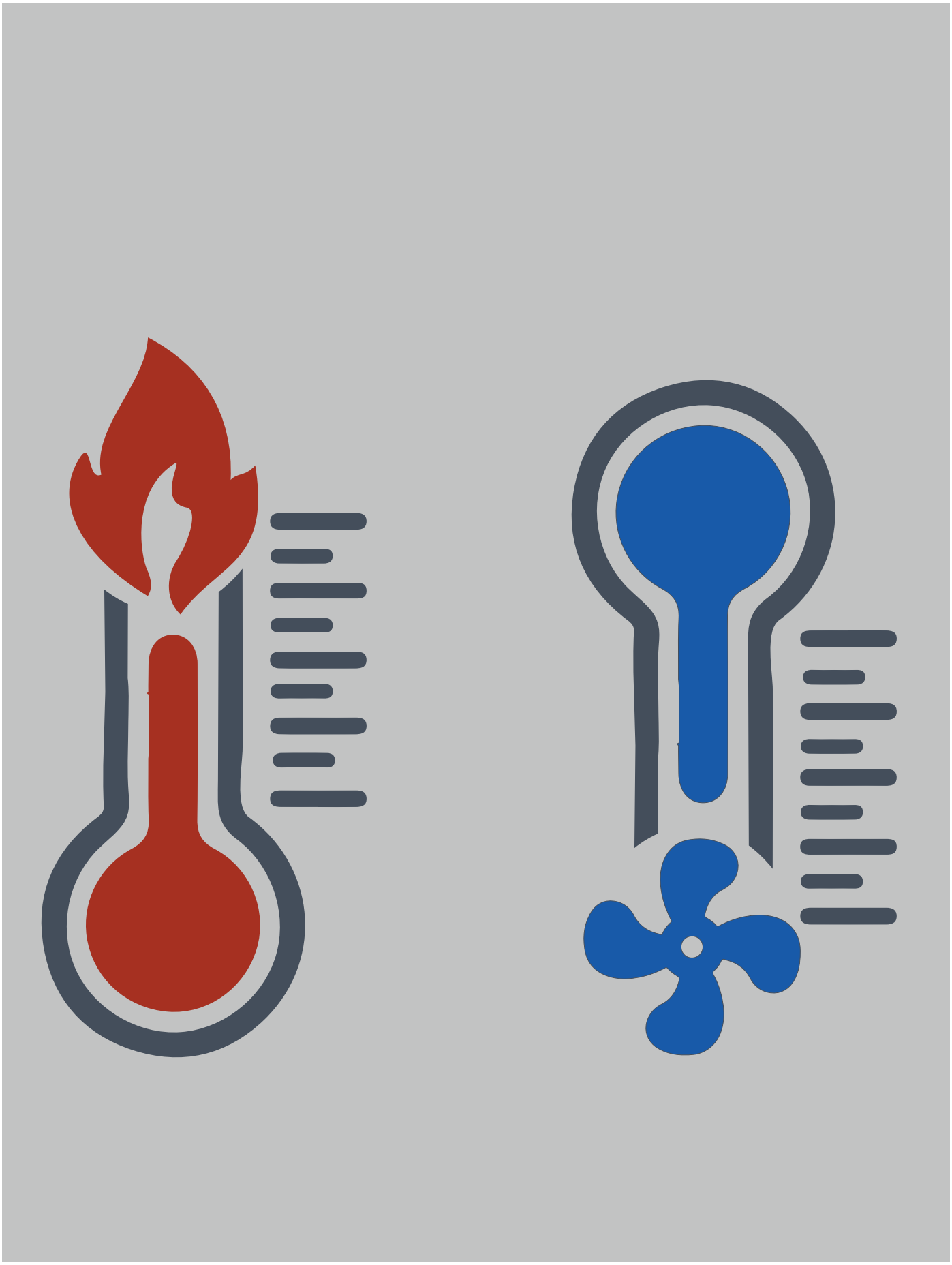

Read the Room: Detecting Environmental and HVAC Clues in SPDs

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LEARNING OBJECTIVES

1. Recognize how environmental changes in the Sterile Processing department can affect sterility, even when sterilization parameters and indicators are within acceptable ranges
2. Understand how environmental conditions can affect equipment performance and employee safety
3. Identify appropriate immediate actions Sterile Processing technicians can take to protect instruments and packaging when environmental conditions become unstable

Many things in the Sterile Processing department (SPD) can go wrong quickly, and not all of them involve instruments, washers or sterilizers. Sometimes the problem is the space itself: the temperature feels off, the air feels heavy or stale, doors operate differently, or something does not feel "right." Those early clues matter because environmental problems often begin quietly but can quickly affect sterility, equipment performance, and staff safety.

This lesson addresses how environmental changes can affect SPD operations, highlights warning signs of environmental and heating, ventilation and air conditioning (HVAC) issues and identifies actions that Sterile Processing (SP) technicians can take to promptly and appropriately address concerns.

Objective 1: Recognize how environmental changes in the Sterile Processing department can affect sterility, even when sterilization parameters and indicators are within acceptable ranges

Many environmental issues never trigger alarms. Instead, they may surface as moisture, physical discomfort, odd equipment behavior, or subtle changes that are easy to overlook during a busy shift.

The air in the SPD is constantly being heated, cooled, filtered and moved. Temperature, humidity, airflow direction, air circulation, and pressure all work together to protect the clean and sterile items in the department. These systems are designed to support safe processing, but only when

conditions remain stable. When one part of that system shifts, the risk does not always appear immediately on a monitor. More often, it shows up in the work itself—on trays, wrappers, shelves, in equipment performance, or how the space feels to the people working in it. Because SP technicians spend their entire shift in this environment, they are often the first to notice when something changes.

One of the most common environmental concerns in SPDs is humidity resulting from extreme temperature fluctuations (guidelines recommend maintaining temperatures between 65°F and 78°F and relative humidity not exceeding 60%). Warm air can hold a significant amount of moisture, but when it cools too quickly, it loses its ability to retain moisture. The air reaches its saturation point, and the excess moisture must go somewhere. In SPDs, it frequently settles on the coolest nearby surfaces, such as stainless steel trays, case carts, shelving, and wrapped sets. Such an occurrence often occurs during abrupt weather changes or during HVAC cycling.

An SPD may feel warm earlier in the shift and then noticeably cooler later. Shortly after, technicians may notice trays feeling damp after cooling, wrappers losing their crispness, or condensation forming on shelving near vents or exterior walls. Sterilization parameters were correct, and indicators passed, yet moisture is present.

Alternatively, too-dry air can also cause problems, especially during colder months. When excessively dry air is present, technicians may notice frequent static shocks when touching carts or trays, wrappers cracking or curling, or labels peeling more easily.

Airflow direction plays a major role in how both moisture and contamination move through an SPD. Decontamination areas are designed to pull air inward, while clean assembly and sterile storage areas are designed to push clean air outward. When airflow is not moving as intended, contaminated or moisture-laden air can migrate into spaces that are meant to stay clean and dry.

Technicians often recognize airflow issues without instruments or meters. Doors may feel more difficult to open or close, air may blow unexpectedly across work surfaces, or odors typically limited to decontamination may be noticeable in clean assembly.

Even when airflow direction is technically correct, it is imperative that air can still circulate evenly and be refreshed. Poor air circulation allows heat and moisture to linger in certain locations, creating localized problems. This is why one shelf, cart, or corner of a room may show dampness while the rest of the SPD appears unaffected. A common example is a shelf that consistently has damp trays while others do not. A technician might notice that a room suddenly feels stuffy, warmer or more humid after carts are rearranged or equipment is placed along walls—signs that airflow and ventilation are disrupted or blocked.

Objective 2: Understand how environmental conditions can affect equipment performance and employee safety

Environmental conditions also affect equipment performance and longevity. Equipment, such as sterilizers, washers, ultrasonic cleaners, printers, and monitoring devices, are designed to operate within specific temperature and humidity ranges. When those ranges are exceeded, equipment may function unpredictably, trigger unexplained alarms, or experience premature wear. For example, a sterilizer may alarm repeatedly during a heat wave, or indicator results may become inconsistent during periods of high humidity.

Temperature also directly affects staff performance and safety. Excessive heat increases fatigue, dehydration and the risk of errors. Conversely, too-cold conditions reduce dexterity and make detailed tasks more difficult. Personal protective equipment becomes more difficult to tolerate in extreme temperatures. If decontamination staff are sweating excessively, feeling lightheaded, or struggling to maintain focus, for example, or if clean assembly technicians are stiff and uncomfortable due to cold conditions, those observations matter. Temperature and humidity levels should be routinely monitored and documented; confirmed or suspected fluctuations should be communicated to SP leaders and others as appropriate (e.g., Facilities Maintenance).

Abnormal noises can provide other important environmental clues and must never be ignored. Changes in what technicians hear, such as whistling near vents, rattling above ceilings, banging when systems cycle, or airflow that suddenly becomes louder or weaker, often signal pressure imbalance, airflow restriction, or HVAC strain. These sounds can mean the system is working harder than normal, or that air is being forced through spaces where it typically does not travel. A technician may notice a high-pitched whistle near a clean assembly vent that was not present earlier in the shift or a loud rush of air when doors open and close.

Objective 3: Identify appropriate actions Sterile Processing technicians can take to protect instruments and packaging when environmental conditions become unstable

When environmental changes are detected or suspected, the primary responsibility of SP technicians is to protect products and escalate concerns appropriately.

If temperature or humidity falls outside the acceptable range, recently sterilized items should be relocated to a more temperature-stable area rather than remaining near exterior walls or supply vents. *Note: Ensure departmental policy allows for this relocation.* Trays can be staged away from draft-prone locations and allowed to cool in more controlled zones. Keeping items covered when possible helps reduce exposure while conditions stabilize. Consolidating trays in a controlled area rather than spreading them throughout the department can also limit uneven cooling. Items showing visible condensation should be held and reprocessed.

A simple and effective way to help confirm airflow direction and imbalance is the tissue test. Holding a lightweight tissue or paper near a doorway can show the direction air is moving. If the tissue moves out of a decontamination area rather than inward, or into clean areas when it should be pushing air outward, it provides additional confirmation that airflow may be compromised and that concerns should be escalated.

When airflow concerns are suspected or confirmed, technicians can reduce risk by adjusting how work is staged. Exposed trays can be moved away from doorways and transition zones, where airflow is most unstable. Traffic between decontamination and clean areas should be minimized to reduce pressure disruption. Case carts and equipment should not be parked in a way that blocks air movement. It is also critical to avoid overcrowding shelves, keeping vents clear, and spacing items so air can move around them freely. Additionally, large loads of hot trays should not be placed in areas already showing signs of stress. Small changes in staging can make a significant difference while larger environmental issues are being addressed.

Another HVAC-related concern that often goes unnoticed involves blocked or compromised air supply and return vents. Vents and returns should be fully visible and unobstructed; however, it is not uncommon to find them partially covered by carts, shelving, trash bins, linen hampers, or even temporary barriers during construction or maintenance. Simply repositioning carts or shelves away from vents may help stabilize conditions while the issue is escalated. Remember: When air cannot enter or exit a space properly, pressure balance and circulation are affected, even if the HVAC system itself is functioning. If conditions begin to feel unstable or unsafe, consider briefly pausing work until leadership and the Facilities Maintenance team are notified and concerns are explored and addressed.

When processing equipment begins functioning abnormally, technicians should document their observations and promptly communicate any environmental or equipment concerns. Not every alarm indicates mechanical failure; sometimes, the environment is the root cause.

For temperature extremes, rotating tasks, adjusting workflows when possible, and escalating concerns early help protect technicians and the quality of work. Staff discomfort is not simply a comfort issue; it is also a safety concern for employees and patients. *Note: Employees may be tempted to leave sterilizer doors open to warm the department; however, this practice must be avoided because it releases heat and moisture into the environment, destabilizing temperature, humidity and airflow. For example, leaving multiple sterilizer doors open during a slow shift can raise room temperature and humidity to the point where condensation forms on nearby shelves and carts. Sterilizer doors should remain closed unless actively loading or unloading. Again, temperature concerns should always be escalated so they can be addressed without compromising the environment. Leaving doors open also places unnecessary strain on the sterilizer itself, as the unit repeatedly reheats the jacket and prepares for the next cycle, which can increase start-up times and contribute to avoidable equipment wear.*

When abnormal noises are heard, they must not be ignored because such changes often occur before visual signs appear. Noting when the noise started, where it is loudest, and whether it coincides with temperature changes or door movement can provide valuable early warning. Often, such incidents occur during periods of environmental stress. On a hot summer afternoon, for example, outdoor air entering the building may be heavy with moisture while the HVAC system is under increased demand. As the system struggles to balance temperature, pressure and airflow, technicians may first hear stronger airflow or unfamiliar noises, or notice doors opening and closing differently. Shortly thereafter, airflow may feel uneven, staff may become uncomfortable, equipment

performance may fluctuate, and moisture may begin appearing on trays or shelving, as air cools faster than moisture can be removed.

In moments like these, technicians can stop trays from moving forward, relocate items to more stable areas, reduce unnecessary handling, adjust staging to support airflow, avoid releasing additional heat or moisture into the room, and communicate observations. Such actions help protect instruments while the leadership, Infection Prevention, and Facilities teams investigate and restore environmental control. Additionally, pass-through windows can be kept closed, and traffic can be reduced.

Conclusion

Whenever environmental changes are noticed, early response matters. Once moisture becomes visible, airflow is disrupted or staff discomfort increases, environmental conditions are often already outside ideal ranges. Recognizing changes early, protecting products, stabilizing the space, and escalating concerns through established procedures are essential actions that strengthen technician practice and support patient safety.

While SP technicians are not expected to fix HVAC systems or diagnose mechanical failures, they are expected to notice signs of malfunction, act appropriately, and communicate clearly. Doing so will help ensure that clean instruments stay clean, sterile items stay sterile, equipment performs reliably, and technicians can work safely and comfortably. P

CRCST Self-Study Lesson Plan Quiz: Read the Room: Detecting Environmental and HVAC Clues in SPDs

Lesson No. CRCST 209 (Technical Continuing Education – TCE) · Lesson expires August 2029

1. Many environmental issues in the Sterile Processing department (SPD):
   a. Do not have a direct effect on device or package sterility
   b. Do not require immediate attention or intervention
   c. Do not trigger alarms
   d. Can be addressed by SP technicians

2. Decontamination areas are designed to:
   a. Pull air inward (negative pressure)
   b. Push air outward
   c. Withstand intense temperature and humidity fluctuations
   d. Automatically correct airflow imbalances

3. Clean assembly and sterile storage areas are designed to:
   a. Maintain negative air pressure
   b. Push clean air outward (positive pressure)
   c. Remain very cold and dry to maintain employee comfort
   d. None of the above

4. Most technicians can recognize airflow issues only with instruments or meters.
   a. True
   b. False

5. Equipment used in the SPD:
   a. Is rarely affected by excessive temperature and humidity ranges
   b. Is designed to operate within specific temperature/humidity ranges
   c. Operate more efficiently in hot, moist environments
   d. Will require immediate servicing by the manufacturer if environmental conditions fall outside normal range

6. If temperature or humidity falls outside the acceptable range, recently sterilized items:
   a. Should not be moved because it will increase contamination risks
   b. Should be relocated to a more temperature-stable area
   c. Should be moved near supply vents
   d. Will be unaffected if other sterility assurance processes were performed

7. Abnormal whistling near vents, rattling above ceilings and banging when systems cycle can signal:
   a. Pressure imbalance
   b. Airflow restriction
   c. HVAC strain
   d. All the above

8. During times of high humidity:
   a. Indicator results may become inconsistent
   b. Steam sterilizers will emit an alarm
   c. Sterilizer vents will clog
   d. Staff can remove some PPE in clean areas

9. What is the technician's primary responsibility when environmental conditions are abnormal?
   a. Performing minor HVAC repairs
   b. Adjusting air handling systems
   c. Documenting suspected changes and notifying the manager when changes are visible
   d. Protecting products and escalating concerns appropriately

10. The tissue test:
   a. Is a simple, effective way to confirm airflow direction
   b. Should only be used in sterile storage areas
   c. Is no longer acceptable for confirming airflow direction or imbalance
   d. Should only be performed by the lead technician or manager

11. Items showing visible condensation:
   a. Are usually considered safe for use
   b. Should be reprocessed
   c. Should be repackaged but not necessarily reprocessed
   d. Should be inspected by the manager to ensure they are safe for use or storage

12. Leaving sterilizer doors open to keep employees warm:
   a. Is acceptable during a slow shift
   b. Is only acceptable when temperatures fall below the acceptable limit
   c. Should be avoided because it releases heat and moisture into the environment
   d. Is acceptable when the practice is written in facility policy

13. When air cannot enter or exit a space properly, pressure balance and circulation are affected:
   a. Even if the HVAC system is functioning
   b. Only if the air handler system is malfunctioning
   c. If humidity and temperature are also out of range
   d. None of the above

14. Alarms on processing equipment:
   a. Only indicate mechanical failures
   b. Can be triggered by environmental changes
   c. Can be disregarded if equipment is well-maintained
   d. Require manufacturer intervention

15. Airflow is most unstable:
   a. Near doorways and transition areas
   b. Near decontamination sinks
   c. In heavily-staffed areas
   d. During cold weather

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