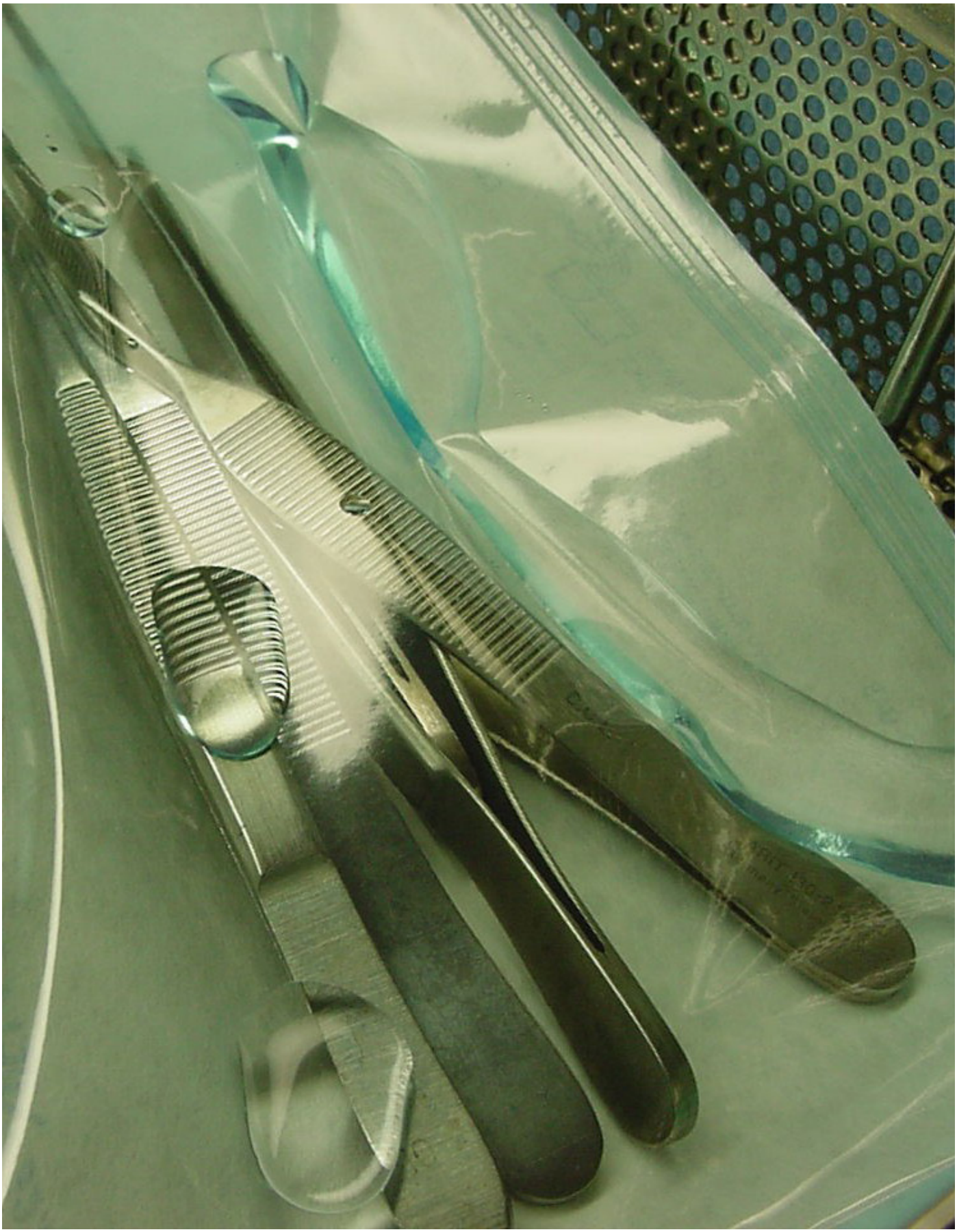

The Challenge of Wet Packs in Steam Sterilization

BY NATALIE LIND, CRCST, CHL, FCS, DIRECTOR OF EDUCATION—HSPA

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LEARNING OBJECTIVES

1. Define wet packs in steam sterilization
2. Discuss the dangers of wet packs and learn some of the more common causes
3. Identify resources to help navigate wet pack issues

At some time, most hospitals will encounter an issue with wet packs. At the least, wet packs create disruption, added effort, and time delays for both the Operating Room (OR) and Sterile Processing (SP) teams. More significantly, wet packs can also cause delays in patient care and increase the risk of infection. This lesson covers basic facts about wet packs and provides resources to aid in wet pack investigations.

Objective 1: Define wet packs in steam sterilization

A common definition of a wet pack is "a package or container that contains moisture after the sterilization process is completed." Moisture can be defined as any visible dampness, droplets or puddles of water on or inside a pack. (See **Figures 1** and **2**)

External moisture may be discovered in the SP work area when packages are removed from the sterilizer. Internal moisture is discovered when the packs are opened in the OR. A load is considered a wet load if visible moisture is present on or in several packages of that load.

Wet packs can occur due to a sterilizer malfunction or mishandling after the sterilization cycle is completed. Sterilized packs should not be handled until they are cooled. If warm packs are placed on a cool solid surface, condensation may form. **Figure 3** provides an example of condensation that can occur when a wet pack is placed on a metal surface before cooling.

Wet packs discovered in the Sterile Processing department (SPD) should not be released. They should be unpacked and reprocessed and follow-up should be done to determine the cause(s) and prevent it from recurring.

Objective 2: Discuss the dangers of wet packs and learn some of the more common causes

Wet packs are much more than just a nuisance. They pose a real danger to the patient. Moisture remaining on or inside a package after sterilization creates a pathway

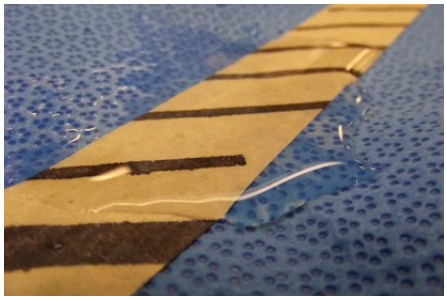

Figure 1

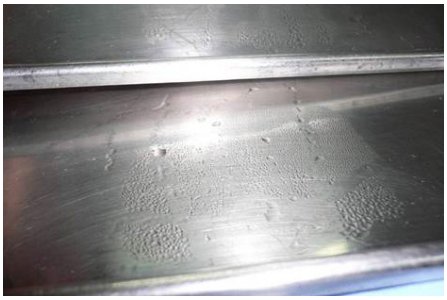

Figure 2

Figure 3

for microorganisms to travel from the outside of the sterilized package to its inside. Contamination is serious. If undetected, it can cause infection, putting the patient at risk.

If a wet pack is placed on a sterile field, it contaminates the sterile field. If a wet pack is detected, anything that the contents of the pack may have touched should be considered contaminated. This increases time, as the contaminated items and supplies must be removed and replaced. The delay can be extended if there is not an immediate replacement available, such as for one-of-a-kind trays or trays in use in other cases. This lost time can delay the procedure and be a source of frustration in a busy OR, but it can also extend the time a patient is under anesthesia or even cause a canceled case.

Wet packs can be caused by human error or mechanical and utility issues involving sterilizers. When a wet pack is discovered, it is important to identify the cause so further wet packs can be prevented.

While no one intentionally makes mistakes, there are times when errors are made that can cause wet packs. The SPD is a busy place with interruptions and tight time restraints that can lead to mistakes. Errors can also be the result of inadequate training, failure to keep abreast of change, pressure to cut corners or lack of awareness of current instructions for use (IFU).

Wet packs are most often the result of inadvertent errors during the assembly or sterilizer loading processes. For example, wet packs can be caused by:

- Not disassembling multipart instruments
- Incorrect application of packaging, including excess folds in wrapping material
- Assembling sets that are too dense to allow drying
- Placing wet instruments into the sterilizer
- Crowded placement of packs on the sterilizer rack
- Incorrect placement of packages (laying peel packs flat rather than organizing paper-to-plastic and standing them on edge in a rack)
- Placing metal containers above peel packs or wrapped items
- Neglecting to set solid trays or basins at an angle to prevent moisture from pooling

Wet packs can also be the result of mishandling packages after sterilization, such as the previous example of setting warm packs on cool surfaces. To prevent this, a handheld infrared or temperature-sensing device can be used to confirm that sterilized items have reached room temperature. It is important to remember that cooling time varies by package; it may be only 30 minutes for small sets or peel packs but can take two hours or longer for larger sets.

It may also be that wet packs are caused by mechanical and/or utility issues. Some of these causes include poor steam quality, malfunctioning steam traps, faulty sterilizer gauges, a clogged or partially clogged chamber drain, worn or deteriorated door gaskets, and boiler issues. As this demonstrates, there are several possible causes of wet packs. The actual cause must be determined to help ensure that the issue is resolved.

Objective 3: Identify resources to help navigate wet pack issues

Wet packs are a complex issue and identifying their cause can be difficult. This investigation is a multistep process and should be documented. Reviewing wet pack documentation is very useful, as it can help identify a pattern or root cause. For example, documentation may demonstrate that a particular set or specialty device is usually involved. It might also point to packages prepared by another department or processed by a specific shift or SP technician. Over time, wet pack records can even indicate a pattern of steam usage within the facility or changes in steam quality during a certain time of year.

Several resources are available to help navigate the problem of wet packs. Facilities Maintenance employees can

evaluate the boiler system as well as environmental factors, such as high humidity in SP work areas. There may be concerns with the quality of the boiler feed water or malfunctioning components in the steam delivery system. Company sterilizer technicians can be called to assess the equipment and perform maintenance or repair.

Staff education can be reviewed and re-training can occur. Make sure that procedures and training documents are clear and easy to read. Schedule education on wet pack prevention and the recall process in the event a wet load is discovered. This information should be included in all training and is a good candidate for periodic refresher in-services.

It is also a good practice to follow the current standards and guidelines, including ANSI/AAMI ST108:2023 *Water for the processing of medical devices*; ANSI/AAMI ST79:2017/(R)2022 *Comprehensive guide to steam sterilization and sterility assurance in health care facilities*, particularly Annex O, Moisture Assessment; and ISO 17665:2024 *Sterilization of health care products — Moist heat — Requirements for the development, validation and routine control of a sterilization process for medical devices.* In addition, the sterilizer operator's manual may also be helpful.

Conclusion

Wet loads occur, and when they do, the efforts of the SP team must be directed at resolving them and preventing future occurrences. It is important to do immediate follow-up to help ensure patient safety. This may include sequestering a single tray or load or, in the worst-case scenario, a recall of items already released for use.

Once the risk has been removed, an investigation should be conducted to identify the source of the wet packs. Mechanical issues are likely to require repair, and staff will need education to help ensure that the best practices are followed. P

RESOURCE

Healthcare Sterile Processing Association. (2023). *Sterile Processing Technical Manual*, ninth edition. Chicago: HSPA.

CRCST Self-Study Lesson Plan Quiz
The Challenge of Wet Packs in Steam Sterilization

Lesson No. CRCST 202 (Technical Continuing Education – TCE) · Lesson expires June 2027

1. Wet packs can:
- a. Put patients in danger
- b. Cause disruption and delays
- c. Create additional work
- d. All the above

2. All wet pack issues should be:
- a. Managed by the Facilities Maintenance department
- b. Handled immediately
- c. Addressed in the Operating Room
- d. Detected by Sterile Processing leaders

3. Additional information about wet packs can be found in:
- a. U.S. Food and Drug Administration (FDA) guidance documents
- b. ANSI/AAMI ST91, Annex N, Quality Assurance
- c. ANSI/AAMI ST79, Annex O, Moisture Assessment
- d. Centers for Disease Control and Prevention (CDC) Guidelines for Sterilization

4. Wet packs:
- a. Are an uncommon occurrence
- b. May be used if they are still warm
- c. Are always caused by a sterilizer malfunction
- d. Can be caused by human error

5. Assembly technicians can mistakenly contribute to wet packs by:
- a. Failing to disassemble multipart instruments
- b. Applying packaging materials incorrectly
- c. Assembling sets that are too dense
- d. All the above

6. Correct sterilizer loading practices include placing:
- a. Clean, wet instruments into the sterilizer
- b. Solid trays or basins at an angle for proper drainage
- c. Metal containers above wrapped items
- d. Stacked peel packs neatly on a tray

7. ANSI/AAMI ST108 provides information about:
- a. Wet packs
- b. Proper assembly of instruments for sterilization
- c. Chemical use
- d. Water quality

8. Internal moisture within a pack:
- a. Is identified in the OR
- b. Is identified in the Sterile Processing department (SPD)
- c. Causes the sterilizer to alarm or abort
- d. Will usually dry before the start of the case

9. An example of a mechanical issue that could cause a wet pack is:
- a. Poor placement of packs
- b. Excessively wet instruments
- c. A malfunctioning door gasket
- d. An overcrowded sterilizer chamber

10. After sterilization, trays should not be handled until:
- a. The humidity in the storage area is below 20%
- b. The moisture has time to evaporate
- c. They are cool
- d. They are requested for use

11. If a wet pack is placed on a sterile field, it:
- a. Must be promptly dried with a non-linting towel
- b. Contaminates the sterile field
- c. Can result in frustration but rarely causes a surgical delay
- d. Is not considered problematic for common sets

12. A handheld infrared device can be used to confirm that sterilized items are dry.
- a. True
- b. False

13. Determining the cause of wet packs is:
- a. A simple, straightforward process
- b. Not important as long as the incident is corrected at the time
- c. The sole responsibility of the manager or most senior instrument technician
- d. None of the above

14. Wet packs can be identified by:
- a. External or internal moisture
- b. Excessive heat
- c. Indicator failure
- d. Instrument corrosion

15. Wet pack documentation is:
- a. Useful for identifying patterns and root causes
- b. Only needed for repeat occurrences
- c. Helpful for making a case against problematic employees
- d. All the above

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