Sleep Disturbance across the Subacute Recovery Phases following Traumatic Brain Injury

Fedele B[1,2,3], **Williams G**[1,2,4], **McKenzie D**[1,3], **Giles R**[1] & **Olver J**[1,2,3]

[1] Epworth HealthCare ; [2] Epworth Monash Rehabilitation Medicine (EMReM) Research Unit; [3] Monash University ; [4] The University of Melbourne

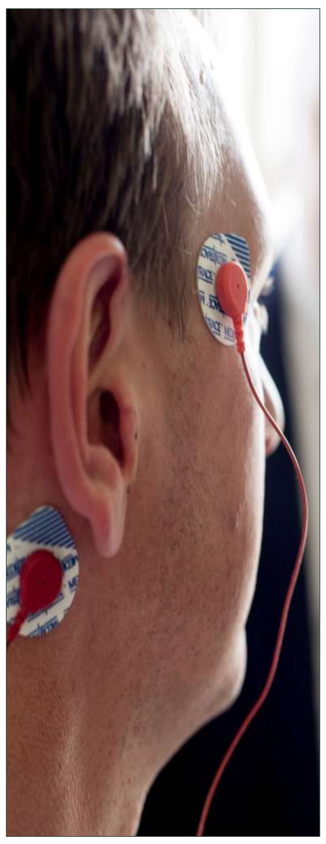
Introduction

- After a traumatic brain injury (TBI), individuals experience a period of confusion known as post-traumatic amnesia (PTA), lasting days to months. During PTA, ≈80% of individuals present with sleep disturbance alongside other symptoms (e.g., memory problems, agitation)
- Sleep disturbance during early TBI recovery is largely under researched, despite evidence that it negatively affects patient outcomes and recovery

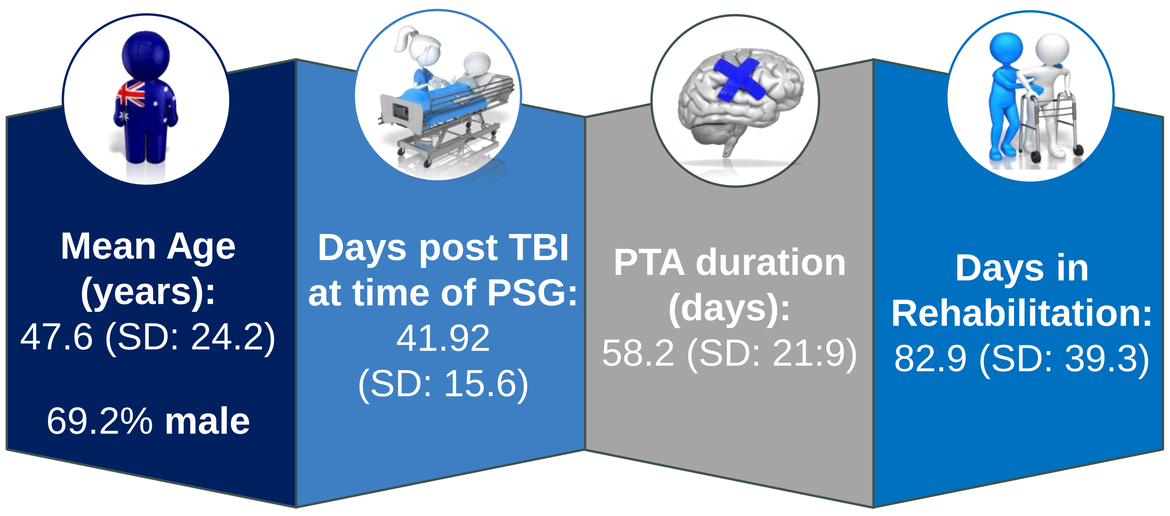
Study Aim

To evaluate the trajectory of sleep disturbance during early TBI recovery, by measuring sleep using gold-standard polysomnography (PSG) in patients experiencing PTA and again following the resolution of PTA.

Methodology and Participants (n=13)

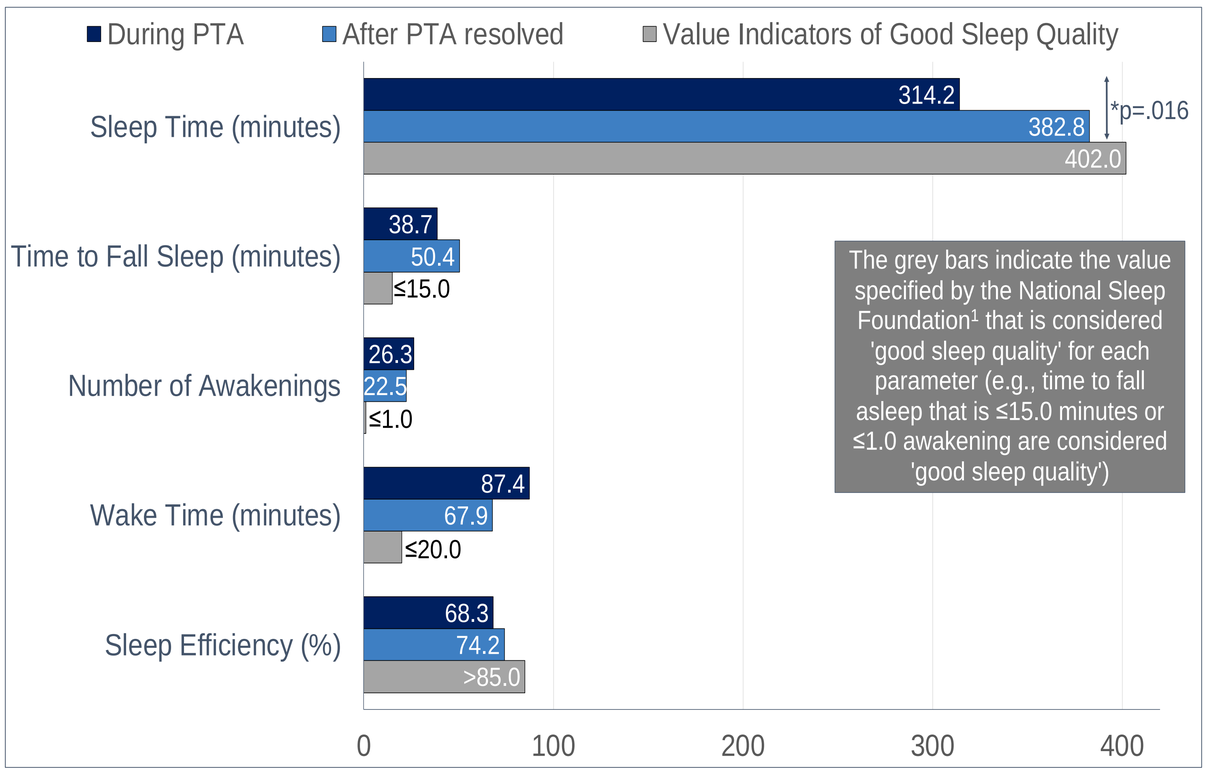


Patients in PTA were recruited from Epworth HealthCare's inpatient TBI Rehabilitation Unit. The Compumedics Somté portable PSG device was attached to the patient's torso overnight at bedside with a Velcro strap. Sticker electrodes were placed on head sites that record brain wave and body activity and inform about sleep/wake parameters and staging. PSG was repeated in patients 2 weeks after PTA had resolved (determined by the Westmead PTA Scale).[1] Patients therefore acted as their own controls.

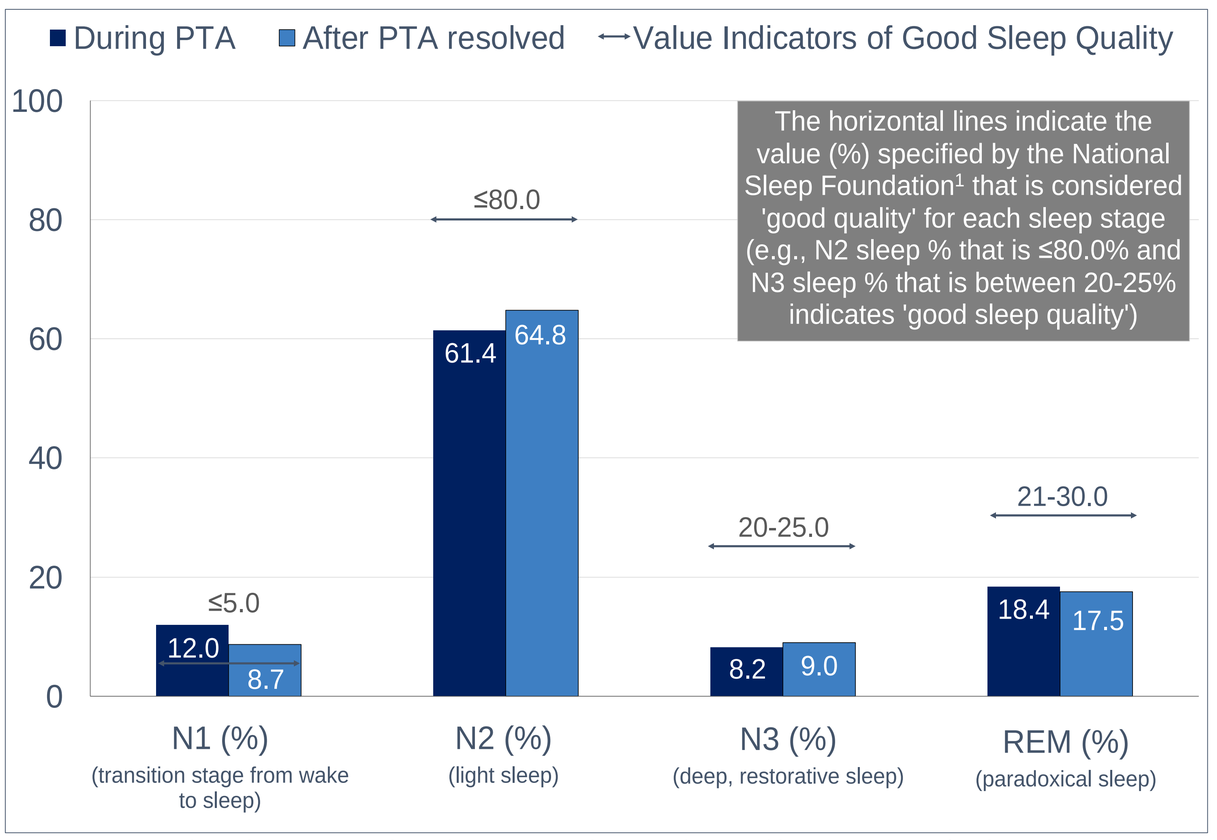


SD (Standard Deviation)

PSG Results



Mean sleep/wake parameters during both recovery phases (in PTA and once PTA had resolved) are displayed above. Whilst sleep time was significantly longer (paired samples t-test; p=.016) after PTA resolved, sleep periods were fragmented in both phases. Patients displayed increased awakenings and decreased sleep efficiency (ratio of time in bed to time asleep). Patient means for all parameters were outside the values indicating 'good sleep quality' (grey bars).[2]



N1 (NREM stage 1); **N2** (NREM stage 2), **N3** (NREM stage 3); **NREM** (non–rapid eye movement sleep)

Patients displayed similar proportions of sleep stages in both recovery phases. The % of N3 (slow-wave, restorative sleep) was decreased and below the value that indicates good sleep quality (20-25%). This can be problematic as N3 sleep's functions (i.e., learning, memory and neural recovery) are important when recovering from a TBI.

Conclusion

To our knowledge, this is the first study to evaluate sleep disturbance in a cohort of patients as they progress through the early recovery phases. There is an urgent need for the surveillance of sleep disturbance which currently does not form part of routine hospital assessment, to facilitate appropriate management and reduce long-term impacts.

EPWORTH MONASH REHABILITATION MEDICINE UNIT

Epworth Research

MONASH University Medicine, Nursing and Health Sciences

SCAN ME

Excellence. Everywhere. Everyday.

1 Shores et al., 1986 ; 2. Ohayon et al., 2017

The authors gratefully acknowledge Epworth's TBI Rehabilitation Nursing Team for conducting the study methodology and the Professor Jack Cade AM Intensivist Major Development Grant and Epworth Medical Foundation Grant Family Bequest for funding support.