

Wet Packs: Improved Communication Leads to Improved Response Time

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Almost every Central Supply sterilization operation will experience the occasional wet pack—that is, moisture remaining after completion of the sterilization and cooling cycles. When a wet pack occurs, the negative impact ripples beyond the Central Supply operation all the way to the operating room (OR) and can delay a procedure. There are several possible causes of wet packs. Finding and correcting the problem involves root cause analysis—a trial and error process that takes precious time. As in many areas of medical technology, from adverse event investigations to routine equipment maintenance, using descriptive words that everybody is familiar with helps define and expedite the process.

Causes of Wet Packs

Steam sterilization is a condensation process to heat up the load to the selected temperature. A 25-pound tray generates about 12 ounces of water¹ normally handled by the sterilizer lower plumbing system and the dry phase. With good quality steam (at least 97% dry steam), sterilizers working at manufacturer specifications (vacuum depths and rate are very important for drying loads), and good loading practices, loads should come out dry with no more than 30 minutes dry time.

There are three potential sources for wet packs in steam sterilization. The steam supply connected to the Central Supply sterilizer accounts for about 60% of all wet packs. A slug of water entering the sterilizer during the initial phase of the sterilization cycle is but one example. Sterilizer performance accounts for 30% of wet pack incidents. For example, a drain valve may be faulty. Finally, improper wrapping and loading of instrument trays or basin sets is responsible for about 10% of incidents.

All three sources require investigation and each must be systematically eliminated as a possible cause.

Internal and External Communications

The term “wet pack” does little to communicate the problem to those investigating and correcting the issue,

much as “broken” means little to a biomedical equipment technician troubleshooting a malfunctioning infusion pump. Central Supply managers must view “wet pack” situations in the same way investigators view details at a crime scene. Using consistent terminology to describe details to facility engineers and outside sterilizer repair services helps shorten the time required for root cause analysis and corrective action. The following terms can effectively communicate and define wet pack problems (vacuum cycles only).

Beads, Puddles, and Lakes

One of the most common wet pack events is visible water on the outside of non-woven, water-repellant wrap material. Steam vapor easily penetrates this material but condensate does not. Where might this water come from? Water, external to wrapped trays, can implicate the steam supply (the initial slug of water). The sterilizer itself might have been compromised by a leaking steam-to-chamber solenoid valve or a crack in the chamber wall. Or improper loading techniques could be at fault (low spots in the wrap might cause water to collect from metal loads above). Often, Central Supply employs workarounds to compensate for beads, puddles, and lakes—for example, cracking chamber doors after cycles for timed



Beads of moisture upon completion of the sterilization and cooling cycles can indicate a wet pack.

periods and pre-heating loads inside the chamber. These workarounds mask underlying issues.

Moisture Inside Trays or Basin Sets

Usually found just prior to surgery, these wet packs are perhaps the most troublesome. Visible moisture means rejecting the tray and reprocessing. Although visible moisture is easy to identify, determining the degree of dampness in wicking material is problematic because individuals' assessments of dampness is highly subjective. Fortunately, there is a scientific method to evaluate dampness of wicking material inside trays:

1. Weigh the wicking towel used inside the tray prior to assembling the tray (gram scale recommended).
2. Run the tray in a vacuum cycle with little or no dry time in an otherwise empty chamber.
3. Remove the tray immediately and then remove the wicking towel.
4. Shake it vigorously to remove the residual vapor.
5. Weigh it again.
6. The percentage weight gain is the moisture content gained.

The weighing method is objective and eliminates disputes based on subjective opinions. It leaves investigators free to ask the more important questions: Where did the visible moisture come from and what can be done about it?

Visible moisture can be caused by heavy metal mass inside the tray, coupled with questionable steam quality. Reducing the total weight of trays to 25 pounds or less helps reduce the amount of condensate created (See ANSI/AAMI ST79:2006—*Comprehensive Guide to steam sterilization and sterility assurance in health care facilities* and ANSI/AAMI ST77:2006—*Containment devices for reusable medical device sterilization*). As an added benefit, a lower tray weight reduces stress on staff. Allowing loads to cool to room temperature after a sterilization cycle is

recommended and also helps avoid visible moisture by allowing the heated vapor inside to dissipate naturally.

For wrapped instrument trays, ANSI/AAMI ST8—*Hospital steam sterilizers*, allows for a 20% weight gain for the wicking towel, but typically, the percentage weight gain of wicking material should be less than 5% with visible moisture not acceptable. Additionally, moisture found in basin sets can be caused by too many layers of non-woven wrap, improper drainage positions of bowls or basins, inadequate wicking, or improper loading of the sterilizer load car. The aforementioned weighing technique can be used for the wicking material used in basin sets to verify moisture content. Finally, plastic containers and inserts do not provide the latent heat of metal and therefore do not aid the drying processes.

Conclusion

Effectively and succinctly communicating wet pack problems reduces frustration for all involved and shortens root cause analysis and corrective action time. Is moisture sitting on the outside of the wrap material? Is visible moisture inside heavy trays? Is the wet load only happening in basin sets? Since steam quality connected to Central Supply sterilizers can vary daily, even hour to hour, it is essential that Central Supply managers, like crime scene investigators, describe exactly what they see to expedite and facilitate corrective action. ■

Reference

1. Deacon W. "What is steam quality: Why is it important to the cs department?" Thermo-Diagnostics, Sept. 2008. Available at http://www.thermo-diagnostics.com/files/Sterile_Steam_Quality.pdf.

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