

TITLE: WARM INTRAVENOUS FLUIDS REDUCE SHIVERING IN PARTURIENTS RECEIVING EPIDURAL ANALGESIA

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**Introduction:** Shivering is a common peripartal complaint during labor and delivery, especially in the presence of concomitant regional anesthesia. Rapid intravascular volume expansion with crystalloid solutions prior to the induction of regional anesthesia may increase the incidence of shivering. This study was designed to compare the effect of rapid intravenous volume expansion with body temperature (38°C) and room temperature (27°C) Ringer's lactate (RL) on the incidence of shivering and change in core temperature in parturients.

**Methods:** With the approval of the Brigham and Women's Hospital Committee for the Protection of Human Subjects from Research Risks and after informed consent was obtained, 27 parturients were studied. Laboring patients and elective cesarean delivery (C/D) patients were studied separately. All patients were afebrile, normovolemic, ASA I parturients between the ages of 20 and 35 years.

Group I consisted of patients in active labor (> 5 cm dilated) who elected epidural analgesia. Group II consisted of non-laboring patients for elective cesarean delivery who were to receive epidural anesthesia. Patients in both groups randomly received intravenous volume expansion with 1000 ml Ringer's lactate, which was either room temperature (27°C) or pre-warmed to body temperature (38°C). The bolus was given through an 18 g catheter over 15 minutes prior to the induction of epidural analgesia/anesthesia. Oral temperatures were recorded with a digital thermometer immediately before and after the fluid bolus. Each patient was observed for 30 minutes after the fluid bolus for the onset of shivering which was regarded as an all-or-none occurrence. Epidural anesthesia was induced during this 30 minute period. Each patient was clothed in a hospital gown and covered with one cotton blanket. The room temperature was 27°C. An epidural catheter was placed in the midline and directed 2 cm caudad at L3-4 using a Weiss 17 g needle with the loss-of-resistance to air technique. Anesthesia was induced in group I with 0.5% bupivacaine which was titrated in 3 ml aliquots to a T9 dermatome level (average of 11ml). Anesthesia was induced in group II with 2% lidocaine with 1:200,000 epinephrine in 3 ml aliquots to the T3 dermatome level (average 24 ml).

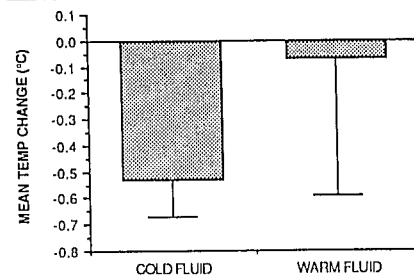
**Results:** In the laboring patients the use of Ringer's lactate at body temperature (38°C) reduced the temperature change associated with bolus infusions at room temperature (p=0.058). This trend approached significance. In cesarean delivery patients, the use of Ringer's lactate at body temperature did significantly reduce the temperature change (p=0.01).

No patient in either the labor or elective cesarean delivery group shivered during the 30 minute observation period after the fluid bolus when Ringer's lactate at body temperature was used.

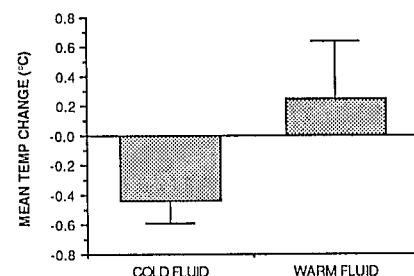
Group I	N	Temp Δ	Shivering	%
cold	6	-0.53 ± 0.14	5/6	83
warm	6	-0.07 ± 0.52	0/6	0
Group II	N	Temp Δ	Shivering	%
cold	8	-0.44 ± 0.15	6/8	75
warm	7	+0.25 ± 0.39	0/7	0

**Discussion:** Shivering rigors can be very unpleasant for the parturient. In addition, shivering can increase oxygen consumption up to 400%, which may be clinically significant in patients with little utero-placental reserve. Although the etiology of shivering in the parturient receiving epidural analgesia/anesthesia is multi-factorial, warming the intravenous fluid prior to the induction of epidural anesthesia significantly reduced shivering in the immediate post induction period. The use of "in-line" intravenous fluid warmers may not be practical in many labor units. The use of prewarmed Ringers lactate in containers, maintained at body temperature (38°C) in a temperature controlled incubator may be a simple, safe and cost effective method to reduce peripartal shivering.

MEAN TEMP CHANGE IN LABORING PTS AFTER FLUID BOLUS



MEAN TEMP CHANGE IN C/D PTS AFTER FLUID BOLUS



#### References:

- Holderoft A, et al: Anaesthesia 34:758-764, 1979.
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