

APPLIED RESEARCH ON

ENVIRONMENTAL AND OCCUPATIONAL HEALTH

IN HOSPITAL CONTEXT

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Resumo

As instalações hospitalares são normalmente muito complexas, que aliadas às exigências dos cuidados de saúde dos pacientes promovem condições para o desenvolvimento potencial de condições de trabalho desconfortáveis. O trabalho em hospitais é assim suscetível de causar danos à saúde resultando em acidentes e doenças ocupacionais. Neste sentido, foi desenvolvido uma linha de investigação com foco em Saúde Ambiental e Ocupacional em Contexto Hospitalar, com o intuito de ser uma contribuição para a compreensão dos fatores de risco aos quais profissionais de saúde e pacientes estão expostos e como essa exposição pode ser reduzida. Esta linha de investigação resultou até à data em 34 publicações e 11 comunicações orais/pósteres: 6 artigos em revistas científicas internacionais, 3 capítulos de livros, 13 artigos/resumos em livros de anais de congressos internacionais, 4 relatórios técnicos, 1 tese de doutoramento e 7 trabalhos de conclusão de curso. O projeto permitiu o estudo de dados sobre exposição ocupacional e acidentes em ambientes hospitalares no Norte de Portugal.

Abstract

Hospital facilities are normally, very complex, which combined with patient requirements promote conditions for potential development of uncomfortable working conditions. The work in hospitals is likely to damage health resulting in occupational accidents and diseases. In this sense, a project focused on Environmental and Occupational Health in Hospital Context was developed to be a contribution to understand the risk factors to which health professionals and patients are exposed in these environments and how this exposure can be reduced. This research line resulted in 34 publications and 11 oral/poster communications: 6 articles in international scientific journals, 3 book chapters, 13 articles/abstracts in books of international congress proceedings, 4 technical reports, 1 doctoral thesis and 7 final course works. The project allowed the study of data about occupational exposure and accidents in hospital environments in the North of Portugal.

Introduction

Workplace-related health impairments, injuries and illnesses cause great human suffering and incur high costs, both for those affected and for society as a whole. Occupational health and safety (OSH) measures and health promotion in workplaces are aimed at preventing this. Hospitals are peculiar workplaces, designed almost exclusively to the needs of users, giving their workers poor working conditions (Carvalhais, Santos, & da Silva, 2016a). The hospital organizations are among the most complex structures, given their diversity of services, facilities, equipment and their hierarchical system of several departments and professions (such as physicians, nurses, health technicians, administrative personnel and general services). The hospital environment has many occupational health risks due to the variety of clinical and non-clinical tasks performed by healthcare workers. The exposures to psychosocial, chemical, physical, mechanical and biological hazards are common in hospital units and predispose healthcare workers to different types of accidents (Nunes et al., 2015). In a paradoxical way, the hospital environment has risks that may pose immediate threats, causing sooner or later health problems to people who maintain direct contact and/or daily life with this kind of environment. There

is also the risk of work accidents with serious consequences for healthcare workers and sometimes for patients. In hospitals, patient exposure has been studied more frequently over the years, than occupational exposure, but in general, vulnerable groups are underrepresented in study populations. This research line pretends to be a contribution to understand the risk factors to which health professionals and vulnerable patients are exposed in these environments and how this exposure can be reduced. units and predispose healthcare workers to different types of accidents (Nunes et al., 2015). In a paradoxical way, the hospital environment has risks that may pose immediate threats, causing sooner or later health problems to people who maintain direct contact and/or daily life with this kind of environment. There is also the risk of work accidents with serious consequences for healthcare workers and sometimes for patients. In hospitals, patient exposure has been studied more frequently over the years, than occupational exposure, but in general, vulnerable groups are underrepresented in study populations. This research line pretends to be a contribution to understand the risk factors to which health professionals and vulnerable patients are exposed in these environments and how this exposure can be reduced.

Occupational accidents in Hospitals: A case study

A study aiming to compare different methods for work accidents (WA) investigation and to verify their suitability in hospital environment (Nunes et al., 2015). For this purpose, three types of accidents that were related with needle stick, worker fall and inadequate effort/movement during the mobilization of patients, were selected. The types of WA analysed were selected according to the national prevalence of WA in Portuguese hospitals. A total of thirty accidents were analysed with six different work accidents investigation methods. The results showed that organizational factors were the group of causes which had the greatest impact in the three types of work accidents. Accident investigations are an integral part of any good safety and health initiative. This study showed that “organizational influences” are the most relevant cause of WA in hospitals, independently of the method applied. The methods used are not mutually exclusive. They can complement each other and be adaptable to the hospital environment. However, the Registration, Research and Analysis of Work Accidents method (RIAAT) showed to be an optimal technique to use in this context. This study was a contribution to OHS practice, for the selection of methods for the analysis of occupational accidents in hospitals and a helpful contribute to improve the investigation system of work accidents in these institutions and in similar sectors.

Thermal comfort among hospital workers: Assessment in two sterilization services through analytical and subjective approaches

The hospital facilities are normally, very complex, which combined with patients requirements, promote conditions for the development of uncomfortable working conditions (Carvalhais, Santos, & da Silva, 2016a). Thermal discomfort is one example of many. This study aimed to determine levels of thermal comfort, sensations and preferences, from a field study carried out in two sterilization services (SS), of two Hospitals from Porto and Aveiro, Portugal. The analytical determination and interpretation of thermal comfort was based on the assumptions of ISO 7726:1998 and ISO 7730:2005. The predicted mean vote (PMV) and predicted percentage of dissatisfaction (PPD) indices were obtained analytically by measurement and estimation of environmental and personal variables, respectively, and calculated according to ISO 7730 equations. The subjective variables were obtained from thermal sensation (subjective PMV) and affective assessment (subjective PPD), reported by questionnaire based on ISO 10551:1995. Both approaches confirmed thermal discomfort in both sterilization services (codified as SS1 and SS2). For all areas, PMV and PPD exceeded in all periods of the day the recommended range of -0.5 to +0.5 and <10%, respectively. No significant differences were found between day periods. The questionnaire results showed that SS2 workers reported a higher level of thermal discomfort. Although, there are no significant differences between PMV and thermal sensations and between PPD and affective assessment. The PMV/PPD model has been found suitable to predict the thermal sensations of the occupants in hospital sterilization services located in a mild climate.

NeoNoise Project: Integrated Approach to Minimize Sound Pressure Levels in Neonatal Intensive Care Units

Exposure to sound pressure levels in neonatal intensive care units has been recognized as a factor which influences the quality and well-being of the occupants (workers and others), as well as the recovery of premature infants who are hospitalized (Carvalhais et al., 2017). Prematurity and low birth weight of newborns lead to the need of a special care in neonatal units, and their permanence in these places can be extended for a long period. Evidence indicates that exposure to high levels of noise adversely affects human health, and these effects are dependent upon various factors (Carvalhais et al., 2015). In hospitals, there are many sources of noise, and high levels exert an impact on patients and staff, increasing both recovery time and stress, respectively.

This study aimed to make an integration of all relevant factors, with the intention to contribute to change the working practices and occupant's

behaviors (Carvalhais, Santos, Xavier, et al., 2016b). This project provided data on sound pressure levels by objective and subjective approaches, as well as information about the exposure factors and sensitivity of the occupants to noise. With this in mind several studies were performed, such a systematic review to examine the studies related to noise in NICUs to understand the sources and effects of noise, as well as some strategies to reduce noise exposure (Carvalhais et al., 2018). Since the Portuguese reality regarding noise levels in NICU wasn't very explored yet, a study aiming to evaluate and characterize the sound pressure levels in three Portuguese NICUs and the noise perceptions of staff, was performed (Santos et al., 2018). Additionally, a study with the purpose to assess the newborns exposure to noise during several health care activities of two NICU, was conducted (Carvalhais et al., 2017). After those studies concerning the characterization of environmental conditions of NICU, more two studies were carried out to test two noise reduction strategies. One of them a study aiming to develop, implement, and evaluate the effectiveness of a training program on noise reduction in NICU, was performed (Carvalhais et al., 2015). The other one, pretended to evaluate the sound pressure levels and to assess noise perception of professionals in a NICU before and after structural modifications and layout redesign (Carvalhais et al., 2021). Finally, some good practices guidelines were summarized in order to promote a healthier environment and to prevent noise production (Carvalhais et al., 2019). All the mentioned studies involved walkthrough inspections, noise measurements and questionnaire surveys. It was found that the noise levels to which the newborns and staff are exposed in NICU, often exceeds the recommended levels for these spaces. But it should be recognized that is very difficult accomplish the proposed levels. However, slightly improvements were found in terms of noise reduction, but unfortunately, the pattern was similar to other studies. Evidence also shows several adverse health effects for newborns and health care staff perceptions of noise. Staff working in NICU environments need more education to understand the effects of noise on the preterm infant's physiological stability. With this education, they will be more aware of the need to change their actions and behavior to reduce noise, which can benefit their patients, and parents, as well as themselves. Even recognizing that a training program is important to change behaviors, this need to be considered in a broader context to effectively control noise in the NICU. Some initial resistance to the implementation of some recommendations is expected, but evidence shows that in general, with training, health care staff recognize the need of changes. Also, the enrolment of hospital top management is fundamental.

Achievements

This research line resulted in 34 publications and 13 oral/poster communications: 6 articles in international scientific journals, 3 book chapters, 13 articles/summaries in books of international congress proceedings, 4 technical reports, 1 doctoral thesis and 7 final course works. Also, it was recognized with two distinctions by PAPRE program from Polytechnic Institute of Porto. The project allowed the study of data about occupational exposure and accidents in hospital environments in the North of Portugal.

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