

The Night in the ICU

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Introduction

Whether it is a matter of keeping on with the hard work - as day and night would be an endless succession, as they actually are - or dragging an entire ward through shallow waters until the morning after, the night shift in the intensive care unit (ICU) has always stood under shady lights. In this article, we aim at analysing the multiple characteristics of life overnight in a critical care ward, the relationships between caregivers, patients and family, and how

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An overview of the multiple characteristics of life overnight in a critical care ward, the relationships between caregivers, patients and family, and how this complex reality is embedded in an artificial and often unfriendly environment.

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From Dusk Till Dawn

Frequently, the hardest task is to keep stable a precarious balance, as being on the ropes. Indeed, while emergency calls and abrupt changes in clinical conditions never rest, intensivists and nurse staff are there to respond: but at what price? The price of necessity, of course, which nonetheless has been demonstrated to carry a heavy load of acute fatigue and sleep deprivation (Gaba and Howard 2002). Partial sleep deprivation - as the one typically caused by night shift, in contrast to total sleep deprivation - is defined as a night of reduced and/or interrupted sleep (Weinger and Ancoli-Israel 2002). If you sum partial sleep deprivation to chronic tiredness related to long working hours, the predictable consequence is a deteriorated clinical performance (both mental and physical) (Maltese et al. 2016; Weinger and Ancoli-Israel 2002). Call it a name: shift work sleep disorder (SWSD) (American Academy Of Sleep Medicine 2001). As a matter of fact, this impairment goes well beyond the mere technical proficiencies: attention, cognition, motor skills and mood are only some of the domains that are affected by sleep deprivation (Mansukhani et al. 2012). Thus, an exhausted staff is an inaccurate one, and the risk of errors is raised (Rubulotta, Scales, and Halpern 2016; Smith-Coggins et al. 1997).

Are we meant to abolish night shifts then? Needless to say, that is not the case. Fortunately, tiredness does not necessar-

ily translate into clinical consequences concerning patient safety. In fact, although a variable grade of decrement in clinicians cognitive and psychomotor performance is proven (and enhanced by longer working shifts), no effect on patient mortality nor increase in relevant clinical events has been observed (Mansukhani et al. 2012; Parshuram et al. 2015). Several methods to reduce sleepiness and insomnia while improving performance in night shift workers have also been studied (Richter et al. 2016). Of these, exposure to bright light (Griepentrog et al. 2018), short (20 to 30 min) naps (Rajaratnam, Howard, and Grunstein 2013), and the intake of caffeine at the beginning of the shift (Schaefer, Williams, and Zee 2012) have shown beneficial effects on vigilance and attitudinal test performance. Still, working hours have to be efficiently regulated (especially in a high-intensity environment) (Lockley et al. 2004), if we want to avoid a tipsy, somnolent captain to pilot our plane (Cassin and Barach 2012).

The Role of the Night Staff: Who, Where, When?

Intensivist physicians improve patient outcomes, while leading to more efficient use of resources (Burchardi and Moerer 2001; Vincent 2000). It has been demonstrated that so-called high-intensity staffing ICUs are able to cut down both patient mortality and hospital length of stay (Pronovost et al. 2002). Indeed, combining high-quality assistance with useful cost-effectiveness performance is always desirable, especially when the most expensive

department of the hospital is in the spotlight. Anyway, whether the above mentioned beneficial results are a consequence of the intensivist presence 24 hours a day is yet to be proven. In fact, we might conceive the night shift as a limbo where we need to freeze the ward and lead it safely to the morning after: does this practically require a highly-trained specialist? We are currently far from answering this question, but concerning this matter, several studies have focused on the contrast between on-call intensivists versus full day and night coverage with senior physicians. The results are intriguing, since these studies fail to observe a higher length of stay or mortality in patients admitted to ICUs that did not have intensivists all around the clock (Kerlin et al. 2013; Kerlin et al. 2015; Wallace et al. 2012). That being so, it may then sound curious that the vast majority of European ICUs and more than one-third of ICUs in the United States actually have intensivist physicians overnight (Diaz-Guzman et al. 2012; Vincent et al. 1997). We have to point out that the cited results come from rather small, single-centred studies, and that once more the one size fits all mentality is presumably misleading. Differences in enrolled patient characteristics, severity of illness, type and resources of the included ICUs, nurse-to-patient ratio and tremendous contextual dissimilarities result in a very low potential for generalisation (Burchardi and Moerer 2001; Guidet, Soares, and Rowan 2016). Hence, systematic and evidence-based insights must come to light before any definitive statement can be written, and the debate is currently wide open.

Environmental Stress: The Noise of Time

The target of every intensivist is, most of the time, to restore patient physiology. Yet, the context in which we operate is often distant from being physiological. Alarms, mechanical ventilation, monitors, nursing, night rounds, bright lights: ICU is really

noisy, day and night unceasingly. Circadian rhythm is rapidly disrupted, and changes in patient sleep pattern and hormone secretion (cortisol and melatonin above all) are widely described (Coppola, Cacciopola, and Chiumello 2019; Korompeli et al. 2017; Simons et al. 2018). Especially during night time, arousals, preponderance of stage 2 sleeping pattern, decreased deep sleep and rapid eye movement (REM) phases are common (Pisani et al. 2015; Teliás and Wilcox 2019). As a consequence, altered sleep in the ICU has been linked to increased risk of delirium, prolonged ICU

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length of stay and augmented mortality (Ely et al. 2004; Weinhouse et al. 2009). Yet, ascribing all the sleeping disorders typical of the critically ill patient to environmental noise appears to be confusing (Horsten et al. 2018). In fact, ICU sleeping disorders show definitely a variable and multifactorial causality (i.e. the illness itself, drugs and sedatives, poor pain control). Nonetheless, great attention has converged on the interventions aimed at reducing the noise in the ICU. Above all, it has been highlighted that non-pharmacological interventions (i.e. patients wearing earplugs and eye masks overnight) resulted in benefits on perceived sleep quality (Huang et al. 2015), even when associated to relaxing background music (Hu et al. 2015). Besides, melatonin administration – with and without environmental interventions – showed positive effects on restoring circadian rhythm, on

improving the quality of sleep, and on cutting down the amount of prescribed sedatives and hypnotics (Huang et al. 2015; Lewis et al. 2018; Mistraletti et al. 2015).

Differently, it has been observed that attempting to reduce the noise per se (including alarm levels, light brightness, number of patient-caregivers interactions) seems to bring marginal effects on patient sleep pattern (Boyko et al. 2017) stressing once again the multifactorial genesis of ICU sleep disorders. Moving another step backwards, we may now address the environmental effects of the intensive care atmosphere on the caregivers. Does all this noise have a consequence on staff health and well-being? It surely does, and many of the mentioned circadian alterations have been described in ICU nurses and physicians as well (Griepentrog et al. 2018; Richter et al. 2016). Indeed, several consequences included in the overall SWSD class – reduced work performance, processing errors, accidents, reduced quality of life – are direct or indirect consequences of passing the night in a hostile habitat, even while working in it (Ahasan et al. 2001) Ergonomics – defined as the study of people's efficiency in their work environment – will have to be at the centre of future research and application, particularly in highly-stressful ambient as ICUs (Ahasan et al. 2001). Beyond any doubt, we – patients, doctors, nurses – are simultaneously protagonists and sufferers of the same nocturnal, unphysiological reality.

Time to Fit an Extra Seat at the Bedside?

Families of critical ill patients undergo a deep, sudden disruption of their lives (Beesley et al. 2018). In order to mitigate the complex impact of life-threatening situations, open ICU policies have proven favourable both towards patient and family needs (Beesley et al. 2016; Alberto Giannini 2017; Marra et al. 2017). Perceiving the closeness of relatives attenuates patient stress and has shown beneficial effects in terms of reducing the incidence of delirium (Rosa

et al. 2017). Besides, participation of the family during ICU procedures appears to play a considerable role in patient-caregivers-relatives relationship (Bijttebier et al. 2001). Indeed, the creation of protocols that establish a routine and safe participation of relatives during ICU procedures (both in election and in emergency) has been encouraged, as it also provides the family with an active role in overall patient care (Beesley et al. 2016). Twenty-four hours visiting policy has been associated to a better acquaintance of ICU staff, to a facilitated commute to the hospital, and to a reduced level of anxiety in patients visiting a French ICU (Garrouste-Orgeas et al. 2008). At the same time, physicians and nurses perceived an enhanced family trust towards them, while unease in visiting the patient and delay in ward organisation appeared not to be increased (or just marginally) by family presence. On the other hand, scarce – if untraceable – literature is available on the role of family presence during the night in the ICU. One exception is maybe represented by paediatric critical wards, where departments are at times variably organised to host parents at the bedside. Nevertheless, quoting a recent survey on family stress in paediatric critical care: "...it's hard sleeping [at the hospital] with the beeps and stuff... at the same time, it's really hard to be away, too, to get the sleep" (Hagstrom 2017). Thus, it is conceivable that an overnight company of close relatives also in adult ICUs could be as favourable as during daytime. As an example, a patient who is able to interact with his relative at the bedside could find

relief in a situation of extreme anxiety and insomnia, a combination frequently observed in our wards. The gap between reality and good intentions is currently very wide, but a step-by-step approach to fulfil patient needs – besides the clinical, technical ones – has to be the leading

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light, provided ICUs are (pragmatically and mentally) equipped to do so (Giannini 2010).

Conclusions

The night shift in the ICU is an everyday challenge, exhausting and unpredictable as walking on thin ice. It brings with itself (and probably emphasises) all the complex aspects that concern a laborious relationship between all its characters - namely patients, staff, family – and the surrounding, often inhospitable environment. Improving the liveability of ICU wards – as with open visiting policies, spaces dedicated to relatives to stay overnight, reduced alarm

tones, dim lights - might then result in a better relationship between all the figures involved, eventually ensuing an overall improved, human-friendly habitat. Moreover, empowering the figure of relatives, letting them participate during procedures and assigning them a role – even symbolic - in patient care might be of relevance in lowering both patient and family stress. Nonetheless, several aspects concerning overnight work in the ICU reality have to be fully elucidated. Above all, addressing the impact of sleep deprivation on healthcare workers and the hypothetical low effect of their interventions at night on patient outcomes, is it really mandatory to have an intensivist all around the clock? Is it finally time for re-scheduling? Perhaps on-call specialists would be enough to manage safely an ICU until the morning after, but what shall we define enough in critical care?

Conflict of Interest

The authors declare no conflict of interest. ■

Key Points

- We might conceive the night shift as a limbo where we need to freeze the ward and lead it safely to the morning after.
- The vast majority of European ICUs and more than one-third of ICUs in the US have intensivist physicians overnight.
- One size fits all mentality is presumably misleading and differences in ICU result in a very low potential for generalisation.
- Patients, doctors, nurses are simultaneously protagonists and sufferers of the same nocturnal, unphysiological reality.

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