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Abstracts From the Neuro Anaesthesia and Critical Care Society Virtual Annual Scientific Meeting: Leeds, May 13 to 14, 2021

Perioperative fasting times in chronic subdural haematoma patients

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Introduction: Chronic subdural haematoma (CSDH) patients commonly present for emergency neurosurgery, however surgery may be delayed. Nil by mouth (NBM) status is therefore prolonged, resulting in malnutrition and dehydration. Underfeeding or malnutrition is known to increase postoperative complications following surgery, including increased patient morbidity and mortality.[1] This patient cohort also tend to be elderly with multiple comorbidities. Prolonged fasting times are therefore detrimental. We audited these patients' fasting times, then implemented a simple nutrition programme when preoperative fasting was found to be excessive.

Methods: 85 patients were identified using our electronic patient record system during January-August 2018. Data collection were prospective and included admission date, discharge date, date of surgery, time listed for surgery and recorded weights. Nutritional data were obtained from inpatient flowsheets to identify patients' oral intake. Defined standards were that all patients should be fasted ≥ 6 hours for solids, and should be NBM ≤ 12 hours (eg, allowing overnight fast from 8pm to 8am).

Results: All patients met the minimum fasting requirement with duration shown in Fig. 1. 43% of patients fasted up to 12 hours. 57% of patients fasted over 12 hours. The median fasting time was 14.7 hours, mean fasting time 18.4 hours. One patient was fasted for 61 hours. 3 patients experienced weight loss > 3 kg.

Conclusions: There were excessive fasting times for over half of patients. However, preoperative feeding increases the risk of aspiration or surgical delay. We chose Fortijuice as a suitable alternative. Considered a clear fluid, it can be given 2 hours preoperatively and contains 300 kcal, 8 g protein, and 67 g carbohydrate per bottle.

FIGURE 1. Duration of preoperative fast. full color online

DOI: 10.1097/ANA.0000000000000817

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Post stroke thrombectomy outcome correlation with physiological parameters, premorbid conditions and interventions in patients admitted to intensive care

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Introduction: Ischaemic stroke is a common cause of morbidity and mortality globally and in the UK it affects approximately 100,000 patients annually[1] with devastating consequences. Evidence has shown that mechanical intra-arterial thrombectomy is more effective in the treatment of ischaemic stroke than with intravenous thrombolysis alone.[2] St George's is a regional stroke centre serving a population of 3.5 million. During the period January 2017 to August 2020 approximately 500 thrombectomies were undertaken and 95 cases were admitted to intensive care (ICU) post procedure. This study aims to establish a correlation between patient demographics, clinical characteristics, physiological parameters and poor outcome (modified Rankin Score > 2 at 90 d) to guide future management and prognostication.

Methods: We retrospectively examined patients' medical records and the stroke thrombectomy database for all cases admitted to ICU post procedure. We recorded patient characteristics, pre-morbid conditions, vessel recanalization (mTICI) score, reason for ICU admission, and physiological parameters within the first 24 hours of admission. Pearson Chi-square test was employed to assess correlation between categorical variables and outcome.

TABLE 1. Number of Post Thrombectomy Patients With a Poor Outcome for Each Variable

	Total Number of Patients	Number of Patients With mRS > 2 at 90 d
Age > 80	7	5
Diabetes	10	9
Basilar artery thrombus	24	19
mTICI score less than 2b	25	24
Reason for ICU admission		
Low GCS on admission	31	28
At risk of neurological deterioration	15	13
Blood pressure control	15	8
Physiological parameters in first 24 hours on ICU		
Lowest recorded systolic BP < 95 mmHg	33	26
Pyrexia > 37.5	26	23

Modified treatment in cerebral infarction (mTICI) classified into grades 0 (no perfusion), 1, 2a, 2b, 3 (complete reperfusion of previously occluded artery). Modified Rankin Score (mRS), a six point disability score (0-5) with a separate category (6) for death. A poor outcome was defined as mRS > 2 at 90 days.

Results: Data are summarised in Table 1. Analysis revealed a statistically significant correlation between poor vessel recanalization (mTICI score < 2b) and poor outcome ($P = 0.014$).
Conclusions: Vessel recanalization grade was unsurprisingly the most reliable predictor of poor outcome in this group of patients and may be considered as a prognostic factor for ICU outcome. No other statistically significant correlations were established with any of the other parameters. This study is likely underpowered to achieve such correlations, but patient numbers for this relatively new service is a limiting factor. Larger studies are needed and could be achieved through national collaboration within stroke and ICU networks.

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Tranexamic acid - an overlooked tool in cranial surgery?

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Introduction: Tranexamic acid (TXA) is safe, reduces surgical blood loss and peri-operative transfusion rates.[1,2] Recent work suggests improvements in trauma mortality and traumatic brain injury.[2] Its role in cranial surgery is unclear, with the evidence base lacking and consensus on optimal dosing debated.[3] The use of TXA in cranial surgery was retrospectively audited to assess current practice in a major neurosurgical centre.
Methods: 104 records of craniotomy, craniectomy and cranioplasty, from 2016 to 2019, at Salford Royal were obtained; 40 elective and 54 non-elective procedures were eligible. Pre-operative haemoglobin (Hb) was defined as the most recent within three months of intervention and post-operative Hb, the lowest three days post-procedure. Transfusion was defined as administration of red blood cells, platelets or plasma. An unpaired two-tailed t-test assuming equal variance was used to analyse the data.
Results: Electively, two patients received intra-operative TXA, one being transfused (2.5%). Non-electively, 11 patients received intraoperative TXA, three of whom received pre-operative TXA. 10 cases (18.5%) of transfusion occurred, six receiving TXA. Various regimes of TXA administration were utilised, with total dosing ranging from 1-3 g. Table 1 shows the average Hb reduction across the cohorts.
Conclusions: A statistically insignificant trend towards reductions in blood loss was seen with TXA across both cohorts without transfusion. Predictably, receiving blood products skews the average Hb reduction. Any benefit of TXA may be masked, as these cases have high volumes of blood loss. The infrequent usage of TXA likely under powered this analysis. NICE states that any surgery with estimated blood loss > 500 mL should be offered TXA. This audit opens the corridor to quality improvement work in cranial surgery. It has begun the investigation of national practice, leading to the proposal for implementation of TXA into care bundles.

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Sedation for interhospital transfer: more likely to lead to awareness than protect the injured brain?

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Introduction: Interhospital transfer often involves sedation to permit neuroprotective ventilation, with neuromuscular blockade (NMB) to facilitate management of intracranial pressure (ICP). NAP5[1] highlights the risk of accident awareness (AAGA) with fixed-rate propofol infusions, and AAGBI guidelines for transfer of the brain-injured[2] recommend using depth of anaesthesia (DOA) monitors to ensure appropriate sedation. We wished to assess current practice in view of these.
Methods: We simultaneously surveyed all anaesthetists and intensivists in the East Midlands (Nov 19 to Feb 20), and retrospectively audited all transfers of mechanically ventilated patients in the critical care network (Oct 17 to Feb 19).
Results: Of 144 respondents, 73% routinely paralyse for transfer, 76% use propofol (mL/h) to maintain sedation, and 28% use target-controlled infusions (TCI). None use DOA monitoring. 30.6 ± 9.6 mL/h was considered an acceptable dose of propofol as a single agent, with 40% increasing and 17% decreasing this in a brain injured patient. NMB was documented or highly suspected in 70% of 225 transfers audited. No sedation was documented in 4% of cases where NMB was used. Propofol (mL/h) infusions were used in 83%, and as a single agent in 43%. Single agent propofol doses used were significantly lower than in the survey (17.4 ± 9.3 mL/h), and this was not altered significantly for brain-injured patients (22%) or alongside a second agent (Fig. 1). No cases used TCI or DOA monitoring.

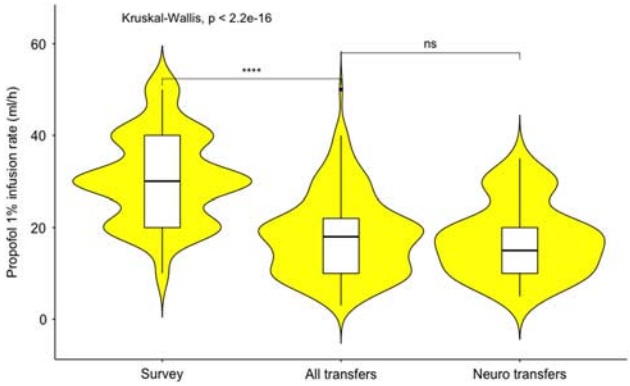

FIGURE 1. Comparison of survey responses with propofol dose used in practice for sedation during transfer. full color online

TABLE 1. Average Haemoglobin (Hb) Reduction for Elective and Non-elective Cohorts

	Non-TXA	TXA
Transfusion included	Hb	Hb
Elective ($P = 0.60$, 95% CI: −25.14 to 14.77)	22.8 g/L (n = 38)	28 g/L (n = 2)
RBC + FFP (n = 1)		
Non-elective ($P = 0.41$, 95% CI: −18.70 to 7.78)	22.8 g/L (n = 43)	28.3 g/L (n = 11)
RBC (n = 2), RBC and FFP (n = 4), RBC + Plts + cryoprecipitate (n = 1), FFP (n = 1) and Plts (n = 3)		
Transfusion removed		
Elective	22.8 g/L (n = 38)	16 g/L (n = 1)
Non-elective ($P = 0.65$, 95% CI: −14.53 to 23.13)	22.9 g/L (n = 38)	18.6 g/L (n = 5)

RBC indicates red blood cells; Plts, platelets; FFP, fresh frozen plasma.

Conclusions: Routine use of NMB and fixed-rate propofol infusions is common, increasing the risk of AAGA. Propofol doses used equate to Cet 2.4 mcg/mL (suggested) and Cet 1.4 mcg/mL (audited),[3] neither of which is sufficient to prevent waking in the average adult. No change in dosing with multiple agents or in brain injury suggests poor understanding of TIVA, and a risk of underdosing for neuroprotection. We argue that TCI pumps and transport-suitable DOA monitoring are essential to improve standards and outcomes.

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Clinical Outcome in critically ill Neurological patients with Coronavirus Disease 19 managed in Neuro-Intensive Care Unit at a Tertiary Health Care Center in South India: a retrospective study

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Introduction: Clinical outcome in critically ill neurological patients with concomitant coronavirus disease 19 (COVID-19) infection requiring intensive care remains poor. At present, the data describing this is lacking. We aimed to describe the clinical characteristics and predictors of mortality and neurological outcome in critically ill neurological patients with confirmed COVID-19 infection admitted to the dedicated COVID-Neuro-Intensive care unit (CNICU).

Methods: In this retrospective, single centred, observational study, all neurological patients with concomitant COVID-19 infection, admitted to the CNICU, between 1st July to 30th November 2020, were included. Patient's demographics, clinical, laboratory, imaging, treatment and outcome data were retrieved from the manual and electronic medical records. Logistic regression was used to identify predictors of mortality and poor outcome.

Results: During the study period, 50 neurological patients with concomitant COVID-19 were admitted to the CNICU. Six patients were excluded as they were managed in the CNICU for less than 24h. The final analysis included data from 44 patients. In-hospital mortality was 26/44 (59%). Poor outcome, defined as mortality and motor response less than five at discharge from the hospital, was observed in 34/44 (77.27%). Worst Modified Sequential Organ Failure Assessment (MSOFA) score, maximum serum lactate dehydrogenase (LDH) and lymphopenia were predictors of in-hospital mortality (OR of 1.88, 1.01 and 0.87 respectively), while worst MSOFA and maximal serum LDH levels were predictive of poor outcome (OR of 1.99 and 1.01, respectively). See Table 1.

Conclusions: Mortality in neurological patients with concomitant COVID-19 infection is high. Inflammatory markers were significantly elevated in COVID-19 infection, suggesting a role for systemic inflammation in patient's outcome. Predictors of mortality and poor outcome were higher MSOFA score and elevated LDH levels. Additionally, lymphopenia was predictive of mortality.

Pre-operative medical evaluation of elderly patients presenting for surgical evacuation of chronic subdural haematoma

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Introduction: A chronic subdural haematoma (cSDH) is a collection of blood lying between the dura and the brain that can occur through traumatic and non-traumatic mechanisms. Patients are frequently elderly with significant comorbidity.[1] We sought to audit medical assessment of patients prior to surgery in patients at our institution against recommendations by the British Geriatric Society (BGS) for medical assessment of elderly patients after a fall.[2]

Methods: As part of an approved audit (PRN:7883) we examined patients aged >60 who underwent surgical drainage of a chronic subdural, between September 2016 and September 2018 at our tertiary centre. Patients referred from other centres were excluded to prevent distortion of results caused by a lack of access to other hospital records. We also recorded postoperative complications (reoperation, acute kidney injury, myocardial infarction, and confusion).

Results: 36 patients were identified. 21 (58%) suffered at least one postoperative complication. 9 (25%) required repeat surgery. The majority (69.44%) of patients had at least one BGS defined comorbidity at presentation, most commonly prior cerebrovascular disease [8/36]. Examinations were often poorly conducted, especially for cognitive impairment [13/36], peripheral sensation [19/36], and feet/footwear assessment [0/36]. Only one patient had a documented postural blood pressure and only one a formal fracture risk assessment. 21 (58%) had a documented ECG prior to surgery, 12 (57%) of which were abnormal.

TABLE 1. Logistic Regression Model for the Prediction of Mortality and Poor Neurological Outcome

	Mortality at Discharge		Poor Outcome at Discharge	
	OR (95% CI)	***P***	**OR (95% CI)**	***P***
Age (y)	1 (0.96-1.04)	0.961	1.01 (0.96-1.06)	0.788
M-GCS at hospital admission	1.1 (0.6-1.99)	0.755	0.43 (0.12-1.03)	0.107
Diagnosis with reference to TBI				
Vascular	0.71 (0.15-3.22)	0.662	1.2 (0.19-7.8)	0.662
Tumour	2.91 (0.34-18.86)	0.426	2.4 (0.25-53.86)	0.483
Others	0.47 (0.07-3.01)	0.427	0.4 (0.05-2.96)	0.427
Chest Imaging suggestive of severe COVID-19	2.4 (0.68-9.38)	0.185	3.33 (0.7-24.38)	0.164
Incidence $SpO_2 < 95\%$	2.97 (0.87-10.78)	0.087	3.77 (0.88-20)	0.087
Inotrope therapy	7.64 (1.55-57.22)	0.021	15.5 (2.98-102.66)	0.002
Worst MSOFA in CNICU	1.88 (1.33-2.96)	0.002	1.99 (1.36-3.33)	0.002
Lymphocyte count	0.87 (0.74-0.97)	0.039	0.92 (0.82-1)	0.071
LDH	1.01 (1-1.02)	0.028	1.01 (1-1.02)	0.016
Ferritin	1 (1-1)	0.193	1 (1-1)	0.056
Steroid therapy	2.02 (0.46-9.52)	0.354	1.93 (0.34-9.51)	0.426
Anticoagulant therapy	0.58 (0.13-2.23)	0.441	0.6 (0.08-2.98)	0.559
Antiviral therapy	2.55 (0.68-11.1)	0.18	5.89 (0.92-115.92)	0.112

CI indicates confidence interval; CNICU, COVID-Neuro-intensive care unit; LDH, lactate dehydrogenase; MSOFA, modified Sequential Organ Failure Assessment; M-GCS, motor component of Glasgow Coma Scale; OR, odds ratio; SpO_2, pulse oximetry; TBI, traumatic brain injury.

Conclusions: Perioperative medical assessment of patients with cSDH is frequently incomplete compared to suggested guidance for assessing patients with falls. Further work is required to assess the impact of this on patient outcomes.

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Switching from dexamethasone to hydrocortisone perioperative steroid cover for endoscopic trans-sphenoidal pituitary surgery - what difference did it make?

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Introduction: Adrenal Insufficiency (AI) is a life-threatening complication and needs prompt recognition and treatment.[1] Many institutions across the world prescribe peri-operative steroid cover in endoscopic pituitary resection surgeries (EPRS) irrespective of preoperative hypothalamic pituitary adrenal (HPA) axis status. Studies comparing administration of empirical peri-operative steroids with those not having any steroids failed to show superiority of one over another.[2,3] Perioperative administration of steroids is not associated with increased risk of complications but may interfere with assessment of the HPA axis.[2] In our practice, we routinely use intra-operative dexamethasone, and found that many patients had low cortisol levels post operatively, prompting us to change from dexamethasone to hydrocortisone. We audited our practice to check compliance with this change and check how many patients required steroid cover on discharge.

Methods: Notes of 37 patients who had EPRS were reviewed retrospectively. Cortisol levels were checked on day 2-3. We looked at the number of patients who were discharged home on steroids, and compared this with data before the change.

Results: Median age was 53 years (27-86). 16 patients received steroids pre-operatively; 13 for suspected AI (on the basis of a short Synacthen test) and 3 for reasons not related to the pituitary tumour. 32 received stress dose Hydrocortisone 50 mg at induction with 3 further intravenous doses every 8 hours, followed by oral administration until cortisol level check on day 2-3. In total, 67% were discharged on steroids in comparison to 71% before the practice change.

Conclusions: Compliance with the new regime was very good (94.6%), but 2/3 of patients still went home on steroids, despite avoidance of dexamethasone. In the future we plan to use a steroid restrictive technique in patients with normal HPA axis.[2,3]

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Platelet reactivity assays: a survey of opinion on their utility in emergency cranial neurosurgery amongst NACCS members

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Introduction: The use of anti-platelet agents has become increasingly common and is a known risk factor for peri-operative bleeding. Point-of-care (POC) devices that measure platelet reactivity are validated in neuroendovascular procedures,[1] and have a role in identifying those at increased risk of thrombosis or haemorrhage. Our objective was to survey opinion on the availability, and potential utility, of such devices for emergency cranial neurosurgery amongst NACCS members.

Methods: An official survey was issued to all current NACCS members between February 17th and March 12th 2020. Members were asked about the availability of such devices in their institution, their practice regarding platelet transfusion in emergency cranial neurosurgery, and if they agreed that using a POC device could reduce transfusion requirements and time to surgery.

Results: We received 90 responses to the survey (approximately 25% of NACCS membership), of which the majority were Consultants (n = 81, 90%). Over 50% stated there were platelet POC devices available in their centre (n = 47), and only 20% (n = 9) stating they had no experience of using one. The commonest reasons for platelet transfusion included surgical request (n = 37, 47%) and on haematological advice (n = 52, 66%). Over 95% (n = 77) would consider using such a device if it were available, with 67% (n = 52) agreeing POC devices could reduce unnecessary platelet transfusion, and 54% (n = 42) agreeing it could reduce time to surgery.

Conclusions: Our results show that platelet POC devices are available in a number of neurosurgical centres, and are already being utilised by some. There is variation in practice with regards to platelet transfusion, and this is likely a reflection of the lack of evidence in this area. Due to their high negative predictive value, these POC devices could be used to identify hypo/non-responders to anti-platelet therapy, potentially reducing unnecessary platelet transfusion and time to emergency surgery.[2,3]

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Impact of COVID-19 on Neuroanaesthesia Services & Training: trainee survey and theatre experience from a North Midlands Major Trauma Centre

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Introduction: Hospital resource management has been at the forefront of UK strategy in combatting the pandemic. This necessitated reviews of service provision; "to operate" or "not to operate" decisions became increasingly difficult as bed pressures soared.[1,2] Royal Stoke University Hospital is a Major Trauma Centre, providing care to the North West and Midlands, encompassing tertiary neurosurgical referral and a 24/7 thrombectomy service.

Methods: A prospectively maintained database was interrogated to identify all neurosurgical or neuro-interventional procedures from 2019-2020. Quantitative & qualitative comparison was performed. Additionally, a NACCS survey was distributed nationally, targeted at trainees, to establish the impact on training in neuroanaesthesia.

Results: We observed an overall 42% reduction in caseload from 2019-2020, including a specific 37% reduction in trauma craniotomies. The overall spectrum of services we provided did not decline. From the NACCS survey, 33% of respondents admit the pandemic has impacted their confidence in delivering neuroanaesthesia and 39% of registrars admit to 'not feeling comfortable' in delivery of out of hours neuroanaesthesia. Intermediate module sign off was greater affected, however for 83% of registrars module sign off was not impacted. 55% of respondents were or will be awarded a COVID outcome at ARCP.[3]

Conclusions: Dramatic reductions in surgical caseload have impacted training and subsequently confidence in neuroanaesthesia amongst trainees. We suggest that education leads could utilise simulation and novel training videos to address the deficit and compensate, in part, for loss in clinical exposure.

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Introduction of a carotid endarterectomy (CEA) service at a neuroscience centre during the SARS-CoV-2 pandemic

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Introduction: There was a reconfiguration of the location of many healthcare services across London during the SARS-CoV-2 pandemic. An example was the change of location of the provision of carotid endarterectomy (CEA) surgery for patients with new strokes in north central London. NICE recommends performing CEA within two weeks of the onset of symptoms.[1] We therefore conducted a service evaluation to review the safe introduction of this service to a new centre.

Methods: Retrospective data collection was conducted over a seven month period (May - December 2020) using our electronic health record system. Data included patient demographics, co-morbidities, time from presentation to surgery and post-operative complications. We used the national targets set by the national vascular registry as audit standard for data collection.[2] The complication rates were a proxy for safety measurement.

Results: 41 patients had CEA (14 females) with mean age of 75 years. 75% of the patients had hypertension as a stroke risk factor and 61% presented with TIA. Mean (standard deviation) time from presentation to surgery was 10 (5.4) days with >85% completed within 2 weeks. Mean HDU length of stay (LOS) was 40 (11.7) hours and total hospital LOS was 9.5 (5.4) days. 45% of patients required post-operative medical management of hypertension. Post-operative rates of MI, cranial nerve dysfunction, and haematoma were comparable to national data (Table 1) except for hospital LOS and 30 day stroke rate.

Conclusions: The CEA service at our institution has been safely introduced and has continued to achieve national targets despite the challenges of bed capacity and implementing a new surgical service during the pandemic. The results also highlight the opportunity to focus on postoperative management and discharge planning protocols.

TABLE 1. Comparison between the National Vascular Registry and Our Institutional Data

	2019 National Vascular Registry N = 4141	Our Institution N = 41
Age >65	73%	73.1%
Mean (SD) age, years		75 (8.7)
Age range		44-88
Male : Female	69% : 31%	66% : 34%
Co-morbidities		
Heart disease (n)	29%	76% (29)
Diabetes (n)	24%	31% (13)
Reason for surgery		
TIA	56%	61% (25)
Stroke	36%	39% (15)
Days from symptom to surgery, mean (SD)	12	10 (5.4)
Range	8-22	1-23
Mean length of stay		
HDU/ITU hours (SD)		40 (11.7)
LOS range		16-68
In hospital days (SD)	2	9.5 (5.4)
LOS range	2-4	2-22
	2019 National Vascular Registry	Our institution
Complications		
Hypertension	Not reported	45%
Haematoma	2.2%	2.4%
Myocardial Infarction	1.1%	0
Cranial nerve dysfunction	2.1%	4.8%
Return to theatre	2.8%	0
Readmission	4.4%	0
30 D Stroke	1.7%	7.3%
30 d Mortality	1.9%	4.8%

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CRASH-3 Trial and the Management of the Traumatic Brain Injured Patient Survey - Have you thought about Tranexamic Acid?

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Introduction: Traumatic Brain Injury (TBI) remains a leading cause of morbidity and mortality.[1] Identifying new treatments alongside established neuroprotective measures, is key to improving outcome. CRASH-3 explored the role of Tranexamic Acid (TXA) in reducing mortality.[2] Some conclusions have been interpreted with caution[3] but it appears its use will soon be linked to a best practice tariff. We aimed to establish current awareness of trial results and whether clinical practice had changed.

Methods: We distributed a simple 6 question online survey via email to all doctors within Anaesthetics, Intensive Care (ICU), Emergency Medicine (EM), and Neurosurgery at St George's Hospital 10 weeks following publication of CRASH-3. We also collected data on TXA administration in TBI patients admitted during this time frame.

Results: 86 responses were received (Anaesthetics 55.8%, Neurosurgery 18.6%, ICU 16.3% and EM 9.3%) from Consultants (59.3%), year 5-7 speciality trainees (10.5%) and from other junior doctors and fellows. Whilst 59.3% of respondents were aware of trial publication, understanding and interpretation of results varied hugely. Surprisingly, only 28% of respondents were aware of potential implications to their clinical practice (Table 1). Of 24 eligible TBI patients only 3 received TXA.

TABLE 1. Awareness of CRASH-3 Trial and Implications to Clinical Practice

Survey Question	Anaesthetics	ICM	EM	Neurosurgery	Total Respondents
Aware of CRASH-3?	48%	85%	62.5%	68.8%	59.3%
Aware of new TBI guidance?	18.8%	57.1%	37.5%	33.3%	23.3%
Change to clinical practice?	18.8%	35.7%	50%	12.5%	28.0%

Conclusions: This survey demonstrated a significant proportion of doctors involved in acute TBI care were unaware of recent literature relating to TXA. Of those aware of the trial, many were unsure of the exact recommendations for TXA administration and had not changed their practice. This is reflected in the current numbers of TBI patients treated with TXA. To address this, we are producing an aide memoir poster and discussing at departmental education meetings. We aim to re-survey in 3-6 months.

References:

1. NICE Guidance: Head injury: assessment and early management. Available at: https://www.nice.org.uk/guidance/cg176. Accessed September 21, 2021.
2. CRASH-3 Trial Collaborators. Effects of tranexamic acid on death, disability, vascular occlusive events and other morbidities in patients with acute traumatic brain injury (CRASH-3): a randomised, placebo-controlled trial. *Lancet*. 2019;394:1713–1723. doi:10.1016/S0140-6736(19)32233-0
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Reducing the risk of exposure keratopathy in neurocritical care patients: a multi-disciplinary team-based approach focused on identifying incomplete lid closure and simple preventative measures

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Introduction: Exposure keratopathy (EK) describes corneal drying leading to epithelial defects, and is common in patients receiving mechanical ventilation. Neurocritical care patients may be exposed to these risk factors for a prolonged period due to brain injury and treatment of intracranial hypertension. The most important risk factor is inability to fully close the eyelids (lagophthalmos) and can cause devastating corneal scarring. Prevention is often straightforward; joint guidelines for intensivists and ophthalmologists were published in 2017.[1] Recognising incomplete lid closure and implementing preventative measures using a protocolised approach is an effective strategy. We used a quality improvement framework to raise awareness of EK amongst our multi-disciplinary team and introduced two new ways to record relevant details in the electronic record.

Methods: We collected data on lid closure, corneal/conjunctival defects, eye care and EK risk factors on 6 occasions from March 2020-Jan 2021. A program of interventions followed the initial audit: practical teaching sessions, modification of electronic nursing records to prompt lid closure assessment, 'smart text' to record findings, educational posters (Fig. 1),[2] and an educational video disseminated via email.

Results: 60 patients were audited (27 women), mean age 60 years, at a mean of 8 days from admission. 32 (53%) were mechanically

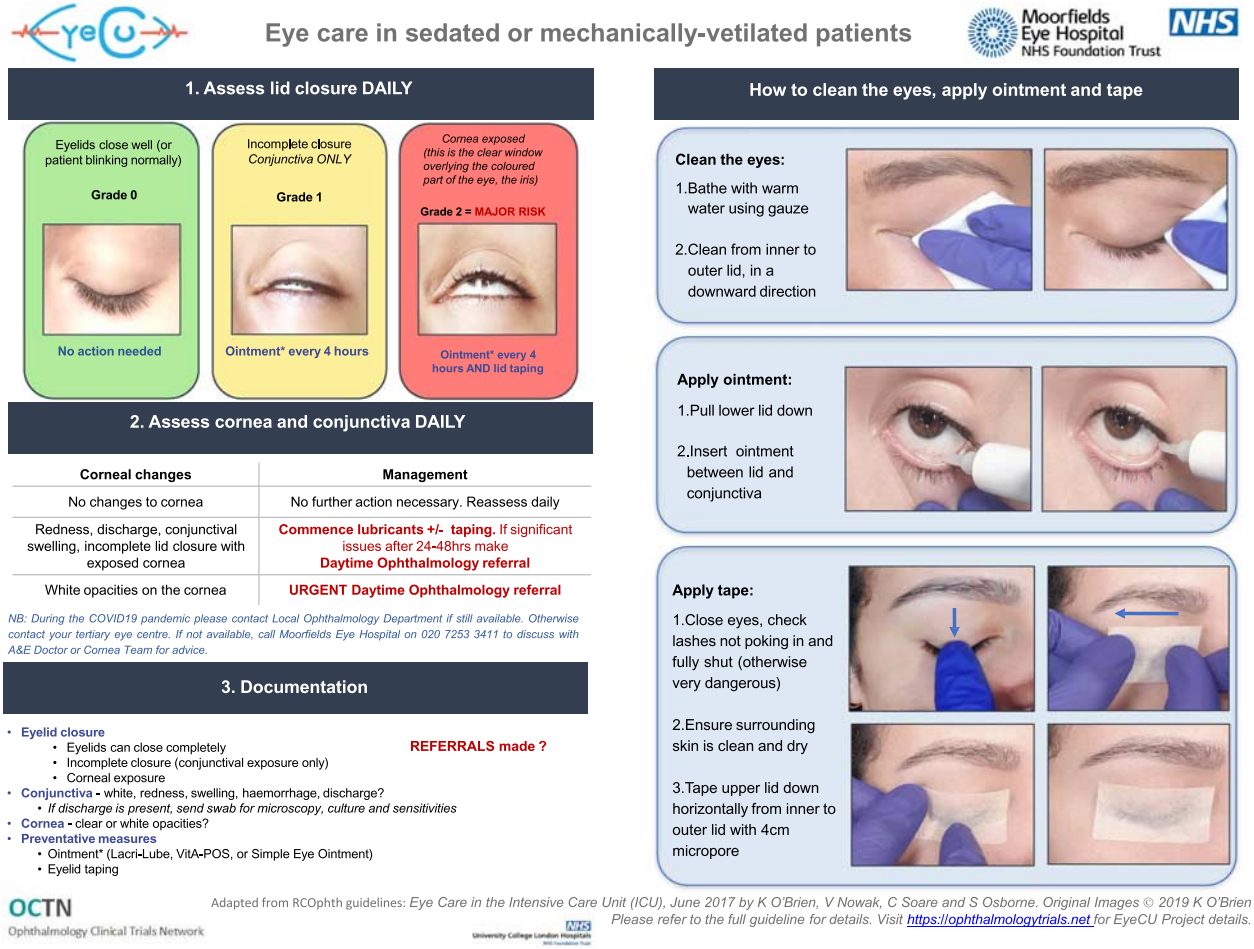

FIGURE 1. Eye care educational poster. full color online

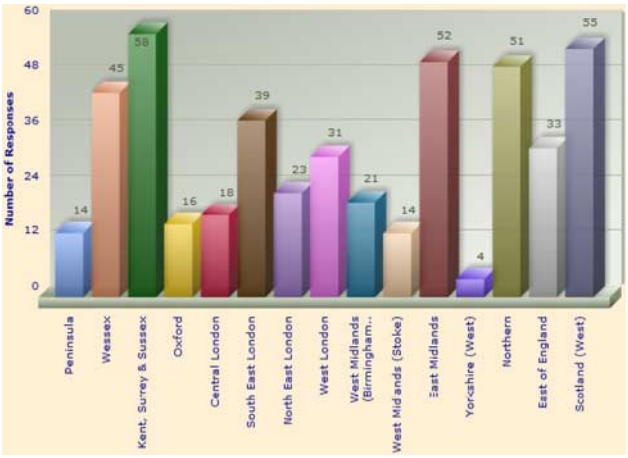

FIGURE 1. Number of responses to trainee survey by school of anaesthesia. full color online

ventilated, 30 (50%) had GCS < 9, and 27 (45%) were exposed to muscle relaxants. Prior to intervention, some eye care was recorded (56%) but grade of lid closure was not. Following intervention, documenting grade of lid closure improved to 82%. There were no incidences of EK.
Conclusions: We have improved practice by making assessment of lid closure, the key risk factor for EK, routine practice.

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A national survey of trainee perspectives on training in neuroanaesthesia and critical care. Report from the Neuroanaesthesia and Critical Care Society (NACCS) trainee network

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Introduction: Using a newly formed network of trainees in schools of anaesthesia across the United Kingdom (UK) we sought to gain a representative sample of views on training in neuroanaesthesia and critical care. Such information may be useful to inform training delivery at local and national levels.
Methods: Using an online survey tool (Survey Galaxy - http://www.surveygalaxy.com) we utilised trainee representatives from 15 schools of anaesthesia across the United Kingdom to distribute the questionnaire to trainees in this region. Being as the initial distribution crossed the first wave of Covid-19 cases a catch-up email was run as case numbers returned to normal.
Results: 474 responses were received from 15 schools of anaesthesia, (Fig. 1). The majority (210 - 44%) of respondents were ST3-4 and 355 (75%) had completed at least intermediate neuroanaesthesia training. 77 (16%) of responses were received from dual ICM/anaesthesia trainees. A subset of 281 answered questions detailing sessional experience. Of these 25 (9%) of trainees reported no neuroradiology exposure during intermediate training, and 101 (36%) no neurocritical care exposure. Similar responses were seen for those who had completed higher training (11 and 44% respectively). Concerningly 101 individuals felt their training did not give them sufficient emergency neurosurgical exposure. Of the 390 who answered this question - 84 (22%) were considering a career in neuroanaesthesia. However, key themes distilled from free-text responses included a perceived lack of consultant jobs, the limited numbers of centres, and challenging working relationships.
Conclusions: Our survey demonstrates the feasibility of using a distributed trainee network to distribute and collate responses from trainees across the UK. The findings of this survey raise key points regarding exposure of trainees to key aspects of neuroanaesthetic practice.

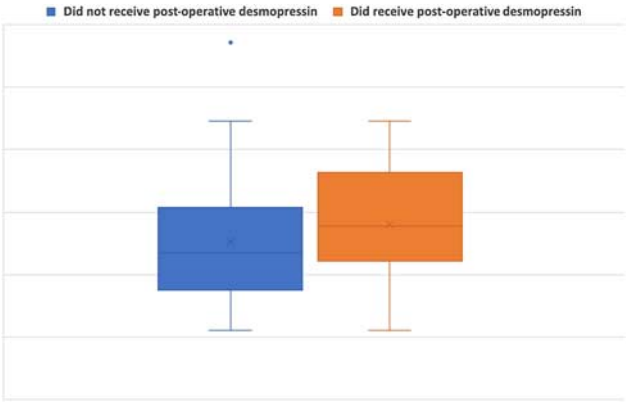

FIGURE 1. Impact of intra-operative intravenous fluids on treatment of post-operative diabetes insipidus. full color online

Development of an Enhanced Recovery after Surgery programme for endoscopic transsphenoidal pituitary surgery at North Bristol NHS Trust: a baseline audit

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Introduction: The Perioperative Medicine Programme (2014) has resulted in a drive to standardise and optimise pre- and intra-operative care to improve outcome.[1] The need to improve cost efficiencies has led to the development of Enhanced Recovery after Surgery (ERAS) protocols in a wider range of specialities. The transition to endoscopic techniques for transsphenoidal pituitary surgery has created an opportunity for the development of such a pathway.[2] The purpose of this audit is to establish current anaesthetic practice and its impact on post-operative care. We will use this information to develop an ERAS programme for elective primary surgery and undertake an audit cycle to measure progress.
Methods: We undertook a retrospective analysis of 41 patients from August 2019 to October 2020. Data were collected pertaining to aspects of anaesthetic care postulated to affect post-operative management and length of hospital stay.
Results: Three areas were identified for improvement. First, an increase in intravenous fluids given intra-operatively was associated with increased treatment of diabetes insipidus (Fig. 1). Second, volatile-remifentanil anaesthetics were associated with 38% nausea and vomiting incidence, in comparison to 27% in those receiving propofol-remifentanil anaesthetic. Third, intra-operative opiates (in addition to remifentanil) were associated with an increased length of stay, with an average of 2 days extra in those receiving > 50 mg morphine equivalents when compared with those who received < 10 mg morphine equivalents.
Conclusions: We plan an ERAS program aimed at tackling these issues. With particular emphasis on removing confounding factors for diabetes insipidus, reducing post-operative nausea and vomiting and thus the risk of surgical closure compromise, and encouraging use of opiate-sparing analgesic strategies, we hope to improve rates of early discharge.

TABLE 1. Summary of Medical Management of Provoked Seizures

Initial Seizure (First Line Management)				Recurrent Seizure (< 24hrs) (Second-line Management)				
Drug Number	Mean Dose (mg)	Mean Optimal Dose (mg)	% of Optimal Dose	Number	Drug	Mean Dose (mg)	Mean Optimal Dose (mg)	% of Optimal Dose
Levetiracetam n = 60	1100	2300	48%	n = 23	Levetiracetam	800	1300	62%
				n = 1	Clobazam	10	20	50%
				n = 6	Lorazepam	1	4	25%
				n = 7	Phenytoin	1500	1400	107%
Lorazepam n = 21	2	4	50%	n = 9	Levetiracetam	1100	2300	48%
				n = 7	Lorazepam	2	4	50%
				n = 3	Phenytoin	800	1800	44%
Phenytoin n = 19	900	1400	64%	n = 9	Levetiracetam	800	2000	40%
				n = 2	Clobazam	10	10	100%
				n = 2	Lorazepam	2	4	50%

Brain injury was confirmed on the basis of CT imaging (hydrocephalus, haemorrhage, pneumocephalus, oedema, infarction or infection). Optimal dosing was calculated using draft neuro-ICU guidelines (Phenytoin 20 mg/Kg, Lorazepam 4 mg or 2 mg depending on actual body weight, Levetiracetam 30 mg/Kg).

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1. Partridge JSL, Rogerson A, Joughin AL, et al. The emerging specialty of perioperative medicine: a UK survey of the attitudes and behaviours of anaesthetists. *Perioper Med (Lond)*. 2020;9:3. doi:10.1186/s13741-019-0132-0
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Medical management of provoked seizures on neurosurgical critical care

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Introduction: Anti-epileptic drugs (AED) are commonly used in neuro-ICU to control seizures in the presence of structural lesions. NICE does not mention the management of provoked seizures.[1] SIGN details the management on single seizures in patients with structural cerebral disorders and provoked seizures but does not mention which pharmacological treatment to use.[2] We sought to examine the current practice of seizure management (preference of first-line AED and dose used) for neurosurgical patients. We also wished to determine re-occurrence of seizures within 24 hours and identify preference of second-line AED.

Methods: Data were collected retrospectively between February 2019-October 2019. Patients with prior history of epilepsy or on any anti-epileptic treatment were excluded. In total, 170 seizures were analysed; N = 100 initial seizure episodes and n = 70, with repeated accounts within 24 hours of the initial seizure. Data were gathered from electronic drug charts, clinical notes (clerked by neurosurgical trainee), nursing notes and CT investigations (radiologist report) to confirm seizure episode.

Results: See Table 1 for summary. At this centre, 60% of seizures were managed with levetiracetam as first-line treatment with a mean dose of 1100 mg, 48% of the optimal treatment dose (30 mg/kg). Of this, 62% went on to have seizures within 24 hours. Levetiracetam was the preferred second line option (59%).

Conclusions: These results demonstrate the use of recognised treatments but at sub-therapeutic doses. The variety of choices opted for as second line highlight the need for a standardised treatment pathway. This is essential as the majority who attend to acute seizures are junior neurosurgeons (on HDU). The lack of guidelines and literature available can explain the variation in practice observed and use of sub-therapeutic doses. This data has led on to further research (NIHR) to scope the literature on current medical management of provoked seizures.

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1. NICE Guidance: Epilepsies: diagnosis and management. Available at: https://www.nice.org.uk/guidance/cg137/chapter/1-Guidance#pharmacological-treatment. Accessed September 21, 2021.
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Dexamethasone management in patients with Brain tumours on ICU

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Introduction: Despite longstanding Dexamethasone use since it was first synthesised, there have been few clinical trials to determine the optimal regimen in brain tumour patients. This audit aims to identify current dexamethasone prescribing practice at one centre initiated on ICU/HDU and complications associated with steroid use (agitation/insomnia and infection).

Methods: Electronic data were collected on 50 patients retrospectively, between September 2019 to January 2020. Patients admitted onto ICU were only included and followed when transferred to step down wards. Data were collected from drug charts and medical notes and analysed using Microsoft Excel.

Results: A summary can be seen in Table 1. Patients with glioblastomas (n = 20) and brain metastases (n = 6) had the highest cumulative doses prescribed with up to 194 mg and 162 mg respectively. Those diagnosed with an oligodendroglioma had the lowest dose (range 30-72 mg) amongst all tumour classifications. Day 1 dose was analysed with GCS score/ CT report findings with patients diagnosed with astroyctoma showing the most varied dose initiation on day 1 post-operatively (n = 5 16 mg, n = 3 8 mg, n = 1 4 mg and n = 1 2 mg). Incidence of agitation and infection during dexamethasone course was collected; n = 20 patients presented with agitation measured by the Richmond Agitation-Sedation Scale (RASS). 10 patients were commenced on benzodiazepines and two on anti-psychotics, while a further 10 patients required antibiotics for treatment of infection.

Conclusions: Practice guidelines exist[1,2] and recommend stratifying severity of neurological symptoms and dosing accordingly. This audit highlights the discrepancy in dosing schedules for steroids and identifies the need to re-evaluate the regimen with a focus on day 1 initiation dose, interval, weaning and transfer of care to step-down wards where regular review is needed to identify ongoing clinical benefit.

TABLE 1. Summary of Dexamethasone Management in Patients With Brain Tumours

The Duration of Post-operative Dexamethasone Prescription on Critical Care and Following Ward Discharge	Count (n)	Dexamethasone Weaning Regimen (d)	Count (n)
1-5 d	*27*	1	*23*
6-9 d	*17*	2	*17*
15-26 d	*5*	3	*6*
36	*1*	4	*4*
		Dexamethasone dose interval prescribed	
Cumulative inpatient Dexamethasone dose (ICU- > ward step down)			
2-20 mg	*20*	Once daily	*39*
22-40 mg	*11*	Twice daily	*4*
46-96 mg	*13*	Three times daily	*1*
106-194 mg	*6*	Four times daily	*6*

References:

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