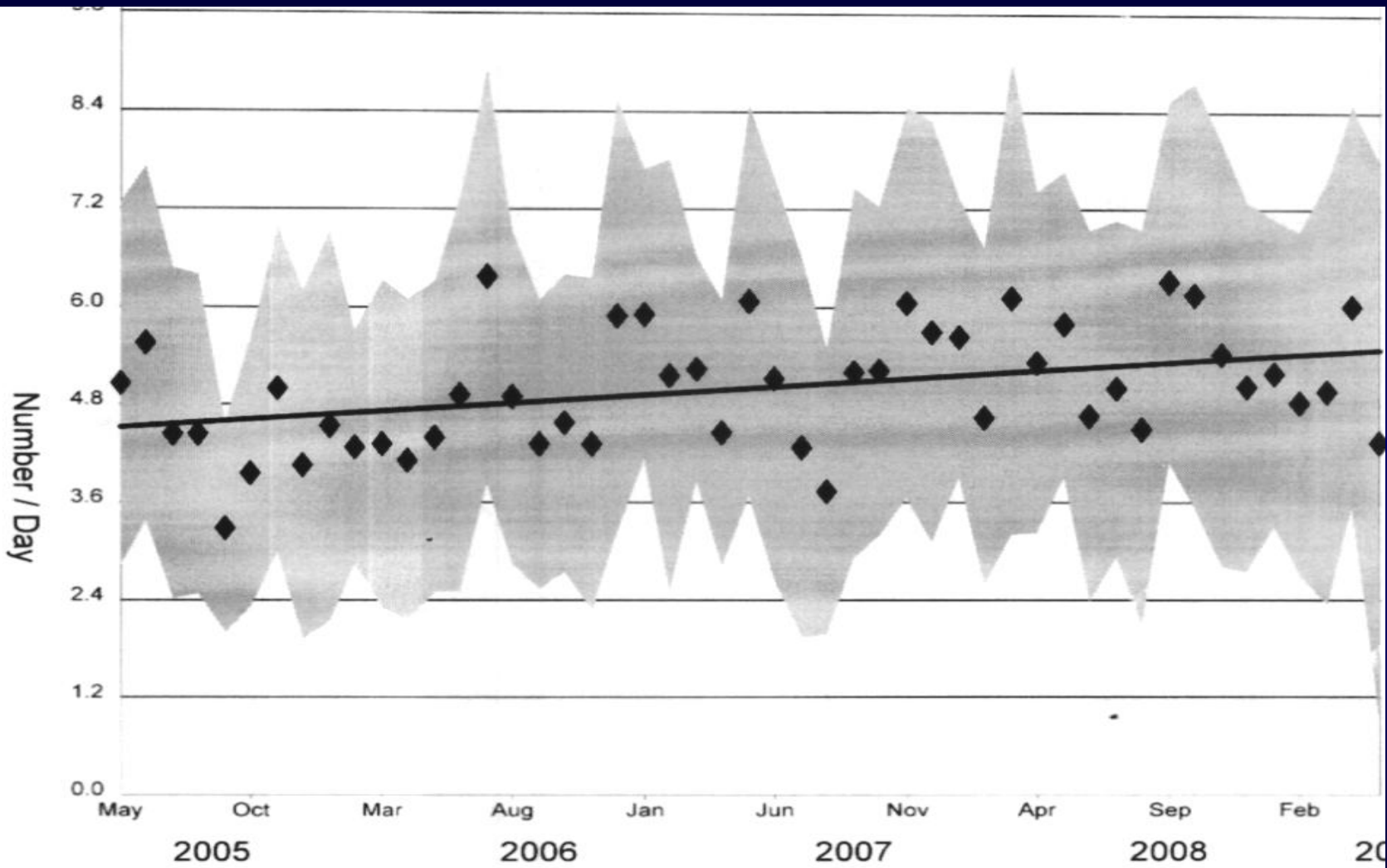


Portable CT in the ICU: Does it Improve Safety?

Michael N. Diringer

Frequency of head CT scans

- Data collected first half of 2005
- 20 bed neurology/neurosurgery ICU
- Mean 5.24 head CT scans per day
- Range 1-11



Each one of these CT requires
a trip to radiology

Turn around time for transport to CT

- 265 transports for head CT
- Time from order entered into computer until scan completed 2.99 ± 1.96 hours

Advantages of point of care testing

- Patient safety
- Imaging more rapidly available at the bedside
- Nursing workload

Patient safety

- Patient leaving the ICU environment
 - Limited monitoring
 - Limited ability to ventilate
 - Difficult to titrate drips
 - Limited medications
 - Lack of additional trained personnel

Patient safety

- Risks associated with transport
 - Extubation
 - Lines pulled
 - Pain
 - Unstable pulmonary status
 - Unstable blood pressure

Imaging availability

- Transport delays
 - Availability of respiratory therapy/transporters
 - Slow elevators
 - Scanner occupied
- Scan can be seen immediately
- Reduced anxiety of family while waiting for results

Nursing workload

- Time wasted during transport
- Abandon second patient
- Less back injury - no need to transfer from bed to scanner and back
- All ICU resources available

Work flow

- Routine scans available for early rounds with neurosurgery
- Results available more rapidly

Adverse effects during transports

- May occur in up to 70% of transports
 - Change in heart rate
 - Arterial hypotension and hypertension
 - Increased ICP
 - Arrhythmias
 - Cardiac arrest
 - Hypocapnia/hypercapnia/hypoxemia
- Up to one-third were equipment related
- Long-term deterioration of respiratory function in 12%

Impact of transport related to patients risk factors

- Low-risk and high-risk transport groups
 - High risk: high PEEP, on vasopressors
- APACHE-matched control cohorts were identified as patients who did not leave the surgical ICU
- The mortality rate for all transport patients vs. controls was 28.6 vs. 11.4% ($p < .01$), no mortality as a direct result of a transport
- The overall mortality rate (51.4%) in the high-risk transport group was higher ($p < .01$) than the APACHE-matched controls

Incidence of complications in intra-hospital transport of critically ill patients

- Prospective, observational study of adults and infants from anesthesiology ICUs
- 226 patients underwent 452 intra-hospital transports
- Overall rate of critical incidents 4.2%
- Complications higher with use of
 - PEEP
 - Catecholamine support
 - Acute need for transport

Critical incidents in 19 of 452 intra-hospital transports

Equipment	
Unintended extubation	1
Near-extubation + loss of chest tube	1
Portable respirator defect	1
Physiologic	
Persistent brain pressure crisis	2
Bronchospasm	1
Severe hypotension	1
Caused by bradyarrhythmia	4*
Caused by tachyarrhythmia	6*
Miscellaneous causes	3
Hypertensive crisis	1
Asystole	2*
Resuscitations	5*

* As part of combined complications

The Use of a Portable Head CT Scanner in the ICU

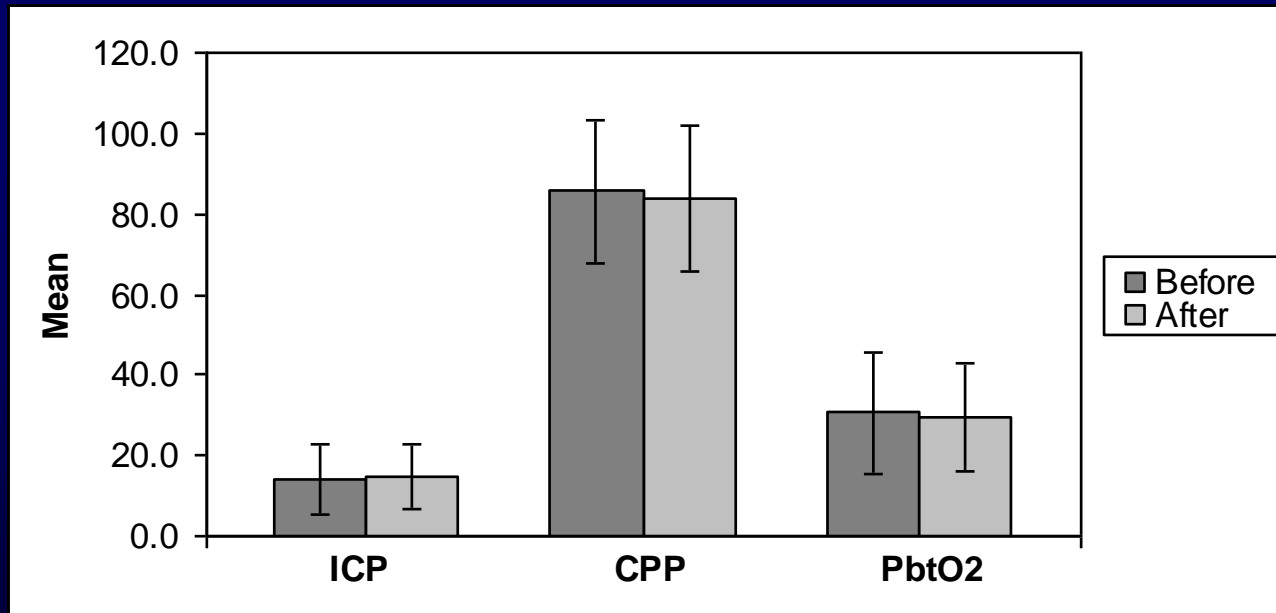
- Retrospective review of 225 portable head CT scans
- Reason
 - F/U intracranial procedure 24%
 - Neurological deterioration 16%
 - Routine follow up 16%
- No scans needed to be repeated because of poor quality

The Use of a Portable Head CT Scanner in the ICU

- Total time to perform scan 19.5 ± 3.5 min
- Actual scan time 2.5 ± 0.7 min
- No loss of i.v. lines
- No interruptions in mechanical ventilation
- No inadvertent extubations

Portable head CT scan and its effect on ICP, CPP and brain oxygen

- Retrospective review of 57 scans
- Continuous ICP, CPP and PbtO₂ monitoring



Change in use of CT with portable scanner

