays to cool, then open the sets (within one hour) and inspect for the following:
 - Moisture on the instruments which may appear as "dew".
 - Moist towels or silicone liners
 - Visible water inside container

If any of the above observations is noted, the set is to be considered not sterile. The following actions can be taken to address the issue:

- Assure that the load remains untouched for a minimum of thirty minutes to two hours depending on the metal mass contained in the sets/load, an AAMI

recommendation. Releasing sets while still warm after steam sterilization contributes to wet sets and tray contamination.

- Reconfigure the set. The placement of the instruments on the set (e.g. all the retractors in the same location) can affect drying effectiveness. Instruments distributed evenly on the sets enhance the drying process.

NOTE: Use of silicone mats increases drying time.

- Redesign the set by dividing a large set into two sets to facilitate drying.
- Promptly revise tray count sheets to reflect tray content or layout changes to ensure all CSP staff configure the trays in the same manner.

Conduct dry tests whenever instruments are added to trays to ensure the additional instrumentation does not adversely affect the drying process. Reconfigure or redesign sets if necessary.

If one wet pack is found, should the entire load be recalled? The problem is no one knows if the entire load was wet or only specific packs. It is in the best interest of patients to recall and reprocess the entire load.

Wet packs represent a major quality issue for the end user. It is essential that when wet packs are found, that a complete investigation be performed so that the cause of the problem is identified. Then steps should be taken (including changes in procedures, inservicing, etc) to correct the problem and prevent preventable recurrences.

References:

AAMI, *Comprehensive Guide to Steam Sterilization and Sterility Assurance in Healthcare Facilities. ST-79, 2008.*

Basics of Sterile Processing. Sterile Processing University, LLC, First Edition, 2006.

POST TEST QUESTIONS: WET PACKS

This in-service is Approved by the CBSPD for 1 CEU. Complete this post test and follow the directions at the end of the test for payment and results

1. The packaging material considered the easiest to dry is
 - A) rigid containers
 - B) muslin
 - C) polyolefin
 - D) peel pouch

2. Most rigid container manufacturers recommend a minimum dry time of
 - A) 10 minutes
 - B) 20 minutes
 - C) 30 minutes
 - D) 40 minutes

3. A wet pack
 - A) is not considered contaminated
 - B) only occurs with gravity displacement sterilization
 - C) only occurs when items are loaded wrong on the autoclave cart
 - D) is still wet after sterilization and drying

4. Which of the following would NOT contribute to a wet pack?
 - A) wrapper too large
 - B) Metal items placed over linen items on autoclave cart
 - C) Non-absorbent materials inside set
 - D) Wrapping high density items in a towel before placing on set

5. AAMI now recommends that Orthopedic loaner sets weight no more than
 - A) 15 pounds
 - B) 25 pounds
 - C) 35 pounds
 - D) 45 pounds

6. One of the recommended ways to resolve moisture found on the outside of packs is to:
 - A) use absorbent material to dry the pack
 - B) extend the dry cycle
 - C) change packaging materials
 - D) line the autoclave cart with absorbent materials

7. AAMI and AORN recommend that packs removed from a steam sterilizer should remain, untouched for how long?
 - A) 5 minutes to 30 minutes
 - B) 20 minutes to 45 minutes
 - C) 30 minutes to 2 hours
 - D) 45 minutes to 2 hours

8. What most affects the drying capability of sets?
 - A) density and weight of set
 - B) density and packaging material
 - C) packaging material and drying time
 - D) drying time and density

9. If one wet pack is identified the best action would be to
- A) reprocess the wet set
 - B) reprocess all items for the past 24 hours
 - C) reprocess all items processed in the affected sterilizer for the last shift
 - D) reprocess all items in the affected load
10. The best method to determine if packs are cool enough to release is
- A) touching the packs with an autoclave resistant glove.
 - B) touching the packs at regular intervals.
 - C) using an infrared thermometer gun.
 - D) waiting the maximum two hours.
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Directions for Payment and Results

This in-service = \$10

Re-do's = \$10 each

No refunds (all sales are FINAL), prices subject to change.

Payment is accepted in the form of a Credit Card, Facility Check, or Money Order only.
Sorry, no personal checks.

Please see the form on the following page.

Upon passing this in-service, your certificate will be mailed to you within 7-10 business days.

Please fill out the form below and submit it with your payment and the quiz to:

Sterile Processing University, 59 Allerton Road, Lebanon, NJ 08833.

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If you have any questions, please email heidi@spdceus.com

Thank you!