

TITLE: AIRWAY HEATING DOES NOT AFFECT RECOVERY TIME OR POSTOPERATIVE COMPLAINTS IN OUTPATIENTS  
 AUTHORS: TJ Conahan III, M.D., DS Kitz, Ph.D., RW Andrews, B.A., JH Lecky, M.D.  
 AFFILIATION: Center for Research in Day Surgery, Department of Anesthesia, University of Pennsylvania, Philadelphia, Pennsylvania 19104

Factors often ignored in assessing recovery from anesthesia in hospitalized patients may assume great importance when caring for patients who are to return home after receiving a general anesthetic. Such factors include patient temperature, postoperative nausea and vomiting, and postoperative airway discomfort. A previous study has reported that active heating and humidifying of the inspired gases is associated with higher body temperatures and shorter recovery room stays for outpatients. Another report indicated that the use of heat and moisture exchange devices (HME) did not affect these parameters.<sup>2</sup> Our study evaluated the effects of two types of heating and humidifying devices and one HME on the recovery course of a particular patient population.

After obtaining approval from the Committee on Studies Involving Human Beings, we studied 100 ASA PS 1 and 2 women scheduled to undergo outpatient laparoscopy with laser lysis of adhesions. Patients were randomly assigned to one of four groups:

- I Standard Anesthesia Circuit
- II Heater/Humidifier with heating wire in inspiratory limb (Fisher and Paykell MR 620)
- III Heater/Humidifier proximal to inspiratory limb (Inspiron Vapor Phase Plus)
- IV Heat and Moisture Exchanger (Gibeck Humid-Vent 2)

Equipment was calibrated according to each manufacturer's instructions and set to deliver inspired gas at 37°-38°C at the patient "Y" piece. We recorded patient age, weight and temperature. All patients received an N<sub>2</sub>O-O<sub>2</sub>-Isoflurane anesthetic with thiopental induction and succinylcholine for muscle relaxation. Fresh gas flows were N<sub>2</sub>O:O<sub>2</sub> 7 l/m:3 l/m until tracheal intubation, when flows were reduced to 3 l/m N<sub>2</sub>O and 2 l/m O<sub>2</sub> and the heating devices were activated. P<sub>et</sub>CO<sub>2</sub> was maintained at 35-40 mm Hg with controlled ventilation and isoflurane concentration was varied as clinically indicated. Anesthetic gas concentrations were monitored with a Perkin-Elmer mass spectrometer. Sublingual temperature was recorded before induction, after intubation, every 15 minutes during the anesthetic, on arrival in the recovery room (RR), and on discharge from RR. The nurses caring for the patients in the RR were unaware of patient groups. Temperature was not a criterion for discharge from the RR. Duration of RR stay, patient complaints of feeling cold or of sore throat, incidents of vomiting, and analgesic and antiemetic therapy were recorded. Post-discharge morbidity was assessed via telephone on the first postoperative day. Chi square tests and analysis of variance were used to determine the significance of differences among groups, with significance accepted at p<0.05.

We found no significant differences among the groups in any of the variables measured. The temperature of patients in all groups decreased by 1.4-1.7°C between the time of induction and admission to the RR. Duration of RR stay was about 2 hours in all groups, and the incidence of postoperative complaints was not different among the groups.

## MEAN VALUES FOR THE STUDY GROUP

	Control	Fisher Paykell	Inspiron	Humid-Vent 2
N	25	25	25	25
Wt (Kg)	61	56	58	57
Age (yrs)	32	31	32	31
Op duration (hrs)	1.0	0.9	0.9	0.9
Temperature (°C)				
pre-induction	37.0	37.0	37.0	36.9
RR admission	35.3	35.5	35.6	35.5
RR discharge	36.4	36.6	36.8	36.3
RR stay (hrs)	2.0	2.0	1.9	2.0
Patient complaints (RR)				
Feeling cold (%)	40	48	44	44
Sore throat (%)	20	20	32	36
Patient complaints (home)				
Sore throat	15/21 (71%)	15/23 (65%)	18/22 (81%)	17/22 (77%)
Cough	7/21 (33%)	8/23 (35%)	10/22 (45%)	9/22 (41%)

There are no significant differences among the groups

All of the recovery times in this study were shorter than the shortest recovery times in a previous study of a heater/humidifier.<sup>1</sup> Several factors may account for this difference. First, the surgical procedures were not identical. Laparoscopy with laser lysis of adhesions may be less traumatic, producing less discomfort and GI upset, than the multiple needle punctures of ovarian tissue performed during ovum retrieval, thus allowing a more rapid recovery. Second, the airway heating devices used in the current study were different than those used in the earlier study. The Fisher Paykell Model 620 was used with a disposable circuit and inspiratory limb heating wire, which may have been less effective than the heavier reusable wire. The Inspiron device humidified and heated the gases before they entered the inspiratory limb of the patient circuit. HME devices have been shown to be ineffective in conserving heat or affecting postoperative stay in a study conducted with a different anesthetic technique in a DSU with a staged recovery area.<sup>2</sup> We included HME devices in the current study to test their effectiveness under conditions identical to those in which the heater/humidifiers were tested.

The shorter RR stay also may reflect increased skill on the part of the anesthesia residents in dealing with outpatients, or increased confidence on the part of the RR nurses in assessing postoperative patients for discharge.

The previous findings, of warmer patients and more rapid RR discharge in patients receiving heated humidified inspired gases, were not duplicated in this similar but not identical, study. The real utility of airway heating devices may lie in longer anesthetics, or the suggestion of utility may have been generated by a particular combination of patients, surgical procedure and anesthetics.

## REFERENCES

1. Conahan TJ, Williams GD, Apfelbaum JL, Lecky JH. Airway heating reduces recovery time (cost) in outpatients. *Anesthesiology* 67:128-130, 1987.
2. Goldberg ME, Jan R, Gregg CE, et al. The heat and moisture exchanger does not preserve body-temperature or reduce recovery-time in outpatients undergoing surgery and anesthesia. *Anesthesiology* 68:122-123, 1988.