Cold exposure and thermal comfort among patients in prehospital emergency care - innovation research in nursing

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Akademisk avhandling

som med vederbörligt tillstånd av Rektor vid Umeå universitet för avläggande av medicine doktorsexamen framläggs till offentligt förvar i Aulan, Vårdvetarhuset fredag den 22 maj, kl. 09:00. Avhandlingen kommer att förvaras på svenska.

Fakultetsopponent: Professor, Inggard Lereim, Institutt for nevromedisin, Det medisinske fakultet, Norges Teknisk Naturvitenskapelige Universitet, Trondheim, Norge
Background  Patients’ cold exposure is a neglected problem in prehospital emergency care. Cold stress increases pain and anxiety and contributes to fear and an overall sense of dissatisfaction. When left untreated, cold stress disturbs vital body functions until ultimately reaches hypothermia.

Aim  The overall aim was to investigate patients’ experiences of thermal comfort and reactions to cold exposure in prehospital emergency care and to evaluate the effects of an intervention using active warming from underneath.

Method  Study I: Persons (n=20) injured in a cold environment in the north of Sweden were interviewed. Active heat was given to 13 of them. Study II: In wintertime, 62 patients were observed during prehospital emergency care. The field study was based on observations, questions about thermal discomfort, vital signs, and temperature measurements. Study III: Healthy young persons (n=23) participated in two trials each. Data were collected inside and outside a cold chamber. In one trial, the participants were lying on a regular ambulance stretcher and in a second trial on a stretcher supplied with a heated mattress. Outcomes were the Cold Discomfort Scale (CDS), back, finger, and core body temperature, four statements from the State-Trait-Anxiety-Inventory (STAI), vital signs, and short notes about their experiences of the two stretchers. Study IV: A quantitative intervention study was conducted in prehospital emergency care in the north of Sweden. The patients (n=30) in the intervention group were transported in an ambulance supplemented with a heated mattress on the stretcher, whereas only a regular stretcher was used in the ambulance for the patients (n=30) in the control group. Outcomes were the CDS, finger, core body, and air temperature, and questions about cold experiences.

Results  Study I: Patients suffered more because of the cold than from the pain of their injuries. The patients were in a desperate need of heat. Study II: Patients are exposed to cold stress due to cold environments. There was a significant decrease from the first measurement in finger temperature of patients who were indoors when the ambulance arrived, compared to the measurement taken in the ambulance. In the patient compartment of the ambulance, 85% of the patients had a finger temperature below the comfort zone and almost half of them experienced the patient compartment in the ambulance to be cold. The regular mattress surface temperature at the ambulance ranged from -22.3 to 8.4 ºC. Study III: A statistical increase of the participants’ back temperature was found between those lying on the heated mattress compared to those lying on the regular mattress. The heated mattress was experienced as warm, comfortable, providing security, and easy to relax on. Study IV: Thermal comfort increased for the patients in the intervention group and decreased in the control group. A significant higher proportion of the participants rated the stretcher as cold to lie on in the control group compared to the intervention group.

Conclusion  The ambulance milieu is too cold to provide thermal comfort. Heat supply from underneath increased comfort and might prevent cold stress and hypothermia.

Keywords  Thermal comfort, thermal discomfort, cold exposure, cold stress, hypothermia, patients’ experiences, active warming, prehospital emergency care, finger temperature, back temperature.