

The Night in the ICU

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Shadowing the Nightwatch: Nocturnal Activity in the ICU

An article exploring the experience of an intensive care registrar overnight and the evidence supporting admissions, fatigue, judgement and morality in the circadian cycle.

At night, ICU feels like a fortress that has been put to bed for the night, and as a registrar, you have a role blended from sentinel, secretary, detective and a Valkyrie.

Crenelated walls of beds jut out into the ward; soft rhythmic hissing of ventilators are reassuring, and there's a constant low level litany of beeps. It feels like being inside an organism, listening to its heartbeat. The lights are low, but you'll hear hushed voices and footsteps, and computer screens sparkle at you; occasionally the blood gas machine whirrs or a phone rings from a relative wanting an update. The phone's irksome cousin, the alarm from the dialysis machine clotting, also makes itself known.

The Entrée

You'll have handover in an office somewhere and then do a round – trying to gracefully and noiselessly glide round your flock and check the plan is complete for the day; yet not disturb the patient. Noise and interrupted 'sleep' have become hot topics in the ICU.

In quarter-master role one checks fluid balances, blood gases; the tally of input output, vital signs and feedback from our nursing colleagues. Sometimes medications need adjusting or fluid prescribing. Our pharmacist colleagues may have helpfully annotated the drug chart. It is often here,

in the pre-witching hour calm that I've found myself having time to tidy them.

Typically, as it heads towards the embers of the day – 9/10 'o' clock, the first seeds of delirium germinate. On rare occasions this is being pleasantly mistaken for a hotel maid; but more commonly patients are distressed, agitated, and committed

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to removing any and all lines, drains and any other perceived manacles. There are certainly circadian cues that contribute to confusion – we know that sensory input is a way of calibrating patients to the here and now (Madrid-Navarro et al. 2015); and "sundowning" became a coined phrase amongst nursing homes for the elderly – this is more correctly a syndrome associated with pre-existing dementia (Canevelli et

al. 2016). I have often wondered if this not-infrequent phenomenon contributes to tales of possession or body metamorphosis at night. Even so, it is not to be underestimated. We know that delirium is a risk factor in itself for mortality as well as consuming nursing resources, extending hospital stay, and increasing risk of harm from hastily-removed devices or deficient monitoring (Diwell et al. 2018).

From a biochemical point of view, there are various theories about delirium being alterations in regulation of cerebral blood flow, a disrupted blood brain barrier, NO signalling, mitochondrial dysfunction, and of course, incongruous sensory input like constant new staff, unnatural light, constant sound, and polypharmacy with hypnotic and sedative drugs (Maccullich et al. 2008). Practically speaking, verbal reassurance can be enough, or reviewing organic reasons such as infection, pain or urinary retention reveals a cure. For delirium tremens – in my experience a suspicious and paranoid form of delirium – benzodiazepines prophylactically or acutely, are favoured. During chronic alcohol abuse, the GABA receptor is heavily modified. In abrupt cessation, inhibitory chloride currents from GABA receptors are attenuated, resulting in constitutive overactivity (Brousse et al. 2012). Henceforth, GABA agonists such as chlorthalidopoxide or lorazepam are the

sensible choice. Personally, in that setting, I have found it works well. Pharmaceutical manipulation of other delirium is hotly contested and a capacious subject.

Midnight

The other side of midnight varies. We all aspire to a peaceful night watch. It is also the period when our own body clocks have succumbed to the nadir of cortisol signalling.

When it comes to ICU admissions, those either admitted or discharged between 00:00 and 08:00 have the highest mortality (Halpern 2015). This has made nocturnal discharges unfavourable as one would expect. However it is also easy to see why; unplanned admissions, emergency surgery (by definition overnight, life threatening) and only those patients unwell enough to be visited by the ravaged night on-call teams will tend to be brought to the attention of critical care.

Fatigue

One of the current questions with respect to nightwork is, "is it unnatural? are error rates larger?" I know myself that many units, unless urgent, prefer to perform procedures in daylight hours. It is unanimously agreed, we avoid surgery overnight.

Surgeons are some of the best studied with respect to fatigue and performance. Laparoscopic surgery skills are significantly impaired (at least on models!) on the first nightshift (Leff et al. 2008). In paediatric trainees, working on calls were equivalent to a significant blood alcohol level as assessed by driving tasks, and verbal and motor recall (Arndt et al. 2005). Self-reported measures of impairment were more likely to be incorrect versus controls – suggesting poor judgement.

When it comes to anaesthetists, it has been shown those individuals working nights were more likely to be working on less sleep (Gander et al. 2008). Although averaged out across a set of shifts, this seemed to amount to <1 hour of acute

deprivation per day-period; however across 12 days this cumulative deprivation impaired memory and attention far more than previous laboratory studies would suggest. A heavy workload in that preceding 24 hours before a nightshift was also a risk.

Meanwhile both caffeine and napping have been shown to improve performance (Mednick et al. 2008; Lovato and Lack 2010); napping potentially more strongly (60-90 minutes in this study!), and has been incorporated into the Association of Great Britain and Ireland's Fight Fatigue Guideline. Even short naps of 5-15 minutes duration are shown to improve alertness for 1-3 hours (Association of Anaesthetists). Anecdotally, I work well after brief naps, and find them valuable in the sometimes less fraught 4-6am period, prior to the arrival of a road traffic accident trauma from morning rush hour.

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There are other, more sinister aspects to nightwork on medical professionals – increased risk of metabolic disease such as diabetes, cardiovascular pathology and early death (Abu Farha and Alefishat 2018). An American study also found concerns relating to effects on small children with parents who have altered chronobiology (Reinke et al. 2015).

Adrenaline

An alternate reality/superimposed state of being the intensive care registrar at night is descent to the ED to help manage a head injury, overdose, cardiac arrest or

equivalent. I am typically unhappy initially to receive these calls, and head wearily like Persephone for her stint in Hades; only on arrival to feel myself click into action. Many of us will recognise that adrenaline wakes us up and can initially offset fatigue – one would expect little less from a fight or flight system. However, interestingly most of the documented evidence comes from old experiments in the 1950's and 1970's. People were forced to sit down and watch radar monitoring for hours. Adrenaline correlated best with performance – and there was no gender discrepancy either (O'Hanlon and Beatty 1976).

When it comes to assessing how critical care should be delivered at night, a lot of attention has been given to debates about continuity of care (evidence now arriving that trained intensivist rather than same intensivist is key) (Halpern 2015), and whether senior/consultant led care is vital. Most UK units operate with remote supervision overnight, with consultants attending in extremis or for particularly knotty scenarios. At the least however, they are just a phone call away. I have always felt well-supported. We also know that with increasing age, sleep deprivation becomes more frequent with respect to nightwork, and also more cumulatively detrimental (Gander and Signal 2008). It is of note in the airline industry.

Decision-making

Lastly, and potentially least directly relevant but a closet worth exploring, is the effect of circadian cues, or even chronotype on morality. A landmark study demonstrated that not only were people more likely to cheat on tasks in the evening (and we could think of this as something like hand hygiene) and I certainly know my enthusiasm for tasks dwindles in the swansong of my shifts. Morality was affected by chronotype (Gunia et al. 2014) - by chronotype one refers to whether a 'lark' or 'night owl.' Sleep deprivation too, contributes to moral reasoning in military officers (Olsen et al. 2010); in

particular, the higher the morality in the rested state, the more is lost under duress.

Another disturbing feature was a study on the judiciary, indicating that favourable outcomes were related to how recently fed or rested a particular judge was (Danziger et al. 2011). I must say that I have always hoped for this, when booking the viva part of postgraduate exams, or interviews.

Conclusion

Overall, whilst on occasion it feels like Charge of the Light Brigade (charging into a closed ravine with gunfire), being the night registrar has its perks. The unit can feel very hushed and hallowed at night; you are aware of how vulnerable sleeping patients are, and feel like their shield. There can be more downtime in which to speak to nurses or tidy a few loose ends. There is a degree of autonomy; testing the elasticity of one's boundaries, and for me, the higher acuity patients often occur at night. I feel less like I'm orbiting

the hospital, on a nightshift, and more plugged in to what the surgeons and the on-call medics are doing. You'll endlessly roam the corridors to find patients in wards you never knew existed (like Theseus, you may need string), but occasionally see another medic, which is a comfort. It is these brief moments of connection, and the blithe feeling of triumph, when you have successfully packaged up your patient, arterial line, ventilator, oxygen cylinder, nurse and porter, and arrive back into the safety of the unit, that you do feel like a returning conqueror. It satisfies the deepest hunter-gatherer instincts within me. Nights are unpredictable and hard. I am almost sure that when Machiavelli said "No enterprise is more likely to succeed than one concealed from the enemy until it is ripe for execution," he was talking about an emergency laparotomy. Despite this, they represent some of my most fruitful learning experiences in medicine. Learning to adapt our biology, or at least our

psychology, to do least harm, would be a valid pursuit. ■

Conflict of Interest

None declared

Key Points

- Noise and interrupted 'sleep' have become hot topics in the ICU.
- When it comes to anaesthetists, it has been shown those individuals working nights were more likely to be working on less sleep.
- Napping improves performance and has been incorporated into the Association of Great Britain and Ireland's Fight Fatigue Guideline.
- There are other, more sinister aspects to nightwork on medical professionals – increased risk of metabolic disease such as diabetes, cardiovascular pathology and early death.
- When it comes to assessing how critical care should be delivered at night, a lot of attention has been given to debates about continuity of care and whether senior/consultant led care is vital.

References

- Abu Farha R, Alefishat E (2018) Shift Work and the Risk of Cardiovascular Diseases and Metabolic Syndrome Among Jordanian Employees. *Oman Med J*, 33(3):235-242.
- Arnedt JT et al. (2005) Neurobehavioral Performance of Residents After Heavy Night Call vs After Alcohol Ingestion. *JAMA*, 294(9):1025-1033.
- Brousse G et al. (2012) Alteration of Glutamate/GABA Balance During Acute Alcohol Withdrawal in Emergency Department: A Prospective Analysis. *Alcohol*, 47(5):501-508.
- Canevelli M et al. (2016) Sundowning in Dementia: Clinical Relevance, Pathophysiological Determinants, and Therapeutic Approaches. *Front Med*, 3:73-73.
- Danziger S et al. (2011) Extraneous factors in judicial decisions. *Proc Natl Acad Sci*, 108(17):6889.
- Diwell RA et al. (2018) Key components of the delirium syndrome and mortality: greater impact of acute change and disorganised thinking in a prospective cohort study. *BMC Geriatr*, 18(1):24-24.
- Fatigue and anaesthetists. Association of Anaesthetists. Available from anaesthetists.org/Home/Resources-publications/Guidelines/Fatigue-and-Anaesthetists.
- Gander P et al. (2008) Sleep Loss and Performance of Anaesthesia Trainees and Specialists. *Chronobiol Int*, 25(6):1077-1091.
- Gander P, Signal L (2008) Who Is Too Old for Shift Work? Developing Better Criteria. *Chronobiol Int*, 25(2-3):199-213.
- Gunia BC et al. (2014) The Morality of Larks and Owls: Unethical Behavior Depends on Chronotype as Well as Time of Day. *Psychol Sci*, 25(12):2272-2274.
- Halpern SD (2015) Nighttime in the Intensive Care Unit. A Lens into the Value of Critical Care Delivery. *Am J Respir Crit Care Med*, 191(9):974-975.
- Leff DR et al. (2008) Laparoscopic Skills Suffer on the First Shift of Sequential Night Shifts: Program Directors Beware and Residents Prepare. *Ann Surg*, 247(3).
- Lovato N, Lack L (2010) The effects of napping on cognitive functioning. *Prog Brain Res*, 185:155-166.
- MacLulich AMJ et al. (2008) Unravelling the pathophysiology of delirium: a focus on the role of aberrant stress responses. *J Psychosom Res*, 65(3):229-238.
- Madrid-Navarro C et al. (2015) Disruption of Circadian Rhythms and Delirium, Sleep Impairment and Sepsis in Critically ill Patients. Potential Therapeutic Implications for Increased Light-Dark Contrast and Melatonin Therapy in an ICU Environment. *Curr Pharm Des*, 21(24):3453-3468.
- Mednick SC et al. (2008) Comparing the benefits of caffeine, naps and placebo on verbal, motor and perceptual memory. *Behav Brain Res*, 193(1):79-86.
- O'Hanlon JF, Beatty J (1976) Catecholamine correlates of radar monitoring performance. *Biol Psychol*, 4(4):293-304.
- Olsen OK et al. (2010) The impact of partial sleep deprivation on moral reasoning in military officers. *Sleep*, 33(8):1086-1090.
- Reinke L et al. (2015) The effect of chronotype on sleepiness, fatigue, and psychomotor vigilance of ICU nurses during the night shift. *Intensive Care Med*, 41(4):657-666.