Normothermia as a SSI Reduction Tool

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Disclosure

- Arizant Healthcare Inc., a 3M company

Objectives

- Describe the impact of hypothermia on perioperative patient outcomes, including SSIs
- Determine effectiveness of perioperative patient warming measures
- Explain the relatedness of preoperative warming to the incidence of hypothermia
- Using an evidence-based practice model, identify the effectiveness of a forced-air warming gown to decrease rate of hypothermia
Surgical Care Improvement Project (SCIP)

- The Surgical Care Improvement Project (SCIP) is a national quality partnership of organizations focused on improving surgical care by significantly reducing surgical complications.
- It is a unique partnership that is proving to be a transformational undertaking in health care. The SCIP goal is to reduce the incidence of surgical complications nationally by 25 percent by the year 2010.

(SCIIP.org)

SCIP Steering Committee

- American College of Surgeons (ACS)
- American Hospital Association (AHA)
- American Society of Anesthesiologists (ASA)
- Association of peri-Operative Registered Nurses (AORN)
- Agency for Healthcare Research and Quality (AHRQ)
- Centers for Medicare & Medicaid Services (CMS)
- Centers for Disease Control and Prevention (CDC)
- Department of Veteran’s Affairs
- Institute for Healthcare Improvement (IHI)
- Joint Commission (JC)

Current SCIP Initiatives

- Beta-blocker administration
- Venous thromboembolism prevention
- Antibiotics
  - Administration within one hour before incision
  - Use of antimicrobial recommended in guideline
  - Discontinuation within 24 hours of surgery end
- Glucose control in cardiac surgery patients
- Proper hair removal
- Normothermia
Best Practices for Preventing SSIs

- **Clipping**
  - Remove hair appropriately
- **Antibiotics**
  - Use prophylactic antibiotics appropriately
- **Temperature**
  - Maintain normothermia
- **Sugar**
  - Maintain glucose control

Why Normothermia?

- Research indicates a correlation between unplanned perioperative hypothermia and:
  - impaired wound healing,
  - adverse cardiac events,
  - altered drug metabolism,
  - coagulopathies,
  - surgical site infection,
  - delayed wound closure,
  - prolonged hospital stay,
  - increased blood products administration,
  - myocardial infarction, and
  - mechanical ventilation

- Normothermia is defined as a core body temperature of 96.8 – 100.2°F (36° – 38°C)

Forced-Air Warming: Clinical Evidence

- Nearly 170 studies published on the safety and effectiveness
  - Including >60 randomized controlled trials
- Forced-air warming is the only patient warming modality with peer-reviewed clinical outcomes data proving effectiveness in maintaining normothermia resulting in a reduction of SSIs
Hypothermic colorectal surgical patients with mild hypothermia have:

- **Infection Rate**
  - Hypothermic: 15%
  - Normothermic: 20%

- **Length of Hospital Stay**
  - Patients with wound infections: 20 days
  - Patients without wound infections: 15 days

Surgical Wound Infections

Normothermia and SSI Reduction

“There is no longer a question whether maintenance of normal core body temperature is important for decreasing the incidence of SSI; the answer is unequivocally yes.”

AORN Recommended Practices

- Assess for the risk of unplanned hypothermia
  - Age
  - BMI
  - Skin integrity
  - Length of surgery
- Develop a plan of care including necessary supplies and equipment
  - Temperature monitoring
- Core temperature measurement
  - Tympanic, distal esophagus, nasopharynx and pulmonary artery
- Interventions to prevent unplanned hypothermia
  - Forced-air warming for 15 minutes pre-op
  - Circulating-water garments and table pads

Adapted from: Kurz et al., New Engl J Med, 1996
AORN Recommended Practices, cont.
• Warming devices are used safely
  – Irrigation fluids 98.6°F
  – IV Fluids – follow manufacturer instructions
• Competency
• Documentation
  – PNDS: Potential diagnoses
    • Risk for imbalanced body temperature
    • Ineffective thermoregulation
    • Hypothermia
• Policies and procedures
• Quality

ASPN Standards & Practice Recommendations
• All patients should receive:
  – Limit skin exposure to lower ambient environment temperatures
  – Initiate passive warming interventions (e.g. blankets, drapes and reflective composites)
  – Maintain ambient room temperature at 20-25 degrees C
• Patients with anesthesia time anticipated to be more than 30 minutes, at risk for hypothermia or increased risk of complications should receive:
  – Forced-air warming

Initial Interventions to Promote Normothermia in Colorectal Patients
• Education of General Surgeon groups
• Maintain OR temperatures at 88°F
• Increased use of the current forced-air warming blanket pre-operatively
• Assured just-in-time warm fluids are used for irrigation
• Applying warm cotton blanket at end of case
• Re-applying forced-air warming blanket immediately after dressings applied
• Discovered forced-air warming on the gel pad
• Considered forced-air warming gown in conjunction with or without a forced-air warming blanket
Initial Practice Interventions

• Normothermia Task Force Initiated
• Representation included:
  – Perioperative Registered Nurses (intra-op),
  – Perianesthesia Registered Nurses (pre & post-op),
  – Clinical Materials Management Specialist,
  – Anesthesiologist, and
  – Advanced Practice Registered Nurses (CNS & CRNA)
• Task was to assure to assess the process of maintaining normothermia of colo-rectal patients

SCIP-Infection-10: Change in October 2009

• Proportion of patients undergoing any operation (any age) who have anesthesia for more than one hour, who have active warming devices used or achieve normothermia within 30 minutes immediately before or 15 minutes immediately after or
  – Excludes patients with intentional hypothermia

CMS SCIP-Infection-10 Perioperative Temperature Management Measure

Numerator
• Active warming used intraoperatively
  – OR –
• At least one temp ≥36.0°C within 30 minutes immediately before or 15 minutes immediately after anesthesia end time

Denominator
• All patients undergoing surgical procedures under general or neuraxial anesthesia of 60 minutes or longer
**Evidence Based Practice**

- Not the same as Research or Performance Improvement
- Utilizes clinical research
- Utilizes clinical expertise
- Puts research into practice
- Utilizes multidisciplinary approach

**Evidence Based Practice Project**

- Iowa Model of Evidence-Based Practice
  - Triggers – problem focused and/or knowledge focused
  - Evaluate priority of topic for organization
  - Team formation
  - Research, literature and other evidence gathering and evaluation
  - Pilot the change in practice
  - Determine implementation
  - Monitor

**Triggers**

- Problem Focused
  - Process Improvement Data
  - Internal/External Benchmarking Data
Achievement of Desired Standard Continued to Fluctuate

Triggers
- Knowledge Focused
  - Research and Literature
  - National standards and guidelines
  - New products

Priority for the Facility
- Effects of hypothermia on patients
- National standards and regulations
Assemble a Team

• Core Charge Nurse from Pre-op Admission Area
• Clinical Value Analysis Nurse
• Perioperative Educator

Forming a team – purpose

• Purpose
  – Review the literature
  – Get input from stakeholders
  – Determine process of pilot

Relevant Research and Related Literature

• Effects of Hypothermia
  – Infection rates of surgical patients
• Prevention of Hypothermia Intraoperatively
  – Use of warm cotton blankets
  – Use of forced air blankets or gowns
• Effectiveness of Prewarming
Effects of Hypothermia

- 74 patients randomly assigned to routine or upper body forced air blanket
- Temps significantly less post
- Time required for full recovery – 4 hours to reach normothermia

Effects of Hypothermia

- 100 patients – lower extremity vascular reconstruction
- 36% incidence in non-warmed patients
- 16% incidence in warmed patients

Effects of Hypothermia

- 60 patients – primary unilateral total hip arthroplasties
- 8 units required in 7 of the 30 hypothermic patients
- 1 unit in 1 normothermic
Effects of Hypothermia – SSI

- 421 patients – breast, varicose vein, or hernia surgery
- SSIs
  - 14% non-warmed (19/139)
  - 5% warmed (13/277)
- More postoperative antibiotics in non-warmed group

Effects of Hypothermia - SSI

- 200 patients undergoing colorectal surgery randomly assigned hypothermia group or normothermia group
- SSIs
  - 19% non-warmed (18/96)
  - 6% warmed (6/104)
- Hypothermic patients had sutures removed one day later and average stay increased by 2.6 days (+20%)

Effects of Hypothermia

- Additional studies including a meta-analysis of 18 studies on the negative effects of hypothermia.
  - Delayed time to extubation
  - Development of neck seromas and flap dehiscence
  - Increased shivering and oxygen consumption
  - Delayed wound healing
  - Decreased drug metabolism
  - Increased hospital stay
  - Decreased thermal comfort for patient
Prewarming Effectiveness

- Reviewed studies of prewarming with forced-air blankets
- Decreased amount of temperature drop
- Decreased number of patients with hypothermia
- More effective than cotton blankets

Level of Evidence

- A – Evidence from well-designed meta-analysis
- B – Evidence from well designed controlled trials, both randomized and nonrandomized, with results that consistently support a specific action, intervention or treatment

Evaluation of Research Base

- Research supported
  - Negative effects on surgical patient when they experienced hypothermia during their perioperative experience
  - Forced-air warming during the intraoperative period did decrease hypothermia
  - Prewarming with forced-air product also decreased the incidence of hypothermia
Evidence Based Project

• Purpose
  – Determine if the use of forced air gowns would decrease the percentage of patients experiencing hypothermia during the perioperative period
  – Determine if patient comfort would increase
  – SCIP criteria – although we looked at the entire perioperative period
  – Evaluate financial impact
    • Costs
    • Linen usage

Develop a PICO statement

• Reason – to define our project
• P = patient population or problem to be evaluated
• I = intervention to be considered and evaluated
• C = comparison intervention that is currently being done
• O = outcomes that are anticipated will be accomplished

EBP Project: Forced Air Warming with Gown

• Patient population – Surgical patients receiving spinal or general anesthesia
• Intervention – Prewarming with forced-air warming gowns
• Comparison – Use of cotton blankets/current interventions
• Outcome desired – Decrease number of surgical patients with hypothermia as defined by a temp of less than 36 degrees C during their perioperative experience
EBP Project: Forced-air Warming with Gown

• **Purpose:**
  Goal was to decrease the incidence of patients experiencing hypothermia during their perioperative experience, increase patient satisfaction and be cost effective

Process

• Group representing Center for Surgical Care, PACU and Surgery
• Data collection for approximately 200 patients using current methods of warm cotton blankets
• Data collection for approximately 200 patients using forced air gowns
• Education of the device for the above departments and the post-op inpatient units
• Survey of nurses following the trial

Evaluation Forms: Prior to trial

• Areas involved:
  – Center for Surgical Care
  – Operating Room
  – Post Anesthesia Care Unit
• Data collected:
  – Temperature
  – Warming used
  – Lowest temperature in surgery
  – Cotton blankets used
Evaluation Form – During trial

- Areas involved:
  - Center for Surgical Care
  - Operating Room
  - Post Anesthesia Care Unit
- Data collected:
  - Temperature
  - Warming used
  - Lowest temperature in surgery
  - Cotton blankets used
  - Use for IV starts

Evaluation Form – After trial staff survey

- Ease of use
- Effectiveness
- Patient response
- Blanket reduction
- Number of patients being cold
- Support purchase

Evaluation – After trial staff survey

- Units Surveyed
  - Center for Surgical Care
  - Pre-Op Holding
  - PACU
  - Surgical Unit (4th)
  - Ortho Unit (6th)
Facility Project Pilot

- 189 patients in the group prior to using forced-air warming gowns
- 239 in the group that trialed the forced-air warming gowns

Results – Related to Hypothermia

- Reduction in patients being cold
- Reduction in patients shivering
- Reduction in number of outpatients experiencing hypothermia
- Reduction in number of outpatient admissions experiencing hypothermia

All Patients – Hypothermia Rate

Hypothermia rate for all patients at some point during surgery:
19% reduction
Outpatients – Hypothermia Rate

Hypothermia rate for outpatients at some point during surgery: 14% reduction

Outpatient Admissions – Hypothermia Rate

Hypothermia rate for outpatient admissions: 26.5% reduction

Evaluation – After trial staff survey

- Effectiveness for IV Starts
- Blanket reduction
- Patient Response
- Number of patients being cold
- Ease of use
- Support implementation
Staff Evaluation Surveys

- It was indicated on 55 patients that the gown was tried for IV starts
- It was successful 54 times.

Staff Evaluation Surveys

• Linen Usage
  - Blanket Usage
    • Decrease of approx. 2 blankets in CSC, 1 in Pre-op Holding and 2 in PACU
    • Also decrease of approx. 2 on the unit
  - Gown Usage
    • Eliminated the need for linen gown usage during the first day
    • Warming gown was reused for some patients after admission during the days following surgery

Linen Usage – Blankets Per Patient Decrease

- Decrease of blankets in different areas:
  - CSC: 2 decrease
  - Pre-op Holding: 1 decrease
  - PACU: 2 decreases
  - Unit: 0 decrease
Patient Feedback

- Positive feedback submitted directly to the product manufacturer
- Autonomy in the ability to control temperature of the device
- Patient requests

Ease of use – Support implementation

- Staff response on survey
- Supported implementation

Next Steps Determined for Implementation

- Education of best period of time to have on patient according to the evidence – believe this will decrease rate of hypothermia further
- Education regarding use for IV starts
- Education on units for complete implementation throughout hospital
- Implemented July, 2009
Surgical Site Infections

- Compared quarter July – September, 2008 with July – September, 2009
- Percentage reduction translated to decrease of 8 infections
- Reviewed literature and information for average cost of SSI
- Savings for the hospital but also improved care for the patient

PI Information regarding PACU Stays

- Decrease in number of extended stays in PACU related to hypothermia
Importance of Evidence-Based Practice Project and Implementation

- Impact on patient
  - Improve patient outcomes
  - Improve patient comfort
  - Increase patient autonomy

Sharing of Information

- Presentation at the SCH Research and Evidence-Based Practice Conference in 2009
- Facility EBP Group presentations in May, 2010
- Presentation at the Association of peri-Operative Registered Nurses Congress in 2011
- Poster Abstract Presentations
  - Summer Institute on Evidence-Based Practice, San Antonio, TX
  - American Association of Ambulatory Surgery Centers Conference 2010, Anaheim, CA

Questions?

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References


