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Monitoring and Responding to Temperature and Humidity Extremes in the Operating Room- Best Practice Recommendations

Purpose

To provide direction on:

- Daily monitoring and documentation of the temperature and relative humidity in operating rooms (OR) and sterile supply.
- Actions to be taken if the recommended humidity is exceeded.

Note: This guidance may also be used in sterile supply areas outside of both the OR and medical device reprocessing areas (e.g. Ambulatory Care (GI Endoscopy, Minor Surgery) other advanced procedural areas, interventional radiology, etc.).

For issues in the medical device reprocessing department, refer to [Evaluation and Response to Incidents of Temperature and Humidity Extremes in the Medical Devices Reprocessing Area, Sterile Storage Area, and Decontamination Area](#).

Elements

1. The facility shall monitor and document relative humidity levels and temperature at least daily either manually or through the Building Management System (BMS).

Relative humidity measures water vapour but is relative to the temperature of the air. It is expressed as the amount of water vapour in the air as a percentage of the total amount that could be held at its current temperature. Current guidelines recommend the following:

- Relative humidity levels of 30 to 60%
AND
- Temperature between 20°C to 23°C within the OR and other areas with sterile storage; and between 22°C to 24°C inside sterile storage areas.

2. Table 1 outlines recommended actions based on **high** relative humidity and temperature.
 - The time interval of concern depends on the circumstances of a particular event.
 - Consider the larger picture beyond relative humidity, temperature and time parameters when deciding next steps (e.g. staff/physician discomfort, wet packs, visible condensation, etc.).
 - Once relative humidity exceeds 60% and temperature exceeds 24°C, recommended actions in the table below should be followed as a proactive measure.
 - Relative humidity exceeding 70% should be treated as an event that needs an immediate appropriate response. If packages are exposed to these conditions for prolonged periods, sterility might be compromised.

Table 1: Level of Concern and Associated Actions for **High** Humidity

Operating Rooms: Temperature should be maintained between 20°C and 23°C . Relative humidity should be maintained between 30% and 60% . The time interval of concern depends on the circumstances of a particular event.	
Level 1 (Mild) Relative humidity 61% to 65% [intermittent over two hours]	<ul style="list-style-type: none"> There is a temperature or humidity concern identified by either Facilities Maintenance or the OR: <ul style="list-style-type: none"> OR notifies Facilities Maintenance or Facilities Maintenance notifies OR Facilities Maintenance verifies the relative humidity and temperature. Once verified, Facilities Maintenance will monitor to assess if the relative humidity or temperature continue to rise and begin corrective actions. OR staff notify OR leadership of situation. OR staff monitor operating conditions within the ORs and report any staff comfort concerns to OR leadership. Workplace incident report should also be submitted. Facilities Maintenance to report status updates at regular intervals to OR leadership and Facilities Maintenance leadership, until the situation is under control. OR leadership reports possible issue to site leadership. Multi-disciplinary team may be assembled (recommended).
Level 2 (Moderate) If greater than 65% and less than 70% relative humidity [extended periods less than four hours]	<ul style="list-style-type: none"> OR staff notifies OR leadership and Facilities Maintenance. Facilities Maintenance to take corrective actions to control relative humidity and temperature. Facilities Maintenance to advise OR leadership prior to increasing the room temperature to control relative humidity. Facilities Maintenance to advise OR leadership if either relative humidity or temperature cannot be controlled below 65% and 24°C. OR staff monitor if humidity is affecting either OR operations or staff comfort and reports changes to OR leadership. Workplace incident report should also be submitted. OR leadership reports possible issue to site leadership and multi-disciplinary team is assembled
Level 3 (Severe) Relative humidity exceeds 70% [for more than four hours]	<ul style="list-style-type: none"> Facilities Maintenance notifies OR leadership that the relative humidity has reached 70% for greater than greater 4 hours. Facilities Maintenance continues to work towards lowering relative humidity or temperature to acceptable levels. OR staff continue to monitor staff comfort level in OR and report changes to OR leadership. A workplace incident report should also be submitted. OR leadership and multi-disciplinary team meet to discuss: <ul style="list-style-type: none"> Staff comfort concerns. Staff safety issue/ability to maintain sterility during surgery. Risk of contamination to sterile supply. Appropriate actions. Site/OR leadership advises zone leadership. If the standard methods of reducing relative humidity are not achieving the desired effect, use of a dehumidifier may be considered. See dehumidifier usage guide.

Dehumidifier Usage Guide

Use of a dehumidifier may be considered to reduce humidity extremes if an OR is the impacted area, and continued operation is required to support ongoing patient care.

The dehumidifier shall be:

- Dedicated to the area.
- Strategically placed to minimize air turbulence in the sterile field area (e.g. in the hallway).
- Cleaned and disinfected after each use.
- Stored covered in the surgical area.

To prevent organism growth, two milliliters (2mL) of bleach shall be added to the reservoir for every one litre (1L) of water the reservoir can hold when:

- The dehumidifier drain cannot be directed to a utility sink (utility sinks are different from hand hygiene sinks), or
- The dehumidifier reservoir is emptied (dehumidifiers shall be checked every two hours and emptied as required).

Sites shall document the following information:

- Date.
 - Time.
 - Initials of staff member who emptied the reservoir tank and changed the bleach solution.
 - Sites determine location of forms.
3. Occasional incidents when the relative humidity rises to between 60% and 70% are generally not considered cause for concern for the safety of medical devices. However, frequent incidents of this nature indicate that HVAC systems may need to be adjusted or improved.
 4. A multidisciplinary team should be assembled to coordinate further notifications and to evaluate corrective actions. The team may include (but is not limited to):
 - Surgery Site Chief Perioperative Medical Director or designate.
 - Director, Clinical Operations (Perioperative, Medical Device Reprocessing).
 - Manager Clinical Operations (Perioperative, Medical Device Reprocessing).
 - Facilities Maintenance.
 - Infection Prevention and Control (IPAC).
 - IPAC Medical Director.
 - Workplace Health and Safety (WHS).
 - Other program representatives as deemed necessary.

5. In some instances, relative humidity may be **lower** than the acceptable (e.g. less than 30%) – see Table 2.
 - Follow a similar process; also consider relative humidity level, timelines, and other specific circumstances.
 - Assemble a multi-disciplinary team to coordinate further notifications and to evaluate possible corrective actions.

Table 2: Level of Concern and Associated Actions for **Low** Humidity

Level 1 (Mild) Relative humidity 25%–30% (intermittent)	<ul style="list-style-type: none"> • OR staff or Facilities Maintenance identifies low humidity. • Facilities Maintenance verifies readings and begins monitoring. • OR staff notify OR leadership and IPAC. • Monitor for staff comfort concerns (e.g., dry eyes, skin irritation). • Submit Workplace Incident Report if discomfort is reported. • Facilities Maintenance provides regular updates until resolved.
Level 2 (Moderate) Relative humidity 20%–25% (sustained for up to 4 hours)	<ul style="list-style-type: none"> • OR staff notify OR leadership, IPAC, and Facilities Maintenance initiates corrective actions (e.g., humidification adjustments). • OR staff monitor for impact on sterile supplies and staff comfort. • OR leadership escalates to site leadership if unresolved. • Multi-disciplinary team assembled if issue persists.
Level 3 (Severe) Relative humidity <20% (lasting more than 4 hours)	<ul style="list-style-type: none"> • Facilities Maintenance notifies OR leadership, IPAC, and site leadership. • Immediate evaluation of risk to sterility and staff safety. • OR staff monitor for signs of compromised sterile packaging or equipment issues. • Multi-disciplinary team convenes to assess operational impact and determine next steps. • Consider use of portable humidifiers if safe and appropriate. • Document all actions and submit incident reports.

References

1. Canadian medical device reprocessing in all health care settings. (Canadian Standards Association) (CAN/CSA Z314:23)
2. [BC Best Practices for EV Cleaning in Healthcare Settings](#)
3. [Perioperative Cleaning and Disinfection Procedure](#)

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