TEMPERATURE REGULATION: WHAT IS THE FUSS?

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TEMPERATURE REGULATION: WHAT IS THE FUSS?

Objectives:

The learner will be able to:

- Verbalize the physiology of temperature regulation
- Discuss the impact of hypothermia on the surgical patient
- Discuss the quality measure normothermia

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Definitions:

- **Core Temperature:** temp. of core thermal compartment;
  - Well perfused-consists of major organs of trunk and head
  - Stable; most accurate indication of temp. during periods of rapid fluctuation
- **Normothermia:** Core temp. 36◦ to 38◦ C (96.8◦ to 100.4◦ F)
- **Hypothermia:** Core temp. less than 36◦ (96.8◦ F)
- **Hyperthermia:** Core temp. greater than 38.5◦ C (101.3 ◦ F)

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Body regulates temperature in 2 ways:

- Autonomic: maintains core temp in range of 0.2◦C above or below 36◦C (96.8◦F)
  - Thermoreceptors located:
    - Skin surface
    - Deep abdominal and thoracic tissue
    - Spinal cord
    - Hypothalamus
    - Parts of brain
  - Response to cold : vasoconstriction/ shivering
- Behavioral responses: perceived change in skin temp, not core temp
  - Individual responds by: adding blankets/ adjust room temp/ move to warmer location

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Affects of hypothermia:

- 3 X greater risk of adverse myocardial outcomes
- Impairs neutrophil function
- Trigger subq vasoconstriction =
  - Tissue hypoxia=
    - Increased risk of SSI
- Increases duration of hospitalization by 20%
- Increased blood loss
- Prolonged and altered drug effects
- Delayed discharge from PACU
- Pressure ulcer development

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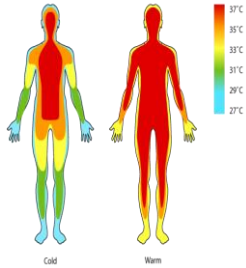

How does hypothermia happen?

Risk factors:

- Extremes in age
- Systolic BP less than 140 mm Hg
- Female
- Level of spinal block
- BMI
- Procedure duration
- Anesthesia duration
- Hx diabetes

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Pre-operative factors:

- Fasting
- Colon prep
- Skin exposure
- Cool fluids
- Pre-existing medical conditions

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Intraoperative:

- General anesthesia:
  - Removes behavioral responses
  - Increases change threshold to 4◦C
- Regional anesthesia
  - Impairs regional responses
  - Impairs central control
- External
  - Ambient room temperature
  - Draping
  - IV fluids/ irrigation

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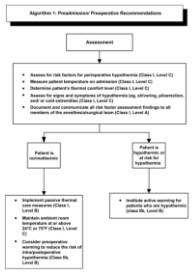

Preadmission/ Perioperative recommendations

- ✓ Assessment
  - ✓ Risk factors
  - ✓ Obtain temperature
  - ✓ Outward signs/ symptoms of hypothermia
  - ✓ Document/ communicate
- ✓ Normothermic:
  - ✓ Passive warming: warm blankets, socks, head covering, limit skin exposure
  - ✓ Maintain room temp
- ✓ Hypothermic or risk for:
  - ✓ Active warming: forced air warming system, radiant warmers, negative-pressure warming systems, warmed humidified inspired oxygen

AORN's Evidence-Based Clinical Practice Guideline for the Prevention of Perioperative Normothermia, second edition, pg 163

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What is a risk for hypothermia?

Having 2 of the following = high risk

- ASA greater than 2
- Pre op temperature less than 96.8F/ 36C
- Receive both regional and general anesthesia
- Undergoing major surgery
- Pt with known risk of cardiovascular complications

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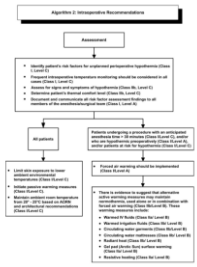

Intraoperative Recommendations:

- ✓ Assessment
  - ✓ Risk factors
  - ✓ Frequent temp monitoring
  - ✓ Signs/symptoms
  - ✓ Pt thermal comfort level
  - ✓ Document/ communicate
- ✓ ALL patients
  - ✓ Limit skin exposure
  - ✓ Passive warming
  - ✓ Ambient room temp 68-77-F
- ✓ Anticipated anesthesia > 30 min & hypothermic pre-op
  - ✓ Forced air warming
  - ✓ Warmed IV fluids
  - ✓ Warmed irrigation fluids
  - ✓ Circulating water garments
  - ✓ Circulating water mattresses
  - ✓ Radiant heat
  - ✓ Gel pad
  - ✓ Resistive heating

ASPAN's Evidence-Based Clinical Practice Guideline for the Promotion of Perioperative Normothermia: second edition, pg 464

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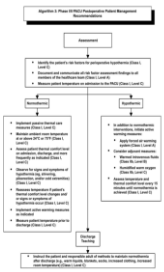

Post-operative Recommendations:

- ✓ Assessment
  - ✓ Risk factors
  - ✓ Measure
  - ✓ Document/ communicate
- ✓ Normothermic:
  - ✓ Passive measures
  - ✓ Maintain room temperature
  - ✓ Assess thermal comfort on admit, discharge and prn
    - ✓ Reassess if changes
  - ✓ Signs/ symptoms
    - ✓ Reassess if changes
- ✓ Hypothermic:
  - ✓ All of normothermic measures, plus
  - ✓ Apply forced air warming
  - ✓ Consider warmed IV fluids
  - ✓ Consider humidified warm oxygen
  - ✓ Assess temp and thermal comfort every 15 minutes until normothermic and document
- ✓ Discharge teaching

ASPAN's Evidence-Based Clinical Practice Guideline for the Promotion of Perioperative Normothermia: second edition, pg 465

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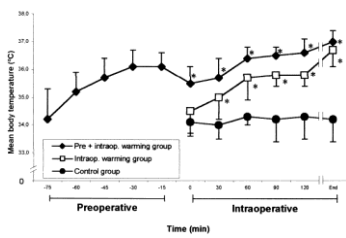
Points to ponder:

- Use the same technique to measure temperature
- Do not use the warming device hose without the manufacturer blanket
- Measure temperature of fluids before use

Opportune active measure application for hypothermia prevention



Vanni SM, Braz JR, Modolo NS, Amorim RB, Rodrigues GR,Jr. Preoperative combined with intraoperative skin-surface warming avoids hypothermia caused by general anesthesia and surgery. *J Clin Anesth*. 2003;15:119-125

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Outcome:

- Warming measures applied at least 30 minutes pre-operative

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Policies and Procedures:

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Poll question

Does your facility assess for hypothermia throughout the peri-operative process?

- yes
- no

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Poll Question

Does your facility utilize the same method of temperature measurement throughout the facility?

- Yes
- No

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Poll Question

What method(s) does your facility utilize for patient warming?

A. Warm blankets
B. Warm fluids
C. Increasing ambient room temperature
D. Forced-air warming
E. All of the above
F. None
G. Both A and B
H. A, B and C
I. A and C
J. B and C

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Inadvertent perioperative hypothermia

- 50-70% of those undergoing surgical procedures
- $2,500-$7,000 reduction in cost/pt through maintenance (Roberson, Dieckmann, Rodriguez, & Austin, 2013, p. 351)

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Appendix B: Preview Section

ASC-13: Normothermia Outcome

Measure Background and Overview:

Measure Calculation and Reporting:

ASC-14: Unplanned Anterior Vitrectomy

Measure Background and Overview:

Normothermia Outcome

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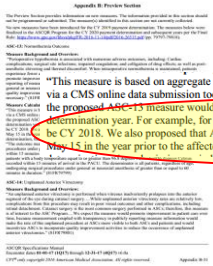

Normothermia Outcome

"This measure is based on aggregate measure data collected via chart abstraction by the ASC and submitted via a CMS online data submission tool (that is, QualityNet). We proposed that the data collection period for the proposed ASC-13 measure would be the calendar year 2 years prior to the applicable payment determination year. For example, for the CY 2020 payment determination, the data collection period would be CY 2018. We also proposed that ASCs submit these data to CMS during the time period of January 1 to May 15 in the year prior to the affected payment determination year. For example, for the CY 2020 payment

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Normothermia Outcome

"The outcome measured in the proposed ASC-13 measure is the percentage of patients having surgical procedures under general or neuraxial anesthesia of 60 minutes or more in duration who are normothermic within 15 minutes of arrival in the post-anesthesia care unit (PACU). The numerator is the number of surgery patients with a body temperature equal to or greater than 96.8 degrees Fahrenheit/36 degrees Celsius recorded within 15 minutes of arrival in the PACU. The denominator is all patients, regardless of age, undergoing surgical procedures under general or neuraxial anesthesia of greater than or equal to 60 minutes in duration." (81FR79799)

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Normothermia Outcome

"The outcome measured in the proposed ASC-13 measure is the percentage of patients having surgical procedures under general or neuraxial anesthesia of 60 minutes or more in duration who are normothermic within 15 minutes of arrival in the post-anesthesia care unit (PACU). The numerator is the number of surgery patients with a body temperature equal to or greater than 96.8 degrees Fahrenheit/36 degrees Celsius recorded within 15 minutes of arrival in the PACU. The denominator is all patients, regardless of age, undergoing surgical procedures under general or neuraxial anesthesia of greater than or equal to 60 minutes in duration." (81FR79799)

Numerator: 12 patients with a body temp ≥ 96.8 degrees F within 15 minutes of arrival to PACU

Denominator: 15 total cases with anesthesia lasting ≥ 60 minutes

$\frac{12}{15}$ X 100 = ? 12/15 =0.8 0.8 x 100 = 80%

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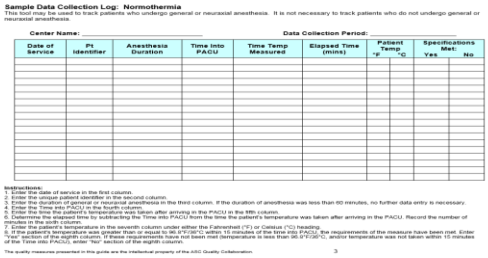

Sample Data Collection Log: Normothermia

This tool may be used to track patients who undergo general or neuraxial anesthesia. It is not necessary to track patients who do not undergo general or neuraxial anesthesia.

Center Name: ______________ **Data Collection Period:** ______________

Date of Service	Pt Identifier	Anesthesia Duration	Time Into PACU	Time Temp Measured	Elapsed Time (mins)	Patient Temp °F	°C	Specifications Met: Yes	No

Instructions:
1. Enter the date of service in the first column.
2. Enter the unique patient identifier in the second column.
3. Enter the duration of general or neuraxial anesthesia in the third column. If the duration of anesthesia was less than 60 minutes, no further data entry is necessary.
4. Enter the Time into PACU in the fourth column.
5. Enter the time the patient's temperature was taken after arriving in the PACU in the fifth column.
6. Determine the elapsed time by subtracting the Time into PACU from the time the patient's temperature was taken after arriving in the PACU. Record the number of minutes in the sixth column.
7. Enter the patient's temperature in the seventh column under either the Fahrenheit (°F) or Celsius (°C) heading.
8. If the patient's temperature was greater than or equal to 96.8°F/36°C within 15 minutes of the time into PACU, the requirements of the measure have been met. Enter "Yes" section of the eighth column. If these requirements have not been met (temperature is less than 96.8°F/36°C, and/or temperature was not taken within 15 minutes of the Time into PACU), enter "No" section of the eighth column.

The quality measures presented in this guide are the intellectual property of the ASC Quality Collaboration. 3

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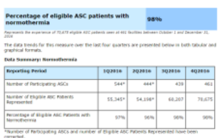


Percentage of eligible ASC patients with normothermia	98%

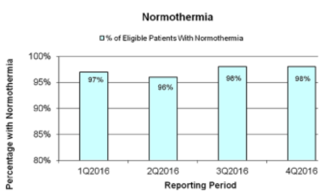
Represents the experience of 70,675 eligible ASC patients seen at 461 facilities between October 1 and December 31, 2016

The data trends for this measure over the last four quarters are presented below in both tabular and graphical formats.

Data Summary: Normothermia

Reporting Period	1Q2016	2Q2016	3Q2016	4Q2016
Number of Participating ASCs	544*	444*	439	461
Number of Eligible ASC Patients Represented	55,345*	54,198*	68,207	70,675
Percentage of Eligible ASC Patients with Normothermia	97%	96%	98%	98%

*Number of Participating ASCs and number of Eligible ASC Patients Represented have been corrected.



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Normothermia Data Collection Tool

Month/Year:

This tool should be used to track patients having surgical procedures under general or neuraxial anesthesia. It is not necessary to track patients who do not have general or neuraxial anesthesia.

Instructions:
1. Enter the date of service in the first column.
2. Enter the unique patient identifier in the second column if you would like to use this data internally for trending; **not required for ASCA benchmarking**.
3. Enter the duration of anesthesia in minutes in the third column under either "General" or "Neuraxial" section as appropriate. If the duration of anesthesia was less than 60 minutes, no further data entry is necessary.
4. Enter the time into PACU in the fourth column.
5. Enter the time the patient's temperature was taken after arriving in PACU in the fifth column.
6. Determine the elapsed time by subtracting the time into PACU from the time the patient's temperature was taken after arriving in PACU. Record the number of minutes in the sixth column.
7. Enter the patient's temperature in the seventh column.
8. Columns 9-11 allow data collection of medical staff, anesthesia provider and PACU RN for tracking of trends.
9. If the patient's temperature was greater than or equal to 96.8°F/36°C within 15 minutes of the time into PACU, the requirements of the measure have been met. Enter "Yes" section of the eighth column.
If these requirements have not been met (temperature is less than 96.8°F/36°C, and/or temperature was not taken within 15 minutes of the time into PACU), enter "No" section of the eighth column. comments optional

Date of Service	Pt Identifier	Anesthesia Duration (mins)	Time into PACU	Time Temp Measured	Elapsed Time (mins)	Pt Temp °F/°C	Intra op °F/°C	MD	MDA/CRNA	PACU RN	Normothermia (Temp >= 96.8°F or 36°C within 15 mins of time into PACU)

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References:

- AORN Guidelines essentials: hypothermia; http://www.aorn.org/essentials/hypothermia; accessed 2/23/2017
- ASC Quality Collaboration; quality measures guide; http://ascquality.org/documents/ASC-QC-Implementation-Guide-4.0-September-2016.pdf
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Quality Net: Specification manual 6.0 appendix B

http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic%2FPage%2FSpecsManualTemplate&cid=1228775745958

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