

Thermoregulation Guidelines for the Care of the Pediatric Patient

Approved by: OR Directors Collaborative, Surgical Professional Practice Council, SJCH Quality Council, Medical Executive Council, and Medical Staff Advisory Council

Background:

Hypothermia is generally agreed on as a temperature less than 36 degrees Celsius/96.8 degrees Fahrenheit and even mild hypothermia is associated with increases in length of stay, surgical site infections, intraoperative blood loss, need for intraoperative blood products, and intensive care unit admissions. A pediatric patient can experience hypothermia preoperatively, intra-operatively, post-operatively, when undergoing procedures in Interventional Radiology or other radiology departments, and when traveling between departments. Patients at greatest risk for experiencing hypothermia include but are not limited to infants and neonates, patients less than 10kg, patients undergoing long procedures or surgeries with large surface areas exposed, patients with metabolic or thermoregulation disorders, and patients with a higher American Society of Anesthesiologist score. The purpose of these guidelines are to prevent and reduce the number of patients that experience inadvertent or unintended hypothermia.

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Revision date: 2/14/2019

Recommendations:

1. Preoperative Temperature Management

- Measure patient's temperature upon arrival to the preoperative area. If patient has a temperature of less than 36 degrees Celsius/96.8 degrees Fahrenheit, the patients temperature should be checked every 15 minutes until patient reaches 36 degrees Celsius/96.8 degrees Fahrenheit or greater.
- Notify anesthesia if unable to warm patient to 36 degrees Celsius/96.8 degrees Fahrenheit or greater.
- Bundle children less than 6 months of age and have a hat in place to prevent heat loss.
- Offer warm blankets to all patients, and cover patients prior to transport.
- Initiate passive and/or active warming measures for all patients 2 years and younger and patients at high risk for hypothermia prior to transfer to OR, as appropriate.



2. Operating Room Environment:

- Maintain pediatric OR rooms between 22-24 degrees Celsius/72-75 degrees Fahrenheit for all pediatric patients.
- Temperature of the operating room is not to be adjusted unless instructed by the anesthesiologist or surgeon.

3. Intraoperative Temperature Monitoring:

- Ensure patient's temperature is 36 degrees Celsius/96.8 degrees Fahrenheit or greater before initiation of anesthesia and document in chart.
- Set forced air warmers to 42 degrees Celsius/107.6 degrees Fahrenheit. Place the patient on the forced air warmer upon arrival to the OR and adjust temperature as needed.
- Record patient temperature in the medical record if surgical case is 30 minutes or longer.
- For all patients 2 years and younger and those at high risk for hypothermia, as determined by the anesthesiologist, monitor temperature via rectal probe, esophageal probe, or nasopharyngeal probe. Skin temperature is not an acceptable means of measuring temperature and will only be used in specific cases as determined by the anesthesiologist.
 - If the procedure requires a Foley catheter, use the Foley to monitor the patient's temperature.
 - Document temperature every 15 minutes for patients 2 years and younger and those at risk for hypothermia.
 - If a patient's temperature is greater than 37 .5 degrees Celsius/ 99.5 degrees Fahrenheit turn off or turn down the forced air warmer until the patient's temperature is 36-37 degrees Celsius/96.8-98.6 degrees Fahrenheit.
- Place warm blankets on the patient to maintain temperature.
- Place a hat on infants 6 months of age and younger as needed.
- During sterile prep, expose patients for the minimum time necessary for application and drying of sterile prep.
 - If indicated use a heat lamp also known as a French fry light for small infants to keep them warm during surgical prep.
 - Minimize pooling of sterile prep around the patient.
 - Forced air warmers can be turned off during sterile prep and turned back on once patient is draped.
- For infants undergoing open abdominal cases, use water proof draping (for example, 10/10 drape) to keep the patient dry when irrigation and fluid spillage is expected.
- Place sterile drapes on the patient as soon as possible after skin preparation to prevent evaporative heat loss.
- Use warmed IV fluids (not to exceed 104 degrees Fahrenheit) when not contraindicated.
- Pre-warmed irrigation fluids not to exceed 122 degrees Fahrenheit per policy "Warming Blankets and Solution" (200.729).

- Warmed irrigation fluids on the sterile field are not exceed 104 degrees Fahrenheit when not contraindicated.
- At the conclusion of the case, leave rectal probe in place for temperature monitoring in PACU. If patients temperature is >36.2 degrees Celsius/ 97 degrees Fahrenheit, the rectal probe can be discontinued upon transfer to the PACU.
- Warm patient's prior to transfer to PACU with use of blankets, forced air warmers, and if needed, radiant bed warmers for patients 8kg or less.
- For warming of neonates please follow the BayCare Clinical Standard "Thermoregulation, Care of the Newborn to Maintain" (BC-CS-OB-138).

4. Postoperative Temperature Monitoring:

- Maintain ambient room temperature in the PACU at 24 degrees Celsius/75.2 degrees Fahrenheit or greater at all times.
- Assess temperature immediately upon arrival and at required intervals.
 - If a rectal probe is in place upon transfer to PACU, use the rectal probe to measure temperature every 5 minutes for the first 15 minutes. If patient temperature is 36.2 degrees Celsius/ 97.1 degrees Fahrenheit or greater the rectal probe may be discontinued upon transfer to the PACU.
- Continue appropriate warming measures (warm blankets, forced air warmer, etc.)
- Communicate to anesthesia any patient that's temperature is less than 36 degrees Celsius/96.8 degrees Fahrenheit despite active warming measures.

5. Radiology/Procedural Temperature Monitoring (All departments, all staff that treat pediatric patients)

- All patients younger than 5 years of age will be accompanied by a member of the SJCH staff as per current policy, "Transporting Patient to Ancillary Departments", with the pediatric emergency room being the only exception.
- Communicate patient is at high risk for hypothermia, to the receiving department prior to transport.
- Place a hat on and swaddle patients 6 months of age and younger when leaving the department.
- In holding areas, maintain an ambient temperature of 24 degrees Celsius/ 75.2 degrees Fahrenheit or greater at all times.
- Adjust room temperature in diagnostic areas to 22-24 degrees Celsius/ 72-75 degrees Fahrenheit when applicable and available for patients 2 years and younger.

6. Education on Thermoregulation of the Pediatric Patient:

- All staff that care for pediatric patients will receive education on thermoregulation (date, time, frequency and type of education to be determined by department)
 - All new hires and transfers to procedural departments will receive education on thermoregulation during the orientation process (date, time, and type of education to be determined by department).



7. Outcomes:

- Prevent inadvertent hypothermia in the pediatric patient by following the above guidelines.
- For questions please contact your manager or educator.

References

1. AST Standards of Practice for Maintenance of Normothermia in the Perioperative Patient. (2015, April 10). Retrieved April, 2018, from http://www.ast.org/uploadedFiles/Main_Site/Content/About_Us/SOP_For_Normothermia.pdf
2. Bajwa, S. J., MD, MBA. (n.d.). Perioperative hypothermia in pediatric patients: Diagnosis, prevention and management. *Anesthesia, Pain & Intensive Care*, (1607), 1-7. Retrieved April, 2018, from <http://www.apicareonline.com/special-article-perioperative-hypothermia-in-pediatric-patients-diagnosis-prevention-and-management/>
3. Beedle, S. B., MSN, RN, CPN, Phillips, A., MSN, APRN-CNS, CCRN, Wiggins, S., PhD, RN, & Struwe, L., PhD, MSN, RN. (2017). Preventing UnPlanned Perioperative Hypothermia in Children. *AORN Journal*, 105(2), 170-183. Retrieved from www.aornjournal.org.
4. Bobo, S., RN. (2015). The Effects of Active versus Passive Prewarming of Pediatric Surgical Patients during the Pre-operative Period. *Journal of Child & Adolescent Behavior*, 3(6), 2375-4494.
5. Burns, V. M., CRNA, MSN, Wojnakowski, M., CRNA, PhD, Piotrowski, K., CRNA, MSN, & Caraffa, G., CRNA. (2009). Unintentional Hypothermia: Implications for Perianesthesia Nurses. *Journal of PeriAnesthesia Nursing*, 24(3), 167-176.
6. Cam, R., Yonem, H., & Ozsoy, H. (2016). Core Body Temperature Changes During Surgery and Nursing Management. *Clinical Medicine Research*, 5(2-1), 1-5. Retrieved April, 2018, from <http://article.sciencepublishinggroup.com/html/10.11648/j.cmr.s.2016050201.11.html>
7. Eyelade, O. R., MBBS, MSc, FWACS, Orimadegun, A. E., MBBS, MSc, FWACP (Paed), Akinyemi, O. A., MBBS, FWACS (Anaeth), Tongo, O. O., MBBS, FWACP (Paed), & Akinyink, O. O., MBBS, FMCPaed, FRCPCH, PhD. (2011). Esophageal, Tympanic, Rectal, and Skin Temperatures in Children Undergoing Surgery with General Anesthesia. *Journal of PeriAnesthesia Nursing*, 26(3), 151-159.
8. Haberman, D. (2014, March 31). Temperature Management in Children. Retrieved March, 2018, from https://www.wfsahq.org/components/com_virtual_library/media/0977d4d0eb723039ec431112d9b2fe5f-40839906db923e34c0d5069cdcb06ef8-305-Temperature-management-in-children.pdf
9. Hooper, V. D., PhD, RN, CPAN, FAAN. (2009). An Introduction to the ASPAN Evidence-Based Clinical Practice Guideline for the Promotion of Perioperative Normothermia. *Journal of PeriAnesthesia Nursing*, 24(5), 269-270. Retrieved April, 2018.
10. Hopper, V. D., PhD, RN, CPAN, FAAN, Chard, R., PhD, RN, CNOR, Clifford, T., MSN, RN, CPAN, Fetzer, S., PhD, RN, Godder, B., MHS, RN, CPAN, CAPA, Martinez, E. A., MD, MHS, . . . Fossum, S., BSN, RN, CPAN. (2010). ASPAN's Evidence-Based Clinical Practice Guideline for the Promotion of Perioperative Normothermia: Second Edition. *Journal of PeriAnesthesia Nursing*, 25(6), 346-365. Retrieved April, 2018.
11. Sessler, D. I., M.D. (2008). Temperature Monitoring and Perioperative Thermoregulation. *Anesthesiology*, 109(2), 318-338.
12. Sohn, V. Y., & Steele, S. R. (2009). Temperature control and the role of supplemental oxygen. *Clinics in colon and rectal surgery*, 22(1), 21-7.
13. Torossian, A., PhD, Brauer, A., PhD, Hocker, J., PhD, Bein, B., PhD, Wulf, H., PhD, & Horn, E., PhD. (2015). Preventing Inadvertent Perioperative Hypothermia. *Deutsches Arzteblatt International*, 112(10), 166-172. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4383851/>.