



Thermal comfort of patients: Objective and subjective measurements in patient rooms of a Belgian healthcare facility

Jan Verheyen^{a,*}, Nele Theys^a, Luk Allonsius^a, Filip Descamps^{b,1}

^a University College of Antwerp, Department of Applied Engineering & Technology, Construction Engineering, Paardenmarkt 92, 2000 Antwerpen, Belgium

^b Vrije Universiteit Brussel, Department of Architectural Engineering, Pleinlaan 2, 1050 Brussel, Belgium

ARTICLE INFO

Article history:

Received 17 September 2010

Received in revised form

27 November 2010

Accepted 11 December 2010

Available online 21 December 2010

Keywords:

Thermal comfort

Patients

Hospital

Healthcare facility

ABSTRACT

In healthcare facilities, the prediction of mean thermal comfort perception of patients and staff is necessary to formulate requirements for the architectural and building systems design and control, and for establishing guidelines for the use of clothing and bedding systems.

In this study thermal comfort of patients is evaluated by comparing objective (environmental and personal) parameters and subjective measurements (questionnaires) of thermal comfort for different groups of patients, according to the ward they are occupied in. The study involved 99 patients of maternity, oncology, neurology, gastro-enterology, abdominal surgery and thoraco-vascular surgery wards.

T tests reveal no significant difference between Predicted Mean Vote (PMV) obtained from objective measurements and Actual Mean Vote (AMV) for all the different wards except for neurology. Binomial tests show that the difference between the predicted percentage of dissatisfied (PPD) obtained by application of the PPD-formula in ISO 7730 as function of Actual Mean Vote and PPD obtained from personal acceptability votes is not significant on a 5% level for all wards. This means that PMV and PPD indices may be used to adequately predict mean thermal responses for these wards except for neurology.

© 2010 Elsevier Ltd. All rights reserved.

1. Introduction

Design and operation of patient rooms should primarily aim at providing a healthy and healing environment for the patients recovering from surgery, injury or disease.

There has been growing scientific evidence that the physical environment has an impact on health and well-being [1]. Every physiological strain applied to the patient will induce extra stress on top of stress related to the disease or injury of the patient which is undesired unless medical treatment requires so. The thermal environment can also be an important source of undesired physiological strain on the body. It is therefore necessary to know how patients perceive thermal comfort.

Thermal comfort of patients can be different from that of the healthy population because the nature of the physical disability will affect thermophysiology, thermal sensation, metabolism, blood flow, regulatory response, such as vasomotor control of body skin temperature or the ability to sweat. Depending on the disability and health status of a patient, the adaptive opportunity may be

restricted, limiting the range of thermal environmental conditions providing comfort. Also the use of technical aids (such as wheel-chairs), medical treatment and the use of drugs can affect thermal sensation and comfort perception. The aged are more largely represented in hospitals in Belgium than they have part in the overall demographic composition. It is generally considered that the ability to thermoregulate decreases with age [2] and that older people prefer slightly higher temperatures [3] although the latter can be attributed to lower activity levels and clothing differences of the elderly compared to their younger counterpart.

1.1. Guidelines and recommendations for thermal environmental conditions of patient rooms

Some recommendations and guidelines for design of patient rooms for healthcare inpatient nursing are summarized in Table 1.

According to Ref. [5] each room should have individual temperature control. Lower or higher temperatures than the ones prescribed in the standard shall be permitted when patients' comfort and (or) medical treatment require those conditions [4]. Thermal comfort requirements should be considered on an individual basis for people with physical disabilities [3]. This is confirmed in the international standard for thermal comfort for

* Corresponding author. Tel.: +32 (0) 494 91 13 52 (Mobile); fax: +32 (0) 3 231 86 70.
E-mail address: jan.verheyen@artesis.be (J. Verheyen).

¹ Daidalos Peutz bouwtechnisch ingenieursbureau.