

Fatigue and the paediatric anaesthetist

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Introduction

The healthcare environment in the state and private sectors is currently very challenging for clinicians. This may compound the problem of occupational fatigue that we currently face as a community.

The problem of occupational fatigue is not unique to the healthcare industry or anaesthesia specifically. To prevent industrial accidents, many industries such as seafaring, mining, public safety, nuclear power, military and transportation have put measures in place to reduce occupational fatigue and improve occupational health.¹ We could learn a lot from them.

Although a search of the literature did not reveal studies relating to paediatric anaesthetists specifically, much research has been done in relation to the impact of fatigue on performance in medicine and anaesthesia in general. What follows is a brief review of some of the literature and how I think it relates to paediatric anaesthesia.

Definition and types of fatigue

Occupational or work-related fatigue is extreme tiredness and reduced functional capacity that is experienced during and at the end of the workday, incorporating dimensions of physical, mental and emotional work fatigue.¹ Howard et al.² define fatigue as inability or unwillingness to continue effective performance of a mental or physical task and is a summary descriptor for the varied effects and labels used to describe the cognitive, behavioural, and physiological outcomes of sleep loss and circadian disruption.

Why is (paediatric) anaesthesia more prone to occupational fatigue?

Our work as anaesthetists demands sustained mental focus at high levels for long periods which contributes to fatigue, both mental and physical.¹ Paediatric anaesthesia requires the same if not hyper-vigilance and thus this cohort may be at higher risk for occupational fatigue. Although this is recognised as a fact, fatigue among anaesthesiologists is accepted as norm or mostly ignored.¹ However, the risk to patient safety cannot be ignored and is well described.

Anaesthesiology by its nature involves crises.³ We work in a complex and dynamic environment where surgery and the patient constantly challenge even the best anaesthetist.³ This

is more pronounced in paediatric anaesthesia, where the heterogeneity of the patients, among other characteristics, often adds to the complexity.

Patients often have poorly structured underlying problems and their responses to interventions cannot always be accurately predicted. Vigilance is required in terms of the progress of surgery because catastrophic complications cannot always be anticipated.³ Added to this patient and surgical stress is time pressure, where the scarcity of theatre time requires anaesthetists to make hasty decisions at times in an attempt to meet efficiency goals, which may not always be for a particular patient's benefit.³

Factors predisposing to fatigue in (paediatric) anaesthesia

In addition to the sustained mental focus anaesthesia demands, the following factors are cited as major contributors to occupational fatigue^{1,4}:

- Long working hours (more than 12.5 hours) and the duration and frequency of night shifts and the sleep deprivation linked to it
- Physical demands (standing for long periods, volume and turnover of patients)
- Undiagnosed hypovolaemia and hypoglycaemia due to lack of adequate breaks to allow for food and fluid intake
- Unrelenting cognitive demands especially linked to patient acuity and the complexity of surgical procedures undertaken
- Interpersonal dynamics
- Prevailing environmental factors (noise, temperature, shortages etc.)
- Reduced tolerance to night shift work (seen as prolonged recovery times) with advancing age
- Personal and family challenges

Individuals working in state hospitals are subject to government regulations on working hours and an overburdened health system teeming with patients, which may not always align with recommendations based on scientific research. Individuals working in the private sector are forced by various factors to make poor choices in personal scheduling in order to 'please' the surgeon and thus keep their list. These factors contribute to fatigue due to the prolonged periods of work which may result and the reduced time for rest between shifts.¹

Sanders et al. reported Epworth Sleepiness Scale scores in the mild sleepiness category among trainees in the Wits Anaesthesia department, which were still much higher than the average population in keeping with the long working hours and regular night shifts required of trainees.⁵

Why should we be concerned about occupational fatigue?

Fatigue has been shown to reduce several aspects of cognitive performance required for the delivery of safe anaesthesia, by 25% from baseline after more than 24 hours of being awake.⁴ Reduced cognitive performance can include any of the following:

- Reduced attention and vigilance with attention lapses
- Impaired memory and decision-making
- Slowed cognitive throughput
- Prolonged reaction time with lowered optimal responding
- Lapses in attention to detail
- Errors of omission
- Compromised problem solving
- Reduced motivation and disrupted communications⁴

Anger and depression culminating in absence of compassion for the patient can also result.⁴

Patient safety is compromised when fatigue-related errors occur, namely drug errors, errors in medical judgment and delayed reaction to events.¹ In United States (US) and Australian studies, anaesthetists reported fatigue as a contributing factor to 2.7% of anaesthesia incidents and 50% of medical judgment errors.¹ In the South African context, Sanders et al.⁵ reported that 48.6% of anaesthetists in their study admitted to making clinical errors related to sleepiness.

Of equal importance is the danger a fatigued anaesthetist poses to themselves and the general public when they drive home after a night shift for instance, running the real risk of causing a car accident.¹ In June 2016, a similar incident was reported in South Africa, where a fatigued intern caused a fatal car accident.⁶

Another potential danger to the anaesthetist is percutaneous injury, although this may have other causes such as sudden patient movement, poor lighting or lapses in concentration.^{4,5}

Countermeasures to fatigue

It is impossible to eradicate fatigue and its consequences but measures can be employed to reduce it. Fatigue risk management (FRM) uses our current understanding of sleep physiology to develop a set of countermeasures that can reduce the impact of sleep deprivation or circadian shifts on physician performance.⁷ The transportation sector has utilised such programmes for years to deal with fatigue among pilots, commercial drivers and train engineers to name a few.⁷

The average adult requires approximately eight hours of sleep in a 24-hour period, which is difficult to ensure given our long hours and night shift work as anaesthetists in most settings.⁴

Reduction of overall work hours would be the most effective strategy against the negative effects of fatigue, but for obvious reasons, it is the most difficult to implement.⁷ The disablers to this strategy include existing nursing and support staff schedules, the demand for service delivery in the state sector and the requirements of surgeons for instant service in the private sector. In general, studies suggest an association between long work shifts of more than 24 hours' duration and a reduction in alertness and performance compared to shorter shifts.⁷ Thus, scheduling which allows for adequate breaks during shifts in suitable rest facilities as well as power napping at work may help stave off the resultant fatigue.¹

In the South African Society of Anaesthesia (SASA) Practice Guidelines on workload, corrective strategies to mitigate fatigue are outlined in detail and are in keeping with international literature.⁴ Of particular importance are the fatigue-alleviating strategies suggested in this document which include: day sleeps before a night shift, naps of at least 40 minutes when feeling excessively fatigued and before driving home, and improved structuring of call and shift rosters. Regarding scheduling in particular, the following suggestions are made:

- Work activities should not exceed 80 hours per week averaged over six weeks
- A minimum of 10 hours' rest between consecutive duties should be allowed for
- Ensuring that continuous shifts on call do not exceed 17 hours of anaesthesia provision at any one time
- Between 10–25% of available working time should be allocated towards non-clinical activities such as continuous professional development (CPD) courses etc.

Mental strain at work could be reduced by creating awareness about the effects of external stressors on work performance and active attempts to reduce them.¹ Assistance with work for women, decreasing demands for older colleagues and increasing flexibility of scheduling for those with families have all been suggested as strategies for reducing fatigue.¹

Other strategies for mitigating fatigue include: caffeine, strategic naps, controlled exposure to bright or blue-enriched light during extended or overnight shifts and appropriate use of recovery sleep.⁷ The judicious use of alarms and timers on monitors can also be seen as helpful in offsetting the negative effects of fatigue, although studies to prove this are lacking.

Strategically planned naps prophylactically before sleepiness occurs have been found to briefly reduce the results of fatigue from sleep deprivation on long night shifts for up to 30 hours.⁷ It appears that a short 20 to 60 minute nap during a night call shift can yield better psychomotor vigilance, performance and alertness.⁷ Sleep inertia, which is an impairment in alertness and performance that is present immediately on waking from sleep as the brain transitions to complete wakefulness (which can take up to four hours), should be considered when planning these strategic naps especially when response to emergency situations upon immediate awakening is required.⁷ Caffeine

intake, exposure to bright light and washing ones' face with cold water have been suggested as countermeasures to sleep inertia.⁷

Microbreaks including a short walk and some brief shoulder, back and neck exercises have been studied among surgeons but could possibly improve alertness in anaesthetists performing anaesthesia for very long surgeries.⁷

Caffeine at a dose of 200 mg six hourly can enhance performance and alertness in fatigued individuals during night shifts.⁷ Caution is advised as it may impair the quality of rest during breaks.⁴

Bright and/or blue-enriched light has been shown to counter fatigue by resetting the circadian phase and rapidly increasing alertness and cognitive performance. These benefits are dependent on intensity, duration and the wavelength of the light. Most benefit is derived from the combination of bright light and either stimulants (i.e. caffeine) or strategic napping.⁷

The relevance of these strategies varies depending on whether the (paediatric) anaesthetist is still in training or a qualified consultant, and whether said consultant is in state or private practice. This is because generally, like our international counterparts, our registrar training years are characterised by long work hours mainly due to night call shifts and the need to prepare for examinations.⁷ In addition, a (paediatric) anaesthetist in private practice, depending on how they have structured their practice, may have either very little after hours work or a large amount if they work with a busy surgeon in solo practice. Thus, each anaesthetist can utilise whichever measures are relevant to them.

Culture and awareness

As clinicians, we often continue to work when most other professionals would either call in sick or get medical advice, presumably because of the demands of our caring profession. This culture of deifying continuing to work while impaired needs to be discouraged. Instead, we must foster a safe culture of vulnerability by speaking out when impaired, by any factors including fatigue, without fearing stigmatisation.

A workplace culture that promotes help-seeking behaviour needs to be nurtured, where a fatigued individual feels no shame in requesting help when feeling vulnerable, and accepts help when others observe fatigue-related behaviour.¹ However, it is essential that fighting fatigue is not kept as a 'matter between colleagues' but that organisational structures are involved to effect change at policy level.¹

Similar to the aviation industry where pilots use a mnemonic checklist to screen for impairment by analysing the influence of potential performance-shaping factors and remaining grounded if impaired, we could use the I'M SAFE approach. I'M SAFE is a simple personal checklist to determine one's ability to perform safely concerning these factors: **I**llness, **M**edication, **S**tress, **A**lcohol/drugs, **F**atigue, **E**ating and **E**limination.³ The reality though is that it is not always possible to be excused from work on account of impairment owing to these factors due to various real and perceived pressures, especially in private practice. A change in culture at individual and organisational levels is needed.

Summary

Occupational fatigue must be addressed as a matter of urgency at individual and institutional level for the sake of both patient and clinician safety. A culture of awareness and support must be encouraged especially in our resource-constrained environment where strategies and guidelines for reducing fatigue suggested in the literature are not able to be implemented.

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