HAVE YOU OPTIMIZED YOUR PRE-OP PROTOCOL TO IMPROVE PATIENT OUTCOMES?

4/28/2017
Disclosure

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Presented by:

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• 3M Infection Prevention Division
Learning Objectives

1. Describe interventions in preparation of the patient for surgery that will reduce the risk of SSI

2. Identify relevant clinical studies that support these measures

3. Describe guidelines and recommended practices that support each intervention
Surgical Site Infections

- Surgical procedures are becoming increasingly more complicated
- Population of surgical patients has more underlying conditions
- These factors increase the risk for developing surgical site infection (SSI)
SSI Epidemiology

SSI are common complications

- SSI occur in 2-5% of patients undergoing inpatient surgery
- Approximately 160,000-300,000 SSI occur each year in the US
- SSI represent 20% of all HAI in hospitalized patients
- SSI is now the most common and costly HAI
Outcomes associated with SSI

- Up to 60% of SSI may be preventable by use of evidence-based guidelines
- Each SSI increases length of stay by approximately 7-11 days
- SSI is associated with 2-11 times higher risk of mortality compared with operative patients without SSI
  - 77% of mortality in patients with SSI is directly attributable to that SSI
- Attributable costs of SSI depend on the type of operative procedure and the infecting pathogen
  - Believed to account for $3.5-10 billion annually in health care expenditures
Process Variability

\[
\left( \frac{\text{Dose of Bacteria}}{\text{(Contamination)}} \right) \times \left( \frac{\text{Virulence}}{\text{(Resistance)}} \right) = \text{Risk}
\]

Resistance of the Host
(Patient)

Patient Variability

CDC Guideline For Prevention Of Surgical Site Infection, 1999
http://www.cdc.gov/ncidod/dhqp/gl_surgicalsite.html
Patient Variability: Resistance of the host (patient)

- Age
- Compromised Immune System
- Diabetes
- Remote Site Infection (Not Treated Prior To Surgery)
- Nutritional Status
- Nicotine Use
- Prolonged Preoperative Stay
- Obesity
- Steroid Use
- Duration of Surgery
Process Variability

- Hand hygiene
- Appropriate antimicrobial prophylaxis
- **Preoperative bathing**
- Nasal decontamination
- Oral decontamination
- **Hair removal**
- Skin preparation
- Surgical hand antisepsis
- Appropriate surgical attire and drapes

- Operating room characteristics
  - Ventilation, traffic, environmental surfaces
  - Sterilization
- Patient management
  - **Normothermia**
  - Glucose control
  - Oxygenation
- Surgical technique
  - Hemostasis
  - Failure to obliterate dead space
  - Tissue trauma
Pre-Operative
Bathing/Showers/Wipes
Process Variability

- Hand hygiene
- Appropriate antimicrobial prophylaxis
- **Preoperative bathing**
- Nasal decontamination
- Oral decontamination
- Hair removal
- Skin preparation
- Surgical hand antisepsis
- Appropriate surgical attire and drapes

Operating room characteristics
- Ventilation, traffic, environmental surfaces
- Sterilization

Patient management
- Normothermia
- Glucose control
- Oxygenation

Surgical technique
- Hemostasis
- Failure to obliterate dead space
- Tissue trauma
Decreasing Microbial Counts on the Skin

Preoperative showers / baths / wipes

- Cleanse the skin by removing dirt and debris
- Products that include an antimicrobial agent will also decrease microbial counts
Preoperative Bathing Recommended Practice

CDC – Guideline for Prevention of Surgical Site Infections, 1999

- “Require patients to shower or bathe with an antiseptic agent at least the night before the operative day” (*Category IB*)

“Chlorhexidine gluconate-containing products require several applications to attain maximum antimicrobial benefit, so repeated antiseptic showers are usually indicated. Even though preoperative showers reduce the skin’s microbial colony counts, they have not definitively been shown to reduce SSI rates.”
Preoperative bathing with chlorhexidine-containing products” (Unresolved issue)

“Preoperative showering with agents such as chlorhexidine has been shown to reduce bacterial colonization of the skin. Several studies have examined the utility of preoperative showers, but none has definitively proven that they decrease SSI risk. A recent Cochrane review evaluated the evidence for preoperative bathing or showering with antiseptics for SSI prevention. Six randomized, controlled trials evaluating the use of 4% chlorhexidine gluconate were included in the analysis, with no clear evidence of benefit noted. To gain the maximum antiseptic effect of chlorhexidine, adequate levels must be achieved and maintained on the skin. Typically, adequate levels are achieved by allowing CHG to dry completely.”

Preoperative Bathing Recommended Practice

AORN – Perioperative Standards and Recommended Practices, 2015

➢ “The collective evidence supports that preoperative patient bathing may reduce the microbial flora on the patient’s skin before surgery.”

➢ “The patient should be instructed to bathe or shower before surgery with either soap or a skin antiseptic on at least the night before or the day of surgery.”

➢ Although many studies support the use of 2% CHG cloths for preoperative bathing, additional research is needed before a practice recommendation can be made.”

1. AORN. Guidelines for Perioperative Practice, Denver, Colorado: AORN, Inc.; 2015
CHG bathing

• The patient’s endogenous flora is the leading cause of SSI and antiseptics decrease bacteria present on the skin\(^1\)
• Preoperative bathing with CHG is effective in reducing skin flora, the same effect is not achieved with the use of soap alone.\(^2-4\)
• Review by Webster\(^5\) did not show a statistically significant reduction in SSI, the studies included were limited to use of 4% CHG
• Use of a non-rinseable form of CHG (2% impregnated cloths) results in a significantly increased reduction in skin flora compared to 4% CHG showers. This reduction was greater with repeated application\(^6\)

5. Webster J, Osborne S. Preoperative bathing or showering with skin antiseptics to prevent surgical site infection (Review). *The Cochrane Library* 2012; 9.
Summary
Preoperative Wipes or Showers

➢ Reduces the bacterial burden on the patient’s skin prior to surgical incision

➢ Practical problems: patient compliance, patient’s ability to bath/shower, and consistency in method of preparation

➢ 2% CHG impregnated cloth proven more effective than 4% CHG liquid detergent in multiple studies

➢ Patient information regarding CHG
  • Inactivated by soaps and shampoos
  • Keep out of eyes and ears
  • Do not use lotions, powders, or creams after application
Reducing Bacteria in the Nares
Process Variability

- Hand hygiene
- Appropriate antimicrobial prophylaxis
- Preoperative bathing
- **Nasal decontamination**
- Oral decontamination
- Hair removal
- Skin preparation
- Surgical hand antisepsis
- Appropriate surgical attire and drapes

Operating room characteristics
- Ventilation, traffic, environmental surfaces
- Sterilization

Patient management
- Normothermia
- Glucose control
- Oxygenation

Surgical technique
- Hemostasis
- Failure to obliterate dead space
- Tissue trauma
Why Implement an Intervention to Reduce Bacteria in the Nares?

• Surgical Site Infections (SSIs) are now the most common and costly HAIs, occurring in 2 – 5% of patients and account for 20% of all HAIs in hospitalized patients.¹

• *S. aureus* is the leading cause of SSI²

• Approximately 30% of the population are colonized with *S. aureus* in the nares.³

• 80% of the *S. aureus* infections are caused by the patient’s own nasal flora.⁴

  » In a study published in the New England Journal of Medicine in which nasal screening was done, for the patients from which samples were available from both the nares and the surgical site (known as paired isolates), over 84% of the *S. aureus* strains isolated from the nares were identical to those isolated from the surgical site.


Nasal Carriage of *S. aureus* is a Major Risk Factor for SSI


- Meta-analysis of five clinical studies
- On average, nasal carriage of *S. aureus* increases the risk of SSI by nearly 6-fold
  - OR= 5.92, 95% CI [1.15-30.39]; p= 0.033
Retrospective cohort study

- 9863 procedures with nasal MRSA PCR screening

Surgery type

- Abdominal 29.8%, ortho 21.8%, neuro 19.7%, Cardiothoracic and vascular 16.7%
- 4.3% with at least 1 positive MRSA PCR day of or within 30 days of procedure

- 1.86% PCR positive developed SSI compared to 0.2% PCR negative (p< 0.0001)

- Multivariate analysis: positive MRSA PCR was an independent risk factor for SSI
  - OR, 9.20; 95%CI, 3.81-20.47, p< 0.0001
Guidelines and Recommendations

2014 SHEA/IDSA Practice Recommendation

• If unacceptably high SSI rates exist for surgical populations despite implementation of the basic SSI prevention strategies then applying standard infection control methods for outbreak investigation and management are recommended, including:
  
  • **Screen surgical patients for *S. aureus* and decolonize preoperatively for high risk procedures including some orthopedic and cardiac procedures**
  
  • Routine preoperative decolonization with mupirocin without screening and targeted use is not currently recommended due to concerns about evolving resistance

Reducing *S. aureus* in the Nares Prior to Surgery

**Bactroban Nasal®** *(mupirocin calcium ointment, 2%)*

- Indicated for institutional outbreaks of MRSA*
- Greater than 90% of subjects/patients in clinical trials had eradication of nasal colonization 2 to 4 days after therapy was completed*

**mupirocin challenges**

- Full 5-day treatment does not fit into pre-surgical logistics
- Poor patient compliance
- Antibiotic resistance

Antiseptic Prep – 5% Povidone Iodine

- Applied 1 hour before incision
- Provides a 99.5% reduction of *S. aureus* in the nares at 1 hour
- Maintains this log reduction for at least 12 hours
- Patented formula designed specifically for the nose-presents unique challenges compared to prepping skin

**Example for 12-hour Time Point**
Baseline: 4.72 logs or 52,000 *S. aureus* – 2.37 logs killed = 220 bacteria remaining at 12 hours
Antiseptic Prep – 5% Povidone Iodine

**Advantages**

- Resistance has not been shown,¹ supports antibiotic stewardship
- Broad spectrum
- Easy to implement in pre-op
- No need to change current protocols
  - i.e., screening
- Directly observed application ensures compliance²
- Demonstrated efficacy in reducing SSI risk

**Disadvantages**

- A small number of patients may be sensitive to povidone iodine-containing products
- Reduces bacteria, does not eradicate

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1. 3M Study 05-011322
Clinical Evidence-Implementation
Clinical Trial Designs – Hierarchy of Evidence

- Systematic Reviews
- Meta-analyses
- Randomized Controlled
- Quasi-experimental
- Cohort Studies
- Case Control Studies
- Case Series
- Case Reports

Descriptive Studies:
- No comparative group
- Description of exposed subjects

Observational Studies:
- No control over allocation of intervention
- No randomization

Experimental Studies:
- Randomization
- Control over use of intervention
- No randomization

Quality of evidence
Clinical Trial Designs – Hierarchy of Evidence for Nasal Antisepsis

- Systematic Reviews
- Meta-analyses
- Randomized Controlled Studies
- Quasi-experimental Studies
- Cohort Studies
- Case Control Studies
- Case Series
- Case Reports

- Phillips, et al.
- Rezapoor, et al.
- Bebko, et al.
- Hogenmiller, et al.
- Waibel, et al.
- Osborn & Reynolds
- Torres, et al.
- Flynn & Carr
- Brown, et al.

“Before and After” Bundle

3M™ Skin and Nasal Antiseptic
Clinical Study Rationale

Preventing Surgical Site Infections: A Randomized, Open-Label Trial of Nasal Mupirocin Ointment and Nasal Povidone-Iodine Solution

- Protocol to reduce the risk of SSI consisted of:
  - CHG bathing the night before and the morning of surgery nasal
  - Nasal mupirocin ointment twice daily for 5 days preoperatively

- Barriers to protocol:
  - 86% compliance to mupirocin regimen
  - 8% of patients reported difficulty obtaining mupirocin due to cost
  - Concerns regarding reports of mupirocin resistance

- These barriers led to search for an alternative
Clinical Studies

Randomized trial comparing SSI after arthroplasty or spine fusion surgery. Patients receiving two applications of Sage® 2% CHG cloths were randomized to:

» one time treatment of 3M™ Skin and Nasal Antiseptic or
» five days of Bactroban Nasal® mupirocin ointment prior to surgery

The primary end point was deep SSI within 3 months of surgery

Results: Intent to treat (n=1,697); Per protocol (n= 1,539)

- Significantly more adverse events were reported by patients in the mupirocin group (8.9%) than patients in the antiseptic group (1.8%) (p<0.05 for all treatment related symptoms)


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Conclusion:

Nasal PI may be considered as an alternative to mupirocin in a multifaceted approach to reduce SSI

Other observations:

• Compared to mupirocin in terms of cost and efficacy, nasal PI provides more value, defined as quality of outcomes divided by cost

• Application of nasal PI by the patient care team just prior to surgery may ensure greater compliance
Clinical Studies

Prospective study comparing SSI in elective orthopedic surgery with hardware before and after implementation of a preoperative decontamination protocol:

» Sage® 2% CHG cloths and Peridex™ 0.12% CHG oral rinse night before and morning of surgery

AND

» 3M™ Skin and Nasal Antiseptic morning of surgery

The primary end point was 30 day SSI rates

Results:

- 100% compliance to protocol
- Multivariate logistic regression: Decontamination protocol = Significant independent protective factor against SSI
  (OR 0.24 [95% CI, 0.08-0.770]; p = 0.02)

Conclusion

“Universal decontamination using this low-cost protocol may be considered as an additional prevention strategy for SSIs”...

Other observations:

– Wider implementation without the need of SA carrier screen and treat may allow for cost savings.
– Advantages to the protocol include shorter duration, cost effectiveness (compared to PCR based protocols), and potentially fewer concerns about antibiotic resistance.
Clinical Studies

Retrospective study comparing infection rate and cost difference between two preoperative protocols in THA and TKA surgery

- MRSA screening, carriers treated with mupirocin preoperatively twice daily for 5 days (control)
- Received one application of 3M™ Skin and Nasal Antiseptic in preop (intervention)

Both groups: CHG bathing for 5 days before surgery; operative leg cleansed with CHG wipe in preop

Results:

- 1,853 patients were included
- No difference in SSI rate between groups: 0.8% in both groups (p = 1.0)
- Significant difference in the mean cost per case: control group: $121.16 versus intervention group: $27.21 (p ≤ 0.01)
- Savings of $93.95/patient

Conclusion

There were significant cost savings with no difference in infection rates; therefore, the 5% povidone-iodine nasal antiseptic is financially and clinically successful.
Clinical Studies

Study comparing SSI between cohorts after spine surgery before and after implementation of 3M™ Skin and Nasal Antiseptic

- All patients undergoing surgery from 01/09-08/10; before nasal antiseptic (control)
- All patients undergoing surgery from 09/10-11/11; after nasal antiseptic implemented (intervention)

Results:

- 9,135 patients were included
  - Significant reduction in SSI rate:
    - control group: (1.22%; 63/5,154 patients) versus intervention group: (0.45%;18/3,981 patients) (p=0.0029)
- There was no trend in the infection rate prior to the intervention (p= 0.18)
- The infection rate for any month pre-intervention was 1.04 times the infection rate of the previous month (95% CI, 0.98 to 1.10)

Preoperative use of the 5% nasal antiseptic prior to surgical intervention resulted in a statistically significant decrease in postoperative infections.
Clinical Studies

Randomized controlled trial comparing *S. aureus* cultures at baseline and after application of nasal treatment in patients undergoing total joint arthroplasty

<table>
<thead>
<tr>
<th>Treatment</th>
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<tbody>
<tr>
<td>Randomized to either:</td>
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<tr>
<td>• Off the shelf 10% povidone iodine (10% PI)</td>
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<tr>
<td>• 3M™ Skin and Nasal Antiseptic (5% PI)</td>
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<tr>
<td>• Saline (control)</td>
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</table>

Nasal swabs were taken preoperatively prior to nasal treatment (baseline), and again at 4 hours and 24 hours after treatment.

• 429 patients were randomized, of which 95/429 (22.1%) were positive at baseline for *S. aureus* and 13.6% of these were MRSA.

• 5% PI formulation demonstrated significantly more effective intranasal decolonization of *S. aureus* over the 4 hour time interval (p=0.003).

• 10% PI no different than saline (control)

### Negative Nasal *S. aureus* Cultures Post Treatment

<table>
<thead>
<tr>
<th></th>
<th>4 hours</th>
<th>24 hours</th>
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<tbody>
<tr>
<td>5% PI (n=34)</td>
<td>48%</td>
<td>41%</td>
</tr>
<tr>
<td>10% PI (n=34)</td>
<td>41%</td>
<td>28%</td>
</tr>
<tr>
<td>Saline (n=27)</td>
<td>79%</td>
<td>31%</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Patients with negative <em>S. aureus</em> culture (%)</th>
<th>0%</th>
<th>10%</th>
<th>20%</th>
<th>30%</th>
<th>40%</th>
<th>50%</th>
<th>60%</th>
<th>70%</th>
<th>80%</th>
<th>90%</th>
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| 24 hours                                          |    |     |     |     |     |     |     |     |     |     |
| 5% PI                                             | 41%|     |     |     |     |     |     |     |     |     |
| 10% PI                                            | 41%|     |     |     |     |     |     |     |     |     |
| Saline                                            | 31%|     |     |     |     |     |     |     |     |     |
Conclusion

The specially formulated 5% PI solution, which contains a specific adherent polymer, remains in the nares for a longer period, which may explain its better efficacy.
Additional References


- Osborn N, Reynolds L. Embedding an Infection Preventionist (IP) in the OR. Presented at the AORN Surgical Conference and Expo, Denver, CO, March 2015.
Summary

- Nasal carriage of *S. aureus* increases risk of SSI, and is of increased focus for high risk surgical procedures.

- If *S. aureus* SSI is higher than benchmark despite effective basic SSI risk reduction strategies then implementation of *S. aureus* decolonization program is recommended.

- Intranasal mupirocin has been used historically to decolonize the nares and is associated with compliance burdens.

- 5% PI formulated specifically for intranasal application is an option that provides directly observed, just in time application with demonstrated efficacy in reducing the risk of SSI.
Pre-Operative Hair Removal
Process Variability

- Hand hygiene
- Appropriate antimicrobial prophylaxis
- Preoperative bathing
- Nasal decontamination
- Oral decontamination
- **Hair removal**
- Skin preparation
- Surgical hand antisepsis
- Appropriate surgical attire and drapes

- Operating room characteristics
  - Ventilation, traffic, environmental surfaces
  - Sterilization

- Patient management
  - Normothermia
  - Glucose control
  - Oxygenation

- Surgical technique
  - Hemostasis
  - Failure to obliterate dead space
  - Tissue trauma
Hair Removal Methods

Clipping

Chemical Depilatory

Shaving (Razor)
Pre-Operative Hair Removal

Shaving causes:

- Nicks
- Cuts
- Microscopic epidermal injuries

Which can lead to Surgical Site Infection (SSI)

## Pre-Operative Hair Removal

<table>
<thead>
<tr>
<th>Hair-Removal Method</th>
<th>Discharge</th>
<th>30-Day Follow-up</th>
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<tr>
<td>PM Razor</td>
<td>14/271</td>
<td>23/260</td>
</tr>
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<td>17/266</td>
<td>26/260</td>
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<tr>
<td>PM Clipper</td>
<td>10/250</td>
<td>18/241</td>
</tr>
<tr>
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SSI Rates

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2015 AORN Guideline

- Hair removal at the surgical site should be performed only in select clinical situations.

- Patients should be instructed not to shave at home.

- When necessary, hair at the surgical site should be removed by clipping or depilatory methods in a manner that minimizes injury to the skin.

- Hair should be removed in a location outside the operating room or procedure room.
Pre-Operative Hair Removal

“Do not remove hair at the operative site unless the presence of hair will interfere with the operation. Do not use razors. If hair removal is necessary, remove hair outside the operating room using clippers or a depilatory agent.

SHEA/IDSA Practice Recommendations

Anderson, D.J. et al. Strategies to Prevent Surgical Site Infection in Acute Care Hospitals: 2014 Update. Infection Control and Hospital Control Epidemiology, June 2014, Vol. 35, No. 6
Prewarming to Maintain Normothermia
Process Variability

- Hand hygiene
- Appropriate antimicrobial prophylaxis
- Preoperative bathing
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- Normothermia
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- Oxygenation

Surgical technique
- Hemostasis
- Failure to obliterate dead space
- Tissue trauma
Normothermia

- Normothermia: the body’s ideal thermal state
- Normal core temperature: \(^1\)
  - Approximately 37.0°C (98.6°F)
- Temperature gradient: \(^1\)
  - 2-4°C between the core and periphery
- Hypothalamus \(^1,2,3\)
  - Regulates core body temperature

Thermoregulation: Under Normal Circumstances

0.2°C Interthreshold Range

Vasoconstriction

NST

Shivering

Vasodilation

Sweating

The body’s normal response to temperature (°C)

32 33 34 35 36 37 38 39 40 41


Thermoregulation: Under Anesthesia

- **Vasoconstriction**
- **Vasodilation**
- **Sweating**
- **Hypothermia**: $< 36.0^\circ C$


Anesthesia causes vasodilation, or an opening of arterial shunts, allowing the warm blood from the core to flow freely and mix with the colder periphery. As the blood circulates, it cools until returning back to the heart, where it causes a drop in core temperature. This is known as heat redistribution, commonly referred to as RTD (redistribution temperature drop).

Maintaining Patient Normothermia

The **induction of anesthesia** is the most significant contributor to unintended perioperative hypothermia in surgical patients.

Reducing the impact of redistribution temperature drop through prewarming is an effective way to help maintain patient normothermia.

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Adverse Effects of Unintended Perioperative Hypothermia

There are many documented adverse effects of unintended perioperative hypothermia including:

- Wound infection
- Myocardial ischemia and cardiac disturbances
- Coagulopathy
- Prolonged and altered drug effect
- Increased mortality
- Shivering and thermal discomfort
- Delayed emergence from anesthesia
Benefits of Normothermia

Maintaining normothermia may yield positive results such as:

- Reduction in the use of blood products
- Shortened length of hospital stay
- Decreased ICU time
- Reduced rate of wound infection
- Decreased likelihood of myocardial infarction
- Lower mortality rates

The Science Behind Prewarming
What Is Prewarming?

Prewarming: the application of heat *prior to anesthesia* for the purpose of increasing total body temperature

• Prewarming = “banking heat”

• Total body temperature = the average combined temperature of the periphery and core
Why Is Prewarming Important?

- It is difficult to **treat** RTD but it can be **prevented** by prewarming.

- Prewarming increases the temperature of the periphery, which limits the amount of heat lost from the core through redistribution.

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Normothermia: An Important Topic
Evidence from Clinical Studies
1. Prewarming Study

**Effects of Prewarming Patients in the Outpatient Surgery Setting**

**Study Design**

Randomized Control Trial (RCT). Patients (N=100) randomized to:

- Forced-air warming (FAW – Treatment, N=50)
- Cotton blankets (Control, N=50)

**Objective**

Effect of prewarming on the patient temperature at arrival to PACU

Results

FAW is more effective than warmed cotton blankets in:

- achieving higher temperature post-op \( (p=0.000) \)
- more patients self reported thermal comfort \( (p=0.000) \)
2. Prewarming Study

Effect of Prewarming on Post-Induction Core Temperature and the Incidence of Inadvertent Perioperative Hypothermia in Patients Undergoing General Anesthesia

Study Design

- Elective spinal surgery patients (N=68) randomized to one of two groups:
  - **Prewarmed** (n=31)
    - 38°C for 60 min preoperatively and warmed intraoperatively with the 3M™ Bair Paws™
  - **Intraop warming only** (n=37)

Objective

- Efficacy of prewarming in preventing inadvertent perioperative hypothermia
Study Findings

- **Prewarming** for 60 min with a forced-air warming gown resulted in:
  - Temperature maintained >36°C in 21 (68%) patients in the prewarmed group, compared with 16 (43%) patients in the control group (p=<0.05).
  - Significantly smaller decrease in mean core temp at 40, 60 and 80 min (p<0.05)
3. Prewarming Study

Effects of preoperative warming on the incidence of wound infection after clean surgery

Study Design

RCT - Patients having clean (breast, varicose vein or hernia) surgery (N=421), randomized to:

- **Unwarmed** group (n=139)
- **Warmed** group (n=277) for a minimum of 30 minutes before surgery as:
  - Full body with FAW (n=139)
  - Local warming to the planned wound area (n=138)

Objective

Effect of prewarming on SSI rate of clean surgeries

Study Findings

• Prewarming for 30 minutes showed a significant reduction in infection rates (p=0.001)

• Significantly more antibiotics prescribed to unwarmed group (p=0.002)
4. Prewarming Study

Impact of Preoperative Warming on Maintenance of Normothermia and Outcome after Colorectal Surgery

Study Details

• Phase 1: Intraoperative warming (FAW + Fluid warming) N=82
• Phase 2: Prewarming (FAW gown + fluid warming) + Intraoperative warming N=59
• OR room temperature maintained at 21°C

Outcomes Measured

• Primary outcome – incidence of admission to PACU with a temp < 36°C
• Secondary outcome - complication rate during hospital stay
• Temps taken at 4 time points: OR arrival, incision, end of surgery, and PACU arrival
Study Findings

• Prewarming
  • Significantly higher normothermic patients on PACU admission (95%) of vs control (43%) (p<0.01)
  • Prewarmed patients had a tendency to have fewer infections and spent less time in the hospital (LOS)

* Significantly different temperature between groups (p=0.05)
Summary of Clinical Evidence

- Prewarming can decrease the incidence of perioperative hypothermia\(^1,2\)

- Prewarming is associated with reduced rates of SSIs\(^3\)

- Prewarming patients has been associated with decreased anxiety and increased satisfaction and comfort rates\(^1,4\)

- Prewarming can result in cost savings\(^1\)

Prewarming & Patient Satisfaction

- Prewarming can provide both **clinical** and **comfort** benefits
- Recent studies have examined the effects of **prewarming** on patient comfort and satisfaction
- Prewarming with a forced-air warming gown vs. warmed cotton blankets can positively affect patient comfort, satisfaction and anxiety levels

> Warmth can play a role for a positive patient experience

Normothermia: An Important Topic

APIC
AST
Institute for Health Care Improvement (IHI)
ASPA
UK Department of Health – National Health Service (NHS)
SHEA

AORN

The Joint Commission (TJC)

AANA

Canadian Patient Safety Institute

ASA

National Institute for Health and Clinical Excellence (NICE)

NQF

Swedish Association of Local Authorities and Region

CMS

Scottish Patient Safety Alliance

Australian Commission for Safety and Quality in Health Care

CMS

NQF
AORN’s Recommended Practices for Unplanned Perioperative Hypothermia

- Create a plan to reduce the risk of unintended perioperative hypothermia
- Monitor core temperatures starting in pre-op and continuing throughout the perioperative process
- 15 minutes of prewarming prior to the start of anesthesia
- Maintenance of normothermia during surgery
- Utilize a warming modality such as:
  - Forced-air warming – Safe, proven, effective and commonly used
  - Circulating-water garments – Effective in adult and pediatric patients
  - Energy transfer pads – Effective in reducing hypothermia during off-pump cardiac surgery

Specific recommendations for pre-op include:

- Assessing every patient by monitoring temperatures, identifying risk factors and thermal comfort level of the patient
- Utilizing active warming for patients with temperatures <36°C
- Providing thermal comfort through passive measures
- Consider prewarming – “Evidence suggests that prewarming for a minimum of 30 minutes may reduce the risk of subsequent hypothermia.”
Summary

• The **induction of anesthesia** is the most significant contributor to unintended perioperative hypothermia in surgical patients.
• Reducing the impact of RTD through prewarming is an effective way to help maintain patient normothermia.
• Studies have shown that prewarming patients has many clinical, as well as comfort benefits.
• Prewarming has shown to increase patient satisfaction rates and decrease anxiety levels.
• Both ASPAN and AORN recommend preoperatively assessing patients to determine risk for perioperative hypothermia.
• Prevention of hypothermia is one of the top 10 patient safety concerns for perioperative RNs