Management of Dilemma under Sleep Deprivation in Anesthesiology
Residents: a Simulation-Based Study

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1. Introduction

Combined with the long working hours, impact of irregular schedule on performance in healthcare can generate high risk for patient safety. Every year, in the United States, between 44,000 and 98,000 people die in hospital as a result of medical errors.

Healthcare professionals themselves are concerned by the effect of sleep deprivation. The risks of driving after an on-call duty (Fruchtman, 2011) are well documented. Most studies have focused on the impact of sleep deprivation on technical skills. However, other skills have to be used in specific situations which are not totally covered by procedure.

Healthcare professionals have to make important decisions whatever the time of day and night and often under sleep deprivation. They have to compare risks associated with potential solutions, particularly in emergency situations. They may not have enough time and resources to review and compare outcomes of every possible solution, including ethical dimensions.

Naturalistic Decision Making (NDM) models have been developed to understand how people make high-stakes decisions under extreme time pressure and under dynamic and uncertain conditions. These cognitive processes involved rapid rates of data processing and are well adapted to time-pressure environments. Furthermore, sleep deprivation has a significant effect on flexibility, spontaneity and creativity (Horne, 1988) and led to more rigid thinking, increased perseverance errors, and marked difficulty in appreciating an updated situation (Harrison, 1999). Physicians have to cope with dilemma under sleep deprivation knowing that fatigue alters capacity to integrate emotion and cognition for decision-making into case of moral dilemma (Killgore, 2007). Physician constantly have to make decisions by estimating all the risks possible to insure safety for the patient. So besides technical skills, it is undeniable that non-technical skills have an essential influence on crisis management. Our research focus on decision making, specifically on dilemma and his management under sleep deprivation. Literature review put forward the lack of researches on this specific point, what brings interest to our study.

We intend to study the impact of sleep deprivation, induced by on-call duty, on technical and non-technical skills and decision making. We hypothesize that complex decision making are more affected by sleep deprivation than simple decision making.

2. Method

11 Residents participated in two simulation sessions, one in sleep deprivation condition (after an on call duty) and one in rested condition (after a day off). These two conditions were counterbalanced. Each scenario, developed with anesthetists, was composed with a simple task (procedural tasks) and a complex task (dilemma).

We used questionnaires and observations to collect data. An observation grid was workout with anesthetists to record omissions during the scenario.

3. Results

For simple tasks, residents under sleep deprivation tend to commit less omission than rested residents. On the contrary, for complex tasks, residents under sleep deprivation tend to commit the amount of omissions than rested residents (Figure 1). Residents, in sleep deprivation condition, have a greater tendency to change opinion under pressure than residents in rested condition (p<0,01) (Figure 2). In rested condition, residents tend to talk over more about dilemma with others healthcare professionals than residents in sleep deprivation condition.
4. Discussion

This preliminary study shows interesting results on the effects of sleep deprivation on performance in simple and complex decision making tasks. Contrary to the hypothesis, we observed an increased number of errors for rested residents compared to sleep deprived residents only for the simple tasks. A possible interpretation is that in simple task, with a high level of alertness residents would comply less with the procedure. In complex task, a significant effect of sleep deprivation on self-confidence is observed showing that when tired, residents are more prone to change opinions under the pressure of a supervisor. The impacts of sleep deprivation on confidence and self-assessment remains to further investigate. The implications of these results will be discussed from an organizational point of view as well as regard to the training of residents.

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References


