A Comparison of Perioperative Temperature Monitoring Sites During Elective Cesarean Deliveries for the Prevention of Maternal Hypothermia: A QI Initiative

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Background

- Maternal hypothermia during Cesarean Delivery (CD) is associated with an increased risk of:
  - Coagulopathy/postpartum hemorrhage
  - Surgical site infections
  - Delayed postpartum recovery
- Temperature monitoring and active warming can help prevent maternal hypothermia.
- The optimal site for noninvasive perioperative temperature monitoring during CD remains unclear.

Aims

- To compare three perioperative temperature monitoring sites during CD: oral, skin, bladder.
- To determine the incidence of maternal hypothermia by measurement site during CD.

QI Study Design and Methods

30 patients undergoing scheduled CD at term, with spinal/CSE

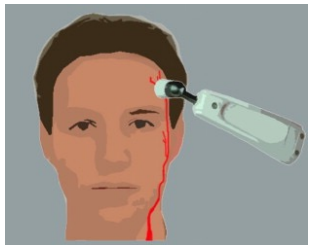
Routine anesthetic care during CD with active warming

Temperature measurement at 3 time points

Pre-skin incision

15 min after infant delivery

Skin closure

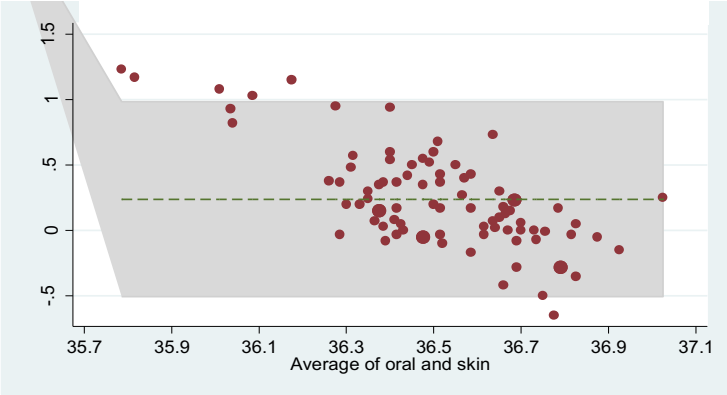


3 temperature measurement sites at each time point:

- Sublingual oral
- Temporal skin
- Bladder

Results

A



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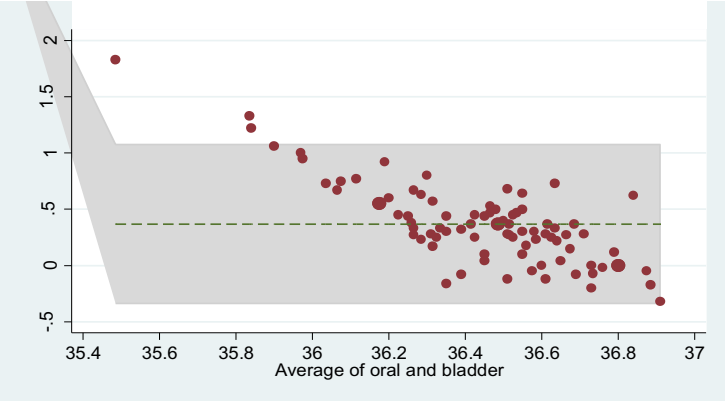

Figure 1. Bland-Altman difference plots comparing oral and skin temperatures (A) and oral and bladder temperatures (B).

Table 1. Correlations at each perioperative time point and overall correlations between oral and skin temperatures, and oral and bladder temperatures.

Perioperative Time Point	Oral and Skin Temperatures	Oral and Bladder Temperatures	Skin and Bladder Temperatures
Pre-skin incision	0.135 (-0.245, 0.542)	0.444 (0.076, 0.719)	0.194 (-0.189, 0.577)
15 min post-delivery	0.174 (-0.201, 0.521)	0.604 (0.314, 0.894)	0.002 (-0.417, 0.415)
Skin closure	0.522 (0.233, 0.764)	0.710 (0.504, 0.894)	0.439 (0.109, 0.727)
Overall	**0.225 (0.018, 0.431)**	**0.588 (0.444, 0.721)**	**0.198 (-0.006, 0.403)**

- The mean difference between sublingual oral and temporal skin temperatures was 0.238 ± 0.380 °C.
- The mean difference between sublingual oral and bladder temperatures was 0.368 ± 0.361 °C.
- Correlations between measurement sites tended to become stronger towards the end of the CD.
- The percentage of maternal hypothermia (below 36 °C) by site was 0% for sublingual oral temperature, 10% for temporal skin temperature and 26.7% for bladder temperature.

Conclusions

- Sublingual oral, temporal skin and bladder thermometry are all viable noninvasive monitoring sites during CD.
- The optimal temperature measurement during CD is not yet established, and accuracy and patient comfort during CD need to be considered.
- Sublingual oral and temporal skin temperatures are weakly correlated.
- Sublingual oral and bladder temperatures are moderately correlated.
- The incidence of hypothermia varied based on the measurement modality
  - Highest incidence with bladder thermometry and lowest incidence with sublingual oral thermometry.
- Findings need to be considered when comparing between institution's rates of hypothermia after CD to enhance overall patient safety.

References

1. Sessler DI. Perioperative temperature monitoring. *Anesthesiology 2021*; 134 (1): 111-118.
2. Cobb B, Cho Y, Hilton G, Ting V, Carvalho B. Active warming utilizing combined IV fluid and forced-air warming decreases hypothermia and improves maternal comfort during Cesarean delivery: A randomized control trial. *Anesthesia & Analgesia 2016*; 122 (5): 1490-1497.