

# Benefits of Pre-Operative Passive Warming On Surgical Patients

## Undergoing Regional Anesthetic Procedures

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### BACKGROUND

- Pre-operative patient warming is a key factor to maintaining normothermia throughout the perioperative process.<sup>1</sup>
- From March 2016 through March 2017, VUH Perioperative Services saw a 54% increase in number of preoperative regional anesthetic procedures (RAP) performed on surgical patients.
- Use of regional anesthetic procedures (RAPs) has been associated with reduced postoperative pain, faster patient recovery, and improved postoperative functional status.<sup>4</sup>
- Factors such as reduced ambient room temperature, amount and length of time of skin exposure during RAP placement can contribute to development of hypothermia.<sup>2</sup>

### PROBLEM

- VUH Perioperative Services warming protocol calls for pre-operative warming with either active or passive measures.<sup>3</sup>
- Active, forced warm air is the typical method used for pre-operative warming in VUH Perioperative Services
- At VUH, use of forced-warm air is not feasible during RAP placement due to sterility requirements, patient positioning, and time constraints.
- Patients undergoing pre-operative RAP at VUH require significant body surface exposure placing them at risk for development of hypothermia.

### PURPOSE

- Determine if pre-operative passive warming methods will maintain body temperature throughout the perioperative process in patients receiving regional anesthetic procedures at VUH.
- Determine if the passive warming approach contributes to reduced length of patient stay in the VUH Post Anesthesia Care Unit (PACU).

#### Research Question

- Will application of pre-operative passive warming methods maintain normothermia in patients receiving regional anesthetic procedures?

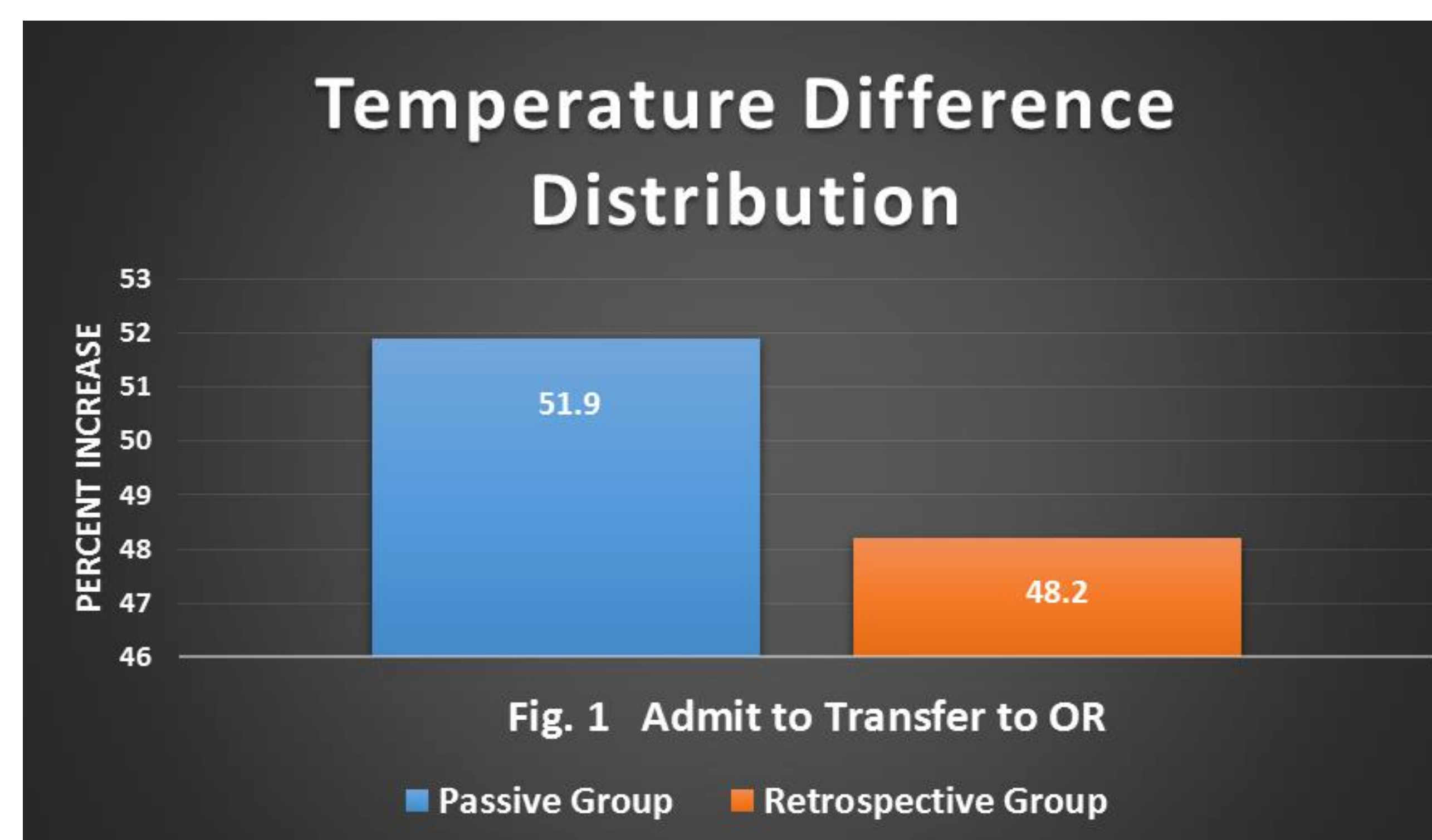
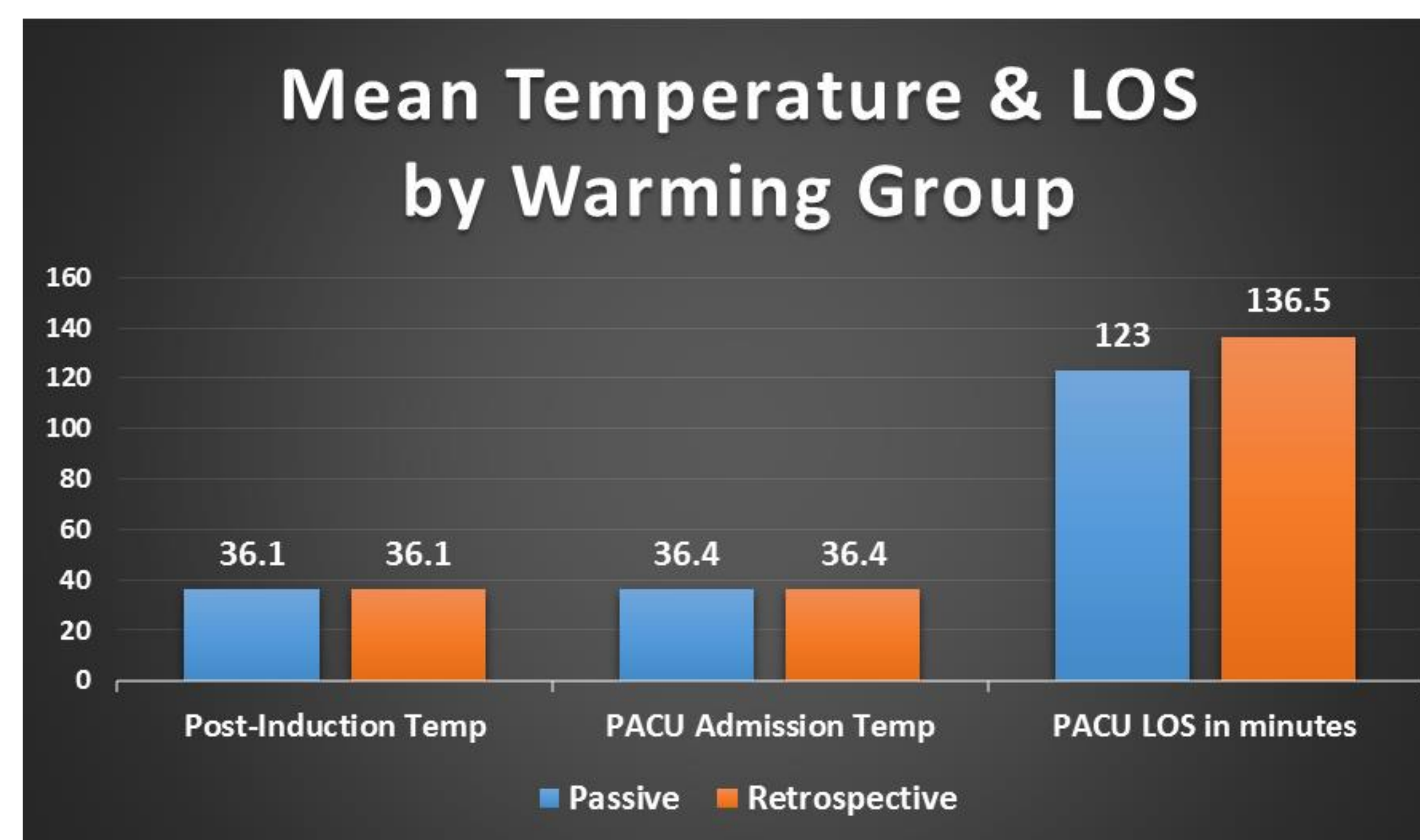
### DESIGN & CONCEPTUAL FRAMEWORK

- Quasi-experimental, non-randomized passive warming trial based on Roy's Adaptation Model<sup>5</sup>.
- Central focus of the Roy Model is adaptation.
- Five major concepts
  - Person- RAP patients
  - Environment- cool ambient air & prolonged skin exposure
  - Health- normothermia
  - Adaptation- passive warming
  - Nursing- application of warming measures
- This QI project was deemed exempt by VUH IRB.

### OUTCOME DATA

- Comparison of tympanic temperatures between warming groups at 4 points in the perioperative process:
  - Admission
  - Hand-off to OR
  - Post-Induction
  - Admission to PACU
- Comparison of length of PACU stay in minutes for RAP patients receiving passive warming as compared to RAP patients warmed according to standard unit protocol

### FIGURES



### REFERENCES

1. Sessler, D. I., Schroeder, M., Merrifield, B., Matsukawa, T., & Cheng, C. (1995). Optimal duration and temperature of prewarming. *Anesthesiology*, 82(3), 674-681.
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3. May, A., Leming-Lee, S., Kelley, K., Randa, S., Maness, C. . (2010). Normothermia. In V. U. M. Center (Ed.), *AS 201170-300.53*
4. Kettner SC, Willschke H, Marhofer P. Does regional anaesthesia really improve outcome? *Br J Anaesth*. 2011;107(suppl1):i90-i95.
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### SAMPLE & METHOD

- 120 surgical patients who received RAP in conjunction with a planned elective orthopedic, abdominal, or thoracic surgical procedure.
  - Retrospective review: 67 patients received warming using forced warm air gown (\$9.75/ea).
  - Passive warming trial: 53 patients received warming via thermal insulated surgical cap (\$1.54/ea) & activated chemical warmer (\$0.54/ea) placed on the inner, upper aspect of one arm.
- Passive measures remained in place throughout the preoperative period (approximately 90mins).
- All participants were non-febrile at time of admission as evidenced by admit temperature less than 38°C (100.4°F).

### RESULTS

- No difference in mean temperatures was found between groups post-induction or upon PACU admission
- Additionally, 51.9% of the passive group ( $n = 28$ ) experienced an increase in temperature from admit to transfer to OR compared to a 48.2% ( $n = 26$ ) of the retrospective group. (Fig. 1)
- A statistically significant, positive correlation was found between hand-off temperature and admission temperature with age ( $p = 0.18$ ).
  - As individual age increased, a greater positive difference between admit and hand-off temperatures was noted.
- Passive group averaged a 13.5-minute shorter LOS in PACU than retrospective group. (Fig. 2)

### CONCLUSIONS & IMPLICATIONS

- Passive warming methods maintained patient temperatures throughout the perioperative process equally as well as the standard unit protocol.
- Older participants responded better to passive warming measures. As age increased, patient temperature also increased.
- Passive warming measures afford the VUH RAP patient population opportunity to receive benefits of pre-operative warming when previously pre-operative warming in this population was not feasible.
- Passive warming is a suitable, cost-effective alternative when forced-air warming is not feasible. Use of passive measures at VUH could result in a cost savings of over \$7 per RAP patient



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