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12-hour shifts: determining the role of temporal flexibility allowed by extended work periods to manage sleepiness variations of nurses and nursing work requirements

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1. Introduction and context

12-hour shifts are increasingly common in the hospital sector. In France, 2/3 of the hospitals and 10.55% of hospital workers are concerned by these atypical work schedules (ATIH, 2014) which affect nearly 26,000 nurses in Europe (Estryn-Béhar & Van der Eijden, 2011).

2. State of the art

Working 12 consecutive hours induces fatigue accumulation during shifts, which can be significant in the final hours (Chen et al., 2013), and adds to physiological desynchronization during night shifts. 12-hour shifts extend the waking period which impacts on sleepiness at work (Folkard & Åkerstedt, 1992), exposing caregivers to potential risks to their safety and to the reliability of their work. However, operators are not passively subjected to these risks as they implement regulation processes in their work activity. Regulation is a control mechanism (Falzon, 2004) which aims to maintain a balance between an operator's resources (cognitive, physical and/or psychological) and the characteristics of his/her work environment (Gonon, 2003). In night work or shift work, operators develop ways of regulation enabling them to manage changes in their sleepiness and achieve their work outcomes. Two types of regulation have been identified. First, operators anticipate changes in their workload and oncoming sleepiness. Depending on their task requirements, they keep margins of manoeuvre for unexpected events and to manage their future variation in sleepiness (Toupin, Barthe & Prunier-Poulmaire, 2014). Second, to handle sleepiness peaks as they occur, operators adapt their activity rate (less travel, fewer actions). They speed up performing tasks by avoiding or changing some procedures to make them suitable for their current status (Barthe & Quéinnec, 2005), and cooperate to ensure reliable work or sleeping and resting (Barthe et al., 2016).

3. Objectives and Methods

The purpose of this study was to identify types of regulation used by nurses and nursing auxiliaries in a hospital department during 12-hour shifts. It was hypothesized that caregivers implement regulation strategies aimed to anticipate and manage sleepiness and work to be done during the day and night shifts.

The study was conducted at the intensive care unit of a French hospital. With 8 beds, it receives patients with critical failures. Their care involves the use of replacement methods such as mechanical ventilation and renal replacement. The systematic collection of data concerned 13 nurses and 6 nursing auxiliaries observed during three 12-hour day shifts and four 12-hour night shifts. The methodology combined the measurement of the caregivers' sleepiness levels during their shift (Karolinska Sleepiness Scale ; Åkerstedt & Gillberg, 1990), the observation of work activity during the first 10 hours of the shift, and an individual self-confrontation interview in the last 2 hours.

The variables tested were the shift (day/night) and the period during the shift (the shift length was divided into 5 periods). The indicators of strategies of regulation (anticipation/managing sleepiness) were: saving energy at work and controlling the service by anticipating while progressing with work, and adjustments to breaks and rest times for managing sleepiness.

4. Results & Discussion

4.1. Results

There was an effect of the shift period $F(3,90) = 20.91$, $p < .05$, and an interaction effect between shift period and shift $F(3,90) = 5.07$, $p < .05$. Sleepiness increased throughout the shift in both shifts. Several anticipatory strategies were identified. Interviews showed that several tasks were done at different times during both shifts: tracing biological parameters, blood glucose, nursing care, syringe preparation or blood test labelling. Anticipatory strategies were used throughout the shift in both shifts: making progress on tasks did not differ significantly between day and night ($t = -1.305$, ns) and between the times of the post $F(4,24) = 1.874$, ns.

Sleepiness management strategies differed between day and night: the work activity remained constant during the day, and decreased during the second half of the night ; rest times were scheduled during the day, and more random at night. The time spent in the break room was longer at night than during the day $F(2,10) = 5.7$, $p < .05$.

4.2. Discussion

12-hour shifts oblige caregivers to work over long periods while their sleepiness gradually increases. But the lengthening of the care period extends their margins of manoeuvre to organize their work, in both day and night shifts. Caregivers continually try to update their representation of their service in order to anticipate potential changes in workload and in their own abilities (Barthe, Quéinnec & Verdier, 2004). They will optimise time and energy by changing the task scheduling of their posts. They advance tasks to make themselves available in case there is a work overload or a high level of sleepiness (Toupin, Barthe & Prunier-Poulmaire, 2013). They postpone tasks to spend more time on another task or to rest.

5. Conclusion & perspectives

The option to advance or postpone a task freely enables caregivers to better manage the unforeseen events that arise in hospital work, but also variations in sleepiness resulting from 12-hour work shifts. Given the success of 12-hour shifts in hospitals and the potential risks associated with them, we advise developing and enhancing temporal leeway for caregivers.

Keywords: 12-hour shifts, sleepiness, work regulation, nurses, night shift.

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