Nottingham University Hospitals NHS
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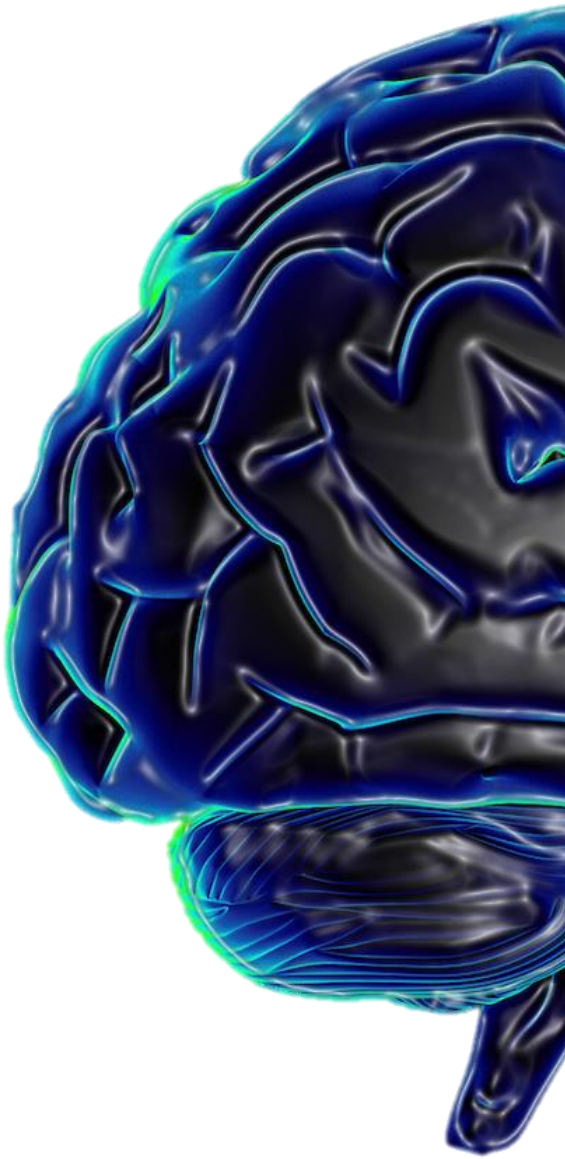
CEREBRAL PERFUSION PRESSURE:

targets and transducer positioning

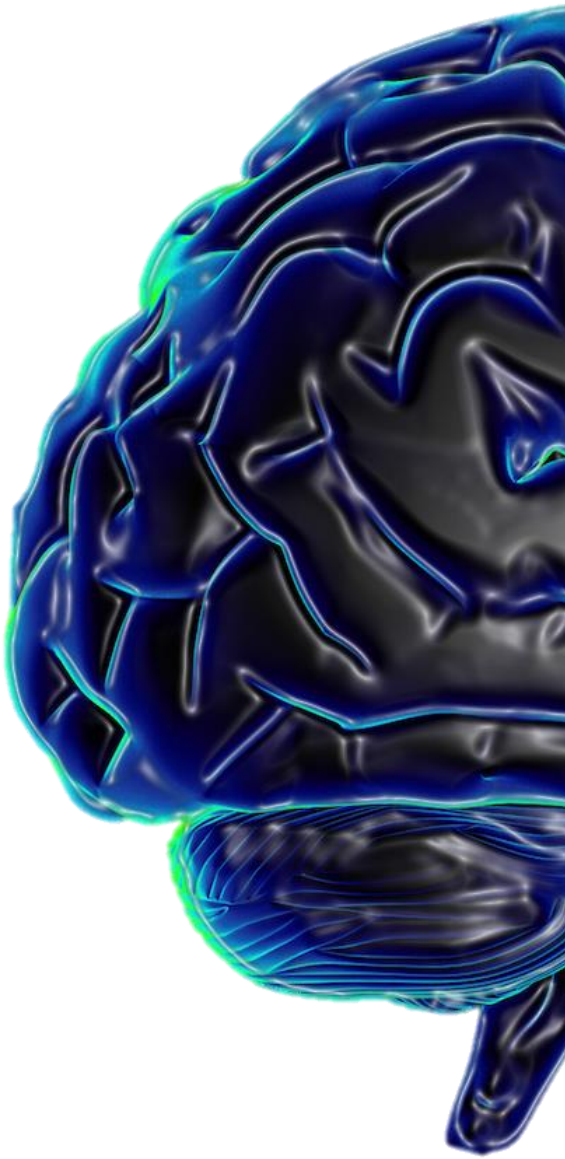


Dr Shayda Karimi

What is CPP?

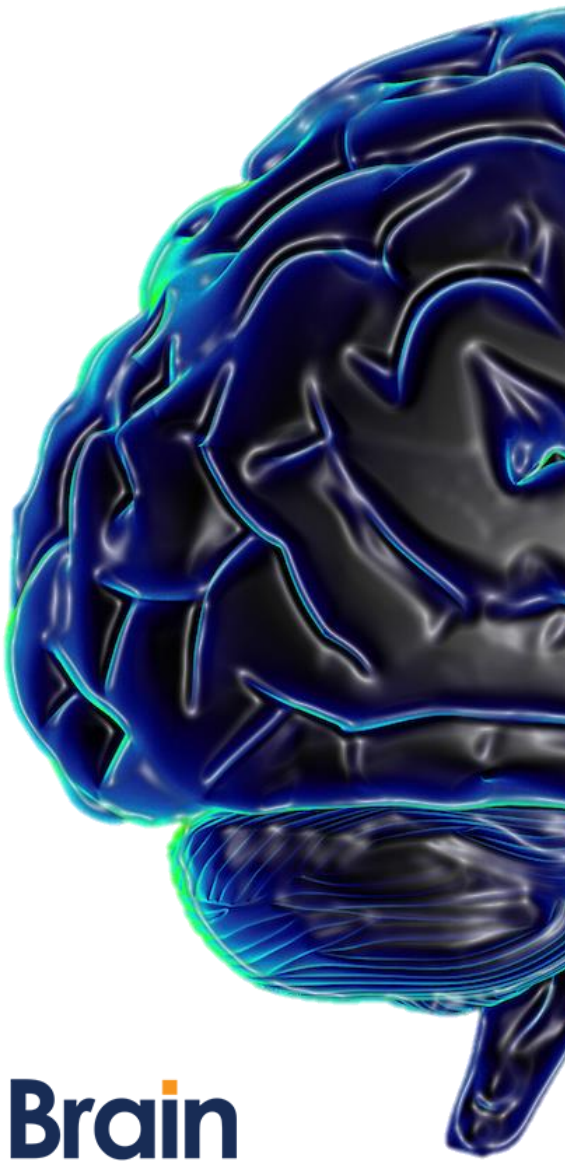
CPP = MAP − ICP

-represents the pressure gradient driving cerebral blood flow (CBF) and hence oxygen and metabolite delivery



Why measure CPP?

- Recommended by brain trauma foundation
- Evidence that CPP monitoring decreases 2-week mortality



Brain Trauma FOUNDATION

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ARTICLE

Marked reduction in mortality in patients with severe traumatic brain injury

Clinical article

Linda M. Gerber, Ph.D.[1], Ya-Lin Chiu, M.S.[1], Nancy Carney, Ph.D.[2], Roger Härtl, M.D.[3], and Jamshid Ghajar, M.D., Ph.D.[4,5]

[1]Departments of Public Health and [3]Neurological Surgery, Weill Cornell Medical College; and [4]Brain Trauma Foundation, New York, New York; [5]Department of Surgery, Jamaica Hospital Medical Center, Queens, New York; and [2]Department of Medical Informatics and Clinical Epidemiology, Oregon Health & Science University, Portland, Oregon

Abbreviations used in this paper: CI = confidence interval; CPP = cerebral perfusion pressure; GCS = Glasgow Coma Scale; ICH = intracranial hypertension; ICP = intracranial pressure; OR = odds ratio; SBP = systolic blood pressure; TBI = traumatic brain injury.

Address correspondence to: Jamshid Ghajar, M.D., Brain Trauma Foundation, 7 World Trade Center, 34th Floor, 250 Greenwich St., New York, NY 10007. email: ghajar@braintrauma.org.

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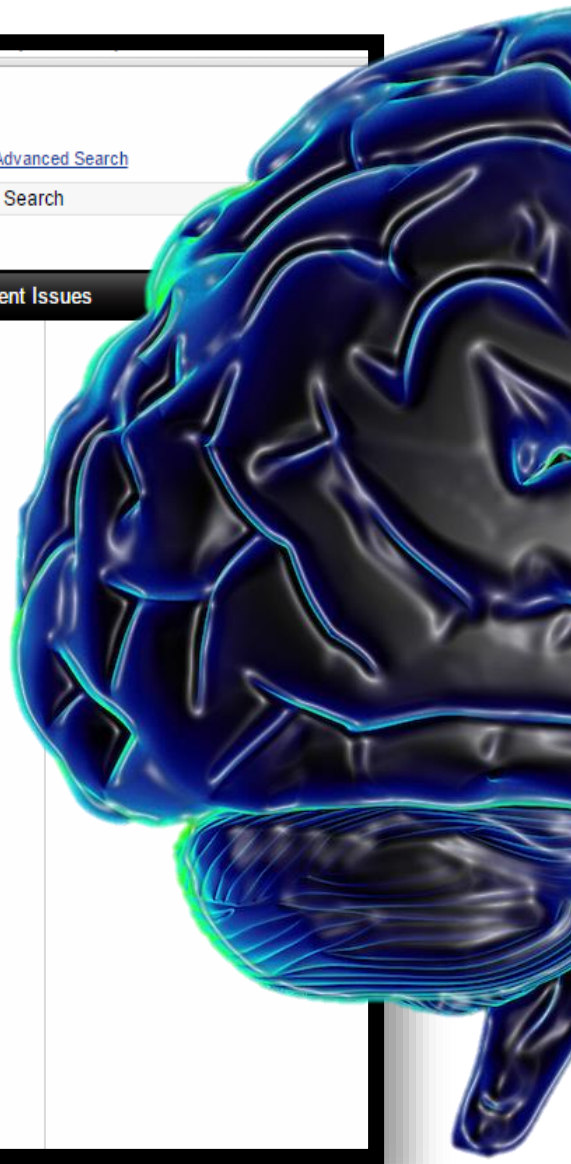
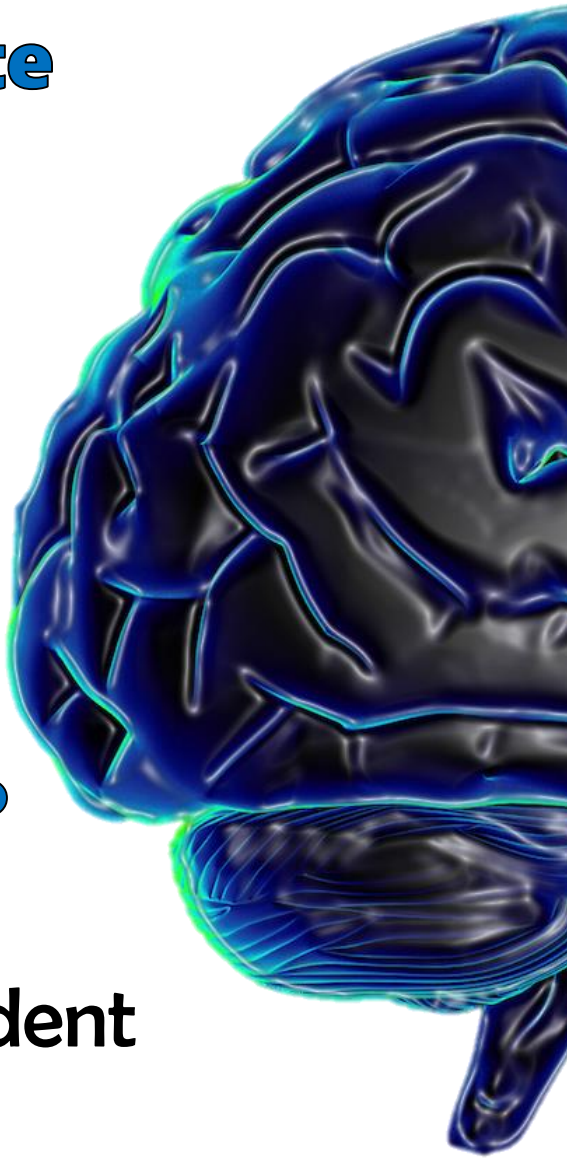


2001- 2009 New York State

2 week mortality decreased from: **22% ⇨ 13%**

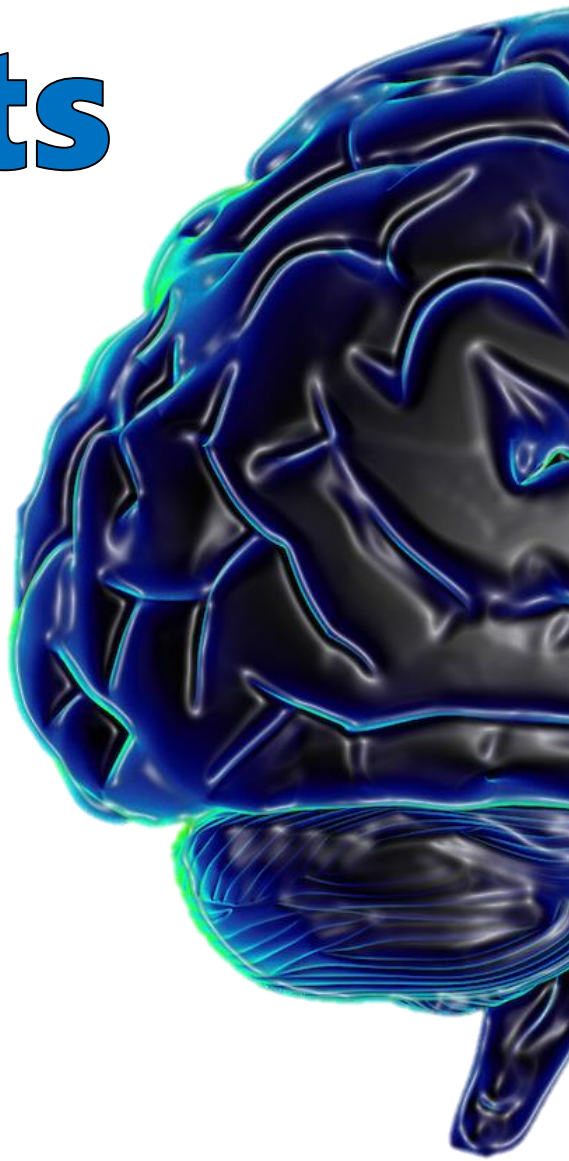
Adherence to CPP treatment thresholds increased from: **15% ⇨ 48%**



Remained significant when independent predictors taken into account

CPP targets

- Target CPP value for survival and favourable outcomes: between 60 - 70 mm Hg[2]
- Avoid aggressive attempts to maintain CPP > 70 mmHg[2]
- Arterial transducer used to estimate mean arterial pressure (MAP) for the calculation CPP = MAP - ICP should be positioned at the level of the tragus

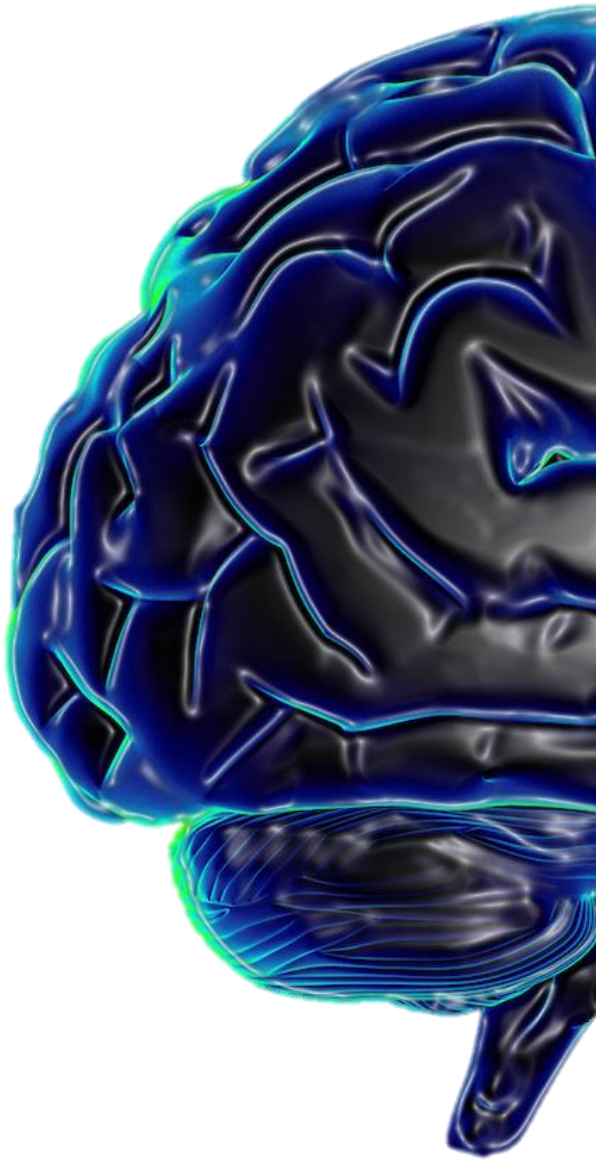


Audit

- Data collected between September –December 2016 @ Queens Medical Centre ITU
- 48 data collection episodes, patients with active CPP monitoring

1. Is CPP being measured correctly ie. is the transducer in the right place?

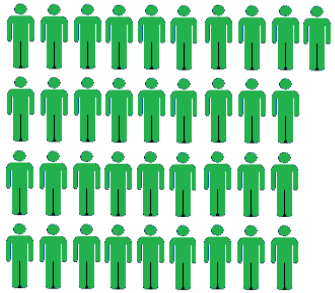
2. Are the CPP targets being met?



48 patients

Is transducer placed correctly?

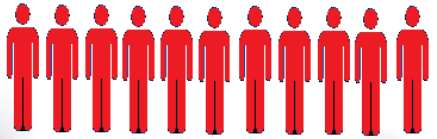
Yes. **37**



CPP below target 60mmHg. **6**

CPP in target 60mmHg. **10**

No **11**

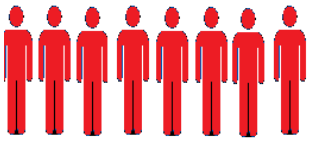


CPP below target 60mmHg. **1**

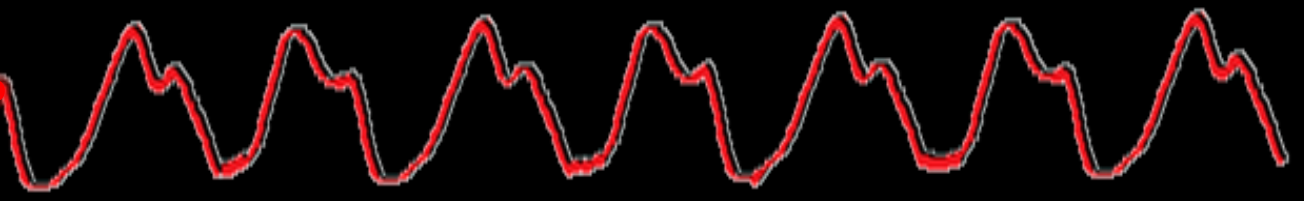
CPP in target 60mmHg. **10**

When transducer re-positioned correctly:

7 remained in target



3 now below target



23%

Transducers placed incorrectly

10/48

episodes CPPs was below target

3

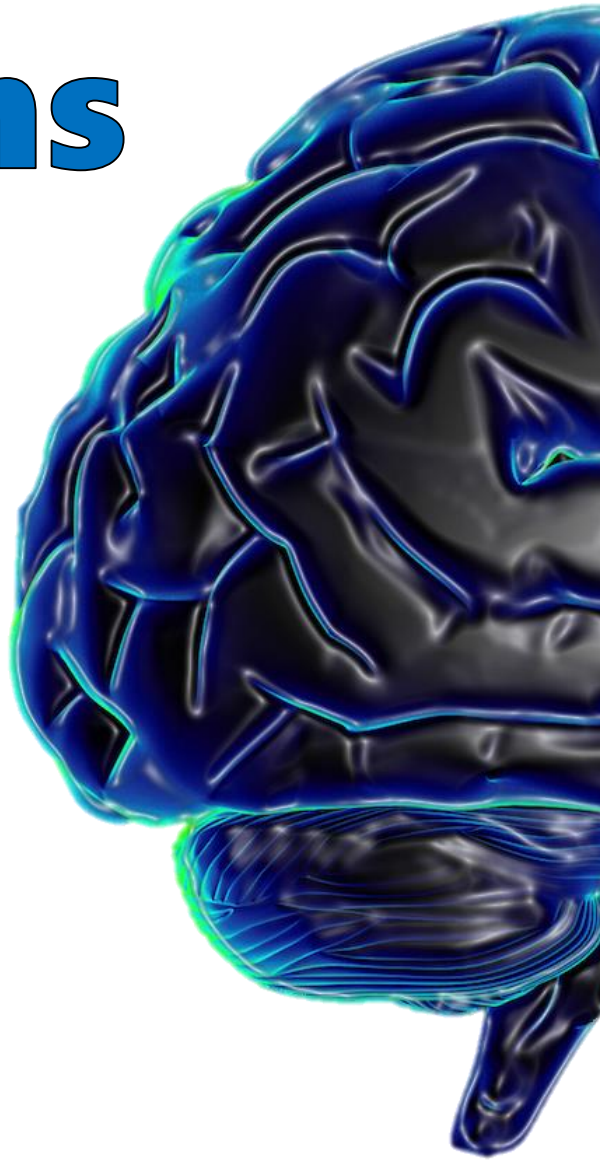
misplaced transducers led to out of target CPP not being recognised

80%

of patients with CPP over 80 were simultaneously on noradrenaline

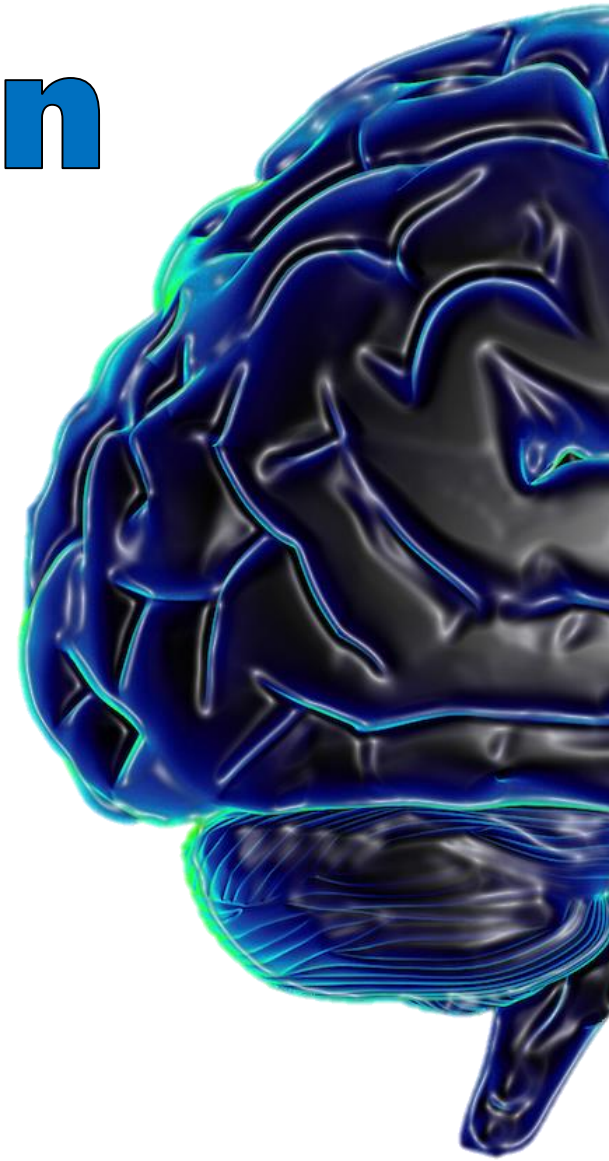
Limitations

- Single point study
- Transducers could have been incorrect for only a few minutes
- Noradrenaline could have recently been titrated which affected the readings.



Discussion

- Re-educate nursing and medical staff re the importance of CPP monitoring and transducer positioning
- ? Dual transducer monitoring- one at tragus and one at heart level
- Introduction of upper CPP target?



Any questions?

References

- Gerber LM, Chiu YL, Carney N, Hartl R, Ghajar J. Marked reduction in mortality in patients with severe traumatic brain injury. J Neurosurg. Dec 2013;119(6):1583-1590. PMID: 24098983. http://thejns.org/doi/abs/10.3171/2013.8.JNS13276?url_ver=Z39.88-2003&rfr_id=ori%3Arid%3Acrossref.org&rfr_dat=cr_pub%3Dpubmed&
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- Joint position statement by the Councils of the Neuroanaesthesia Society of Great Britain and Ireland (NASGBI) and the Society of British Neurological Surgeons (SBNS) with regards to the calculation of cerebral perfusion pressure in the management of traumatic brain injury. 2014. http://www.sbns.org.uk/files/8914/3282/6634/Final_Revised_NACCSGBI__SBNS_statement_Aug_2014.pdf
- Dr DIARMAID DILLON , calculation of cerebral perfusion pressure on icu, Belfast Health and Social care Trust, regional intensive care unit