



## Nurses' occupational physical activity levels: A systematic review



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### ABSTRACT

**Background:** Nurses' physical performance at work has implications both for nurses' occupational health and patient care. Although nurses are the largest healthcare workforce, are present 24-hours a day, and engage in many physically demanding tasks, nurses' occupational physical activity levels are poorly understood.

**Objectives:** The aim of this systematic review was to examine nurses' occupational physical activity levels, and explore how nurses accumulate their physical activity during a shift.

**Design:** This narrative systematic review was guided by the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) Statement.

**Data sources:** EBSCOHost (MEDLINE, CINAHL, Age Line, Academic Search Complete, Global Health, Health Business Centre, Health Policy Reference Centre, Health Source (Consumer and Nursing/Academic Edition) and SPORTDiscus), Embase, Informit, ProQuest Health and Medical, Science Direct, Scopus, and Web of Science databases.

**Review methods:** A systematic search of seven databases were completed to locate peer-reviewed journal articles documenting nurses' occupational physical activity levels from January 1990. Papers were included if they were original research papers; measured physical activity objectively and/or subjectively; reported nurses' occupational physical activity; and were published in English. Articles were excluded if nurses' data were not reported separately from other professional groups. Two researchers independently screened the articles, extracted data, and undertook the methodological quality assessments.

**Results:** Fifteen studies met the inclusion criteria. Nursing work predominantly comprised of light-intensity physical activity. In nine studies how nurses' accumulated occupational physical activity were documented and showed that the majority of a nurses' shift was spent standing or walking whilst completing direct patient care tasks. However, the definition of the nursing populations studied were often poorly reported, and few researchers reported the validity and the reliability of the measurement tools used.

**Conclusions:** Nurses' occupational physical activity levels largely consist of light-intensity physical activity interspersed with moderate-intensity tasks. It is not known whether physical activity during one shift affects the activity levels in the following shift. This systematic review is the first step towards understanding the physical demands of nursing work, and how nurses' physical activity may impact workplace wellbeing and patient safety.

**Limitations:** A meta-analysis was not possible due to the variability in how physical activity outcomes were presented. Several studies had heart rate outcomes that were converted, where possible, by the authors into physical activity outcomes.

**Registration:** This systematic review is registered with PROSPERO; Registration number: CRD42016045427

### What is already known about the topic?

- Nursing involves shift work that can negatively affect the three main pillars of good health: diet, sleep and physical activity.
- Most researchers have investigated nurses' leisure-time physical

activity levels, and little is known about nurses' occupational physical activity.

- Understanding occupational physical activity is important because if occupational physical activities impair nursing performance, there may be safety consequences for both nurses and their patients.

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## What this paper adds

- The authors found in this systematic review that nurses spent the majority of a shift engaged in light-intensity physical activity, interspersed with bouts of moderate-intensity physical activity, accumulated through direct patient care tasks, standing and walking.
- Nurses' occupational physical activities exceed current population physical activity recommendations of 150–300 minutes per week of moderate-intensity physical activity or 10,000 steps per day.
- There are major knowledge gaps about how nurses' occupational physical activity affects their activity levels within the same shift and the following shift, which in turn may impact on workforce planning and occupational health initiatives.

## 1. Introduction

Healthcare workers are the largest global workforce, and 48% of healthcare workers are nurses (World Health Organisation, 2016). Nursing presents a challenging work environment with irregular shift rotations (Albert et al., 2014; Chin et al., 2016; Han et al., 2016; Nahm et al., 2012; Nelson et al., 2014; Tada et al., 2014), long shift durations that range from 8- to 12-hours (Albert et al., 2014; Chin et al., 2016; Nahm et al., 2012), and physically demanding tasks (Chin et al., 2016; Flannery et al., 2014; Nelson et al., 2014). All of these factors can adversely affect nurses' health and work performance.

In hospitals, nurses have a 24-hour a day direct care presence. Consequently, shift work is a major component of nursing (Makowiec-Dabrowska et al., 2000; Tucker et al., 2010). Although it is possible for nurses to work permanent day, evening, or night shifts, the majority of nurses work a rotating shift system (Järvelin-Pasanen et al., 2013; Saksvik-Lehouillier et al., 2013). There are two common shift systems. The first is a two-shift system that comprises of a 12-hour day and a 12-hour night shift. The second is a three-shift system that comprises of an 8-h day, an 8-h evening, and an 8- to 10-hour night shift (Royal College of Nursing, 2012). Rotating shift work can have acute adverse effects such as higher absenteeism and lower work productivity, as well as impairing the quality of patient care and safety (Jung and Lee, 2015; Saksvik-Lehouillier et al., 2013). For example, 12-hour shifts can increase clinical risk through performance decrements and increased risk of errors (Clendon and Gibbons, 2015; Makowiec-Dabrowska et al., 2000), while 8-hour shifts are associated with reduced job satisfaction and increase frequency of missed shifts (Stone et al., 2006). Prolonged exposure to rotating shift work systems can have adverse chronic health effects, such as a higher incidence of cancer and cardiovascular disease (Buchvold et al., 2015; Henwood et al., 2012; Nicoletti et al., 2015).

Sleep, diet and physical activity are the three pillars essential for good health that may combat the adverse effects of shift work (Horoho, 2013). Studies related to nurses' health have predominantly focused on nurses' sleep (Admi et al., 2008; Han et al., 2012; Järvelin-Pasanen et al., 2013; Sveinsdóttir and Gunnarsdóttir, 2008) and dietary habits (Almajwal, 2015; Chin et al., 2016; Jung and Lee, 2015; Saksvik-Lehouillier et al., 2013). There is limited published research on nurses' physical activity levels (Albert et al., 2014; Nahm et al., 2012; Perry et al., 2015; Tucker et al., 2010), particularly occupational physical activity, which accounts for a large proportion of their waking hours. To date, most research related to nurses' physical activity has been focused on leisure-time physical activity, and has shown that nurses' average physical activity level is of a moderate- (Albert et al., 2014; Perry et al., 2015; Tucker et al., 2010) or low-intensity (Nahm et al., 2012). Nurses appear to not be meeting the current physical activity guidelines of 150 minutes per week (Department of Health, 2014) through their leisure-time activity alone (Ahmad et al., 2015; Jung and Lee, 2015; Naidoo and Coopoo, 2007). As a result, researchers have focused on developing interventions for increasing nurses' leisure-time physical activity (Torquati et al., 2017). Given that the majority of

adults' waking time is spent at work (Clemes et al., 2014; Kikuchi et al., 2015), the findings of previous research studies may be underestimating nurses' daily activity levels as well as the proportion of nurses meeting current physical activity guidelines. Without information on nurses' occupational physical activity and how this activity may impact their leisure-time activity, it is difficult to determine whether nurses' total physical activity is adequate, and whether interventions are needed (Torquati et al., 2017). Consequently, evaluating nurses' occupational physical activity levels will be the major focus of this systematic review.

To understand nurses' physical activity levels during a shift, it is important to identify how physical activity is accumulated both in terms of activity patterns and the tasks performed. Nursing tasks are often physically demanding (Samaha et al., 2007), and require manual handling and awkward body positions (Carugno et al., 2012; Chen et al., 2011; Nicoletti et al., 2014a; Vieira et al., 2008). Common manual handling tasks include transferring patients between trolleys, beds and chairs, repositioning patients in bed, pushing beds, trolleys, wheelchairs and commode chairs, and carrying heavy pieces of equipment (Stričević and Papež, 2015; Yip, 2001). The physical demands of these tasks increase when there is limited availability of equipment and staff, the patient has significant mobility limitations or is overweight or obese, or when a task was repeated across a shift (Yip, 2001). It is possible that availability of equipment and staff, the patients, and task repetition may lead to differences in nurses' physical activity between-shifts.

How nurses accumulate their physical activity across a shift and the types of tasks that they engage in is poorly understood. It is estimated that 31% of nurses' time is spent in patients' rooms, with 91% of that time spent engaged in nursing care tasks (Hendrich et al., 2008). Of these nursing tasks, 35% of nurses' time was spent completing documentation (presumably standing, which is a light-intensity activity), 19% of nurses' time was spent in direct patient care activities such as providing care, and patient transport (presumably moderate-intensity), and 17% of nurses' time was spent on medication administration (presumably light-intensity; Hendrich et al., 2008). The second aim of this systematic review was to synthesise the available literature on how nurses' accumulate occupational physical activity with the aim of better understanding if and how nurses' occupational physical activity interacts with leisure-time physical activity, thus enabling more accurate profiling of nurses' total physical activity levels.

## 2. Methods

This is a narrative systematic review that were guided by the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) Statement (Moher et al., 2015). In accordance with PRISMA, the systematic review protocol is registered with the International Prospective Register of Systematic Reviews (PROSPERO; Registration number: CRD42016045427).

### 2.1. Search strategy

An electronic database search of EBSCOhost (MEDLINE, CINAHL, Age Line, Academic Search Complete, Global Health, Health Business Centre, Health Policy Reference Centre, Health Source (Consumer and Nursing/Academic Edition) and SPORTDiscus), Embase, Informit, ProQuest Health and Medical, Science Direct, Scopus, and Web of Science was completed on 18th May 2016. 'No lift' and other manual handling initiatives were introduced predominantly in the United Kingdom and Australian nursing during the 1990s that changed the way in which nurses worked (Engkvist, 2006; Tracey, 1997). Consequently, 1990 was used as the earliest date for this review (Health and Safety Executive; Tracey, 1997), although it is acknowledged that manual handling regulations do not exist in all jurisdictions, or exist in varying degrees in some countries (de Castro, 2004; de Castro et al.,

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