



Comfort, Satisfaction, and Anxiolysis in Surgical Patients Using a Patient-Adjustable Comfort Warming System: A Prospective Randomized Clinical Trial

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Comfort warming systems aim to produce a comfortable local environment over which the individual patient has control. We studied a patient-adjustable comfort warming system using the Bair PAWS (Patient Adjustable Warming System) (Arizant Healthcare, Inc, Eden Prairie, MN), specifically to study comfort warming rather than therapeutic warming. One-hundred thirty patients were enrolled in this prospective randomized clinical trial, with 58 patients randomized to the patient warming gown, and 72 randomized to the warm blanket group. Groups were similar for gender, age, height, weight, surgical time, body surface area, and body mass index. The patient-adjustable warming system group had perceived greater control and satisfaction at 30 minutes after treatment was initiated compared with the warmed blanket control group. However, there were no differences in satisfaction levels with thermal comfort among those patients contacted one day postoperatively. Additional research is needed to improve external validity of study findings. Further refinement of a nursing definition of thermal comfort should be explored.

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THERMAL COMFORT in humans is a subjective, individual response to environmental and physiologic condi-

tions.¹⁻³ Thermal discomfort caused by abrupt or excessive heat loss produces a sense of anxiety and physical discomfort in humans. Comfort warming systems aim to produce a comfortable local environment over which the individual patient has control. Summers et al identified that the perception of comfort when using the Bair Hugger Convective Warming Device (Arizant, Inc, Eden Prairie, MN) was significantly greater than in the group using bath blankets at 30 minutes after arrival in the postanesthesia care unit (PACU) and at discharge.⁴ However, to date we have found only one published nursing study that has focused on thermal comfort and its relationship to patient satisfaction and anxiety reduction.⁵

Satisfaction is an important outcome because it is one variable used to assess the quality of a patient's health care.⁶ Practitioners of environmental engineering attempt to produce thermal environments that please the majority of individuals exposed to the same conditions within

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a building. However, as both experience and research demonstrate, within a given thermal setting, a certain percentage of individuals will still be uncomfortable. A considerable amount of research has been performed to evaluate the conditions under which humans are thermally comfortable.⁶⁻⁹ The most important variables affecting thermal comfort are (1) activity level, (2) thermal resistance of clothing, (3) air temperature, (4) mean radiant temperature of the surrounding structures, (5) relative air velocity, and (6) the ambient water vapor pressure.¹⁰

Wagner et al⁵ studied preoperative patients, comparing the effects of patients with warmed cotton blankets versus patient-controlled warming gowns on patients' perceptions of thermal comfort and anxiety. Both warming interventions had a positive effect on patients' thermal comfort and well-being, and patients who used the patient-controlled warming gown had significantly reduced preoperative anxiety. This study enrolled volunteers who responded to a flyer in a preadmission clinic; selection bias may have influenced the findings.

In a more recent study published in the anesthesia literature, Wen et al¹¹ tested the hypothesis that preoperative forced-air warming is as effective for anxiolysis as intravenous midazolam 30 mcg/kg, finding that preoperative warming was not equivalent to midazolam for anxiolysis. They concluded that preoperative warming was not recommended as the sole means of reducing preoperative anxiety.

Preoperative anxiety, while common, varies from patient to patient. As identified in a recent study by Rosen et al, preoperative anxiety can be significant.¹² Their results demonstrated that 57% of the patients they studied were not calm preoperatively. Recommendations from this study included evaluation and documentation of the patient's state of mind and individualizing care to provide emotional support, decrease anxiety, and promote a more positive patient experience. Individualizing care could include allowing the patient greater control of the local environment through personalized temperature adjustment.

Purpose

We proposed to study a patient-adjustable comfort warming system using the Bair PAWS (Patient Adjustable Warming System) (Arizant Healthcare, Inc, Eden Prairie, MN), specifically to study comfort warming rather than therapeutic warming. We hypothesized that patients randomized to the patient-adjustable thermal warming device would be more satisfied with their thermal comfort and less anxious when compared with patients randomized to warmed blankets.

Materials and Methods

We measured satisfaction with thermal comfort using a visual analogue scale (VAS) before and after applications of the device or blankets, postoperatively and upon discharge from the hospital, in both the device group and the blanket group. Patients completed a paper and pencil survey with the assistance of the study nurse; each patient responded to the statement "I am **SATISFIED** with my ability to be as warm or cold as I like" by marking a single vertical line on a 10-cm horizontal line with 0 being extremely dissatisfied and 100 being extremely satisfied. Further, to measure anxiety, we used the self-administered anxiety section of the State-Trait Anxiety Inventory (STAI Form Y-1)¹³ before application of the device or blankets in both groups. The S-Anxiety scale (STAI Form Y-1) consists of twenty statements that evaluate how the respondent feels "right now, at this moment." The STAI has demonstrated reliability and validity in previous studies.¹⁴ At 30 minutes after baseline, patients were asked to rate their overall **ANXIETY** level using a VAS, with 0 being no anxiety and 100 extremely high. In addition, patients were contacted the day after surgery to determine their overall satisfaction with thermal comfort (measured by a verbal analogue scale). We chose to use visual and verbal analogue scales because they are simple to use, are associated with good compliance among study subjects, and have been shown to be both reliable and valid.

We also assessed whether nurses administering thermal devices would find the device easier to use to promote thermal comfort when compared with the use of warmed blankets. We used a five-question investigator-developed survey to determine the nurse's experience with the ease of use in each patient randomized to either the devices or blankets. We anticipated that nurses administering thermal devices would be more satisfied with their ability to provide and promote thermal comfort for patients randomized to the device compared with patients randomized to blankets; we measured overall satisfaction of the study nurses with both methods of warming for each study patient using a VAS.

Setting and Participants

After receiving Institutional Review Board approval, PACU study nurses screened all orthopedic patients having outpatient surgery for eligibility. Patients 18 years of age or older, capable of giving informed consent, and having outpatient knee or shoulder procedures at a large Midwestern university health system were considered eligible for the study. Patients were excluded if they were taking beta-blockers, clonidine, or ergot compounds. In addition, patients who were addicted to recreational drugs and alcohol or with a history of psychiatric, emotional, or hearing disorder, Raynaud's disease,

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