“Real-time” heat stress among surgeons while performing surgery

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Heat stress impacts surgeons

- Personal protective equipment; ambient temperature, heat generating equipment
- Elevated core body temperature impacts comfort, physiological, and psychological responses
- Chronic long-term exposure negatively impacts well-being
- Cognitive Performance; executive decisions, processing speed, short-term memory
Physiological Response to Heat Stress

- Increased Response
  - Heart rate
  - Blood flow, perspiration
- Hormone response
- Production of heat proteins
- HPA Axis Activation
Physiological Response to Heat Stress

Chronic activation: wear and tear

- Elevated corticosteroid activation
- Impaired immune system
- Digestive disorders
- Dysregulated HPA-axis
- Chronic kidney disease of unknown etiology
- Reproductive problems

↓ Cognitive performance
## Psychological Response to Heat Stress
### Cognition Performance

**Aim:** Effects of passive heat on attention and memory

**Results:**
- ↓ working memory
- ↓ pattern recognition
- ↑ impulsivity

Gaoua et al., 2010

**Aim:** Effects of hyperthermia on executive control

**Results:**
- Decreased attention and reaction time

Sun et al., 2012

**Aim:** Effects of hyperthermia on complex tasks

**Results:**
- Decrease in visual-motor tracking

Pill et al., 2017
Impact on Patient Safety

- Hospital acquired infections do lead to wound contamination
- Data on hospital acquired infections
- Increased length of stay
- Increased likelihood of 30-day readmission
Heat Stress Study of Surgeons Performing Surgery in ‘Real-time’

**Multiple Cross-Over Design:** 15 male Orthopedic surgeons performing 4 trial each, AB/BA design

**Subjective Comfort scale** by Likert Scale measure

**Skin Temperature** and **Core Body Temperature** measured continuously by wireless sensors

**Cognitive Battery** measuring visual motor tracking, episodic learning, processing speed, delayed memory

**Ambient room temperature** controlled at 21°C
Questions?
References