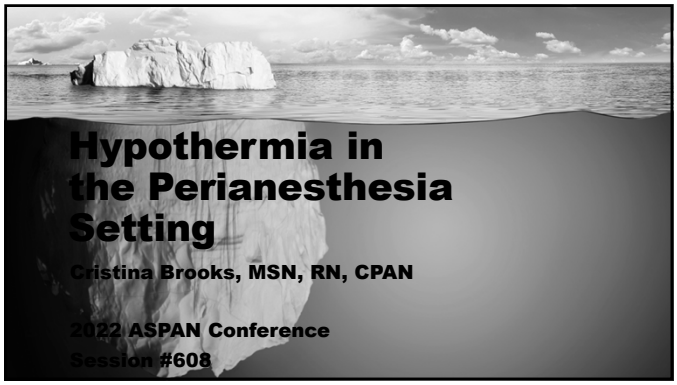


Hypothermia in the Perianesthesia Setting

Cristina Brooks, MSN, RN, CPAN

2022 ASPAN Conference
Session #608

1

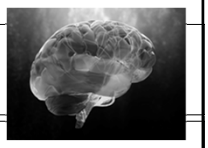
Hypothermia…Defined

Core body temperature less than 36° C (96.8° F)

- Core body temperature
  Deep thoracic, abdominal, and central nervous system tissues.
- Peripheral temperature:
  Arms, legs, skin and peripheral tissues

2

Thermoregulatory system



- Core temperature regulation
  - Hypothalamus → links the endocrine system to the nervous system
  - Hypothalamus functions as a thermostat for the body
  - Cold conditions trigger heat producing mechanisms

3

Why do I feel chilly?

- Peripheral and central thermoreceptors
- Temperature receptors on body
- Afferent and efferent neurons
- Behavioral vs Physiologic response

Afferent signals → Hypothalamus → Efferent behavioral component

4

Heat Loss

- Radiation
- Convection
- Conduction
- Evaporation

**Room temperature is the single most critical factor influencing heat loss

5

Temperature Measurement

CORE

- Pulmonary Artery
- Cutaneous (zero-heat-flux thermometry)
- Esophageal
- Nasopharynx
- Tympanic (probe with contact thermistor or thermocouple mechanisms)

PERIPHERAL

- Oral
- Bladder
- Axilla
- Rectum
- Tympanic (infrared sensor)
- Cutaneous (liquid crystal strip)
- Temporal artery

6

Consistency

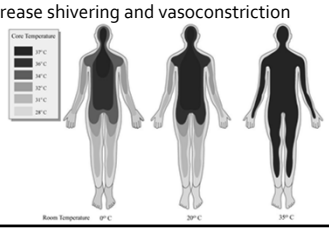
- Consistent temperature measurement is imperative for monitoring trends and detecting hypothermia

7

Effects of Anesthesia on Thermoregulation

General Anesthesia

- Vasodilation
- Rapid core temp decrease of 0.5-1.5° C
- Redistribution hypothermia
- Decrease shivering and vasoconstriction

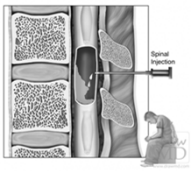


8

Effects of Anesthesia on Thermoregulation

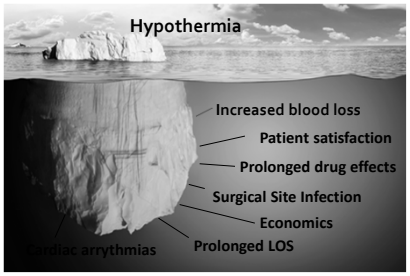
Spinal Anesthesia

- Vasodilation
- Blocked afferent signals
- False sense of warmth



9

It's not just a little chill…



10

Complications…why do they happen?

- Cardiac effects
- Increased bleeding
- Prolonged drug effects
- Surgical site infection

11

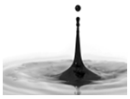
Cardiac Effects

- Myocardia Ischemia
  - Increased myocardial demand
  - Hypothermia elevates BP, HR, plasma catecholamine concentrations (primarily norepinephrine)
  - Causes left shift of the oxyhemoglobin dissociation curve- reduces available oxygen for tissues

12

Bleeding

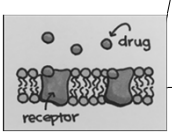
- Hypothermia induced coagulopathy
- Impaired platelet function and clotting activity
- Increased risk for requiring blood transfusion



13

Prolongation of Drug Effects

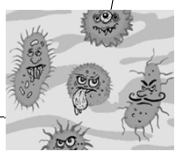
- Alters pharmacokinetics of drugs
- Impairs enzyme activity
- Decreased metabolism and excretion
- Prolonged effect of anesthetics and various drugs
- Overall delayed emergence from anesthesia



14

SSI

- Vasoconstriction
- Decreased PaO_2
  - Oxyhemoglobin dissociation curve
- Impaired immunity- neutrophil function



15

Prolonged Length of Stay

- Prolonged PACU LOS
- Increased length of hospital stay
- Increased cost
- Linked to pressure ulcer development

16

Risk Factors

- Age >60-70
- SBP <140
- Female gender
- Higher level of spinal block
- BMI below normal
- Procedural duration
- Body surface/wound area covered
- Anesthesia duration
- Hx DM with autonomic dysfunction

Other

- Ambient room temp
- Neonates
- Trauma/burn
- Pt with fluid shifts
- Pt with PVD, endocrine d/o, pregnancy, open wounds

17

Warming Techniques

Passive Insulation Methods

- Cotton blankets
- Reflective composite fabric (space blankets)
- Surgical drapes
- Thermal clothing
- Head covering

Active Warming

- Forced warm air (blanket or gown)
- Circulating water mattress or garment
- Electric blanket
- Warmed IV fluids and irrigation fluids
- Radiant warming
- Warmed anesthesia gasses

18

Assessment

- Passive versus active warming
- Active warming: temp measurement Q15 min
- Consistent measurement technique

19

Prevention is Key!

- Prewarming!
  - Studies show an average prewarming time of 30 minutes to be effective.
  - Minimal prewarming of 10 minutes as sufficient to significantly reduce the rate of hypothermia.
- Hypothermia identified before surgery should be addressed and treated
- Don't wait until hypothermia has set in

20

Fun facts

Treating hypothermia, also…

- Results in less opioid use
- Greater patient satisfaction, improved thermal comfort
- Less shivering

21

22