REFERENCE #	CITATION	CONCLUSION(S)	CONSENSUS SCORE	EVIDENCE TYPE	POPULATION	INTERVENTIONS	COMPARISON	SAMPLE SIZE	OUTCOME MEASURE
1	Kurz A. Physiology of thermoregulation. Best Pract Res Clin Anaesthesiol. 2008;22(4):627–644.	Describes the physiologic response to anesthesia related to hypothermia.	VA	N/A	N/A	N/A	N/A	N/A	N/A
2	Kurz A. Thermal care in the perioperative period. Best Pract Res Clin Anaesthesiol. 2008;22(1):39–62.	Perioperative hypothermia is a common complication of anesthesia and surgery. Body temperature should be monitored in most surgical patients.	VA	Review of the literature	N/A	N/A	N/A	N/A	N/A
3	Sessler DI. Thermoregulatory defense mechanisms. Crit Care Med. 2009;37(7 Suppl): S203-10.	Therapeutic hypothermia remains a subject of active investigation. The combination of buspirone and dexmedetomidine reduces the shivering threshold.	VA	Expert opinion	N/A	N/A	N/A	N/A	N/A
4	Sessler DI. Temperature monitoring and perioperative thermoregulation. Anesthesiology. 2008;109(2): 318-338.	Temperature should be monitored in patients undergoing major surgery during regional anesthesia. Patients should be actively warmed to maintain normothermia.	VA	Expert opinion	N/A	N/A	N/A	N/A	N/A
5	Board TN, Srinivasan MS. The effect of irrigation fluid temperature on core body temperature in arthroscopic shoulder surgery. Arch Orthop Trauma Surg. 2008;128(5):531–533.	Irrigation should be warmed to 36^0C for shoulder arthroscopy patients.	IIC	Quasi-experimental	Patients having arthroscopy surgery	Warm irrigation fluid	Room temperature irrigation fluids	24	Patient temperature

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6	Sessler DI. Perioperative heat balance. Anesthesiology. 2000;92(2): 578-590.	Obesity, use of tourniquets, type of anesthesia all cause hypothermia.	VA	Expert opinion	N/A	N/A	N/A	N/A	N/A
7	Lantry J, Dezman Z, Hirshon JM. Pathophysiology, management and complications of hypothermia. Br J Hosp Med. 2012;73(1): 31-37.	Defines methods of heat loss and signs and symptoms of hypothermia.	VB	Literature review	N/A	N/A	N/A	N/A	N/A
8	Mitchell JC, D'Angelo M. Implications of Hypothermia in Procedural Areas. Journal of Radiology Nursing. 2008;27(2): 70-73.	Outlines care and effects of hypothermia	VC	Review of the literature	N/A	N/A	N/A	N/A	N/A
9	Hart SR, Bordes B, Hart J, Corsino D, Harmon D. Unintended perioperative hypothermia.. Ochsner Journal. 2011;11(3): 259-270.	Overall review of methods to maintain normothermia	VB	Review of the literature	N/A	N/A	N/A	N/A	N/A
10	Rozentsveig V, Neulander EZ, Roussabrov E, et al. Anesthetic considerations during percutaneous nephrolithotomy. J Clin Anesth. 2007;19(5):351–355.	A statistically significant drop in temperature was found during percutaneous nephrolithotomy	IIIC	Descriptive study	Patients having percutaneous nephrolithotomy	N/A	N/A	20	Patient temperature
11	Sun Z, Honar H, Sessler DI, et al. Intraoperative core temperature patterns, transfusion requirement, and hospital duration in patients warmed with forced air. Anesthesiology. 2015;122(2): 276-285.	Hypothermia increased the need for transfusion	IIIA	Descriptive	Patients having surgery	N/A	N/A	58,814	Need for transfusion
12	Steelman Victoria M, Graling Paula R, Perkhounkova Yelena. Priority Patient Safety Issues Identified by Perioperative Nurses. AORN J. 2013;97(4): 402-418. [IIIB]	Ambulatory and hospital based nurses identified prevention of hypothermia as a high priority safety issue	IIIB	Descriptive	Nurses	N/A	N/A	3137	Priority safety issues

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13	Forbes SSEskicioglu CNathens ABFenech DSLaflamme CMcLean RFMcLeod RSBest Practice in General Surgery Committee University of Toronto. Evidence-based guidelines for prevention of perioperative hypothermia. J Am Coll Surg. 2009;209(4): 492-503.e1.	Recommends that hypothermia be prevented and supports the use of various monitoring and warming devices.	IVA	Clinical Practice Guideline	N/A	N/A	N/A	N/A	N/A
14	Hooper VD, Chard R, Clifford T, et al. ASPAN's evidence-based clinical practice guideline for the promotion of perioperative normothermia: second edition. J Perianesth Nurs. 2010;25(6):346–365.	Summarizes measures to take to prevent hypothermia throughout the entire perioperative time frame.	IVA	Clinical Practice Guideline	N/A	N/A	N/A	N/A	N/A
15	Nygren J, Thacker J, Carli F, et al.; Enhanced Recovery After Surgery Society. Guidelines for perioperative care in elective rectal/pelvic surgery: Enhanced Recovery After Surgery (ERAS®) Society recommendations. Clin Nutr. 2012;31(6):801–816.	Professional guidelines supporting monitoring of temperature during rectal surgery.	IVA	Clinical Practice Guideline	N/A	N/A	N/A	N/A	N/A
16	Lassen K, Soop M, Nygren J, et al. Consensus review of optimal perioperative care in colorectal surgery: Enhanced Recovery after Surgery (ERAS) Group recommendations. Archives of Surgery. 2009;144(10): 961-969.	Upper-body forced air heating cover should be used in addition to warming to 2 hours before and after surgery	IVA	Clinical Practice Guideline	N/A	N/A	N/A	N/A	N/A

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17	Lassen K, Coolsen MM, Slim K, et al.; ERAS® Society; European Society for Clinical Nutrition and Metabolism; International Association for Surgical Metabolism and Nutrition. Guidelines for perioperative care for pancreaticoduodenectomy: Enhanced Recovery After Surgery (ERAS®) Society recommendations. Clin Nutr. 2012;31(6):817–830.	Recommend using circulating-water garment systems or forced air warming devices	IVA	Clinical Practice Guideline	N/A	N/A	N/A	N/A	N/A
18	National Collaborating Centre for Nursing and Supportive Care. The Management of Inadvertent Perioperative Hypothermia in Adults [NICE Clinical Guidelines No. 65]. London, United Kingdom: Royal College of Nursing; 2008.	Recommendations covering all aspect of inadvertent perioperative hypothermia.	IVA	Clinical Practice Guideline	N/A	N/A	N/A	N/A	N/A
19	Standards of perioperative nursing. In: Guidelines for Perioperative Practice. Denver, CO: AORN, Inc.; 2015: 693-708.	Standards of perioperative nursing	IVB	Professional guideline	N/A	N/A	N/A	N/A	N/A
20	American Nurses Association. Nursing : scope and standards of practice. Silver Spring, Md.: American Nurses Association; 2010.	Professional guidelines	IVB	Professional guideline	N/A	N/A	N/A	N/A	N/A
21	Chon JY, Lee JY. The effects of surgery type and duration of tourniquet inflation on body temperature. J Int Med Res. 2012;40(1):358–365.	In knee surgery with a tourniquet, the drop in core body temperature after tourniquet deflation correlates is greater with increased tourniquet time and in arthroscopic procedures compared to open procedures	IIIA	Observational study	Patients having knee surgery with a tourniquet	N/A	N/A	60	Core temperature

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22	Holtzclaw BJ. Managing inadvertent and accidental hypothermia. ONLINE J CLIN INNOV. 2008;10(2): 1-58.	Documents risk factors for hypothermic disorders, lists and support measurements devices and warming approaches.	IIIA	Systematic review of the lieterature	N/A	N/A	N/A	N/A	N/A
23	Leijtens B, Koeter M, Kremers K, Koeter S. High incidence of postoperative hypothermia in total knee and total hip arthroplasty: a prospective observational study. J Arthroplasty. 2013;28(6):895–898.	Incidence of hypothermia was 26.3% for Total hip and 28% for TKA. Study done in the Netherlands.	IIIB	Prospective, observational study	Patients have TKA or THA.	N/A	N/A	262 TKA 426 THA	Temperature after peri-prosthetic closure
24	Journeaux M. Peri-operative hypothermia: implications for practice. Nurs Stand. 2013;27(45):33–38.	Maintaining perioperative normothermia improves outcomes in surgical patients. Pre-warming should be performed and risk factors for hypothermia should be identified preoperatively.	VB	Review of the literature.	N/A	N/A	N/A	N/A	N/A
25	Paulikas CA. Prevention of unplanned perioperative hypothermia. AORN J. 2008;88(3): 358-365.	Overview of causes, effect and prevention of hypothermia.	VC	Expert opinion	N/A	N/A	N/A	N/A	N/A
26	Parodi D, Tobar C, Valderrama J, et al. Hip arthroscopy and hypothermia. Arthroscopy. 2012;28(7):924–928.	Factors contributing to development of hypothermia included prolonged surgery time, low body mass index, low blood pressure, low temp of irrigation fluid (with significance on surgery time and fluid temp).	IIIB	Observational	Patients having hip arthroscopic surgery	N/A	N/A	73 patients	Patient temperature

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27	Khan SA, Aurangzeb M, Zarin M, Khurshid M. Temperature monitoring and perioperative heat loss. JPMI - Journal of Postgraduate Medical Institute. 2010;24(2): 85-90.	The amount of heat lost is related to the amount of time spent in the perioperative environment and on the measures used to prevent heat loss.	IIIC	Observational	Patients undergoing major lower limb vascular surgery	N/A	N/A	32	Patient temperature
28	Pearce B, Christensen R, Voepel-Lewis T. Perioperative hypothermia in the pediatric population: Prevalence, risk factors and outcomes. Journal of Anesthesia and Clinical Research. 2010;1(1).	Hypothermia occurs more frequently in older children and in those having long procedures. Hypothermia is associated with greater blood loss.	VB	Organizational experience	Children having surgery	N/A	N/A	530	Presence of hypothermia
29	Winslow EH, Cooper SK, Haws DM, et al. Unplanned perioperative hypothermia and agreement between oral, temporal artery, and bladder temperatures in adult major surgery patients. J Perianesth Nurs. 2012;27(3):165–180.	Temporal artery thermometers should not be used in perioperative areas and patients should be warmed using convective and conductive measures. Older age, BMI lower than 30, and OR ambient temperature, lower than 68 are factors that increase the risk of unplanned perioperative hypothermia.	IIIA	Prospective descriptive	Elective major surgery patients	N/A	Oral, temporal artery, and bladder temperatures	64	Temperatures

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30	de Brito Poveda V, Galvao CM, dos Santos CB. Factors associated to the development of hypothermia in the intraoperative period. Rev Lat Am. 2009;17(2):228–233.	The type and duration of anesthesia, body mass index, and operating room temperature were directly associated with a drop in the mean body temperature.	IIIB	Prospective, descriptive, correlational study	Patients having elective surgery lasting at least one hour.	N/A	N/A	70	Patient temperature
31	Hernandez M, Cutter TW, Apfelbaum JL. Hypothermia and hyperthermia in the ambulatory surgical patient. Clin Plast Surg. 2013;40(3):429–438.	Both hypo and hyperthermia discussed thoroughly. Interventions for both are suggested.	VB	Expert opinion	N/A	N/A	N/A	N/A	N/A
32	Lenhardt R. The effect of anesthesia on body temperature control. Front Biosci. 2010;2:1145–1154.	Overview of the relationship between anesthesia and thermoregulation	VA	Expert opinion	N/A	N/A	N/A	N/A	N/A
33	Hoyle J, Andrzejowski J. An audit of perioperative temperature management in a day case surgery unit. J One Day Surg. 2008;18(3):76–78.	The longer the anesthesia time the greater the potential for hypothermia.	IIIC	Descriptive	Patients having surgery	N/A	N/A	94	Patient temperature
34	Kim EJ, Yoon H. Preoperative factors affecting the intraoperative core body temperature in abdominal surgery under general anesthesia: an observational cohort. Clin Nurse Spec. 2014;28(5): 268-276.	The following factors were indicative of hypothermia: Low body temp preoperative, low weight, age.	IIIB	Quasi-experimental	Patients having abdominal surgery	N/A	N/A	147	Patient temperature

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35	Huh J, Cho YB, Yang MK, Yoo YK, Kim DK. What influence does intermittent pneumatic compression of the lower limbs intraoperatively have on core hypothermia? Surg Endosc. 2013;27(6):2087–2093.	Use of intermittent compressions devices caused a decrease in temperature therefore temperature should be monitored.	IA	RCT	Patients having laparoscopic resection for colorectal cancer	Intermittent pneumatic compression devices on	Intermittent pneumatic compression devices off	47	Core temperature
36	Hannan EL, Samadashvili Z, Wechsler A, et al. The relationship between perioperative temperature and adverse outcomes after off-pump coronary artery bypass graft surgery. J Thorac Cardiovasc Surg. 2010;139(6):1568–1575.e1.	Hypothermic and hyperthermic patients are at an increased risk for post-op mortality & complications	IIIA	Retrospective/ observational	Adult Cardiac surgery patients	N/A	N/A	865	Temperature
37	Araz C, Pirat A, Unlukaplan A, et al. Incidence and risk factors of intraoperative adverse events during donor lobectomy for living-donor liver transplantation: a retrospective analysis. Exp Clin Transplant. 2012;10(2):125–131.	Increased age was a predictor of hypothermia.	IIIA	Retrospective descriptive	Patients undergoing donor lobectomy for living-donor liver transplantation	N/A	N/A	182	Temperature
38	Yang R, Wolfson M, Lewis MC. Unique aspects of the elderly surgical population: an anesthesiologist's perspective. Geriatr Orthop Surg Rehabil. 2011;2(2):56–64.	Describes the steps to take to decrease the risk for hypothermia in the elderly.	VA	Expert opinion	N/A	N/A	N/A	N/A	N/A
39	Talley HC, Talley CH. AANA Journal course update for nurse anesthetists—part 5: evaluation of older adults. AANA J. 2009;77(6):451–460.	The elderly are more prone to hypothermia therefore methods to maintain normothermia should be instituted.	VB	Expert opinion	N/A	N/A	N/A	N/A	N/A

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40	Han SB, Gwak MS, Choi SJ, et al. Risk factors for inadvertent hypothermia during adult living-donor liver transplantation. Transplant Proc. 2014;46(3): 705-708.	Low body surface area, female gender and emergency of end-stage-liver disease (acute or acute-on-chronic vs chronic) are risk factors for hypothermia.	IIIB	Retrospective	Patients having living donor liver transplants	N/A	N/A	134	Patient temperature
41	Miao N, Levin SW, Baker EH, et al. Children with infantile neuronal ceroid lipofuscinosis have an increased risk of hypothermia and bradycardia during anesthesia. Anesth Analg. 2009;109(2):372–378.	Children with infantile neuronal ceroid lipofuscinosis experience hypothermia more frequently than a control group.	IIA	Case-control study	Children with Infantile Neuronal Ceroid Lipofuscinosis (NCL)	Children with NCL	Children without NCL	8 with, 25 without	Presence of hypothermia
42	Billeter AT, Hohmann SF, Druen D, Cannon R, Polk HC Jr. Unintentional perioperative hypothermia is associated with severe complications and high mortality in elective operations. Surgery. 2014;156(5):1245–1252.	707 of 2138 patients experienced hypothermia which is associated with at higher rate of morbidity and mortality.	IIIA	Descriptive	Patients having elective surgery	N/A	N/A	2138 patients	Duration of stay, death, complications,
43	Seifert PC, Wahr JA, Pace M, Cochrane AB, Bagnola AJ. Crisis management of malignant hyperthermia in the OR. AORN J. 2014;100(2):189–202.	Overall description of hyperthermia and steps to care for a patient during a crisis.	VC	Expert opinion	N/A	N/A	N/A	N/A	N/A
44	Scott EM, Buckland R. A systematic review of intra-operative warming to prevent postoperative complications. AORN J. 2006;83(5):1090–1113.	Hypothermia is linked to complications and temperature needs to be monitored.	IA	Systematic review with meta-naalysis	N/A	N/A	N/A	N/A	N/A
45	Arshad M, Qureshi WA, Ali A, Haider SZ. Frequency of hypothermia during general anaesthesia. Pak J Med Health Sci. 2011;5(3):549–552.	Hypothermia occurred in 25 % of the patients therefore the patient's temperature should be monitored.	IIIC	Descriptive longitudinal	Patients 15-60 yrs. having general anesthesia for > 1 hour.	N/A	N/A	300	Temperature

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46	Flaifel HA, Ayoub F. Esophageal temperature monitoring. Middle East J Anesthesiol. 2007;19(1):123–147.	Temperatures should be monitored and there was a large difference between skin temperature and esophageal temperature.	IIIB	Descriptive	Patients having surgery	N/A	N/A	53	Patient temperature
47	Gustafsson UO, Scott MJ, Schwenk W, et al. Guidelines for perioperative care in elective colonic surgery: Enhanced Recovery After Surgery (ERAS®) Society recommendations. Clin Nutr. 2012;31(6):783–800.	Clinical practice guidelines for care of the patient having elective colonic surgery	IVA	Clinical Practice Guidelines	N/A	N/A	N/A	N/A	N/A
48	Standards for Basic Anesthetic Monitoring. 2010. American Society of Anesthesiologists. http://www.asahq.org/~/media/Sites/ASAHQ/Files/Public/Resources/standards-guidelines/standards-for-basic-anesthetic-monitoring.pdf. Accessed September 21, 2015.	Provides guidance on temperature monitoring.	IVC	Clinical practice guideline	N/A	N/A	N/A	N/A	N/A
49	Standards for Nurse Anesthesia Practice. 2013. American Association of Nurse Anesthetists. http://www.aana.com/resources2/professionalpractice/Documents/PPM%20Standards%20for%20Nurse%20Anesthesia%20Practice.pdf. Accessed September 21, 2015.	Guidelines for taking temperatures	IVC	Professional guideline	N/A	N/A	N/A	N/A	N/A
50	Temperature Monitoring During Surgical Procedures. Malignant Hyperthermia Association of the United States. http://www.mhaus.org/healthcare-professionals/mhaus-recommendations/temperature-monitoring. Accessed September 21, 2015.	Clinical guideline which supports temperature monitoring in all cases of general anesthesia over 30 minutes	IVB	Clinical Practice Guideline	N/A	N/A	N/A	N/A	N/A

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51	O'Grady NP, Barie PS, Bartlett JG, et al. Guidelines for evaluation of new fever in critically ill adult patients: 2008 update from the American College of Critical Care Medicine and the Infectious Diseases Society of America. Crit Care Med. 2008;36(4):1330–1349.	Guidelines for preferred method for monitoring temperature.	IVB	Clinical practice guideline	N/A	N/A	N/A	N/A	N/A
52	Torossian A, Brauer A, Hocker J, Bein B, Wulf H, Horn EP. Preventing inadvertent perioperative hypothermia. Dtsch Arztebl Int. 2015;112(10): 166-172.	Guideline for prevention of intraoperative hypothermia	IVA	Professional guideline	N/A	N/A	N/A	N/A	N/A

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53	Torossian A. Thermal management during anaesthesia and thermoregulation standards for the prevention of inadvertent perioperative hypothermia. Best Pract Res Clin Anaesthesiol. 2008;22(4):659–668.	Oral, nasopharynx, esophagus and urinary bladder temperature may be used. Hypothermia is connected with negative outcomes. Prewarming and active warming should be applied when anes time will be greater than 60 min. Forced-air warming, conductive warming, infusion fluid warming, increasing the operating room temperature, and warming of irrigation fluids are warming methods. Patient should be normothermic preop. Temperature should be monitored throughout the perioperative period.	VB	Literature review	N/A	N/A	N/A	N/A	N/A
54	Sessler DI. Temperature monitoring: the consequences and prevention of mild perioperative hypothermia. South Afr J Anaesth Analg. 2014;20(1):25–31.	Hypothermia is connected to various complications and the standard of care is to monitor temperature.	VB	Expert opinion	N/A	N/A	N/A	N/A	N/A

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55	Bridges E, Thomas K. Noninvasive measurement of body temperature in critically ill patients. Crit Care Nurse. 2009;29(3): 94-97.	When taking temperatures be sure you are controlling for the factors that the accuracy and precision of the measurement.	VB	Review of the literature	N/A	N/A	N/A	N/A	N/A
56	Lawson L, Bridges EJ, Ballou I, et al. Accuracy and precision of noninvasive temperature measurement in adult intensive care patients. Am J Crit Care. 2007;16(5): 485-496.	Temperature measurements in order were oral and temporal artery, axillary, then ear measurements. Intubation effected the accuracy of oral temperatures and temporal artery temperatures were effected by diaphoresis and air flow across the face.	IIIB	Observational	ICU patients	N/A	N/A	60	Patient temperature
57	Eshraghi Y, Nasr V, Parra-Sanchez I, et al. An evaluation of a zero-heat-flux cutaneous thermometer in cardiac surgical patients. Anesth Analg. 2014;119(3): 543-549.	Zero-heat-flux temperature probes are an effective means for measuring core temperature	IIIB	Descriptive	Patients having nonemergent cardiac surgery	N/A	N/A	105	Patient temperature variation between the two methods
58	Sato H, Yamakage M, Okuyama K, et al. Urinary bladder and oesophageal temperatures correlate better in patients with high rather than low urinary flow rates during non-cardiac surgery. Eur J Anaesthesiol. 2008;25(10):805–809.	Urinary bladder temperature can be used as an indicator of core body temperature and is more accurate in patients having a high urinary flow rate.	IB	RCT	Patients undergoing tympanoplasty	Urinary flow rate	Esophageal versus bladder temperature	24	Patient temperature

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59	Kimberger O, Saager L, Egan C, et al. The accuracy of a disposable noninvasive core thermometer. Can J Anaesth. 2013;60(12): 1190-1196.	The temperatures obtained using a double sensor forehead thermometer is an accurate method for obtaining temperatures in patients undergoing regional and general anesthesia.	IIB	Quasi-evperimentl	Patients having general and regional anesthesia	N/A	N/A	36 general/20 regional	Bladder, esophageal or forehead temperature
60	Barringer LB, Evans CW, Ingram LL, Tisdale PP, Watson SP, Janken JK. Agreement between temporal artery, oral, and axillary temperature measurements in the perioperative period. J Perianesth Nurs. 2011;26(3):143–150.	Temporal artery monitoring may be used as method for obtaining noninvasive perioperative temperatures.	IIB	Quasi-experimental	Adult surgical patients	N/A	Oral, temporal artery and axillary temperatures	86	Oral, temporal artery and axillary temperatures
62	Langham GE, Maheshwari A, Contrera K, You J, Mascha E, Sessler DI. Noninvasive temperature monitoring in postanesthesia care units. Anesthesiology. 2009;111(1):90–96.	None of the eight methods tested were consistently within 0.50C of the bladder temperature. Oral, deep forehead and temporal artery temperatures correlated reasonably well. Oral and if necessary axillary are good routes to use for post-operative temperature monitoring.	IIB	Comparison	Patients having laparoscopic surgery	N/A	Compared oral, axillary, temporal artery, forehead skin-surface, forehead liquid-crystal display, infrared aural canal, deep forehead, and deep chest temperatures to bladder temperature	50	Patient temperature

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63	McConnell E, Senseney D, George SS, Whipple D. Reliability of temporal artery thermometers. Medsurg Nurs. 2013;22(6):387–392.	Temporal artery temperature is a reliable method to measure patient temperature.	IIB	Quasi-experimental	Adult surgical inpatients	N/A	Oral temperatures to temporal artery temperatures	34	Patient temperature
64	Stelfox HT, Straus SE, Ghali WA, Conly J, Laupland K, Lewin A. Temporal artery versus bladder thermometry during adult medical-surgical intensive care monitoring: an observational study. BMC Anesthesiology. 2010;10:13.	Temporal artery not recommended when need accuracy for hyper or hypothermia.	IIIA	Prospective Obervational	Adult ICU patients	N/A	Bladder temperatures to temporal artery temperatures	14 patients, 736 pairs of temperatures	Patient temperature via bladder or temporal artery sites.
65	Sahin SH, Duran R, Sut N, Colak A, Acunas B, Aksu B. Comparison of temporal artery, nasopharyngeal, and axillary temperature measurement during anesthesia in children. J Clin Anesth. 2012;24(8):647–651.	There was a correlation of temperatures taken at the temporal artery and nasopharynx locations. The correlation was less between the temporal artery, nasopharynx, and axillary temperatures. Therefore the temporal artery method may be used for temperature taking in children.	IIB	Quasi-experimental	Children	N/A	Temporal artery, nasopharynx, and axillary temperature	60	Temperatures
66	Hocker J, Bein B, Bohm R, Steinfath M, Scholz J, Horn EP. Correlation, accuracy, precision and practicability of perioperative measurement of sublingual temperature in comparison with tympanic membrane temperature in awake and anaesthetised patients. Eur J Anaesthesiol. 2012;29(2):70–74.	The oral method of temperature taking may be used with awake and anesthetized patients for short cases	IIB	Quasi-experimental	Adults undergoing elective surgery, awake and anesthetized	N/A	Oral and tympanic temperatures	171	Temperature

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67	Washington GT, Matney JL. Comparison of temperature measurement devices in post anesthesia patients. J Perianesth Nurs. 2008;23(1):36–48.	Either the electronic thermometer or the chemical clinical thermometers may be used but should use only one type of measure on each person.	IIA	Quasi-experimental	Surgical patients	Electronic thermometer	Chemical clinical thermometer.	727	Temperature
68	Moran JL, Peter JV, Solomon PJ, et al. Tympanic temperature measurements: are they reliable in the critically ill? A clinical study of measures of agreement. Crit Care Med. 2007;35(1):155–164.	Bladder temperature reflects core temperature more so than tympanic methods.	IIA	Quasi-experimental	Adult	N/A	Tympanic, urinary, and axillary temperatures to pulmonary artery temperatures	110	Temperature
69	Gasim GI, Musa IR, Abdien MT, Adam I. Accuracy of tympanic temperature measurement using an infrared tympanic membrane thermometer. BMC Res Notes. 2013;6:194.	Tympanic membrane thermometers are as reliable and accurate as axillary mercury glass thermometers.	IIB	Quasi-experimental	Adults ED patients	N/A	Axillary to tympanic membrane	174	Temperatures
70	Jay O, Molgat-Seon Y, Chou S, Murto K. Skin temperature over the carotid artery provides an accurate noninvasive estimation of core temperature in infants and young children during general anesthesia. Paediatr Anaesth. 2013;23(12):1109–1116.	Skin temperature over the carotid artery is a viable site for use in small children.	IIB	Quasi-experimental	Pediatric surgical patients	N/A	Skin temperature over the upper abdomen, axilla, and carotid artery to nasopharyngeal temperature.	48	Temperature

REFERENCE #	CITATION	CONCLUSION(S)	CONSENSUS SCORE	EVIDENCE TYPE	POPULATION	INTERVENTIONS	COMPARISON	SAMPLE SIZE	OUTCOME MEASURE
71	Masamune T, Yamauchi M, Wada K, et al. The usefulness of an earphone-type infrared tympanic thermometer during cardiac surgery with cardiopulmonary bypass: clinical report. J Anesth. 2011;25(4):576–579.	There was correlation between the temperatures from the three different types of thermometers.	IIB	Quasi-experimental	Patients having coronary surgery with bypass	Ear phone thermometer	Rectal and nasopharyngeal thermometers	12	Correlation between different sites of temperature monitoring
72	Opatz O, Trippel T, Lochner A, et al. Temporal and spatial dispersion of human body temperature during deep hypothermia. Br J Anaesth. 2013;111(5): 768-775.	Temperature should be monitored as close as possible to the organ of interest.	IIB	Quasi-experimental	Patients having coronary surgery with bypass	N/A	Arterial, esophageal, vesical, and cranial	24	Patients having coronary surgery with bypass
73	Kiya T, Yamakage M, Hayase T, Satoh J, Namiki A. The usefulness of an earphone-type infrared tympanic thermometer for intraoperative core temperature monitoring. Anesth Analg. 2007;105(6):1688–1692.	Earphone type infrared tympanic thermometer may be used for intraoperative core temperature monitoring.	IIIB	Comparative	Adult patients having surgery under general anesthesia and cardia surgery	Earphone type infrared tympanic thermometer	Esophageal temperature	18 non-cardiac, 8 cardiac	Patient temperature
74	Fetzer SJ, Lawrence A. Tympanic membrane versus temporal artery temperatures of adult perianesthesia patients. J Perianesth Nurs. 2008;23(4):230–236.	Tympanic membrane thermometers or temporal artery thermometers can be used but should not compare the results.	IIB	Descriptive correlational	Adult surgical patients	Tymppanic membrane	Temporal artery	222	Patient temperature
75	Kimberger O, Thell R, Schuh M, Koch J, Sessler DI, Kurz A. Accuracy and precision of a novel non-invasive core thermometer. Br J Anaesth. 2009;103(2):226–231.	The double sensor thermometer can be considered an alternative to distal esophageal core temperature.	IIB	Quasi-experimental	Periop and ICU patients,	Double sensor thermometer	Distal esophageal thermometer	68 patients	Patient temperature

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76	Farnell S, Maxwell L, Tan S, Rhodes A, Philips B. Temperature measurement: comparison of non-invasive methods used in adult critical care. J Clin Nurs. 2005;14(5): 632-639.	The chemical thermometer was more reliable than the tympanic thermometer. However, compared with the pulmonary artery catheter.	IIB	Prospective / Quasi-experimental	Adult intensive care patients	Chemical thermometer; tympanic thermometer	Pulmonary artery catheter temperature	160 temperature sets from 25 patients	Patient temperature
77	Calonder EM, Sendelbach S, Hodges JS, et al. Temperature measurement in patients undergoing colorectal surgery and gynecology surgery: a comparison of esophageal core, temporal artery, and oral methods. J Perianesth Nurs. 2010;25(2):71–78	Oral and temporal artery temperatures are a clinically acceptable replacement core (esophageal) temperatures.	IIB	Quasi-experimental	Patients undergoing colorectal or gynecology surgery	Oral and temporal artery temperatures	Esophageal temperature	23	Patient temperature
78	Apa H, Gözmen S, Bayram N, et al. Clinical accuracy of tympanic thermometer and noncontact infrared skin thermometer in pediatric practice: an alternative for axillary digital thermometer. Pediatr Emerg Care. 2013;29(9):992–997.	The infrared tympanic thermometer can be used to measure temperature in the pediatric population as can the noncontact infrared thermometer.	IIIB	Descriptive	Pediatric patients	Infrared tympanic and forehead noncontact thermometers	Axillary digital thermometer	1639 reading in 50 patients	Difference between temperature readings
79	Hooper VD, Andrews JO. Accuracy of noninvasive core temperature measurement in acutely ill adults: the state of the science. Biol Res Nurs. 2006;8(1): 24-34.		IIIA	Systematic review	N/A	N/A	N/A	N/A	N/A
80	Kimberger O, Cohen D, Illievich U, Lenhardt R. Temporal artery versus bladder thermometry during peri-operative and intensive care unit monitoring. Anesth Analg. 2007;105(4):1042–1047.	Temporal artery thermometry should not be used in the OR and it is not a substitute for bladder thermometry	IIIB	Comparative	Neurosurgery patients in OR and ICU	N/A	N/A	35 patients 280 sets of measurements	Temperature

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81	Tan GM, Galinkin JL, Pan Z, Polaner DM. Laryngeal view and temperature measurements while using the perilaryngeal airway (Cobra-PLUS) in children. Paediatr Anaesth. 2013;23(12):1180–1186.	Temperatures recorded using a perilaryngeal airway thermistor may be used for intraoperative temperature trending.	IIA	Quasi-experimental	Patients <18 years of age receiving general anesthesia	N/A	N/A	80	Patient temperature
82	Lefrant JY, Muller L, de La Coussaye JE, et al. Temperature measurement in intensive care patients: comparison of urinary bladder, oesophageal, rectal, axillary, and inguinal methods versus pulmonary artery core method. Intensive Care Med. 2003;29(3):414–418.	In ICU patients, urinary bladder and esophageal electronic thermometers reflect core temperature better than the electronic rectal thermometer which is better than inguinal and axillary gallium-in-glass thermometers.	IIIB	Descriptive	ICU patients	N/A	N/A	42	Patient temperature
83	Eyelade OR, Orimadegun AE, Akinyemi OA, Tongo OO, Akinyinka OO. Esophageal, tympanic, rectal, and skin temperatures in children undergoing surgery with general anesthesia. J Perianesth Nurs. 2011;26(3):151–159.	Rectal or tympanic temperatures may be used if esophageal probes are not available.	IIB		Children undergoing surgery	N/A	N/A	36	Patient temperature at different sites.
84	Drake-Brockman TFE, Hegarty M, Chambers NA, Von Ungernsternberg BS. Monitoring temperature in children undergoing anaesthesia: a comparison of methods. Anaesth Intensive Care. 2014;42(3):315–320.	Temperatures varied between sites.	IIIA	Comparative	Children having elective non-cardiac surgery	Temperature recorded at tympanic membrane, temporal artery, axilla, skin on the chest	Nasopharyngeal	200	Patient temperature

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85	Gobolos L, Philipp A, Ugocsai P, et al. Reliability of different body temperature measurement sites during aortic surgery. Perfusion. 2014;29(1):75–81.	Tympanic temperature measurements should replace bladder and rectal temperature measurements in this group of patients.	IIIB	Observational retrospective	Patients having surgical repair of the thoracic aorta	N/A	N/A	22	Patient temperature
86	Pawley MD, Martinsen P, Mitchell SJ, et al. Brachial arterial temperature as an indicator of core temperature: proof of concept and potential applications. J Extra Corpor Technol. 2013;45(2):86–93.	The brachial artery is a good location to monitor temperature and is reflective of core temperature.	IIIB	Descriptive/comparative	Patients having coronary surgery with bypass	Brachial artery temperature	Pulmonary artery, aortic arterial inflow, and nasopharynx temperatures	10	Patients having coronary surgery with bypass
87	Fallis WM. Monitoring bladder temperatures in the OR. AORN J. 2002;76(3):467–489.	Results of temperature monitoring via the urinary bladder were similar to those of core sites but it may be influenced by urine flow rate.	VA	Literature review	N/A	N/A	N/A	N/A	Preferred method for temperature monitoring
88	Smith J. Methods and devices of temperature measurement in the neonate: a narrative review and practice recommendations. Newborn Infant Nurs Rev. 2014;14(2):64–71.	Provides guidance as to how to select an appropriate method of taking the temperature in neonates	VA	Review of the literature	N/A	N/A	N/A	N/A	N/A
89	Asher C, Northington LK. Position statement for measurement of temperature/fever in children. J Pediatr Nurs. 2008;23(3):234–236.	Guideline for taking temperatures in infants and neonates	IVC	Professional guideline	N/A	N/A	N/A	N/A	N/A

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90	Clinical Practice Guideline: Non-invasive Temperature Measurement in the Emergency Department. 2011; title revised 2013. Emergency Nurses Association. https://www.ena.org/practice-research/research/CPG/Documents/TemperatureMeasurementCPG.pdf. Accessed September 21, 2015.	Guideline for taking temperatures in infants and neonates	IVA	Professional guidelines	N/A	N/A	N/A	N/A	N/A
91	Guideline for health care information management. In: Guidelines for Perioperative Practice. Denver, CO: AORN, Inc; 2015:491–511.	Guidelines for documentation on the perioperative patient record.	IVB	Clinical Guideline	N/A	N/A	N/A	N/A	N/A
92	Guideline for transfer of patient care information. In: Guidelines for Perioperative Practice. Denver, CO: AORN, Inc; 2015:583–588.	Guidelines for the transfer of patient care information	IVB	Clinical Guideline	N/A	N/A	N/A	N/A	N/A
93	Putzu M, Casati A, Berti M, Pagliarini G, Fanelli G. Clinical complications, monitoring and management of perioperative mild hypothermia: anesthesiological features. Acta Biomed Ateneo Parmense. 2007;78(3):163–169.	Temperature should be monitored in patients having surgery lasting longer than 30 minutes and hypothermia is connected with complications and the monitoring site should be individualized.	VB	Review of the literature	N/A	N/A	N/A	N/A	N/A
94	Collins JB, Verheyden CN, Mahabir RC. Core measures: implications for plastic surgery. Plast Reconstr Surg. 2013;131(6):1266–1271.	Temperatures should be monitored in all plastic surgery patients having a procedure lasting longer than 60 minutes	VB	Expert opinion	N/A	N/A	N/A	N/A	N/A

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95	Schmied H, Kurz A, Sessler DI, Kozek S, Reiter A. Mild hypothermia increases blood loss and transfusion requirements during total hip arthroplasty. Lancet. 1996;347(8997):289–292.	Blood loss is increased in hypothermic patients.	IB	RCT	Patients having total hip arthroplasty	Forced air warming device and warm IV fluids	No warming	60	Blood loss
96	Rajagopalan S, Mascha E, Na J, Sessler DI. The effects of mild perioperative hypothermia on blood loss and transfusion requirement. Anesthesiology. 2008;108(1):71–77.	Hypothermia increases blood loss	IA	Meta-analysis	N/A	N/A	N/A	N/A	N/A
97	Kiekkas P, Theodorakopoulou G, Stefanopoulos N, Tsotas D, Baltopoulos GI. Postoperative hypothermia and mortality in critically ill adults: review and meta-analysis. Aust J Adv Nurs. 2011;28(4):60–67.	There is a positive association between postoperative hypothermia and hospital mortality in surgical ICU patients.	IIIB	Systematic literature with meta-analysis	N/A	N/A	N/A	N/A	N/A
98	Jeyadoss J, Thiruvenkatarajan V, Watts RW, Sullivan T, van Wijk RM. Intraoperative hypothermia is associated with an increased intensive care unit length-of-stay in patients undergoing elective open abdominal aortic aneurysm surgery: a retrospective cohort study. Anaesth Intensive Care. 2013;41(6):759–764.	Hypothermia increases the length of stay in the ICU.	IIIC	Retrospective, cohort	Patient s having surgery	N/A	N/A	102	Temperature
99	Karalapillai D, Story DA, Calzavacca P, Licari E, Liu YL, Hart GK. Inadvertent hypothermia and mortality in postoperative intensive care patients: retrospective audit of 5050 patients. Anaesthesia. 2009;64(9):968–972.	Hypothermia is related to an increase risk of mortality	IIIA	Retrospective study.	Postoperative patients admitted to the ICU	N/A	N/A	5050	Death

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100	Liu CK, Liao CH, Wan KS, et al. Change in intraoperative rectal temperature influencing erectile dysfunction following transurethral resection of the prostate. J Formosan Med Assoc. 2012;111(6):320–324.	There was a higher rate of erectile dysfunction among the cases of hypothermia	IIIB	Descriptive study	Males have TURP for BPH	N/A	N/A	86	Incidence of erectile dysfunction
101	Moslemi-Kebria M, El-Nashar SA, Aletti GD, Cliby WA. Intraoperative hypothermia during cytoreductive surgery for ovarian cancer and perioperative morbidity. Obstet Gynecol. 2012;119(3):590–596.	The patients with hypothermia had a decreased chance of survival and increased chance of having complications.	IIIA	Descriptive	Women having cytoreductive surgery for ovarian cancer	N/A	N/a	146	Presence of temp below 36 degrees C.
102	Yamasaki H, Tanaka K, Funai Y, et al. The impact of intraoperative hypothermia on early postoperative adverse events after radical esophagectomy for cancer: a retrospective cohort study. J Cardiothorac Vasc Anesth. 2014;28(4):955–959.	Intraoperative hypothermia leads to a greater risk of complications in patients undergoing esophagectomy.	IIIA	Retrospective cohort study	Patients having esophagectomy	N/A	N/A	121	Presence of complications
103	Sumer BD, Myers LL, Leach J, Truelson JM. Correlation between intraoperative hypothermia and perioperative morbidity in patients with head and neck cancer. Arch Otolaryngol Head Neck Surg. 2009;135(7):682–686.	In this group of patients there is a correlation between hypothermia and post-op complications.	IIIB	Descriptive	Patients having ablative surgery for head and neck surgery	N/A	N/A	43	Complications post-op
104	Quiroga E, Tran NT, Hatsukami T, Starnes BW. Hypothermia is associated with increased mortality in patients undergoing repair of ruptured abdominal aortic aneurysm. J Endovasc Ther. 2010;17(3):434–438.	Hypothermia increases the risk of mortality in pats having surgery for AAA	IIIB	Descriptive	Patients with ruptured AAAs	N/A	N/A	40	30-day mortality rate

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105	Oda J, Kasai K, Noborio M, Ueyama M, Yukioka T. Hypothermia during burn surgery and postoperative acute lung injury in extensively burned patients. J Trauma. 2009;66(6):1525–1529.	The presence of intraoperative hypothermia correlated with the development of acute lung injury	IIIB	Descriptive study	Burn patients having surgery	N/A	N/A	16	Presence of acute lung injury
106	Coon D, Michaels J 5th, Gusenoff JA, Chong T, Purnell C, Rubin JP. Hypothermia and complications in postbariatric body contouring. Plast Reconstr Surg. 2012;130(2):443–448.	Hypothermia leads to complications in body contouring patients.	IIIA	Quasi-experimental	Patients having post bariatric body contouring surgery			308 with 77 receiving prewarming.	Rate of hypothermia.
107	Morehouse D, Williams L, Lloyd C, et al. Perioperative hypothermia in NICU infants: its occurrence and impact on infant outcomes. Adv Neonatal Care. 2014;14(3):154–164.	Hypothermic neonates had a higher rate of adverse events and required more support interventions than normothermic	IIIB	Prospective, case-control	Infants having operative procedure	Neonates having surgery in the OR	Neonates having surgery in the PACU	108	Presence of hypothermia.
108	Reynolds L, Beckmann J, Kurz A. Perioperative complications of hypothermia. Best Pract Res Clin Anaesthesiol. 2008;22(4):645–657.		VA	Review of the literature	N/A	N/A	N/A	N/A	N/A
109	Burke S, Hanani M. The actions of hyperthermia on the autonomic nervous system: central and peripheral mechanisms and clinical implications. Autonomic Neurosci. 2012;168(1–2):4–13.	Hypothermia effects the nervous system and autonomic end organs such as smooth muscle and nerves of the gastrointestinal tract.	VB	Review of the literature	N/A	N/A	N/A	N/A	N/A

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110	Vanamoorthy P, Pandia MP, Bithal PK, Valiaveedan SS. Refractory hypotension due to intraoperative hypothermia during spinal instrumentation. Indian J Anaesth. 2010;54(1):56–58.	Report of a case of hypothermia during a spinal instrumentation procedure	VA	Case report	N/A	N/A	N/A	N/A	N/A
111	Dickinson A, Qadan M, Polk HC Jr. Optimizing surgical care: a contemporary assessment of temperature, oxygen, and glucose. Am Surg. 2010;76(6):571–577.	Summarizes effects of hypothermia.	VB	Expert opinion	N/A	N/A	N/A	N/A	N/A
112	Qadan M, Gardner SA, Vitale DS, Lominadze D, Joshua IG, Polk HC Jr. Hypothermia and surgery: immunologic mechanisms for current practice. Ann Surg. 2009;250(1):134–140.	Hypothermia exerts multiple effects at the cellular level, leading to impaired innate immune function.	IIIC	Descriptive	Blood samples of healthy volunteers	N/A	N/A	Not determined	Cellular activity
113	Fred C, Ford S, Wagner D, Vanbrackle L. Intraoperatively acquired pressure ulcers and perioperative normothermia: a look at relationships. AORN J. 2012;96(3):251–260.	There is a relationship between the development of pressure ulcers and the presence of hypothermia	IIIB	Retrospective,epl anatory non-experimental	Patients having surgery who develop pressure ulcers	N/A	N/A	84	Presence of pressure ulcers
114	Diaz M, Becker DE. Thermoregulation: physiological and clinical considerations during sedation and general anesthesia. Anesth Prog. 2010;57(1):25–32.	Summarizes effects of hypothermia.	VC	Expert opinion	N/A	N/A	N/A	N/A	N/A
115	Kurz A, Sessler DI, Lenhardt R. Perioperative normothermia to reduce the incidence of surgical-wound infection and shorten hospitalization. Study of Wound Infection and Temperature Group. N Engl J Med. 1996;334(19):1209–1215.	Maintaining intraoperative hypothermia may decrease infectious complications and shorten hospitalizations in patients having colorectal surgery.	IA	RCT	Adults having colorectal surgery	Application of forced air warming and IV fluid warming	No warming devices	200	Presence of wound infection

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116	Frank SM, Fleisher LA, Breslow MJ, et al. Perioperative maintenance of normothermia reduces the incidence of morbid cardiac events. A randomized clinical trial. JAMA. 1997;277(14):1127–1134.	The warmed group had fewer cardiac complications.	IB	RCT	Surgical patients who were scheduled for ICU admission post-op	FAW device applied	No warming device applied	270 (143 control, 127 experimental	Post cardiac complications
117	Mahoney CB, Odom J. Maintaining intraoperative normothermia: a meta-analysis of outcomes with costs. AANA J. 1999;67(2):155–163.	A temperature less than 35.5 degrees C. results in adverse outcomes	IIIB	Systematic review of the literature	N/A	N/A	N/A	N/A	Presence of complications
118	Seamon MJ, Wobb J, Gaughan JP, Kulp H, Kamel I, Dempsey DT. The effects of intraoperative hypothermia on surgical site infection: an analysis of 524 trauma laparotomies. Ann Surg. 2012;255(4):789–795.	Intraoperative hypothermia less than 35C adversely affects SSI rates after trauma laparotomy.	IIIB	Descriptive	Patients having trauma laparotomies	N/A	N/A	524	Presence of SSI
119	Romlin B, Petruson K, Nilsson K. Moderate superficial hypothermia prolongs bleeding time in humans. Acta Anaesthesiol Scand. 2007;51(2):198–201.	Surgical site bleeding is increased by hypothermia	IIIB	Observational study	Volunteers	N/A	N/A	15	Bleeding time
120	Lista F, Doherty CD, Backstein RM, Ahmad J. The impact of perioperative warming in an outpatient aesthetic surgery setting. Aesthet Surg J. 2012;32(5):613–620.	Warmed patients experienced less time in the PACU.	VB	Quality improvement study	N/A	N/A	N/A	N/A	N/A
121	Esnaola NF, Cole DJ. Perioperative normothermia during major surgery: is it important? Adv Surg. 2011;45:249–263.	Discussion of pathophysiology as well as types of warming and studies of effectiveness and types of monitoring devices that are best.	VB	Literature review	N/A	N/A	N/A	N/A	N/A

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122	Lau AW, Chen CC, Wu RS, Poon KS. Hypothermia as a cause of coagulopathy during hepatectomy. Acta Anaesthesiol Taiwan. 2010;48(2):103–106.	Case report describing the relationship between hypothermia and coagulopathy.	VA	Case report	N/A	N/A	N/A	N/A	N/A
123	Melton GB, Vogel JD, Swenson BR, Remzi FH, Rothenberger DA, Wick EC. Continuous intraoperative temperature measurement and surgical site infection risk: analysis of anesthesia information system data in 1008 colorectal procedures. Ann Surg. 2013;258(4):606–612; discussion 612-613.	These is no correlation between hypothermia and surgical site infection.	IIIA	Descriptive	Patients having colo-rectal surgery	N/A	N/A	1008	SSI after 30 days
124	Geiger TM, Horst S, Muldoon R, et al. Perioperative core body temperatures effect on outcome after colorectal resections. Am Surg. 2012;78(5):607–612.	Patients with lower intraoperative temperature had fewer surgical site infections, decreased length of stay, and less leaks in the postoperative period.	IIIB	Descriptive study	Patients undergoing an elective segmental colectomy	N/A	N/A	79	Presence of complications
125	Linam WM, Margolis PA, Staat MA, et al. Risk factors associated with surgical site infection after pediatric posterior spinal fusion procedure. Infect Control Hosp Epidemiol. 2009;30(2):109–116.	Hypothermia during surgery appears to provide protection against SSI.	IIIA	Retrospective case-control study	Pediatric patients who underwent a spinal fusion.	N/A	N/A	44 infected compared to 132 non-infected	Presence of complications
126	Long KC, Tanner EJ, Frey M, et al. Intraoperative hypothermia during primary surgical cytoreduction for advanced ovarian cancer: risk factors and associations with postoperative morbidity. Gynecol Oncol. 2013;131(3):525–530.	Intraoperative hypothermia was not associated with the development of postoperative complications.	IIIA	Descriptive study	Women having cytoreductive surgery for ovarian cancer.	N/A	N/A	297	Presence of complications

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127	Tedesco NS, Korpi FP, Pazdernik VK, Cochran JM. Relationship between hypothermia and blood loss in adult patients undergoing open lumbar spine surgery. J Am Osteopath Assoc. 2014;114(11):828–838.	No correlation exists between intraoperative blood loss and intraoperative core body temperature during spine surgery	IIIA	Descriptive	Patients having lumbar spine surgery	N/A	N/A	168 procedures on 160 patients	Amount of perioperative blood loss
128	Karalapillai D, Story D, Hart GK, et al. Postoperative hypothermia and patient outcomes after major elective non-cardiac surgery. Anaesthesia. 2013;68(6):605–611.	Hypothermia is not associated with increased length of stay or mortality	IIIB	Retrospective observational	Non-cardiac post-op ICU patients	N/A	N/A	50,689	Patient temperature
129	Smith CE, Sidhu RS, Lucas L, Mehta D, Pinchak AC. Should patients undergoing ambulatory surgery with general anesthesia be actively warmed? Internet J Anesthesiol. 2007;12(1):18p.	The combination of IV fluid warming and convective warming was more effective at maintaining normothermia than the application of warmed cotton blankets.	IB	RCT	Ambulatory surgery patients with cases scheduled longer than 30 mins.	Active warming used	No warming used.	336 (156 warming group, 180 control)	Presence of hypothermia, patient temperature
130	Salazar F, Donate M, Boget T, et al. Intraoperative warming and post-operative cognitive dysfunction after total knee replacement. Acta Anaesthesiol Scand. 2011;55(2):216–222.	Maintaining an intraoperative tympanic temperature higher than 36 0 C increased the risk of postoperative cognitive dysfunction markedly and the concept of normothermia should be evaluated further.	IA	RCT	Adults over 65 yrs. of age	Active warming	Standard care	125 patients	Cognitive functioning
131	Silva AB, Peniche Ade C. Perioperative hypothermia and incidence of surgical wound infection: a bibliographic study. Einstein (Sao Paulo). 2014;12(4):513–517.	There is no connection between SSI and hypothermia	IIIB	Systematic review of the literature	6 articles	N/A	N/A	N/A	N/A

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132	Constantine RS, Kenkel M, Hein RE, et al. The impact of perioperative hypothermia on plastic surgery outcomes: a multivariate logistic regression of 1062 cases. Aesthet Surg J. 2015;35(1):81–88.	The rates of surgical site infection, dehiscence, erythema, necrosis, seroma, hematoma, delayed wound healing, and composite wound problems were not affected by the presence of hypothermia in plastic surgery patients. Prewarming appears to have no significant effect on reducing the rate of hypothermia in plastic surgery, and prewarming does not significantly impact patient outcomes.	IIIB	Descriptive	Plastic surgical patients	N/A	N/A	1062	Wound complications and warming status
133	Lehtinen SJ, Onicescu G, Kuhn KM, Cole DJ, Esnaola NF. Normothermia to prevent surgical site infections after gastrointestinal surgery: holy grail or false idol? Ann Surg. 2010;252(4):696–704.	Pay-for-reporting measures focusing on perioperative normothermia may be of limited value in preventing SSI after GI surgery.	IIIA	Descriptive	Patients having GI surgery	N/A	N/A	146 cases and 323 matched controls	Patient temperature
134	Young H, Bliss R, Carey JC, Price CS. Beyond core measures: identifying modifiable risk factors for prevention of surgical site infection after elective total abdominal hysterectomy. Surg Infect (Larchmt). 2011;12(6):491–496.	Hypothermia not associated with higher rate of SSI	IIIB	Retrospective cohort descriptive	Patients having Total abdominal hysterectomy	N/A	N/A	192	Presence of an SSI

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135	Baucom RB, Phillips SE, Ehrenfeld JM, et al. Defining intraoperative hypothermia in ventral hernia repair. J Surg Res. 2014;190(1):385–390.	There is no association between temperature and SSI in ventral hernia repairs and maintaining perioperative normothermia may only decrease SSIs in certain at-risk populations.	IIIA	Descriptive	Adult patients having ventral hernia repair	N/A	N/A	553	Surgical site infections
136	Fecho K, Lunney AT, Boysen PG, Rock P, Norfleet EA. Postoperative mortality after inpatient surgery: incidence and risk factors. Ther Clin Risk Manag. 2008;4(4):681–688.	Perioperative hypothermia did not effect the incidence of 48 hour and 30 day postoperative mortality after inpatient operations.	IIIA	Retrospective cohort	Records from inpatient surgery patients	N/A	N/A	12,739	Deaths
137	John M, Ford J, Harper M. Peri-operative warming devices: performance and clinical application. Anaesthesia. 2014;69(6):623–638.	Literature based description of the various types of warming devices including pros and cons.	IB	Systematic literature review	N/A	N/A	N/A	N/A	N/A
138	Benson EE, McMillan DE, Ong B. The effects of active warming on patient temperature and pain after total knee arthroplasty. Am J Nurs. 2012;112(5):26–33.	Use of patient-controlled, forced-air warming gowns elevates perioperative body temperature	IC	RCT	Patients having total knee replacement	Forced air warming device used	No warming device used	30 (15 in each group)	Patient temperature
139	Sajid MS, Shakir AJ, Khatri K, Baig MK. The role of perioperative warming in surgery: a systematic review. Sao Paulo Med J. 2009;127(4):231–237.	Perioperative warming assists in reducing postoperative wound pain, wound infection, shivering, and perioperative blood loss.	IB	Systematic review	N/A	N/A	N/A	N/A	N/A

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140	Galvao CM, Liang Y, Clark AM. Effectiveness of cutaneous warming systems on temperature control: meta-analysis. J Adv Nurs. 2010;66(6):1196–1206.	Circulating water warming garments are more effective than forced air warming and both are better then passive warming devices.	IB	Systematic review	N/A	N/A	N/A	N/A	N/A
141	Poveda Vde B, Martinez EZ, Galvao CM. Active cutaneous warming systems to prevent intraoperative hypothermia: a systematic review. Rev Lat Am. 2012;20(1):183–191.	The circulating water garment system is more effective than forced air warming and ; forced-air and carbon-fiber technology are similar.	IB	Systematic review	N/A	N/A	N/A	N/A	N/A
142	Moola S, Lockwood C. Effectiveness of strategies for the management and/or prevention of hypothermia within the adult perioperative environment. Int J Evid Based Healthc. 2011;9(4):337–345.	Use active warming strategies (forced air warming); discontinue passive warming in vulnerable groups; commence warming preoperatively; in extended surgeries or aged patients use multiple active warming strategies; warm fluids designated for intraoperative administration; water garment warmer was significantly more effective than forced air warming.	IB	Systematic review	N/A	N/A	N/A	N/A	N/A

REFERENCE #	CITATION	CONCLUSION(S)	CONSENSUS SCORE	EVIDENCE TYPE	POPULATION	INTERVENTIONS	COMPARISON	SAMPLE SIZE	OUTCOME MEASURE
143	Alderson P, Campbell G, Smith AF, Warttig S, Nicholson A, Lewis SR. Thermal insulation for preventing inadvertent perioperative hypothermia. Cochrane Database Syst Rev. 2014;6:CD009908.	Forced air warming is more effective at maintaining normothermia than reflective blankets or clothing and no clear evidence indicating that reflective blankets or clothing increases a person's temperature.	IIA	Systematic review	N/A	N/A	N/A	16 studies	N/A
144	Shorrab AA, El-Sawy ME, Othman MM, Hammouda GE. Prevention of hypothermia in children under combined epidural and general anesthesia: a comparison between upper- and lower-body warming. Paediatr Anaesth. 2007;17(1):38–43.	In this population upper and lower body warming was equally effective.	IIB	Quais-experimental	Children having urology surgery	Upper body FAW	Lower body FAW	80	Patient temperature
145	Yokoe DS, Anderson DJ, Berenholtz SM, et al. A compendium of strategies to prevent healthcare-associated infections in acute care hospitals: 2014 updates. Infect Control Hosp Epidemiol. 2014;35(8):967–977.	Guideline describing steps to take to prevent SSI.	IVB	Professional guideline	N/A	N/A	N/A	N/A	N/A
146	Colwell AS, Borud LJ. Optimization of patient safety in postbariatric body contouring: a current review. Aesthet Surg J. 2008;28(4):437–442.	Summary of 80 articles and recommendations listed include use of forced-air warming blankets, warming intravenous or injectable fluid, or raising the room temperature	VA	Literature review	N/A	N/A	N/A	N/A	N/A

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147	Munday J, Hines SJ, Chang AM. Evidence utilisation project: Management of inadvertent perioperative hypothermia. The challenges of implementing best practice recommendations in the perioperative environment. Int J Evid Based Healthc. 2013;11(4): 305-311.	The incidence of hypothermia decreased after instituting various evidence based practices.	VB	Quality report	Adult surgical patients	N/A	N/A	145	Temperature
148	Lynch S, Dixon J, Leary D. Reducing the risk of unplanned perioperative hypothermia. AORN J. 2010;92(5):553–562.	Forced air warming should be used and is more effective than warming laparoscopic irrigation fluids and applying warm cotton blankets.	VB	Performance improvement project	N/A	N/A	N/A	N/A	N/A
149	Aksu C, Kuş A, Gürkan Y, Solak M, Toker K. Survey on postoperative hypothermia incidence in operating theatres of Kocaeli university. Turk Anesteziyoloji ve Reanimasyon Dernegi Dergisi. 2014;42(2):66–70.	Temperatures and patient warming should be completed during administration of anesthesia.	IIIB	Descriptive	All ages of surgical patients.	N/A	N/A	564	Patient temperature
150	Fleisher LA, Fleischmann KE, Auerbach AD, et al. 2014 ACC/AHA guideline on perioperative cardiovascular evaluation and management of patients undergoing non-cardiac surgery: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. Circulation. 2014;130(24):2215–2245.	Maintaining perioperative normothermia may decrease cardiac events inpatients having non-cardiac surgery.	IVA	Clinical Practice Guideline	N/A	N/A	N/A	N/A	N/A

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151	Inês Guedes Lopes, António Manuel Sousa Magalhães, de Sousa Abreu, de Ara Batista. Preventing perioperative hypothermia: an integrative literature review. Revista de Enfermagem Referência. 2015;8(1):147–155.	Active warming devices are more effective that passive devices and circulating water and forced air warming devices are the two most effective methods of active warming.	IIA	Systematic literature review	7 articles	N/A	N/A	N/A	N/A
152	Birch DW, Manouchehri N, Shi X, Hadi G, Karmali S. Heated CO(2) with or without humidification for minimally invasive abdominal surgery. Cochrane Database Syst Rev. 2011;(1):007821.	Warming of gases used for insufflation did not reduce the incidence of hypothermia.	IA	Systematice review with meta-analysis	N/A	N/A	N/A	N/A	N/A
153	Shao L, Zheng H, Jia FJ, et al. Methods of patient warming during abdominal surgery. PLoS One. 2012;7(7):e39622.	Using a combination of body wrapping and a heating blanket is more effective than a	IC	RCT	Patients having abdominal surgery	Combined warming methods (body wrapping, heating	No warming	160	Patient temperature
154	Pagnocca ML, Tai EJ, Dwan JL. Temperature control in conventional abdominal surgery: comparison between conductive and the association of conductive and convective warming. Rev Bras Anestesiol. 2009;59(1):56–66.	The combined warming method was more effective at maintaining normothermia than the circulating water mattress alone.	IB	RCT	Patients undergoing exploratory laparotomy	Circulating water mattress plus forced air warming	Circulating water mattress	43 (24 mattress only , 19 combination	Patient temperature
155	Kim P, Taghon T, Fetzer M, Tobias JD. Perioperative hypothermia in the pediatric population: a quality improvement project. Am J Med Qual. 2013;28(5):400–406.	Bundling of warming methods reduces the incidence of hypothermia	VA	Organizational quality study	Pediatric patients having surgery	Bundle of warming devices	No use of warming devices	7532	Patient temperature

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156	Melling AC, Ali B, Scott EM, Leaper DJ. Effects of preoperative warming on the incidence of wound infection after clean surgery: a randomised controlled trial. Lancet. 2001;358(9285):876–880.	Prewarming before surgery reduced infection rates in clean surgery.	IB	RCT	Patients having breast, varicose vein, or hernia surgery.	Prewarming	No prewarming	421	Surgical site infection
157	Andrzejowski J, Hoyle J, Eapen G, Turnbull D. Effect of prewarming on post-induction core temperature and the incidence of inadvertent perioperative hypothermia in patients undergoing general anaesthesia. Br J Anaesth. 2008;101(5):627–631.	Prewarming with a forced air system results in a smaller decrease in intraoperative temperature.	IB	RCT	Patients undergoing spinal surgery under general anesthesia	Prewarming	No prewarming	31 prewarmed. 37 control group	Patient temperature
158	De Witte JL, Demeyer C, Vandemaele E. Resistive-heating or forced-air warming for the prevention of redistribution hypothermia. Anesth Analg. 2010;110(3):829–833.	Resistive heating blanket vs air-forced system vs control no warming. Resistive heating group temperature was significantly higher than the control group.	IA	RCT	Patients undergoing laparoscopic colorectal surgery	Pre warming with either a resistive - heating or forced air warming device	No prewarming	27 total divided into three groups	Patient temperature
159	Chung SH, Lee BS, Yang HJ, et al. Effect of preoperative warming during cesarean section under spinal anesthesia. Korean J Anesthesiol. 2012;62(5):454–460.	Prewarming by forced air-warming devices and warmed fluid prevents hypothermia in patients undergoing elective cesarean delivery with spinal anesthesia.	IB	RCT	Patients undergoing elective cesarean delivery with spinal anesthesia.	Prewarming by either warm IV fluids or forced air warming	No prewarming applied	45 (15 in each group)	Patient temperature

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160	Horn EP, Bein B, Bohm R, Steinfath M, Sahili N, Hocker J. The effect of short time periods of pre-operative warming in the prevention of peri-operative hypothermia. Anaesthesia. 2012;67(6):612–617.	Prewarming for as little as 10 minutes helps to decrease intraoperative hypothermia.	IB	RCT	Patients having surgery lasting between 30-90 minutes	Prewarming for 10,20,30 mins	No prewarming	200 (55: control, 52 : 10 mins, 43: 20 mins, and 50: 30 mins warming)	Presence of hypothermia
161	Cassey JG, King RA, Armstrong P. Is there thermal benefit from preoperative warming in children? Paediatr Anaesth. 2010;20(1):63–71.	Prewarming by increasing the ambient temperature increased the core temperature of the participants.	IB	RCT	Children having surgery	Ambient temperature at 26 degrees C.	Ambient temperature at 21 degrees C.	30 in each group	Patient temperature
162	Wong PF, Kumar S, Bohra A, Whetter D, Leaper DJ. Randomized clinical trial of perioperative systemic warming in major elective abdominal surgery. Br J Surg. 2007;94(4):421–426.	Prewarming helped decrease blood loss and complication rates.	IB	RCT	Patients having major elective abdominal surgery	Prewarming 2 hours before surgery	No prewarming	103 (56 control group, 47 warming group).	Blood loss and complication rates.
163	Wasfie TJ, Barber KR. Value of extended warming in patients undergoing elective surgery. Int Surg. 2015;100(1):105–108.	The incidence of hypothermia is decreased when patients are prewarmed.	IB	RCT	Surgery	Portable warming gown applied preoperatively	Standard warming procedures	94 (46 warming group, 48 control group)	Patient temperature

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164	Vanni SMD, Castiglia YMM, Ganem EM, et al. Preoperative warming combined with intraoperative skin-surface warming does not avoid hypothermia caused by spinal anesthesia in patients with midazolam premedication. Sao Paulo Med J. 2007;125(3):144–149.	Pre-warming plus intraoperative warming using a forced air warming device minimizes but does not eliminate perioperative hypothermia	IB	RCT	Patients having elective lower abdominal surgery.	Pre plus Intraoperative warming	Passive warming or intraoperative warming only	30 (10 each group)	Patient temperature
165	Perl T, Peichl LH, Reyntjens K, Deblaere I, Zaballos JM, Brauer A. Efficacy of a novel prewarming system in the prevention of perioperative hypothermia. A prospective, randomized, multicenter study. Minerva Anestesiol. 2014;80(4):436–443.	Active prewarming with a forced-air warmer and an insulating prewarming suit achieves significantly higher core temperatures during anesthesia and at the end of surgery when compared to commercial or conventional insulation.	IA	RCT	Patients having surgery lasting 30-120 minutes.	Active preoperative prewarming with a forced-air warmer connected to a prewarming suit	Standard preoperative insulation, passive preoperative insulation with a commercial prewarming suit	90 patients (30 in each group)	Patient temperature
166	Minchin I. Management of temperature & major abdominal surgery. Dissector. 2009;37(3):13–15.	Pre-warming should be performed	IIC	Quasi-experimental	Patients having elective abdominal surgery	Use of pre-warming	No pre-warming	10	Temperature
167	Llewellyn L. Effect of pre-warming on reducing the incidence of inadvertent peri-operative hypothermia for patients undergoing general anaesthesia: a mini-review. Br J Anaesth Recovery Nurs. 2013;14(1–2):3–10.	Prewarming should be performed preoperatively.	IA	Systematic review of only RCTs	N/A	N/A	N/A	N/A	N/A
168	de Brito Poveda V, Clark AM, Galvao CM. A systematic review on the effectiveness of prewarming to prevent perioperative hypothermia. J Clin Nurs. 2013;22(7–8):906–918.	Forced air warming is effective as a method for prewarming.	IA	Systematic review of the literature	N/A	N/A	N/A	N/A	N/A

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169	Roberson MC, Dieckmann LS, Rodriguez RE, Austin PN. A review of the evidence for active preoperative warming of adults undergoing general anesthesia. AANA J. 2013;81(5):351–356.	Rewarming is effective	IIB	Systematic review	N/A	N/A	N/A	N/A	N/A
170	Gorges M, Ansermino JM, Whyte SD. A retrospective audit to examine the effectiveness of preoperative warming on hypothermia in spine deformity surgery patients. Paediatr Anaesth. 2013;23(11):1054–1061.	Preoperative warming reduces the amount of time the patient is hypothermic	IIIB	Retrospective	Pediatric patients having spinal surgery	Preoperative warming	No warming	55 no warming, 105 warming	Patient temperature
171	Kiekkas P. Prewarming critically ill patients. AORN J. 2012;96(4):409–411.	Patients should be pre-warmed	VB	Expert opinion	N/A	N/A	N/A	N/A	N/A
172	Roth JV. Some unanswered questions about temperature management. Anesth Analg. 2009;109(5):1695–1699.	Patients should be pre-warmed especially for short cases.	VB	Expert opinion	N/A	N/A	N/A	N/A	N/A
173	Bitner J, Hilde L, Hall K, Duvendack T. A team approach to the prevention of unplanned postoperative hypothermia. AORN J. 2007;85(5):921–923.	Preoperative warming with a forced air warming improved patient's postoperative core temperatures and potentially reduced the incidence of hypothermia-related complications.	VB	Quality improvement study	Total joint replacements	Use of forced air warming device preoperatively	No preoperative warming	333	Temperature on admission to the PACU

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174	Shukry M, Matthews L, de Armendi AJ, et al. Does the covering of children during induction of anesthesia have an effect on body temperature at the end of surgery? J Clin Anesth. 2012;24(2):116–120.	Application of cotton blankets and a forced air warming device after the patient entered the OR but before induction did not result in a higher core temperature when compared to no cotton blankets or a forced air warming device being applied.	IA	RCT	Children having minor surgery	Application of a cotton blanket and forced air warming device pre-anesthesia induction	No covers	49	Patient temperature
175	Nicholson M. A comparison of warming interventions on the temperatures of inpatients undergoing colorectal surgery. AORN J. 2013;97(3):310–322.	Prewarming did not reduce the number of patients experiencing hypothermia.	IC	RCT	Patients having colon surgery	Prewarming	No prewarming	66 (32 control, 34 experimental)	Presence of hypothermia
176	Adriani MB, Moriber N. Preoperative forced-air warming combined with intraoperative warming versus intraoperative warming alone in the prevention of hypothermia during gynecologic surgery. AANA J. 2013;81(6):446–451.	Preoperative warming with a forced air warming gown offers no benefit over conventional therapy in maintaining normothermia in the perioperative period.	IIA	Quasi-experimental	Patients having gynecologic surgery	Prewarming plus intraoperative warming	Intraoperative warming only	30	Patient temperature
177	Fettes S, Mulvaine M, Van Doren E. Effect of pre-operative forced-air warming on postoperative temperature and postanesthesia care unit length of stay. AORN J. 2013;97(3):323–328.	Prewarming pts before surgery did not have an affect on pt's post op temps or LOS	VA	Organizational experience	Patients having a variety of surgeries	Prewarming with forced air warming device	No prewarming	128	Patient temperature

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178	Kim YS, Jeon YS, Lee JA, et al. Intra-operative warming with a forced-air warmer in preventing hypothermia after tourniquet deflation in elderly patients. J Int Med Res. 2009;37(5):1457–1464.	Intraop warming with FAW prevented hypothermia caused by general anesthesia and tourniquet deflation in elderly patients undergoing TKA; although a drop in core body temperature after tourniquet deflation could not be prevented, intraoperative active warming increased core body temperature before tourniquet deflation preventing subsequent hypothermia	IA	Randomized, single-blind study	Females over 65 years old undergoing unilateral TKA	Either FAW device with upper body blanket	No warming	24 (2 groups of 12)	Final core body temperature after tourniquet deflation
179	Pu Y, Cen G, Sun J, et al. Warming with an under-body warming system reduces intraoperative hypothermia in patients undergoing laparoscopic gastrointestinal surgery: a randomized controlled study. Int J Nurs Stud. 2014;51(2):181–189.	Use of an underbody warming system decreases intraoperative hypothermia during laparoscopic gastrointestinal surgery.	IA	RCT	Patients undergoing laparoscopic surgery for GI cancer	No warming device	Underbody warming device	110 (55 in each group	Patient temperature
180	Yoo HS, Park SW, Yi JW, Kwon MI, Rhee YG. The effect of forced-air warming during arthroscopic shoulder surgery with general anesthesia. Arthroscopy. 2009;25(5):510–514.	Forced-air warming is more efficient than a cotton blanket alone at maintaining perioperative normothermia	IB	RCT	Patients having elective shoulder arthroplasty	Forced air warming	Cotton blanket	44 (22 in each group)	Patient temperature

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181	Trentman TL, Weinmeister KP, Hentz JG, Laney MB, Simula DV. Randomized non-inferiority trial of the vitalHEAT temperature management system vs the Bair Hugger warmer during total knee arthroplasty. Can J Anaesth. 2009;56(12):914–920.	The Conductive warming system using circulating warm water with a vacuum applied to a single extremity underperforms when compared to a forced air warming device.	IB	RCT	Patients having unilateral total knee arthroplasty	Circulating warm water device with vacuum	Forced air warming device	55 (30 in water group 25 in FAW group)	Patient temperature
182	Fleisher LA, Metzger SE, Lam J, Harris A. Perioperative cost-finding analysis of the routine use of intra-operative forced-air warming during general anesthesia. Anesthesiology. 1998;88(5):1357–1364.	There is a cost savings realized with the use of FAW.	IB	RCT	Patients having surgery	Application of a FAW device	No warming	100 (50 each group)	Cost of procedure
183	Pikus E, Hooper VD. Postoperative rewarming: are there alternatives to warm hospital blankets. J Perianesth Nurs. 2010;25(1):11–23.	Forced air warming is the most effective and all effective methods of warming should be used.	IIIB	Systematic review	Adult surgical patients	N/A	N/A	N/A	N/A
184	Leung KK, Lai A, Wu A. A randomised controlled trial of the electric heating pad vs forced-air warming for preventing hypothermia during laparotomy. Anaesthesia. 2007;62(6):605–608.	Forced air warming device is more effective than electric heating pad in patients having a laparotomy	IIA	Quasi-exerimental	Patients undergoing laparotomy	Forced air warming device and warm IV fluids	Electric heating pad	60 patients (30 in each group)	Patient temperature
185	Moyses AM, Trettene Ados S, Navarro LH, Ayres JA. Hypothermia prevention during surgery: comparison between thermal mattress and thermal blanket. Rev Esc Enferm USP. 2014;48(2):228–235.	The thermal mattress was more effective in preventing hypothermia during surgery than a forced air warming blanket.	IIB	Quasi-experimental	Patients having Open GI tract surgery	Thermal blanket	Thermal mattress	38 (19 in each group)	Patient temperature

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186	Egan C, Bernstein E, Reddy D, et al. A randomized comparison of intraoperative PerfecTemp and forced-air warming during open abdominal surgery. Anesth Analg. 2011;113(5):1076–1081.	Resistive heating blanket vs air-forced system. No statistically significant difference between the two groups.	IIB	Quasi-experimental	Patients undergoing major open abdominal surgery	Underbody resistive warming system	Upper-body forced-air warming system	36 underbody, 34 upper body	Patient temperature
187	Ruetzler K, Kovaci B, Guloglu E, et al. Forced-air and a novel patient-warming system (vitalHEAT vH2) comparably maintain normothermia during open abdominal surgery. Anesth Analg. 2011;112(3):608–614.	Upper body FAW and the water sleeve device were equally effective in maintaining normothermia.	IIB	Quasi-experimental	Patients having elective major open abdominal surgery	Circulating-water sleeve	Forced air warming device	71 (37 sleeve, 34 FAW)	Patient temperature
188	Brandt S, Oguz R, Hüttner H, et al. Resistive-polymer versus forced-air warming: comparable efficacy in orthopedic patients. Anesth Analg. 2010;110(3):834–838.	There is no significant difference FAW vs resistive warming	IIB	Quasi-experimental	Patients having orthopedic surgery	Forced air warming	Resistive-polymer system	80 (40 in each group)	Patient temperature
189	Fanelli A, Danelli G, Ghisi D, Ortu A, Moschini E, Fanelli G. The efficacy of a resistive heating under-patient blanket versus a forced-air warming system: a randomized controlled trial. Anesth Analg. 2009;108(1):199–201.	No significant difference between resistive heating-blanket or FAW system,.	IIB	Quasi-experimental	Patients having hip replacement	Resistive heating under-patient blanket	Forced-air warming system	56 patients	Patient temperature
190	Kadam VR, Moyes D, Moran JL. Relative efficiency of two warming devices during laparoscopic cholecystectomy. Anaesth Intensive Care. 2009;37(3):464–468.	No difference in the efficacy of either system	IIB	Quasi-experimental	Patients having elective laparoscopic cholecystectomy	Radiant warming device	Forced air warming device	29 (15 FAW group, 14 radiant group)	Patient temperature

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191	Ihn CH, Joo JD, Chung HS, et al. Comparison of three warming devices for the prevention of core hypothermia and post-anaesthesia shivering. J Int Med Res. 2008;36(5):923–931.	The surgical access blanket prevented the core temperature from decreasing more effectively than the upper body blanket or the circulating water mattress.	IIB	Quasi-experimental	Females having total abdominal hysterectomy	FAW device surgical access blanket,	FAW Upper body blanket; Circulating water mattress.	90 (30 in each group)	Patient temperature
192	Sato H, Yamakage M, Okuyama K, et al. Forced-air warming effectively prevents midazolam-induced core hypothermia in volunteers. Eur J Anaesthesiol. 2009;26(7):566–571.	FAW after midazolam administration can prevent sedation-induced redistribution hypothermia.	IIB	Quasi-experimental	Volunteers	N/A	N/A	6	Volunteer temperature
193	Witt L, Dennhardt N, Eich C, et al. Prevention of intraoperative hypothermia in neonates and infants: results of a prospective multicenter observational study with a new forced-air warming system with increased warm air flow. Paediatr Anaesth. 2013;23(6):469–474.	The forced air warming system providing warm air from the back is effective in preventing hypothermia in neonates and infants	IIIB	Descriptive	Neonates and infants having surgery	N/A	N/A	119	Patient temperature
194	Panossian C, Simoes CM, Milani WR, Baranauskas MB, Margarido CB. The intraoperative use of warming blankets in patients undergoing radical prostatectomy is related with a reduction in post-anesthetic recovery time. Rev Bras Anestesiol. 2008;58(3):220–226.	Use of forced air warming device reduces the length of stay in the PACU.	IIIC	Retrospective comparison	Men having radical prostectomy	Use of forced air warming	No warming	244	Length of stay in PACU

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195	Carpenter L, Baysinger CL. Maintaining perioperative normothermia in the patient undergoing cesarean delivery. Obstet Gynecol Surv. 2012;67(7):436–446.	Intraoperative forced air warming and warmed IV fluids alone do not maintain maternal temperature during and after C-section, but used in conjunction with other measures may prevent maternal and neonatal hypothermia with improvement in umbilical cord blood gases.	VA	Review of the literature	N/A	N/A	N/A	N/A	N/A
196	Tanaka N, Ohno Y, Hori M, Utada M, Ito K, Suzuki T. A randomised controlled trial of the resistive heating blanket versus the convective warming system for preventing hypothermia during major abdominal surgery. J Perioper Pract. 2013;23(4):82–86.	Forced air warming is just as effective as resistive heating at maintaining normothermia.	IB	RCT	Patients undergoing major abdominal surgery	Resistive heating device	Forced air warming device (Control group)	70	Patient temperature
197	Rathinam S, Annam V, Steyn R, Raghuraman G. A randomised controlled trial comparing Mediwrap heat retention and forced air warming for maintaining normothermia in thoracic surgery. Interact Cardiovasc Thorac Surg. 2009;9(1):15–19.	The passive warming device used in the study is as effective as FAW in maintaining normothermia during intraoperative period.	IA	RCT	Patients undergoing major thoracic surgery procedures	Passive warming blanket	Forced air warming device	30 (16 passive, 14 FAW)	Patient temperature
198	Ng V, Lai A, Ho V. Comparison of forced-air warming and electric heating pad for maintenance of body temperature during total knee replacement. Anaesthesia. 2006;61(11):1100–1104.	Intraoperative body temperature was maintained equally well in both groups.	IIB	Quasi-experimental	Patients undergoing total knee replacement.	Forced air warming device	Electric heating pad	60	Patient temperature

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199	Calcaterra D, Ricci M, Lombardi P, Katariya K, Panos A, Salerno TA. Reduction of postoperative hypothermia with a new warming device: a prospective randomized study in off-pump coronary artery surgery. J Cardiovasc Surg. 2009;50(6):813–817.	Use of the circulating water device decreased the blood loss and length of stay compared to use of forced air warming devices.	IA	RCT	Patients having off pump coronary artery bypass	Circulating water device	Forced air warming device	50	Blood loss, length of stay
200	Galvao CM, Marck PB, Sawada NO, Clark AM. A systematic review of the effectiveness of cutaneous warming systems to prevent hypothermia. J Clin Nurs. 2009;18(5):627–636.	Carbon-fiber blankets and forced-air warming systems are effective at preventing hypothermia but circulating-water garments may be more effective	IA	Systematic review of the literature	N/A	N/A	N/A	N/A	N/A
201	Hasegawa K, Nakagawa F, Negishi C, Ozaki M. Core temperatures during major abdominal surgery in patients warmed with new circulating-water garment, forced-air warming, or carbon-fiber resistive-heating system. J Anesth. 2012;26(2):168–173.	The circulating water garment was more effective than forced air warming device or carbon-fiber resistive heating system.	IIA	Quasi-experimental	Patients undergoing open abdominal surgery	N/A	N/A	36	Patient temperature
202	Rein EB, Filtvedt M, Walloe L, Raeder JC. Hypothermia during laparotomy can be prevented by locally applied warm water and pulsating negative pressure. Br J Anaesth. 2007;98(3):331–336.	A device using warm water and pulsating negative pressure was better at preventing and reversing hypothermia during laparotomy compared to a forced-air warming device.	IC	RCT	Patients having laparotomy for major abdominal surgery	Application of locally applied warm water and pulsating negative pressure warming device	Forced air warming device	20 (10 in each group)	Patient temperature

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203	Butwick AJ, Lipman SS, Carvalho B. Intraoperative forced air-warming during cesarean delivery under spinal anesthesia does not prevent maternal hypothermia. Anesth Analg. 2007;105(5):1413–1419.	Intraop lower body FAW does not prevent intraop hypothermia in women having cesarean delivery.	IC	RCT	Women having C-sections	FAW unit applied to lower body	No warming device used	30	Patient temperature/ presence of hypothermia
204	Legg AJ, Hamer AJ. Forced-air patient warming blankets disrupt unidirectional airflow. Bone Joint J. 2013;95–B(3):407–410.	There was a much larger count of particles with the forced air warming device when compared to the control and the radiant warming device.	IIB	Quasie-experimental	Simulation	Forced air warming device/ Radiant warming device	No device	N/A	Particle count
205	Belani KG, Albrecht M, McGovern PD, Reed M, Nachtsheim C. Patient warming excess heat: the effects on orthopedic operating room ventilation performance. Anesth Analg. 2013;117(2):406–411.	Force-air warming device created a significant disruptive impact on clean airflow patterns over the surgical site, and conductive fabric warming did not when compared to controls.	IIB	Quasi-experimental	Simulation	Forced air warming device or conductive fabric	Control simulation	N/A	Bubble counts
206	Legg AJ, Cannon T, Hamer AJ. Do forced air patient-warming devices disrupt unidirectional downward airflow? J Bone Joint Surg Br. 2012;94(2):254–256.	FAW resulted in significant mean increase in temp and number of particles over surgical site when compared with radiant warming or control	IIC	Quasi-experimental	Volunteer	Forced air warming device	Radiant warming device.	5 samples per method	Temperature at surgical site and particle numbers.

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207	Reed M, Kimberger O, McGovern PD, Albrecht MC. Forced-air warming design: evaluation of intake filtration, internal microbial buildup, and airborne-contamination emissions. AANA J. 2013;81(4):275–280.	FAW devices emit significant levels of airborne particles which may or may not end up on the surgical site.	IIIB	Observational study	23 FAW device blowers	N/A	N/A	NA	Microorganism from areas swabbed;
208	Dasari KB, Albrecht M, Harper M. Effect of forced-air warming on the performance of operating theatre laminar flow ventilation. Anaesthesia. 2012;67(3):244–249.	FAW release significantly higher levels of excess heat.	IIB	Observational study	Simulation	Forced-air warming blanket, over-body conductive blanket,	Under-body resistive mattress	N/A	Air-temperature at surgical site
209	Albrecht M, Gauthier RL, Belani K, Litchy M, Leaper D. Forced-air warming blowers: an evaluation of filtration adequacy and airborne contamination emissions in the operating room. Am J Infect Control. 2011;39(4):321–328.	FAW Blowers emit air borne contaminants. Alternative technologies to prevent inadvertent hypothermia should be considered.	IIIB	Descriptive	Simulation	N/A	N/A	52 blowers	Microbial counts emitted and organisms on internal air pathways
210	Albrecht M, Gauthier R, Leaper D. Forced-air warming: a source of airborne contamination in the operating room? Orthop Rev (Pavia). 2009;1(2):e28.	FAW blowers emit air borne contaminants. Alternative technologies to prevent inadvertent hypothermia should be considered.	IIIB	Descriptive	Simulation	N/A	N/A	25 blowers	Microbial counts emitted from FAW
211	McGovern PD, Albrecht M, Belani KG, et al. Forced-air warming and ultra-clean ventilation do not mix: an investigation of theatre ventilation, patient warming and joint replacement infection in orthopaedics. J Bone Joint Surg Br. 2011;93(11):1537–1544.	FAW was found to have a disruptive impact on the air flow patterns over the surgical site compared to the electric heating pad.	IIIC	Comparative	Simulated/Manikin	FAW device	Conductive fabric warming device	N/A	Bubble counts
212	Wu X. The safe and efficient use of forced-air warming systems. AORN J. 2013;97(3):302–308.	Easy to follow recommendations for choosing a FAW device	VB	Review of the literature	N/A	N/A	N/A	N/A	N/A

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213	Wood AM, Moss C, Keenan A, Reed MR, Leaper DJ. Infection control hazards associated with the use of forced-air warming in operating theatres. J Hosp Infect. 2014;88(3):132–140.	Forced air warming increases the contamination of the air but there is no link to SSI.	VB	Review of the literature	N/A	N/A	N/A	N/A	N/A
214	Tumia N, Ashcroft GP. Convection warmers—a possible source of contamination in laminar airflow operating theatres? J Hosp Infect. 2002;52(3):171–174.	There was a slight increase in the cfu found in the air after turning on the FAW device but it was not clinically significant.	IIC	Quasi-experimental	Patients having surgery	FAW device on	FAW device off	4	Bacterial counts of the air
215	Zink RS, Iaizzo PA. Convective warming therapy does not increase the risk of wound contamination in the operating room. Anesth Analg. 1993;76(1):50–53.	Use of a FAW unit does not increase the bacterial counts at the surgical sites	IIC	Quasi-experimental	Volunteers	N/A	N/a	8	Bacterial counts
216	Kellam MD, Dieckmann LS, Austin PN. Forced-air warming devices and the risk of surgical site infections. AORN J. 2013;98(4):354–366.	The evidence did not clearly identify FAW as increasing the risk of SSI.	IIIB	Literature summary	15 articles	N/A	N/A	N/A	N/A
217	Huang JK, Shah EF, Vinodkumar N, Hegarty MA, Greatorex RA. The Bair Hugger patient warming system in prolonged vascular surgery: an infection risk? Crit Care. 2003;7(3):R13–R16.	Use of a FAW unit does not increase the bacterial counts at the surgical sites	IIIB	Descriptive	Adults having prolonged abdominal vascular surgery	N/A	N/a	16	Bacterial counts
218	Forced-air warming and surgical site infections. Our review finds insufficient evidence to support changes in current practice. Health Devices. 2013;42(4):122–125.	There is insufficient evidence to state that use of FAW systems leads to an increase in SSIs.	VB	Literature review	N/A	N/A	N/A	N/A	N/A

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219	Moretti B, Larocca AM, Napoli C, et al. Active warming systems to maintain perioperative normothermia in hip replacement surgery: a therapeutic aid or a vector of infection? J Hosp Infect. 2009;73(1):58–63.	Forced air warming can be used without contaminating the field	IIB	Quasi-experimental	Patients having total non-cemented hip implants	N/A	N/A	30	SSI
220	Sessler DI, Olmsted RN, Kuelpmann R. Forced-air warming does not worsen air quality in laminar flow operating rooms. Anesth Analg. 2011;113(6):1416–1421.	FAW does not negatively effect laminar airflow.	IIB	Quasi-experimental	Volunteer and manikins	FAW unit on	FAW unit off	N/A	Tracer background particle counts
221	Chung K, Lee S, Oh SC, Choi J, Cho HS. Thermal burn injury associated with a forced-air warming device. Korean J Anesthesiol. 2012;62(4):391–392.	FAW should always be used with a blanket and according to manufacturer DFU.	VC	Case report	N/A	N/A	N/A	N/A	N/A
222	Sikka RS, Prielipp RC. Forced air warming devices in orthopaedics: a focused review of the literature. J Bone Joint Surg Am. 2014;96(24):e200.	Warming devices should be cleaned and maintained according to manufacturer's instructions for use.	VB	Review of the literature	N/A	N/A	N/A	N/A	N/A
223	Brauer A, Quintel M. Forced-air warming: technology, physical background and practical aspects. Curr Opin Anaesthesiol. 2009;22(6):769–774.	Blankets should be attached to the hose prior to use.	VA	Review of the literature	N/A	N/A	N/A	N/A	N/A
224	Chapp K, Lange L. Warming blanket head drapes and trapped anesthetic gases: understanding the fire risk. AORN J. 2011;93(6):749–760.	The forced air warming blanket head drape should be tented and the blower should be on whenever the drape is in place.	VB	Quality study	N/A	N/A	N/A	N/A	N/A
225	Guideline for a safe environment of care, part 1. Guidelines for Perioperative Practice. Denver, CO: AORN, Inc; 2015:239–264.	Guidelines for blanket warmers	IVA	Profesional guideline	N/A	N/A	N/A	N/A	N/A

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226	Wagner K, Smith CE, Quan KJ. Prevention of hypothermia during interventional cardiology procedures in adults. Internet J Anesthesiol. 2010;23(2):14p.	Full body gel pad warming resulted in higher procedural temps and lower incidence of hypothermia compared to controls	IB	RCT	Adults undergoing elective electrophysiology	Gel pad warming	No warming	95	Presence of hypothermia
227	Perez-Protto S, Sessler DI, Reynolds LF, et al. Circulating-water garment or the combination of a circulating-water mattress and forced-air cover to maintain core temperature during major upper-abdominal surgery. Br J Anaesth. 2010;105(4):466–470.	Circulating water mattress plus forced air warming is non-inferior to just circulating water garment.	IC	RCT	Patients having abdominal surgery	Circulating water mattress plus forced air warming	Circulating water garment	36 (16 garment, 20 mattress and FAW)	Patient temperature
228	Wadhwa A, Komatsu R, Orhan-Sungur M, et al. New circulating-water devices warm more quickly than forced-air in volunteers. Anesth Analg. 2007;105(6):1681–1687.	The rate of rewarming was 25% faster with the energy transfer pad than circulating-water garment, and twice as fast as the forced air warming devices.	IIC	Quasi-experimental	Healthy adult volunteers	N/A	Energy transfer pad, to circulating-water garment, to forced air warming devices.	7	Rate of rewarming.
229	Davis JS, Rodriguez LI, Quintana OD, et al. Use of a warming catheter to achieve normothermia in large burns. J Burn Care Res. 2013;34(1):191–195.	Using an intravenous warming catheter reliably maintained core body temp[temperature during burn surgery	IIB	Quasi-experimental retrospective case-control study	Patients having burn surgery	Use of a intravenous warming catheter	Traditional temperature conserving interventions	62 procedures	Patient temperature
230	Corallo JP, King B, Pizano LR, Namias N, Schulman CI. Core warming of a burn patient during excision to prevent hypothermia. Burns. 2008;34(3):418–420.	A warm water circulating device was used to maintain normothermia during surgery on a burn patient.	VB	Case study	N/A	N/A	N/A	N/A	N/A

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231	Paris LG, Seitz M, McElroy KG, Regan M. A randomized controlled trial to improve outcomes utilizing various warming techniques during cesarean birth. J Obstet Gynecol Neonatal Nurs. 2014;43(6):719–728.	Those receiving warmed fluids had a higher intraoperative temperature and those warmed with the underbody pad had a higher temperature in the PACU.	IA	RCT	Women having cesarean birth	Application of warmed under body pad or warmed IV fluids.	Routine care	226 total	Patient temperature
232	Chakladar A, Dixon MJ, Crook D, Harper CM. The effects of a resistive warming mattress during caesarean section: a randomised, controlled trial. Int J Obstet Anesth. 2014;23(4):309–316.	Use of a resistive warming mattress decreased the rate of perioperative hypothermia in patients having cesarean birth	IA	RCT	Patients having cesarean birth	Use of resistive warming mattress	No warming mattress	116	Presence of inadvertent perioperative hypothermia
233	Perl T, Rhenius A, Eich CB, Quintel M, Heise D, Bräuer A. Conductive warming and insulation reduces perioperative hypothermia. Central European Journal of Medicine. 2012;7(3): 284-289.	A conductive warming mattress system plus insulation is more effective than insulation alone.	IA	RCT	Patients having head and neck surgery.	Insulation plus conductive warming mattress	Insulation only	30, (15 in each group)	Patient temperature
234	Sharma M, Dixon M, Eljelani F, Crook D, Harper M. A randomised controlled trial to determine the influence of carbon-polymer warming blankets on the incidence of perioperative hypothermia during and after short, day-case operations. J One Day Surg. 2014;24(4):92–99.	Use of an electric blanket during short surgeries may reduce the incidence of hypothermia.	IB	RCT	Surgical patients	Standard care plus an electric warming blanket	Standard care	70	Patient temperature
235	Munday J, Hines S, Wallace K, Chang AM, Gibbons K, Yates P. A systematic review of the effectiveness of warming interventions for women undergoing cesarean section. Worldviews Evid Based Nurs. 2014;11(6):383–393.	Forced air warming and under-body carbon polymer mattresses were effective at preventing intraoperative hypothermia	IA	Systematic review of only RCTs	N/A	N/A	N/A	N/A	N/A

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236	Hirvonen EA, Niskanen M. Thermal suits as an alternative way to keep patients warm peri-operatively: a randomised trial. Eur J Anaesthesiol. 2011;28(5):376–381.	The patients wearing a thermal suit had less temperature drop when compared to those experiencing just conventional warming methods.	IB	RCT	Patients having surgery	Application of thermal suits	No thermal suits	39 (19 in thermal suit group and 20 in control.	Patient temperature
237	Koeter M, Leijtens B, Koeter S. Effect of thermal reflective blanket placement on hypothermia in primary unilateral total hip or knee arthroplasty. J Perianesth Nurs. 2013;28(6):347–352.	Use of a thermal reflective blanket did not prevent hypothermia	IA	RCT	Patients having primary unilateral total hip or knee replacement surgery.	Application of a thermal reflective blanket	No blanket applied	58 (29 in each group)	Patient temperature
238	Han SB, Gwak MS, Choi SJ, et al. Effect of active airway warming on body core temperature during adult liver transplantation. Transplant Proc. 2013;45(1):251–254.	Active warming and humidification of anesthesia gases decreases the rate and duration of hypothermia during liver transplants.	IB	RCT	Patients having liver transplants	Use of heated humidifier	Use of heat and moisture exchanger	34 (17 each group)	Patient temperature
239	Jo YY, Kim HS, Chang YJ, Yun SY, Kwak HJ. The effect of warmed inspired gases on body temperature during arthroscopic shoulder surgery under general anesthesia. Korean J Anesthesiol. 2013;65(1):14–18.	Active warming and humidification of anesthesia gases decreases the degree of hypothermia during shoulder arthroscopy surgery.	IA	RCT	Patients having shoulder arthroscopic surgery	Use of heated humidifier	No warming	40	Patient temperature
240	Lee HK, Jang YH, Choi KW, Lee JH. The effect of electrically heated humidifier on the body temperature and blood loss in spinal surgery under general anesthesia. Korean J Anesthesiol. 2011;61(2):112–116.	Active warming and humidification of anesthesia gases decreases the degree of hypothermia during spinal surgery.	IA	RCT	Patients having spinal surgery	Use of heated humidifier	No warming	80	Patient temperature

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241	Lee Y, Kim H. The effects of heated humidified gases on body temperature and shivering in patients under general anesthesia. Int J Biosci Biotechnol. 2013;5(4):61–72.	Anesthesia gases should be heated and humidified.	IIB	Quasi-experimental	Patients having musculoskeletal surgery	Warmed gases	Room temperature gases	71	Patient temperature
242	Kim G, Kim MH, Lee SM, Choi SJ, Shin YH, Jeong HJ. Effect of pre-warmed intravenous fluids on perioperative hypothermia and shivering after ambulatory surgery under monitored anesthesia care. J Anesth. 2014;28(6):880–885.	Use of pre-warmed IV fluids decreased intraoperative hypothermia.	IA	RCT	Females having minor surgery	Pre-warmed IV fluids	Room temperature IV fluids	27participants, 26 control	Patient temperature
243	Xu HX, You ZJ, Zhang H, Li Z. Prevention of hypothermia by infusion of warm fluid during abdominal surgery. J Perianesth Nurs. 2010;25(6):366–370.	Use of warmed IV fluids decrease the rate of hypothermia inpatients having abdominal surgery.	IB	RCT	Patients having abdominal surgery	Warmed IV fluids	Room temperature IV fluids	30 (15 in each group)	Patient temperature
244	Yokoyama K, Suzuki M, Shimada Y, Matsushima T, Bito H, Sakamoto A. Effect of administration of pre-warmed intravenous fluids on the frequency of hypothermia following spinal anesthesia for cesarean delivery. J Clin Anesth. 2009;21(4):242–248	Use of warmed IV fluids decrease the rate of hypothermia in patients having C-sections.	IB	RCT	Females having C-sections	Warmed IV fluids	No warming of IV fluids	30 (15 in each group)	Patient temperature
245	Woolnough M, Allam J, Hemingway C, Cox M, Yentis SM. Intra-operative fluid warming in elective caesarean section: a blinded randomised controlled trial. Int J Obstet Anesth. 2009;18(4):346–351.	IV fluids should be warmed and either a cabinet or a device can be used.	IB	RCT	Females having C-sections	Warmed IV fluids using a warming device or a warming cabinet.	No warming of IV fluids	75 (25 in each group)	Patient temperature

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246	Hasankhani H, Mohammadi E, Moazzami F, Mokhtari M, Naghgizadh MM. The effects of intravenous fluids temperature on perioperative hemodynamic situation, post-operative shivering, and recovery in orthopaedic surgery. Can Oper Room Nurs J. 2007;25(1):20–24.	Temperature drop in the room temperature group was greater in the control group compared to the warmed group	IB	RCT	Patients having orthopedic surgery	Warmed IV fluids	No warmed IV fluids	30	Patient temperature
247	De Mattia AL, Barbosa MH, de Freitas Filho JP, Rocha Ade M, Pereira NH. Warmed intravenous infusion for controlling intraoperative hypothermia. Rev Lat Am. 2013;21(3):803–810.	The use of warmed IV fluids alone does not prevent hypothermia.	IA	Quasi-experimental	Patients having abdominal surgery	Warmed IV fluids	No warmed IV fluids	60 (30 in each group)	
248	Andrzejowski JC, Turnbull D, Nandakumar A, Gowthaman S, Eapen G. A randomised single blinded study of the administration of pre-warmed fluid vs active fluid warming on the incidence of peri-operative hypothermia in short surgical procedures. Anaesthesia. 2010;65(9):942–945.	Administration of warm IV fluids is effective at decreasing the rate of hypothermia.	IA	Quasi-experimental	Day surgery procedures lasting <30 mins.	Warmed fluids using an inline warmer or a warming cabinet.	Room temperature fluids	76	Patient temperature
249	Tekgul ZT, Pektas S, Yildirim U, et al. A prospective randomized double-blind study on the effects of the temperature of irrigation solutions on thermoregulation and postoperative complications in percutaneous nephrolithotomy. J Anesth. 2014;29(2):165–169.	Using room temperature irrigation fluids leads to an increased rate of hypothermia and other associated complications.	IA		Patients having percutaneous nephrolithotomy	Warmed irrigation fluids	Room temperature irrigation fluids	60 (30 in each group)	Patient temperature

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250	Kim YS, Lee JY, Yang SC, Song JH, Koh HS, Park WK. Comparative study of the influence of room-temperature and warmed fluid irrigation on body temperature in arthroscopic shoulder surgery. Arthroscopy. 2009;25(1):24–29.	Warming of irrigation fluid helps to decrease the rate of hypothermia in patients having an arthroscopy.	IB	RCT	Patients having arthroscopic surgery	Warmed irrigation fluid	Room temperature irrigation fluid	46 (23 in each group)	Patient temperature
251	Jin Y, Tian J, Sun M, Yang K. A systematic review of randomised controlled trials of the effects of warmed irrigation fluid on core body temperature during endoscopic surgeries. J Clin Nurs. 2011;20(3–4):305–316.	Irrigation solution should be warmed for endoscopic surgeries	IB	Systematic review with meta-analysis	Patients having endoscopic surgery	Warmed irrigation solution	Room temperature irrigation solutions	13 RCTs / 686 patients	Patient temperature
252	Parodi D, Valderrama J, Tobar C, et al. Effect of warmed irrigation solution on core body temperature during hip arthroscopy for femoroacetabular impingement. Arthroscopy. 2014;30(1):36–41.	Warming of irrigation solutions decreases the drop in temperature.	IIA	Analytical, prospective, observational	Patients having hip arthroscopic surgery for femoroacetabular impingement	Warmed irrigation solutions	Room temperature solutions	166	Patient temperature
253	Oh JH, Kim JY, Chung SW, et al. Warmed irrigation fluid does not decrease perioperative hypothermia during arthroscopic shoulder surgery. Arthroscopy. 2014;30(2):159–164.	Warmed irrigation fluid was not superior to room-temperature irrigation fluid in reducing the occurrence of perioperative hypothermia during arthroscopic shoulder surgery.	IIA	Quasi-experimental	Patients having arthroscopic shoulder surgery	Warmed irrigation fluids	Room temperature irrigation fluids	72	Patient temperature
254	Deren ME, Machan JT, DiGiovanni CW, Ehrlich MG, Gillerman RG. Prewarming operating rooms for prevention of intraoperative hypothermia during total knee and hip arthroplasties. J Arthroplasty. 2011;26(8):1380–1386.	Raising the ambient temperature of the OR preoperatively has a minimal effect on preventing intraoperative hypothermia.	IA	RCT	Patients undergoing elective knee or minimally invasive hip arthroplasty.	Prewarming the OR	OR was not prewarmed	66	Patient temperature

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255	Ozer AB, Tosun F, Demirel I, Unlu S, Bayar MK, Erhan OL. The effects of anesthetic technique and ambient temperature on thermoregulation in lower extremity surgery. J Anesth. 2013;27(4):528–534.	IN patients having lower extremity surgery the room temperature affected the mean skin temperature. Room temp affected thermoregulation in Group A (gen anes)	IIB	Quasi experimental	Adult males having lower extremity surgery	Room temperature of 20–22 degrees C	Room temperature of 23–25 degrees C.	90	Mean skin temperature and mean body temperature
256	Cheng KW, Wang CH, Chen CL, et al. Decreased fresh gas flow cannot compensate for an increased operating room temperature in maintaining body temperature during donor hepatectomy for living liver donor hepatectomy. Transplant Proc. 2010;42(3):703–704.	Increasing the ambient room temperature increased the post-operative temperatures	IIIB	Descriptive	Patients having surgery	N/A	N/A	167	Patient temperature
257	Yang HL, Lee HF, Chu TL, Su YY, Ho LH, Fan JY. The comparison of two recovery room warming methods for hypothermia patients who had undergone spinal surgery. J Nurs Scholarsh. 2012;44(1):2–10.	Radiant warming devices effectively rewarmed patients faster than warm cotton blankets.	IIB	Quasi-experimental	Post-operative spinal surgery patients with hypothermia	N/A	Warm cotton blankets to radiant warmer	65 patients in each group	Patient temperature
258	Al-Qahtani AS, Messahel FM. Benchmarking inadvertent perioperative hypothermia guidelines with the National Institute for Health and Clinical Excellence. Saudi Med J. 2011;32(1):27–31.	In this study, improvement in the service delivered to patients resulted in a drop in the incidence of inadvertent periop hypothermia	VB	Quality report	N/A	N/A	N/A	N/A	Presence of hypothermia
259	Hegarty J, Walsh E, Burton A, Murphy S, O'gorman F, McPolin G. Nurses' knowledge of inadvertent hypothermia. AORN J. 2009;89(4):701–704.	Nurses are lacking knowledge about causes of and effects of hypothermia.	IIIB	Quantitative, descriptive	Perioperative nurses attending a meeting	N/A	N/A	130	Knowledge of hypothermia

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260	Gurunluoglu R, Swanson JA, Haeck PC; ASPS Patient Safety Committee. Evidence-based patient safety advisory: malignant hyperthermia. Plast Reconstr Surg. 2009;124(4 Suppl):68S–81S.	Provides guidance for the ambulatory setting when dealing with MH.	IVA	Clinical guideline	N/A	N/A	N/A	N/A	N/A
261	Litman RS, Joshi GP. Malignant hyperthermia in the ambulatory surgery center: how should we prepare? Anesthesiology. 2014;120(6):1306–1308.	Dantrolene should be available in all ASCs.	VB	Expert opinion	N/A	N/A	N/A	N/A	N/A