

“My Little Journey”

Assessing the quality of information delivery to paediatric patients

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Introduction

Parents and children experience high anxiety levels during the perioperative period, which can be improved with both practical and psychological preparation preoperatively, for example using the RCOA information leaflet (1). In 2019, there were 3614 paediatric patients at Portsmouth Hospital, with over 75% undergoing an elective procedure. It has been suggested that one hospital visit can have a long term negative psychosocial impact. The aim of this project was to assess the satisfaction levels of parents of children undergoing a general anaesthetic, and the quality of care and information delivery.

Methodology

A survey was designed based on the RCOA standards for best practice in paediatric patients (2):

- ✦ 90% of parents should receive information preoperatively
- ✦ 100% of parents should find this satisfactory
- ✦ 100% should find the anaesthetic assessment satisfactory
- ✦ 100% should be satisfied with arrangements for induction

Paper questionnaires were given to parents preoperatively, including questions about information delivery and clinical care. The questionnaires were collected following the patient’s return to the ward postoperatively.

Results

40 questionnaires were completed. Over 90% of parents were satisfied with the information they received prior to assessment by a clinician, rating it as “excellent”, but the majority would prefer this in an interactive media form rather than a paper leaflet. 35% of parents did not find the induction of anaesthesia a positive experience, due to a lack of information in advance for both the parent and child. A common need was further guidance on management of postoperative pain; starvation status and eating (which requires collaboration with the surgical team); and the timing of discharge.

Discussion

The survey demonstrated overall excellent satisfaction rates. Not all parents received adequate information preoperatively, which could be due to administrative failings, or surgery at short notice. Although the experiences at induction were not always positive, this did not necessarily reflect on the delivery and quality of care. More information preoperatively could manage patient expectations better. However, it is evident that more information is required in easily available formats.



“My Little Journey” app

Based on this survey, a business case was produced and funding was approved for the introduction of the “Little Journey” app, tailored specifically to the hospital, with interactive 3D photos and information about the perioperative journey. The app is freely downloadable and has been shown at other sites to reduce perioperative anxiety in paediatric patients and their parents; fewer cancellations; and improve speed to discharge. No staff or time resources are needed for information delivery, and it is more environmentally friendly than paper leaflets. Usage of the app will be monitored and used to assess parent satisfaction later this year.



References

1. Guidelines for the provision of paediatric anaesthetic services. RCOA, London 2011 (www.rcoa.ac.uk/node/714).
2. Middle, J & Wee, M. Audit Recipe Book. *Royal College of Anaesthetists*, 2012.

QR for QI - Improving staff confidence when using the Pro-1

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Proning is sometimes necessary for surgical access. The process is demanding for staff (1), and poses potential patient safety issues (2). The Pro-turn© (Hospital Direct) is a reusable piece of equipment that aims to make proning safer for staff and patients. Following anecdotal evidence of low motivation to use the Pro-turn© in our department, we sought to investigate this and introduce an educational tool to improve confidence and safety.

Methods

A survey to investigate confidence and knowledge using the Pro-Turn© was distributed to theatre staff in a large DGH. Staff were asked to report their own confidence and safety in using the Pro-turn© on a quantitative scale (0=not confident, 5=very confident). A step-by-step guide [figure A] with a Quick Response (QR) code (linking to a video demonstration) [figure B] was produced and attached to the equipment. Following introduction of these interventions for one month, a further survey was then completed to re-assess confidence.

Results

- Initial survey returned 59 responses from anaesthetists, surgeons & wider theatre staff.
- 33% of respondents had never used the Pro-Turn© before. 60% felt that a printed visual aid and 75% felt that a video demonstration would improve confidence levels.
- Mean self-reported confidence was 2.7 & mean self-reported safety was 2.4 (out of 5).
- The post-intervention survey (20 respondents at time of submission) demonstrated improvements in mean self-reported confidence to 3.8 and mean self-reported safety to 4 (out of 5).
- 100% of respondents felt the interventions were useful.

Discussion

- Barriers to proning patients in theatre include staff unfamiliarity & lack of training (1)
- Access to formal training is limited currently due to social distancing guidelines.
- We have demonstrated that simple and free interventions can improve self-reported confidence and safety of the theatre multi-disciplinary team when using the Pro-turn© to prone patients.

References

1. N Wiggerman. J Zhou. D Kumpar. 'Proning patients with COVID-19: A Review of Equipment and Methods'. Human Factors. 2020; 62 (7): 1069-1076
2. H Edgcombe. K Carter. S Yarrow. 'Anaesthesia in the prone position'. British Journal of Anaesthesia. 2008; 100 (2): 165-183

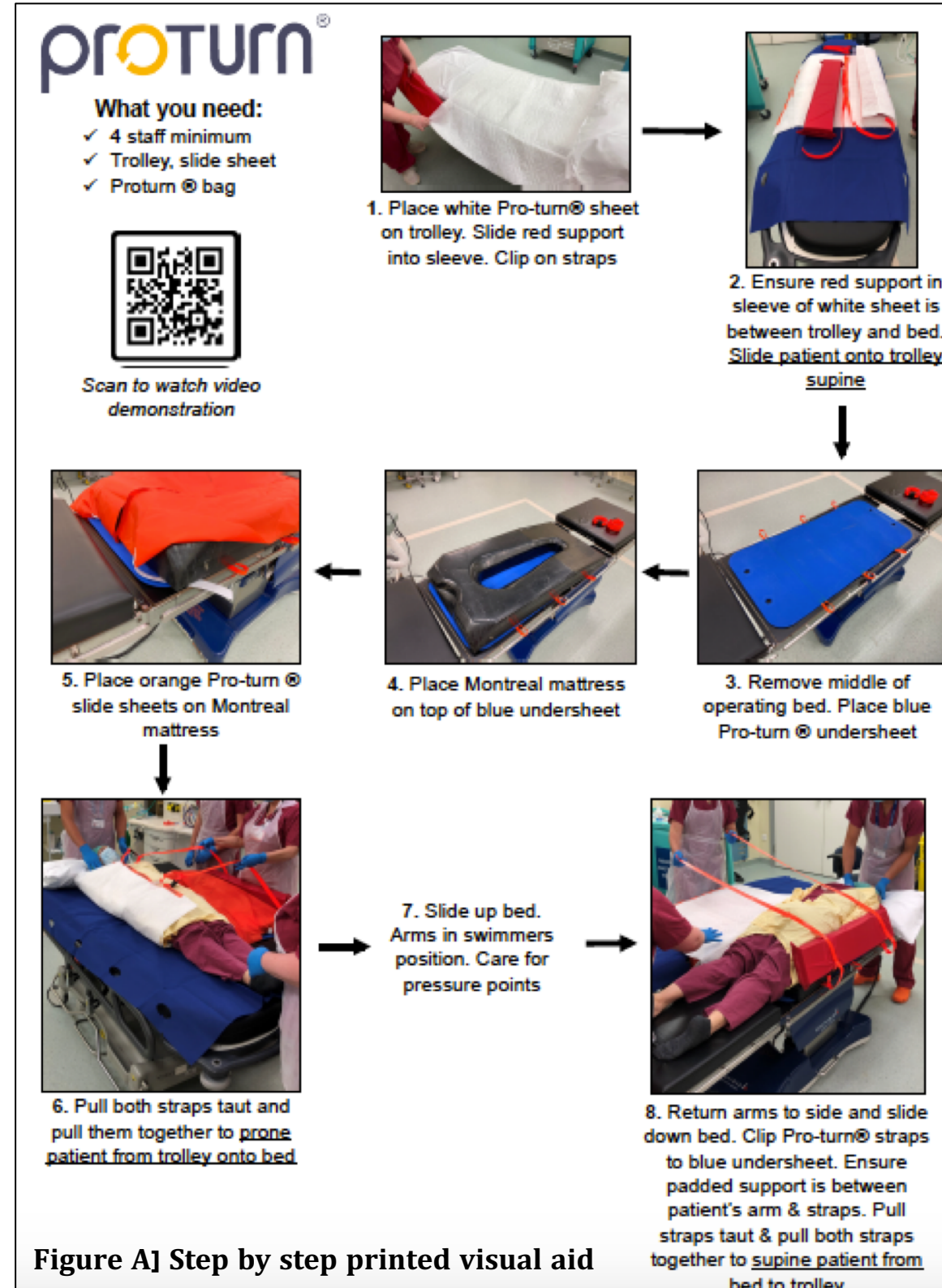


Figure A] Step by step printed visual aid

Acknowledgements

With thanks to Rachel Bartlett, Theatres Moving & Handling lead, Queen Alexandra Hospital, PU
Free to use software used for video editing (Mixilab Animotica©) & QR code generation (Unitag©)

Introduction of a Multidisciplinary Obstetric COVID-19 Team Safety Brief

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Introduction:

COVID-19 resulted in frequent changes to processes, protocols and guidelines in our obstetric unit. This brought to light issues involving frequently changing PPE requirements and multiple changes in type of PPE supplied which led to the need for repeated staff fit tests. In addition, there were communication difficulties due to PPE, delays in the theatre team's readiness due to donning and high levels of background stress amongst the team.¹ Additional challenges included increased staff turnover and those returning from self-isolation making it difficult to keep everyone abreast of rapid written guideline changes.

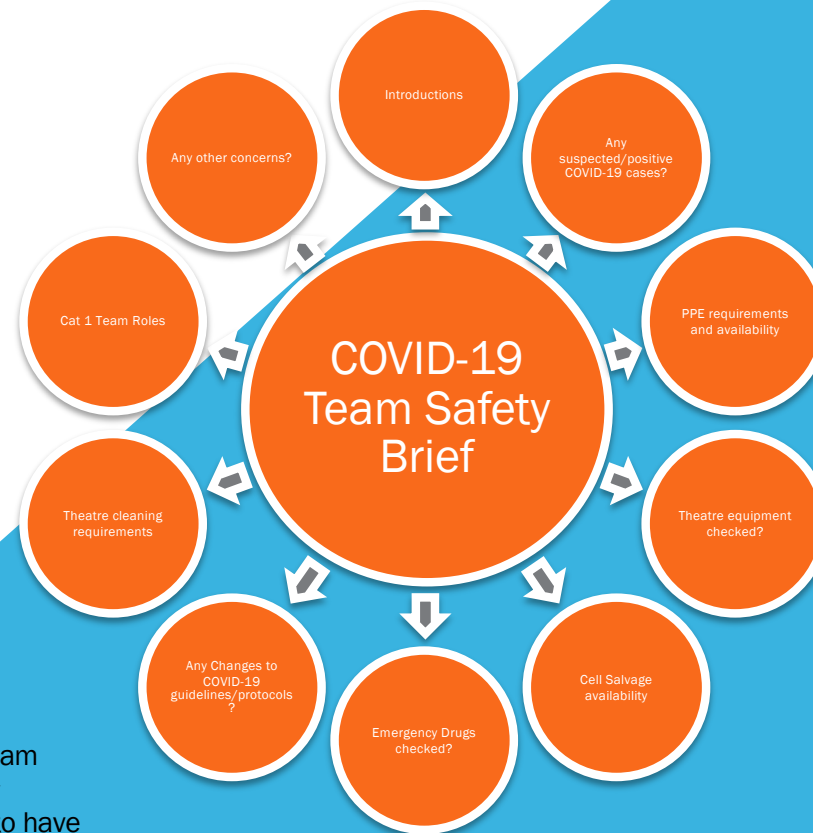
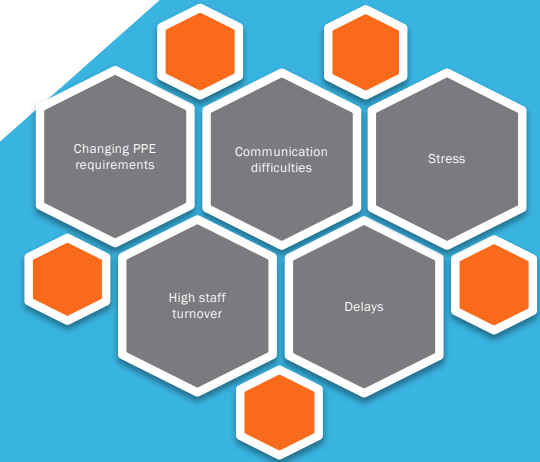
Background:

Performing team briefings has been shown to “foster a sense of belonging to teams, empowerment for all members, and better communication” leading “not only to a culture of safety” but also “significantly improving job satisfaction”. Pre-operative briefings in particular have been shown to improve patient outcomes² and reduce “the frequency of communication breakdowns that lead to delays”.³ This is obviously of high importance during an obstetric emergency. However, before the COVID pandemic we did not perform such briefings on labour ward. We felt it was key that all team members were able to identify challenges in advance and felt reassured with regards to PPE requirements if there was an emergency theatre case.

Process:

We introduced a multidisciplinary obstetric team brief on the acute maternity unit at University Hospitals Dorset, Poole. The aim of this was to have a shared mental model which would help staff feel reassured about anticipated challenges, with plans in place to tackle these.

It was attended each shift by the co-ordinating midwife, theatre scrub team, operating department practitioner, senior obstetric doctor and the senior anaesthetic doctor.



Outcome:

The whole team found that the team brief prepared them for emergencies, saved time, improved teamwork, communication and ultimately patient safety.

In conclusion, we would recommend the introduction of such a team brief at all obstetric units in the event of any further unanticipated events resulting in major changes to working practices and also feel it is useful as we continue to deal with the COVID-19 pandemic.

References:

1. S.Hignett et al. “Human factors issues of working in personal protective equipment during the COVID-19 pandemic”. *Association of Anaesthetists*, 2020.
2. National Patient Safety Agency. “Five Steps to Safer Surgery”. *NPSA*, 2010.
3. Nundy et al. “Impact of Preoperative Briefings on Operating Room Delays”. *Archives of surgery*, 2008.

QUALITY IMPROVEMENT: THINK DRINK!

OPTIMISING PAEDIATRIC PRE-OPERATIVE FLUID FASTING

Dr F. Ng CT2, Dr H. Mackinnon, Dr L. Fenner Consultant Anaesthetist, Salisbury District Hospital



Introduction

The APAGBI Consensus Statement (2018) recommends that children should be encouraged to have clear fluids up to **one hour** before elective general anaesthesia, unless there is a clear contraindication[1]. A growing body of evidence suggests this leads to less irritability and dehydration, while the risk of gastric aspiration does not increase even if fluids are drunk up to the operation itself[2]. Interventions were implemented in consecutive years at Salisbury District Hospital, a regional cleft centre, and their impact on reducing paediatric pre-operative fluid fasting times were reviewed.

Methods

Clinical notes of all paediatric cases conducted in 'Main Theatres' in a two-week period in January 2020 were retrospectively reviewed to determine time of last fluid intake and time of arrival in theatre. These were compared to those over the same time period in 2019 and 2018.

Interventions

In June 2018, posters were displayed emphasising the 6-4-1 hour fasting guidance.

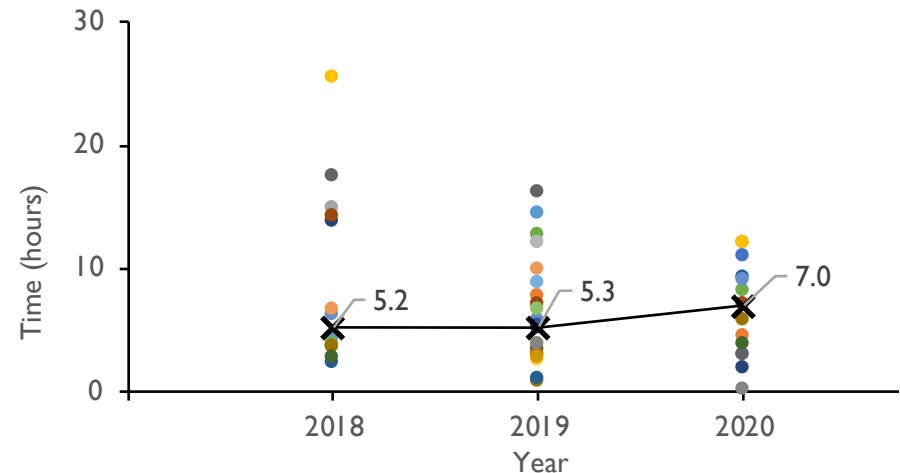
During 2019, fluid fasting guidance was included in the induction programme for incoming junior doctors, and reinforced in teaching to specialist surgical nurses, who were encouraged to educate parents. In addition, the paediatric ward housekeeper was tasked with offering squash to every child on arrival.

References

1. APAGBI Consensus Statement on updated fluid fasting 30 April 2018 <http://www.apagbi.org.uk>
2. Andersson H, Zaren B, Frykholm P. Low incidence of pulmonary aspiration in children allowed intake of clear fluids until called to the operating suite. Paediatric Anaesthesia 2015; 25 (8) 770-777.

Results

Figure 1. Pre-operative fluid fasting times in paediatric cases



Despite an increase in median fluid fasting time, the range of fluid fasting times has visibly reduced, with fewer children being fasted for longer time periods. Maximum fasted time decreased from 25.3 hours in 2018 to 16.1 hours in 2019, and 12.0 hours in 2020.

Discussion

The improvement in distribution of fluid fasting times with each year is a positive outcome. Review of patient notes revealed fewer documented cases of patients being told out-of-date fasting guidance, such as 'nil by mouth from midnight'. However, there is still work to be done to move closer to the one hour goal. Our next step is to update the template letter sent to parents of children undergoing elective surgery highlighting the fasting times; further interventions and a subsequent review are planned. Overcoming ingrained preconceptions in staff is challenging; educating and empowering patients and parents to take responsibility may be the next step.

Airway Safety Project: Bournemouth Hospital Intensive Care Unit

Implementation of the Bedside “Airway Information Form”; A Quality Improvement Project

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3. Consultant, Intensive Care, Royal Bournemouth Hospital

Background:

- The NAP4 study of major airway events occurring in the United Kingdom demonstrated that a disproportionate number of adverse airway incidents (20%) occurred within Intensive Care Units.¹
- Suggested reasons: **a failure to plan airway strategies**, skill mix (particularly out of hours), ICU environment and familiarity.
- Recommendations: Basic airway assessments be completed for ICU patients with a plan put in place for failure, which is clearly communicated to the ICU staff caring for the patients.²

Aims:

1. To review ICU staff opinions on how airway information was documented prior to the introduction of the ICU airway information form.
2. To improve patient safety through better accessibility of airway information.
3. To encourage routine basic airway assessments of all ICU patients so that appropriate plans are in place for when more junior clinicians are staffing the ICU out of hours.

Methodology:

An online survey was sent to Bournemouth ICU staff; assessing opinions on current documentation of airway information and possible changes. As a result of this, laminated airway information forms (see Figure One) were developed. The forms were designed to be visible on the wall behind the bed space. A follow up survey was subsequently carried out.

NHS
University Hospitals Dorset
NHS Foundation Trust

ICU AIRWAY INFORMATION FORM

Name _____ Date: _____

Anaesthetic drug allergy _____

| Airway | ETT | Tracheostomy - date: | Laryngectomy | | | |
|--|----------|----------------------|--------------|------------|-----|----|
| Size: | Length : | | Type: | | | |
| Intubation | Unknown | I | IIa | IIb | III | IV |
| Laryngoscope | MAC 3 | MAC 4 | McGrath | Glidescope | | |
| | Bougie | BURP | | | | |
| Anticipated difficulty with intubation or mask ventilation? | | | | | | |
| Airway plan | | | | | | |
| Plan A | | | | | | |
| Plan B | | | | | | |
| Plan C | | | | | | |
| Plan D | | | | | | |

V1.4 Dec 2020 Authors: Dr K.Stratton, Dr G.Moore, Dr. N.Chee. approved by the Critical Care Group. Review Dec 2022

Figure One: ICU Airway Information Form

Results:

- The initial survey yielded 40 responses from ICU staff including consultants, junior doctors, physios and nursing staff (bands 5-8).
- 61% of respondents to the initial survey felt that airway information was not documented reliably for ICU patients, and 87.5% felt that safety would be improved with the implementation of personalised bedside airway information forms.
- The second survey had 26 respondents. 92% stated that they felt patient safety had improved following the advent of the bedside airway information forms, and 100% felt they should become a permanent feature of our ICU.
- In the second survey 61.5% of staff working on Bournemouth ICU were confident they could source key airway information to prepare for an emergency intubation, compared to only 25% in the initial survey.

Conclusion:

- Bedside Airway Information forms have improved rapid availability of key airway information.
- Our quality improvement project potentially reduces the risk of major airway complications occurring.
- Bedside Airway Information forms have brought our trust in line with standards recommended by DAS ICU Intubation Guidelines 2018.²
- Following feedback from ICU staff, the airway information forms will be re-printed in A3 size and on yellow paper to make them more visible.

References:

- ¹2011. NAP 4: Major complications of airway management in the United Kingdom. National Audit Projects. [online] London: The Royal College of anaesthetists and the Difficult airway society. Available at: <https://www.nationalauditprojects.org.uk/NAP4-Report#pt>
- ²Higgs A, McGrath B, Goddard C, et al. Guidelines for the management of tracheal intubation in critically ill adults. *BJA*. 2018; 120(2); 323-352.

Training in Awake Tracheal Intubation

Dr Katherine Elliott, Dr James McEwan, Dr Osgar Rylah, Dr Rebecca Sands
Background

The Difficult Airway Society (DAS) report that success in Awake Tracheal Intubation correlates with experience but due to COVID-19 training opportunities have been limited for the last year.¹ This has been a cause of concern for senior trainees approaching CCT who have been diverted from training

lists to critical care. We are pleased to have demonstrated that training in ATI does not have to be paused as demonstrated by our exceptional learning experience at Basingstoke and North Hampshire Hospital (BNHH) using ourselves, trainees, as subjects.

Methods

Trainees read and assimilated the DAS guidelines for awake tracheal intubation in adults². Local ethics approval was obtained, and trainees consented formally. Candidates were fasted in line with elective surgery protocol. All participants performed two lateral flow tests prior to the session and had received at least one COVID-19 vaccine. A COVID-19 health questionnaire and temperature assessment were performed and PPE was used throughout. The teaching took place in an operating theatre with full monitoring and resuscitation equipment and staff immediately available. Saturations monitoring was used. High flow nasal oxygen was available but largely not used, as candidates were not sedated.

Led by the BNHH Airway Lead, four advanced trainees received a short video presentation detailing anatomical considerations, techniques for topicalisation, tips and tricks for flexible intubating bronchoscopy (FB), videolaryngoscopy (VL) and combined approaches to the airway³ (a technique where both FB and VL are used together synergistically). The combined approach is the preferred technique at Basingstoke for the management of both anticipated and unexpected difficult intubation in both anaesthetised and awake patients. Having first practised FB, VL and nasendoscopy on manikins the trainees then performed airway topicalisation, nasendoscopy, laryngoscopy using FB and VL using McGrath® Mac, King Vision™ and Airtraq®. Each trainee performed and experienced a series of combined approaches to the airway including a novel combined technique for patients with very limited mouth opening.



Results

This was a superb training experience and all participants reported significant improvement in their confidence in performing these procedures, as well as in their understanding of the ergonomics and human factors essential to ATI. Clinical confidence was assessed with a 0-10 visual analogue scale, where 0 meant 'not confident to perform technique with direct supervision' and 10 meant 'would confidently perform solo'. For topicalisation, mean score increased from 4/10 to 10/10. For awake flexible intubating bronchoscopy, mean score increased from 3/10 to 8/10, and for awake combined technique, mean score increased from 2/10 to 8/10. No complications were encountered.



Discussion

Clinical opportunities to practise ATI are sparse and probably inadequate for the acquisition of skills demanded by NAP 4⁴. Using candidates as subjects was invaluable and incomparable to manikins. It allowed time for experimentation, leading to vast increases in participant confidence in both performing ATI and their ability to explain and adequately consent patients for the procedure. These gains are attributable in part to participants having experienced each procedure. We hope that other centres will consider providing inspirational educational opportunities such as this when they are able – in ATI and other areas of anaesthesia.

Acknowledgements

The session was kindly supported by Ambu®, who provided equipment and video expertise. We would also like to thank Dr. Nick Jones for his help and guidance.



1 Sneyd, J. Robert, et al. (2020), The impact of the COVID-19 pandemic on anaesthesia trainees and their training. *British Journal of anaesthesia*, 125 Vol 4: 450-455. <https://doi.org/10.1016/j.bja.2020.07.011>

2 Ahmad, I., El-Boghdady, K., Bhargath, R., Hodzovic, I., McNarry, A.F., Mir, F., O'Sullivan, E.P., Patel, A., Stacey, M. and Vaughan, D. (2020), Difficult Airway Society guidelines for awake tracheal intubation (ATI) in adults. *Anaesthesia*, 75: 509-528. <https://doi.org/10.1111/anae.14904>

3 Khan, M.F., Shamim, F., Slote, M.U., Salim, B. and Abbas, S.A. (2021), Combined use of a videolaryngoscope and a flexible bronchoscope for awake tracheal intubation when front-of-neck airway is not an option*. *Anaesthesia Reports*, 9: 12-15. <https://doi.org/10.1002/anr3.12091>

4 NAP 4. Major Complications of Airway Management in the United Kingdom. Accessed via <https://www.nationalauditprojects.org.uk/NAP4>

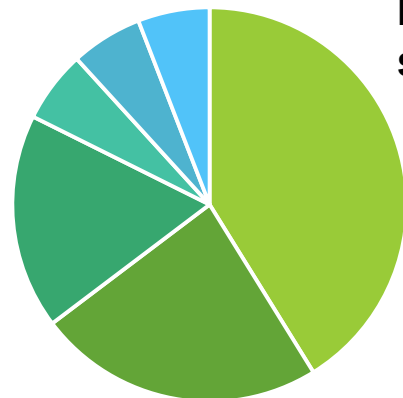
Reducing the cost of managing difficult airways

Dr Katie Preston, Dr Maqbool Jaffer

Background

- Sugammadex has revolutionised managing difficult airways as it can reverse deep neuromuscular block
- However its use is often rationed due to cost
- This project looked at safe methods to reduce the cost of using sugammadex

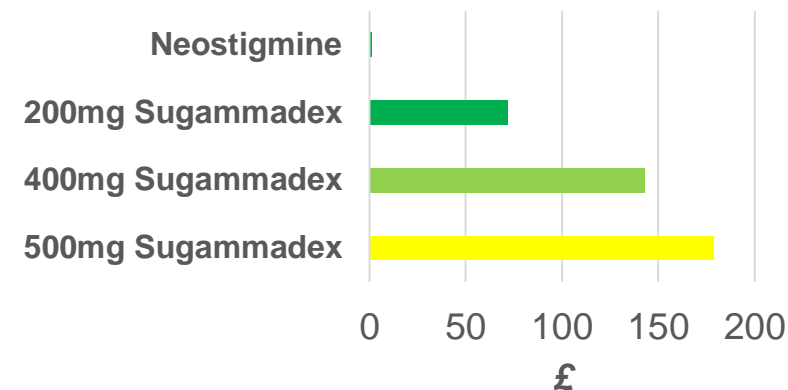
Understanding



Indications for sugammadex use

- High BMI (41%)
- Difficult airway (24%)
- Post op resp failure (18%)
- Failed intubation (6%)
- RSI for short case (6%)
- Frail patient (6%)

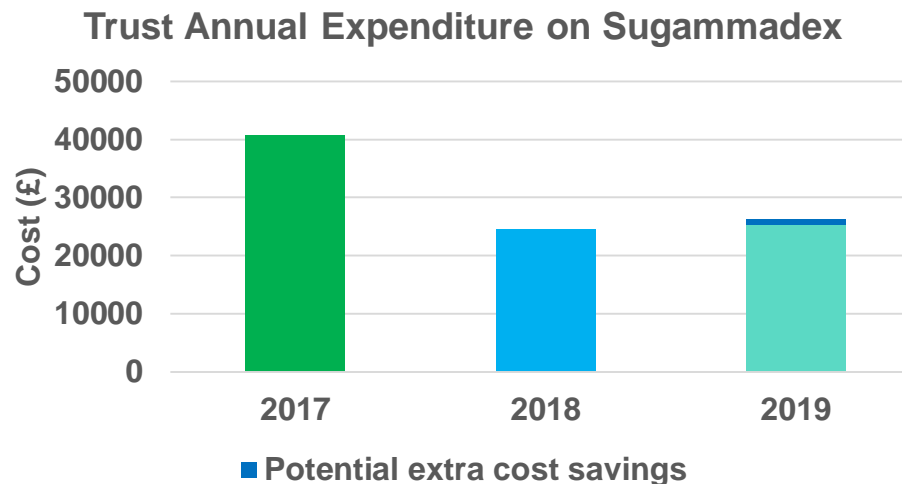
Cost of reversal



Changes

- Smaller 200mg vials were procured in 2018, leading to a £15,000 saving
- Using two small 200mg ampules instead of one 500mg ampule saves £36 per dose
- The trust could save a further £1000 per year if the smallest possible vials are used (4% saving)

Results



Conclusions

- Using the smallest combination of sugammadex vials saves money
- 2mg/kg dose can be given safely from 1-2 twitches on TOF (Bailey CR, Anaesthesia, 2017)
- Be grateful that sugammadex comes off patent in 2023!

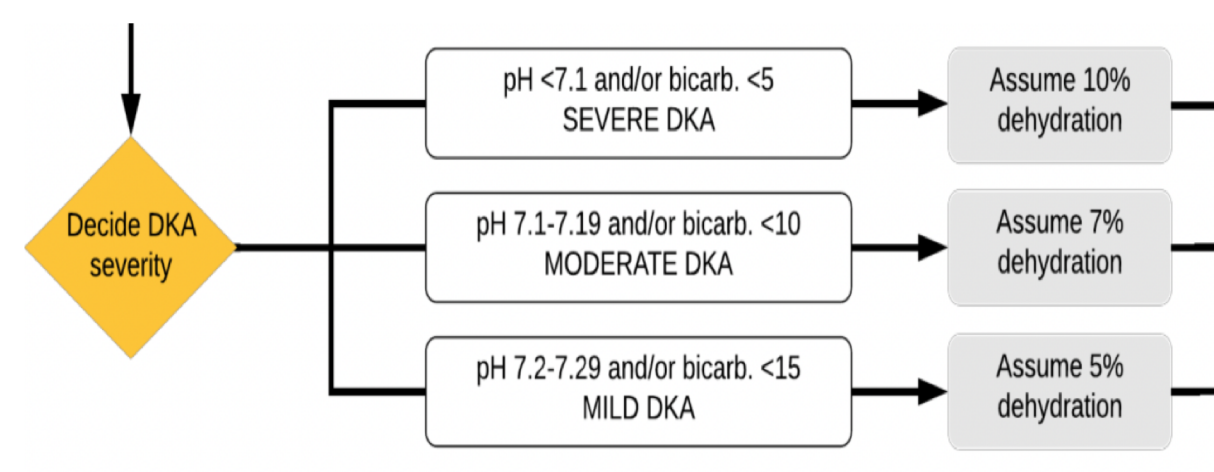
Introduction

Diabetic Ketoacidosis (DKA) is a life-threatening condition characterised by hyperglycaemia, ketoacidosis and dehydration. Symptoms of Type 1 diabetes are often missed in young children, thus DKA is the presenting feature in up to 25% of under 5s (1). Management of DKA in children is different to that in adults and can be confounded by difficult IV access and unfamiliarity with paediatric guidelines and drug dosing. Complications such as cerebral oedema and electrolyte disturbance are more common in smaller children (2) and make ongoing management more complex. We discuss the case of a 5-year-old with DKA to illustrate these issues.

The Case

A 5 year-old child presented with severe DKA as her first presentation of T1DM. She had experienced general malaise, abdominal pain and vomiting and was now unusually drowsy. On admission, a blood gas showed a pH of 6.8, glucose 19.1, ketones 5.7, HCO₃⁻ 6 and K⁺ 3.5mmol/L consistent with severe DKA. Her GCS was 11. She was managed using the 2020 British Society of Paediatric Endocrine and Diabetes (BSPED) DKA guideline (3).

Fig 1 BSPED 2020 DKA guideline



Change in pH and K⁺ with time from admission

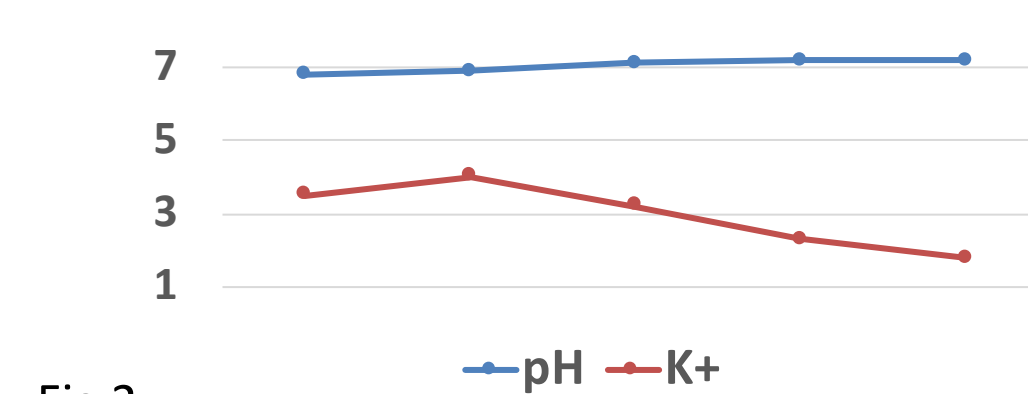
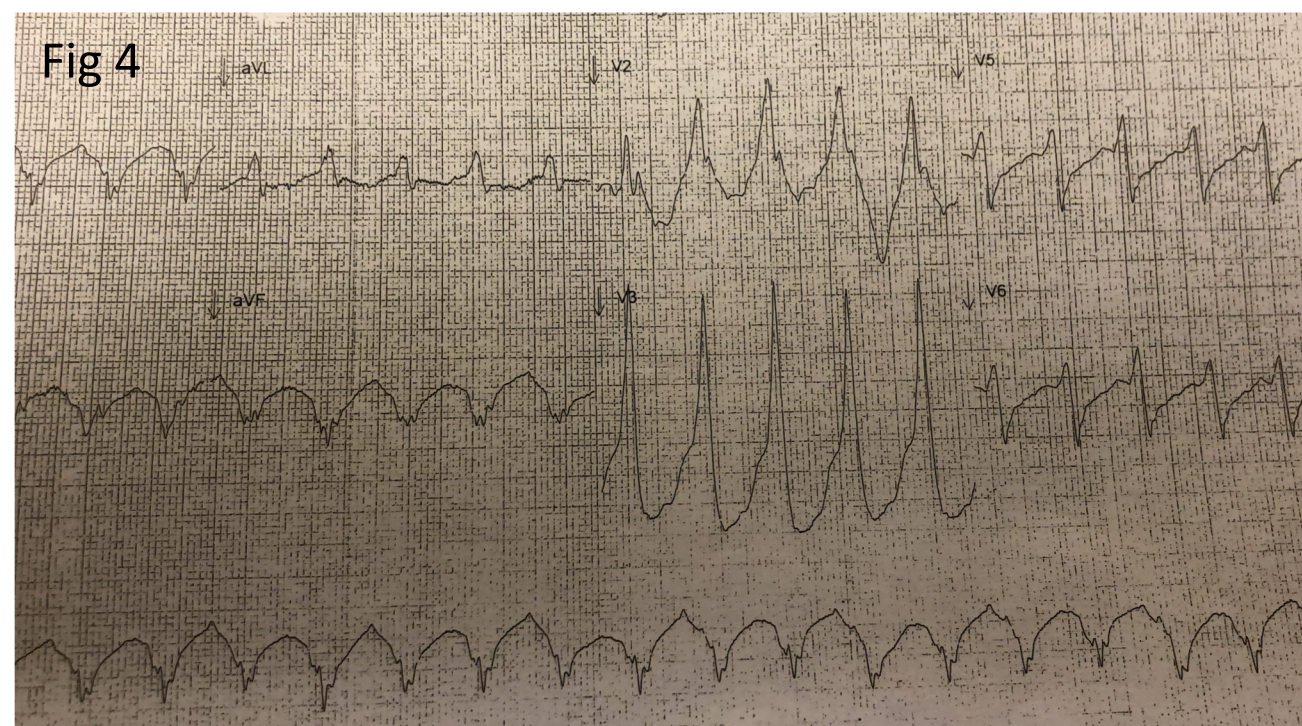


Fig 2

She developed signs of raised ICP and received hypertonic saline, following which her GCS improved. Her acidosis gradually improved, but her K⁺ fell (fig.2) despite supplementation. That evening she became bradycardic and was found to have a K⁺ of 1.8mmol/L. She developed irritable arrhythmias (fig.4) culminating in ventricular fibrillation (VF).

Fig 3: Hypokaleamic ECG. Life in The Fast Lane.



DC shock at 100J was administered following which she was asystolic. APLS guidelines were followed, and she received K⁺ 0.5mmol/kg peripherally. ROSC occurred 8-9 minutes after the initial VF. Central and arterial lines were sited, and central potassium replacement was given. The insulin infusion was paused. She was retrieved to the regional PICU where she made a full metabolic and neurological recovery. She was repatriated 3 days after PICU admission and is now coping well at home with her new diagnosis of diabetes.

References

1. Diabetes UK position statement 2015
2. Paediatric diabetic ketoacidosis. Steel s, Tibby s. Cont Edu Anaes Crit care & Pain. 2009;9 (6):194-199
3. BSPED guideline 2020 <https://www.sort.nhs.uk/Media/Guidelines/BSPED-DKA-guideline-2020-update.pdf>
4. Agarwal HS. Subclinical cerebral edema in diabetic ketoacidosis in children. *Clin Case Rep.* 2018;7(2):264-267.
5. Davis SM, Maddux AB, Alonso GT, Okada CR, Mourani PM, Maahs DM. Profound hypokalemia associated with severe diabetic ketoacidosis. *Pediatr Diabetes.* 2016;17(1):61-65. do

| Childhood DKA | Adult DKA |
|---|---|
| Diagnosis of diabetes often delayed due to vague symptoms | Classical triad of polydipsia, polyuria and weight loss |
| DKA likely to be more severe and more likely to be 1 st presentation of T1DM | Symptoms of DKA usually recognized earlier especially if known diabetic |
| Electrolyte imbalance less likely to be prevented: difficult phlebotomy reduces monitoring, lower body stores and more difficult to calculate replacement | Emphasis on risk of hypokalemia, monitoring and aggressive K ⁺ replacement |
| Cerebral oedema commonest cause of death | Cerebral oedema rare, other comorbidities e.g. sepsis more likely |
| Dehydration corrected over 48-72 hours, unless shocked, % dehydration assumed based on initial pH | Generous fluid approach |

Discussion

This child was admitted with severe DKA and cerebral oedema and developed severe hypokalaemia, despite moderate K⁺ replacement, suffering a hypokaleamic cardiac arrest. On discussion with her parents, she had a long history of fatigue and is a 'different more energetic person' after treatment. It is likely that she developed metabolic disturbance and DKA over a long period, predisposing her to the complications she suffered and demonstrating the difficulty in diagnosis of T1DM in small children. Subclinical cerebral oedema is a relatively common and easily missed complication of paediatric DKA (4). Clinically apparent cerebral oedema affects 1% of admissions but is the most common cause of morbidity and mortality in childhood DKA. Hypokalaemia develops during resuscitation, in all age groups, but is rarely as pronounced, and not as common a focus in paediatric guidelines as it is in adults. Aggressive K⁺ replacement in children may be unfamiliar to clinicians outside PICU and it is often inadequately replaced. This can result in severe hypokalaemia and the need for central access, anaesthesia and PICU transfer, which is traumatic for the family and costly to the NHS. The 2020 BSPED guidelines provide clear guidance and a calculator to assist in management of DKA but perhaps do not go far enough with regards to hypokalaemia. All children with DKA require paediatric involvement and HDU care, but the need for PICU and interhospital transfer might be avoided by seeking early advice from practitioners familiar with safe methods of aggressive electrolyte replacement.

Tips

| | |
|---------------------|---|
| General | <ul style="list-style-type: none"> • Isotonic fluids e.g. plasmalyte reduce risk of hyperchloremic acidosis • Start insulin at least 1 hour after rehydration begun: 0.05-0.1u/kg/hr • Do not bolus insulin: increases risk of hypoglycaemia/kalaemia (5) • Avoid bicarbonate: increases risk of cerebral oedema and hypokalaemia (5) • Ensure paed nurses check and prepare drugs: familiarity prevents drug errors |
| Hypokalaemia | <ul style="list-style-type: none"> • Risk factors: lower age and weight, low K⁺ at presentation, longer duration of acidosis • 40mmol/L K⁺ in all fluids from outset unless anuric/hyperkalaemic • NGT and early replacement of enteral K⁺ • If K⁺ low (<2.6) delay/pause insulin and consider need for central access • Central access is possible awake e.g. Leadcath in femoral, basilic or ext.jugular vein. • K⁺ 0.5mmol/kg can be diluted in 20mls saline and given via a large peripheral cannula if K < 2mmol/L and the patient is dysrhythmic • Ensure continuous ECG monitoring |

Recurrent pneumothorax in a Critically ill ventilated COVID-19 patient

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Background

- Clinical investigation with **computed tomography (CT)** scanning is ubiquitous in modern medicine
- There have been **several cohort studies investigating the radiological changes in patients with COVID-19 lung disease** [1,2].
- The most common CT findings are **bilateral ground-glass opacification (GGO) (87.5-88%), consolidation (31.8%) with peripheral (76%) or multilobar involvement (78.8%)**, most commonly seen in the first 14 days of patients admission
- There are a handful of case reports of spontaneous **pneumothorax** and **pneumomediastinum** in the COVID-19 population [3,4]

Patient journey

- A young **33-year-old woman** presented to the emergency department with a one-week history of **cough, shortness of breath and myalgia**, with no other significant past medical history
- Febrile at 38.5°C, tachycardic at 110bpm** with a **stable blood pressure and saturating 95% on room air**. Her bloods were unremarkable
- Chest radiograph (CXR)** demonstrated **bilateral patchy areas of increased opacity and prominent lung markings** (Figure 1)
- She was admitted to the acute medical unit, but her **respiratory function rapidly deteriorated**, necessitating a trial of non-invasive ventilation.
- She quickly failed this when on the intensive care unit (ICU), **needing intubation and mechanical ventilation**. She was **confirmed SARS-CoV-2**
- A repeat CXR showed **considerable interval worsening of parenchymal opacification within both lungs** (Figure 2).
- She required different ventilation strategies, including **multiple proning positions**
- She was referred for **Extra Corporal Membrane Oxygenation (ECMO)** at a regional ECMO centre. She had been ventilated for more than ten days, it was felt that the patient **would not benefit from ECMO**
- She was started on a course of **methyl prednisolone (1mg/kg, BD)** for a week and her ventilation mode was modified to **Airway Pressure Release Ventilation (APRV)**.
- There was an **initial improvement in her oxygenation**, without any significant deterioration in arterial carbon dioxide concentration (PaCO₂) or pH, and plateau pressures around 30 cmH₂O.
- However, **at day 14**, the beneficial effect of APRV was not sustained, and she was switched back to a mandatory ventilation mode
- On the same day, during one of her prone positionings, her **airway pressures increased dramatically with cardiovascular compromise**. She was clinically diagnosed with **tension pneumothorax**

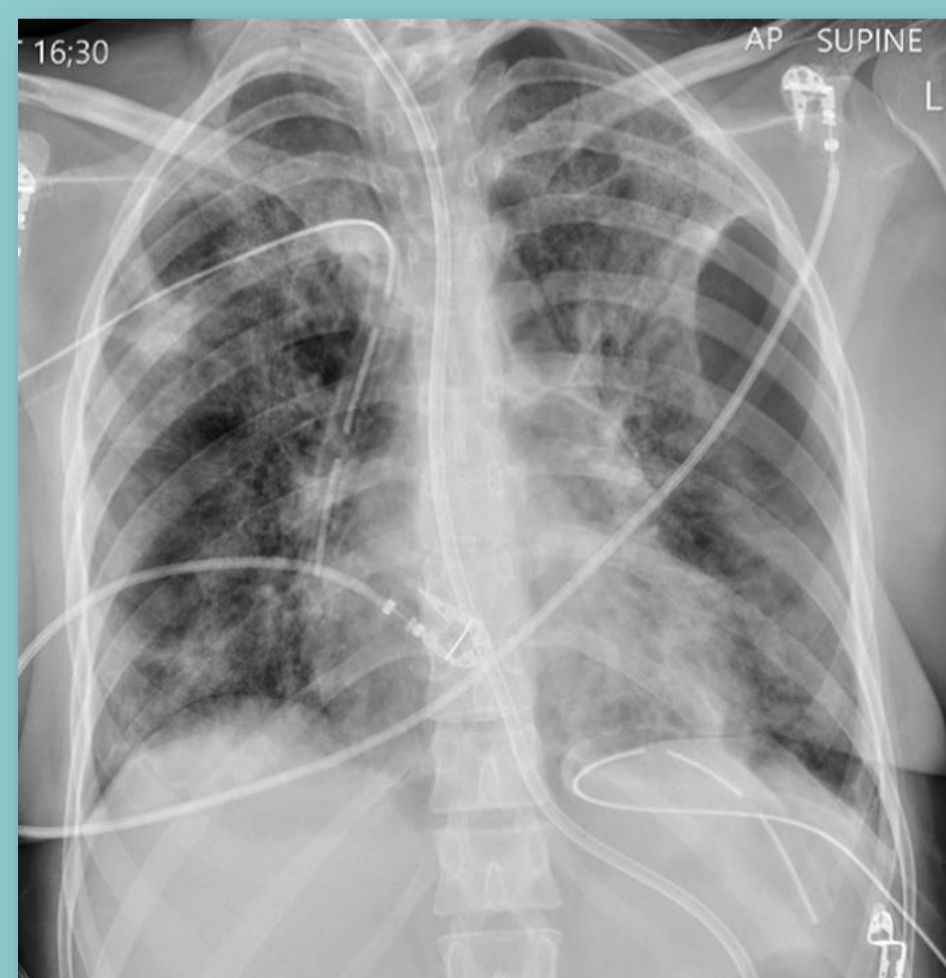
Figure 1. Admission Chest X-ray



Figure 2. Admission to ICU, post intubation



Figure 3. Day 14 post insertion of chest drains



Acknowledgements

To the co-authors of this case report and to all the critical care staff at University Hospital Southampton for their care of the patient.

Patient journey - continued

- She was immediately placed supine and received a **needle decompression**, followed by **insertion of bilateral intercostal chest drains (ICDs)** (Figure 3)
- After a period of recovery and stability, she had a **tracheostomy placed after 24 days**
- However, **failed to progress in her respiratory wean**
- She did develop a **swinging pyrexia** with raised inflammatory markers, including a **procalcitonin of 6.4**
- A **thorax CT** was ordered to investigate. This demonstrated a **large loculated left hydro-pneumothorax, bilateral anterior pneumatoceles, widespread bilateral ground-glass and crazy paving appearances** with the radiological appearance of classic COVID-19 pneumonia (Figure 4).
- Due to the complexity of her ICD management and CT findings, a **Cardio-thoracic surgical input** was sought
- After **Cardio-thoracic MDT discussion**, she was deemed too unwell for surgical interventions initially, opting for **conservative management with ICDs**
- After her initial ICD, she went on to have **several more ICDs**, including an **ICD under video-assisted guidance** to place due to the complexity of her hydro-pneumothorax.
- Despite placement of multiple ICDs, **serial thoracic CT scans showed persistent changes** with an increase in the size of the left sided hydro-pneumothorax
- After **60 days**, she successfully underwent a **video-assisted thoracoscopic surgery (VATS)** for a **washout of empyema and further placement of ICD**
- After **109 days** on ICU, she was **successfully decannulated** and stepped down to a respiratory ward, where she continued to receive the appropriate physiotherapy.
- She was discharged to a rehabilitation facility after a total of **116 days inpatient stay**
- She has been subsequently discharged home following an additional period of rehabilitation. Her **most recent thorax CT** showed **significant improvement**, with a **large reduction in the size of her left hydro-pneumothorax** (Figure 5)
- She is awaiting non-urgent outpatient follow up with the COVID-19 clinic and thoracic surgeons

Figure 4. Serial axial sections of thorax computed tomography (CT) (Panel A-D), showing bilateral ground glass opacification, pneumatoceles (white arrows) with large complex left hydro-pneumothorax (green arrows).

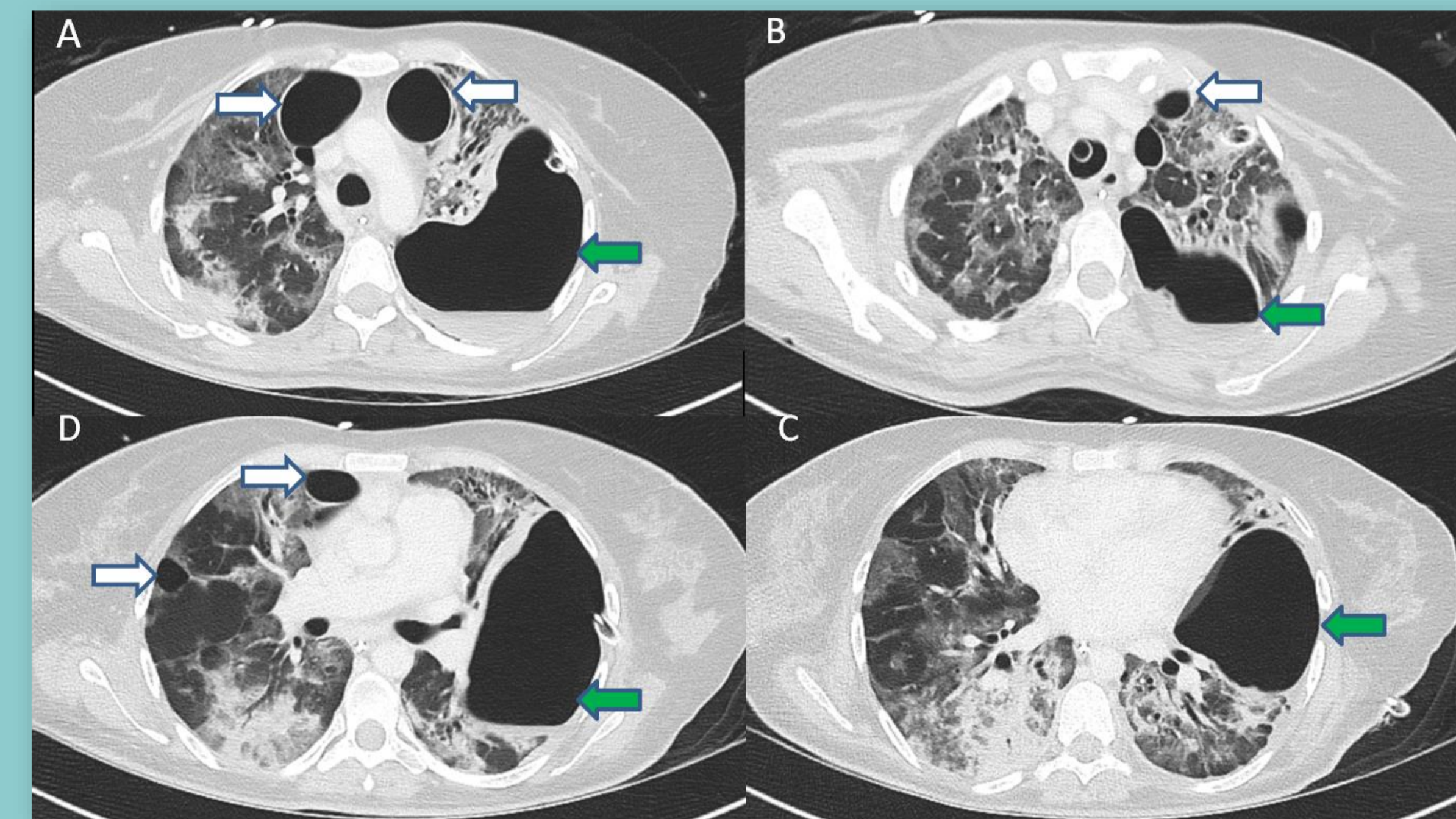


Figure 5. Serial axial sections of thorax computed tomography (CT), post decannulation and for surgical planning. Shows some bilateral scarring from COVID-19 infection, significant improvement in the size of the left hydro-pneumothorax but residual pneumatoceles anteriorly.



Discussion

- We present a rare case and CT findings of a young woman, with no significant medical history or underlying lung pathology, who developed extensive bilateral pulmonary changes including a **large, persistent hydro-pneumothorax and pneumatoceles following COVID-19 infection**.
- This is a **rare complication of COVID-19** not previously reported in the literature and it has had a significant impact on this patient's recovery, resulting in the **delayed progress of her weaning from mechanical ventilatory support** and a **prolonged stay in the intensive care unit**
- In our patient, the underlying mechanism for her recurrent pneumothorax, hydro-pneumothorax and development of pneumatoceles are unclear
- Whether it is a **combination of inflammatory injury from COVID-19 pneumonia and barotrauma** has not been determined, severe COVID-19 lung infection itself may lead to a chronic cystic lung disease state, or **possibly related to barotrauma and volutrauma as a result of the difficult mechanical ventilation pathway she endured**
- Early **MDT discussions with cardio-thoracic anaesthetists and surgeons** was essential, deciding early thoracotomy would have been to **high risk** a procedure and adopting a more conservative approach with ICD
- This is a rare complication of COVID-19 not previously reported in the literature and it has had a significant impact on this patient's recovery

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The practicalities of managing beta-blocker toxicity – a District General Hospital experience of a severe propranolol overdose



Dr S Bhattacharjee CT2, Dr N Stafford ST3
Anaesthetic Department, Dorset County Hospital

Case A 54 year old patient admitted to the Emergency department following an intentional mixed overdose thought to have consisted of over 2g of propranolol along with lower but unknown quantities of sertraline, amitriptyline and tramadol. The patient was first seen approximately three hours post ingestion due to Glasgow coma score of less than 8 with a Heart rate of 55 beats per minute and mild QTc prolongation (QTc 470ms) with no haemodynamic instability. Pupils were 5mm and sluggish bilaterally.

In hour four a rapid deterioration of physiology was witnessed with severe bradycardias down to 28 beats per minute associated with hypotension of 65mmHg systolic and prolongation of the QTc to 486ms. Initial resuscitation measures included 1L IV fluids, 3mg of atropine and increasing doses of peripheral adrenaline, all of which had little to no effect on heart rate or blood pressure. Treatment escalated aggressively as per overview below prior to transfer up to intensive care.



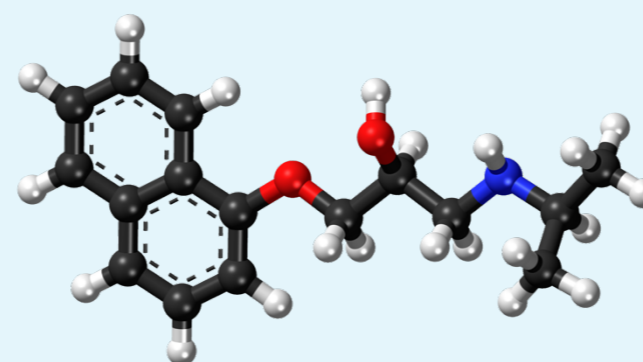
PROPRANOLOL OVERVIEW (2)

Preparations

- IR tablets (mg): 10, 40, 80, 160mg
- SR capsules (mg): 80, 160
- Oral solution

Properties

- Non-selective beta blockade
- Na⁺-channel blocker



Kinetics

- PEAK PLASMA CONC. @ 2 hours
- HALF-LIFE 3-6 hrs therapeutic use, 10-20 hrs with MR preps



Outcome and learning The patient was off vasopressor support and extubated after 24 hours then discharged home 36 hours later. Severe propranolol toxicity works on both Beta Adrenergic receptors and sodium channels (1). Treating severe overdose is challenging due to complex pharmacology and therefore guidelines are a helpful tool to guide management. The practicalities of this can be difficult. TOXBASE (1) suggests a bolus of glucagon followed by a high dose infusion. We had difficulties with supply of glucagon in such quantities which meant a delay in administration and limited infusion doses before hospital supply ran out at around hour 9. It is thought that Glucagon is effective by bypassing the blocked Beta adrenoceptors to activate adenylyl cyclase (2), Glucagon therapy in this setting has a limited evidence (2). Given this and the impracticality of its use at the doses required should it still feature so prominently in the TOXBASE guidelines when other more accessible and easily administered drugs such as intralipid could also be of benefit but do not feature in the TOXBASE guidelines (3)?

Pharmacological Basis of Treatments

Management overview

• **Arterial line** & **Central venous access**

• **Atropine** boluses

• **Adrenaline** boluses then infusion

• Intubation and ventilation.

• 8.4% **sodium bicarbonate** bolus

• **Calcium gluconate** bolus

• **Intralipid** bolus followed by an infusion

• **Glucagon** bolus followed by infusion

• **High dose insulin euglycaemic therapy (HIET)** Bolus followed by Infusion (80 units/Hr)

• **Isoprenaline** infusion

• Close monitoring of glucose, K⁺ and pH (every 30 minutes)

| Treatment | Pharmacological and proposed physiological mechanisms | Summary of doses and management |
|---|--|--|
| Atropine | - Anti-cholinergic, antagonises parasympathetic tone at the muscarinic acetylcholine receptors. | Bradycardia management, 500mcg boluses up to 3mg total. |
| Adrenaline | - Directly compete at the beta receptors blocked by propranolol or other beta blocker. Adrenaline will increase afterload due to alpha adrenoceptor mediated vasoconstriction and may increase oxidative stress on the myocardium (4). | 5 to 50mcg IV boluses, to affect. Infusion @ 0.01-0.1 mcg/kg/min. Bradycardia/negative inotropy may be refractory with overdose. |
| Glucagon | - Increases intracellular cAMP via G-protein stimulatory receptor that bypasses the beta-adrenoceptor. Positive chronotropy/inotropy. (2&4) | Given as a 5mg bolus, followed by an infusion of 0.1mg/kg per hour |
| High-dose insulin euglycaemic treatment (HIET) | - Potent inotropy at high doses, increases calcium handling via the PI3K pathway. - Assists uptake of carbohydrate for the stressed myocardium. - Improves local microcirculation via endothelial nitric oxide synthase (eNOS) (4) | Given as a bolus dose of 1iu/kg (ensure K ⁺ > 4.5mmol, glucose > 10mmol >L) and then infusion commenced 0.5 to 1.0iu/kg/hr up to 10iu/kg/hr. Becoming increasingly preferred. (4) |
| Sodium bicarbonate | - Mechanism is not fully appreciated, will vary by toxin and type of channel - high concentration gradient of Na ⁺ and rise in pH may aid modulation at the Na ⁺ channel (5). - Increased protein binding due to alkalaemia – possibly reduces free drug (5). | 50 to 100ml boluses NaHCO ₃ 8.4%. Aiming for pH 7.5 to 7.55, continue treatment if QRS complex widened (1). |
| Intralipid | - Propranolol is highly lipophilic. Proposed binding to reduce the availability of free drug, increases clearance (6). | 1.5ml/kg 20% intralipid bolus. Followed by infusion at 15ml/kg/hr. |

References

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4) Deranged physiology. Beta blocker overdose. Website: <https://derangedphysiology.com/main/required-reading/pharmacology-and-toxicology/Chapter%205.2.5/beta-blocker-overdose>

5) Bruccoleri et al. (2016). A Literature Review of the Use of Sodium Bicarbonate for the Treatment of QRS Widening. J Med Toxicol. 2016 Mar; 12(1): 121–129.

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Background

- Currently I am the sole advanced pain trainee in Wessex Deanery
- 1 CCT with specialist interest in Pain medicine in the last 10+ years

Aim

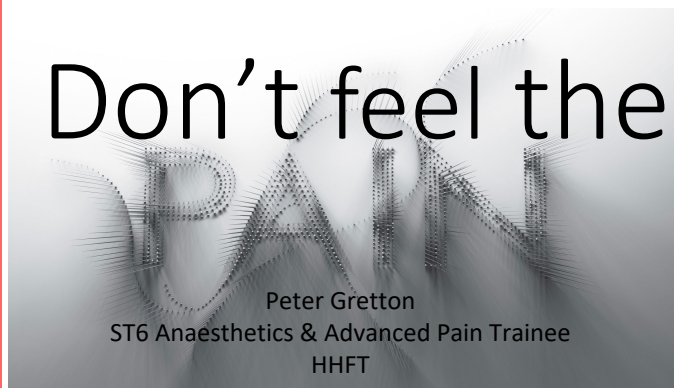
- To identify and highlight what discouraged/s current Wessex anaesthetic trainees from taking up Advanced Pain Training
- Identify areas that can be modified to boost engagement
- Reach out to prospective trainees with interest
- Identify trainee misconceptions

Method

- A survey was circulated via Wessex trainee WhatsApp group and Wessex Deanery email circular
- requested to grade their accordence (scale strongly disagree – strongly agree [1-5]) to the 10 prepared statements to indicate why they did not or may not consider enrolling in APT
- Trainees were invited to enter comments relating to their rating or other explanations
- The data collected was processed and analysed using the data tool incorporated in the SurveyMonkey app.

Results

- 48 respondents completed the survey
- 15 respondents left comments to further explain their sentiments
- Mean score (range 1-5) calculated. If median = mean score (3.0) = no strong feeling either way.
- Mean <3 = disagreement; mean score >3= agreement



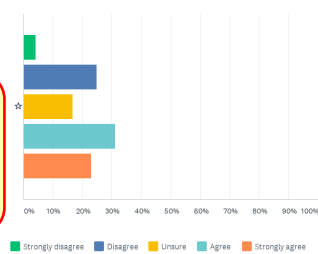
Statements:

1. Lack of clear outcome measures
 2. More postgraduate exams/qualifications
 3. Perceived lack of evidence based medicine
 4. Complex physiological & psychological needs of chronic pain patients
 5. Don't believe you have the skill set/tools to deal with chronic pain patients
 6. Don't see the benefit of specialist pain medicine
 7. Not enough exposure/experience in pain medicine to make informed decision on a career in pain medicine
 8. Not perceived to be glamorous sub-specialty
 9. Outpatient clinics not intended as part of your future job plan
 10. Lack of role models
- 1=strongly disagree, 2=disagree, 3=unsure, 4=agree, 5=strongly agree

Significant findings:

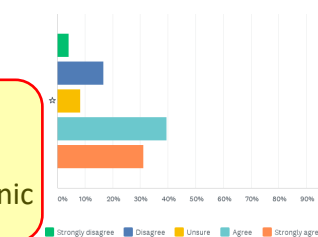
EDUCATION/EXPOSURE Q7 – mean 3.33; 54.17% agree or strongly disagree

- hear success stories of chronic pain patients (eg. teaching/patient videos/ workshops)
- Lack of exposure / experience during training is main factor
- Difficulty getting good quality training in the region.



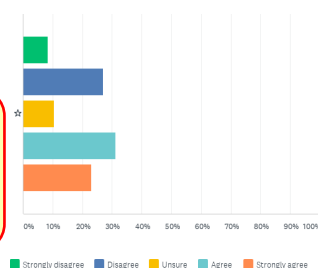
PATIENT FACTORS Q4 – mean 3.77; 70.83% agree or strongly agree

- chronicity of disease & psychological aspect of patients needs
- Not sure I want to take on complex chronic pain where I feel I can't offer a significant change to their pain burden.' OP Clinic



JOB PLAN Q9 – mean 3.44; 54.17% agree or strongly disagree

- Heavy clinic workload
- does not appeal due to the outpatient clinics
- Delivery model: In the community setting, so less support if things go wrong



Conclusion

- Advanced Pain training remains undersubscribed in Wessex & wider
- Clearly multifaceted causation for this
- Certain components of the profession will not change (patients/clinic/exams/politics?)
- However:
 - 83% see pain as a beneficial specialty
 - <35% felt they didn't have the skills
 - Exposure to pain medicine needs to be improved within the region
 - More can be done!

What next...?

- Improve clinical exposure
- Regional teaching day
- Increase in-training career advice

Ultrasound-Guided Cannulation Course

Dr Ben Cambers & Dr Robyn Lee, Anaesthetic Trust Grade Registrars, Royal Bournemouth Hospital



BACKGROUND

Difficult IV access is not a new problem. Patients are getting larger, have more comorbidities and are staying in hospital longer. Frequent venesection and an encouragement to remove peripheral cannulae after 4 days has led to more difficulty obtaining IV access.

When access is particularly challenging the anaesthetist or intensivist is often called to help.

The use of ultrasound-guided cannulation, in theory, should make this a rarity, however it is not a skill taught in medical school and the already beleaguered junior doctor has little time to learn this skill on the job.

Our aims were two-fold - to improve the plight of the junior doctor by equipping them with the skills to obtain vascular access through the use of ultrasound, and therefore also to limit the amount of extraneous work we, as an ICU team, have to do.

With this in mind we wanted to create a course for junior doctors that would enable them to learn the fundamentals of ultrasound and allow the opportunity to practice this skill. The course needed to fulfil some fundamental criteria. It had to:

1. Be free of cost
2. Cater primarily to junior doctors
3. Be short - ideally 1hr long
4. Have practical hands-on experience
5. Provide some basics of ultrasound

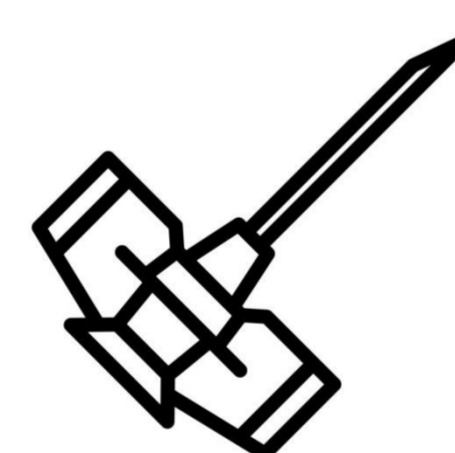
We were able to provide 6 teaching sessions of 1 hour duration each in the anaesthetic department of Royal Bournemouth Hospital for up to 8 junior doctors per session.



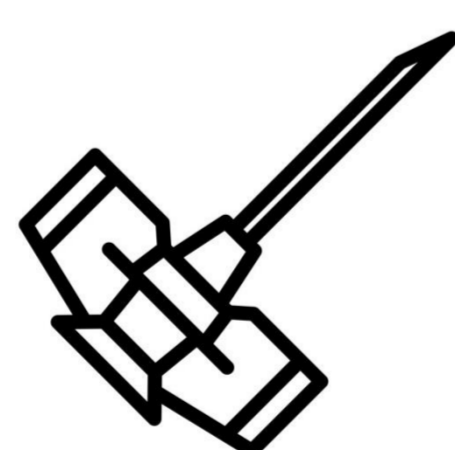
Attendees had the chance to practice on this model

Sonotrain™ Vein model

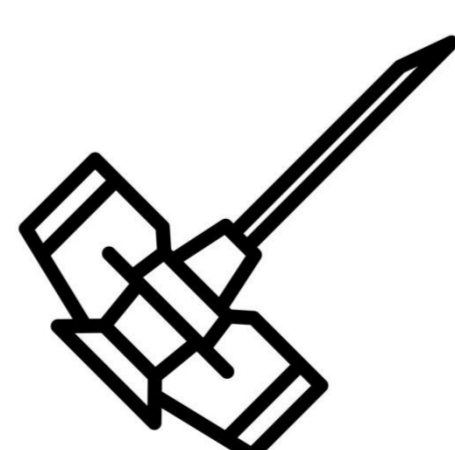
METHODS



Lecture - the lecture was a focused 10 minute PowerPoint presentation on the principles of ultrasound. It included a video of ultrasound-guided cannulation, information about the Doppler effect and practical aspects of using ultrasound.



Introduction to the ultrasound machine - we talked through the functions of the ultrasound machine we were using - namely the Sonosite - focusing on probe usage, manipulation of depth and gain and the different planes of imaging - 'out-of-plane' and 'in-plane'.



Practice - the junior doctors then split into groups of 3 and practised identifying vessels on each other, differentiating artery from vein, and looking at how to position the probe and change depth and gain. The next step was for each doctor to try cannulating the Sonotrain fake arm (kindly donated by the education department). This vein model is perfect for sonoanatomy and it enabled the doctors to practise safely (see picture above).

RESULTS

Our aim of helping junior doctors learn and feel confident with the technique of ultrasound was assessed using pre- and post-course questionnaires. We wished to determine whether they felt more confident in using the ultrasound machine, knew how to cannulate with ultrasound and whether they would be happy to practise on their own.

All of the doctors reported an improvement in their confidence in using the ultrasound machine (30/30, 100%). 29 of the 30 (96%) said they would feel comfortable attempting ultrasound cannulation on a patient following the course.

Our second aim of limiting the number of cannula requests ICU doctors receive is more difficult to assess because it requires accurate recording of the number of requests, which despite our best efforts was not being done. We have subsequently set up a spreadsheet to record the requests and to ask whether or not the requester has attended or had any formal ultrasound teaching.

Overall feedback for the course was universally positive. All of the doctors said the faculty were knowledgeable and friendly. A selection of the comments are written below.

'Really great opportunity. Incredibly useful and well thought out delivery'

'Every junior doctor should do an ultrasound cannula course!'

'Really useful practical course. I feel much more confident to try an US guided cannula in practice now. Thank you!'

Poster advertising the Course

Free Ultrasound Cannulation Course For Junior Doctors

Are you interested in learning a new skill?
Do you want hands-on practice with ultrasound?
Are you fed up of calling for help with difficult iv access?

If so - then sign up for the free USS cannulation course

6 places for each session available

Practical workshop with lecture and videos.

Venue: RBH, Anaesthetic Seminar Room

Dates:
11/11/20 6-7pm
19/11/20 6-7pm
24/11/20 6-7pm
02/12/20 6-7pm

Organisers: (Anaesthetic Registrars)
Dr Robyn Lee
Dr Ben Cambers

Please e-mail benc39@hotmail.com to book a place



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During the process of creating this course we asked ourselves why basic ultrasound skills aren't taught in medical school? We are in the process of contacting local medical schools and trying to introduce a variant of this course to 4th/5th year medical students as part of their clinical skills practical teaching sessions. The aim is to have this up and running by 2022.

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Improving the rapid assessment and management of tracheostomy related critical incidents within a District General Intensive Care Unit – an MDT educational approach.



Dr S. Bhattacharjee CT2, Dr A. Aswath ST7, Dr R. Jee Consultant in Anaesthetics/Intensive Care (Dorset County Hospital Anaesthetic Department)

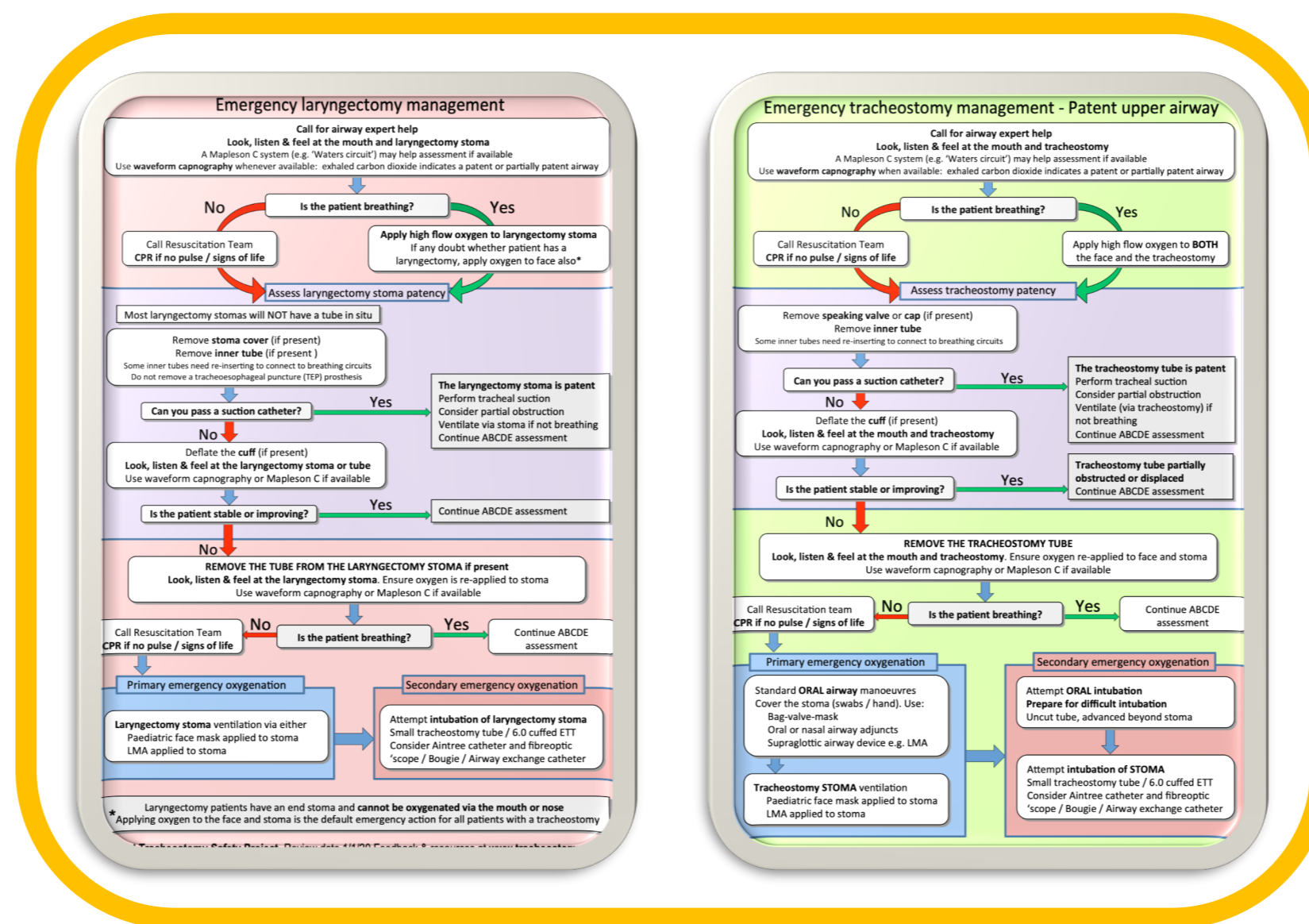


Background Within our District General hospital, we have a variety of clinical experience and skill mix throughout our nursing and medical staff including rotational trainees. With the advent of the COVID-19 pandemic and greater numbers of patients with respiratory failure, understanding the care of tracheostomies is ever more important particularly with non-trained staff supporting the unit. With the recent publication of the 'Improving Tracheostomy Care' project ¹ we felt it imperative that our critical care team's approach to emergencies involving tracheostomies required standardisation and ongoing education to improve patient outcomes.

Aims To implement a reproducible half-day education and simulation session surrounding tracheostomy care and associated emergencies:

- 1) Utilise the current emergency National Tracheostomy Safety Project (NTSP) algorithms ².
- 2) Ensure the use of NTSP bedhead signs with associated algorithms for all tracheostomy patients within our unit.

NTSP Algorithms – Emergency tracheostomy management ²



Feedback Teaching was well received by all. Response to the inclusion of the MDT in both educator role and participation aspects of the session was very positive. The varied team-working through scenarios allowed dynamic discussion in the debriefs and highlighted the limitations and dependency on each other's clinical roles.

Progress & Considerations Since the initial educational session we have seen an increase in tracheostomy weaning patients within our unit due to COVID-19. We are currently utilising the NTSP bed head signs with associated algorithms consistently. We have further dates scheduled for simulation sessions with the view to pass over the format and teaching material to rotational anaesthetic registrars to maintain implementation. We should consider the use of previous attendees as faculty to teach peers (both nursing and medical staff) to aid consolidation of learning.

Method Overview of 3-hour teaching session.

Learner group Core Anaesthetic Trainees x 2, ICU nursing staff x 2, ODP/Resus Officer x 1

Teacher Group Anaesthetist/ICU Consultant & trainees, ICU physiotherapist & nurse

Introduction

Lecture with introduction to types of tracheostomy + overview of NTSP emergency algorithms

Workstations

Physiotherapist led tracheostomy session (types, caps, weaning & de-cannulation)

Trainee/nurse led sim lab – hands on walk through with NTSP algorithms

Simulations

Scenario 1 – tracheostomy patient with laryngectomy

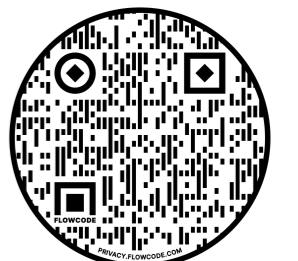
Scenario 2 – tracheostomy patient with patent upper airway

Conclusions By improving the understanding of common tracheostomies used, their routine care and standardising approaches to emergencies we aim to reduce the incidence and severity of critical incidents relating to tracheostomy patients. By utilising the critical care MDT during training sessions there is the opportunity to share knowledge, appreciate each other's roles and limitations while approaching critical incidents as a team. These simulation sessions could easily be implemented by other critical care teams to align with the NTSP suggestions.

References

- 1) Tracheostomy.org [Internet]. National Tracheostomy Safety Project; Improving Tracheostomy Care. Available from: <http://www.tracheostomy.org.uk/healthcare-staff/improving-tracheostomy-care>.
- 2) Tracheostomy.org [Internet]. National Tracheostomy Safety Project, Emergency Care (Adults); Emergency Algorithm – Tracheostomy. Available from: <http://www.tracheostomy.org.uk/storage/files/Patent%20Airway%20Algorithm.pdf>.

RESOURCE LINK



SCAN QR CODE



Hypocortisolaemia masquerading as anaphylaxis

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Correspondence to kenniesarah@gmail.com

INTRODUCTION - Profound hypotension is a recognised clinical feature of both anaphylaxis and an acute hypoadrenal state. Central hypoadrenalism is seen in intracranial disease processes affecting the hypothalamic–pituitary–adrenal axis. We present an unusual case of apparently typical peri-operative anaphylaxis in a man with intra-cranial lymphoma, the anaphylaxis was treated as such but the negative allergy testing led to a subsequent diagnosis of hypocortisolaemia being made. The patient and his relatives gave permission for his case to be discussed in medical literature.

Case description

- A 69 year old man presented to a neurosurgical centre for urgent biopsy of a posterior fossa lesion (intra-cranial lymphoma (see Image 1). He had been transferred from a DGH where he had received initial treatment for a presumed ischaemic cerebellar stroke after presenting with vertigo and vomiting. 4 months prior to this, he was diagnosed with diabetes insipidus and hypogonadotropic hypogonadism. Initial assessment of his adrenocortical function appeared normal. An MRI of the pituitary was also normal.
- The biopsy procedure was deferred for 1 week due to previous antiplatelet therapy. Dexamethasone was withheld to avoid tumour shrinkage prior to the biopsy. [1]
- The patient underwent general anaesthesia for biopsy of his posterior fossa. Anaesthesia was induced with TIVA (propofol, remifentanyl), 90mg of rocuronium was also given to aid intubation. Immediately following induction, he became profoundly hypotensive, this was unresponsive to first measures (ephedrine) but ultimately responded to intravenous fluid and adrenaline (boluses followed by an infusion). Intravenous hydrocortisone and chlorphenamine were given, as per AAGBI guidelines. [2] He was admitted to the Neurosciences Intensive Care Unit (NICU) with a working diagnosis of anaphylaxis. The suspected trigger agents were remifentanyl, propofol and rocuronium; with the latter deemed the most likely.
- Dexamethasone was commenced on NICU. Unfortunately, the patient developed a Takotsubo cardiomyopathy secondary to resuscitative adrenaline. In terms of allergy testing, blood which had been taken prior to the reaction was tested for specific IgE antibodies for pholcodine and suxamethonium (which could have been suggestive of possible rocuronium allergy), and for chlorhexidine. These were all negative. Serum tryptase levels were taken at 1, 3 and 24 hours after the event. No deflection from a normal baseline was demonstrated. None of these results were considered to have made the diagnosis of anaphylaxis less likely.
- The neurosurgical plan was to wean dexamethasone and plan for a repeat procedure at a later date, pending a full assessment in the anaesthetic allergy clinic. Dexamethasone was weaned on NICU. Prior to stopping it completely, the NICU medical team ensured that this patient did not previously take any steroids regularly. Following an endocrine review, he was discharged home on his previously prescribed desmopressin, levothyroxine and testosterone.
- 19 days after being discharged, he required a short course of dexamethasone for neurosurgical symptom control. A concurrent repeat CT brain revealed stable intracranial appearances with no change in ventricular volume. 22 days later, he presented to anaesthetic allergy clinic for formal allergy testing at which time he was no longer taking dexamethasone. Unfortunately, he was unwell with sepsis due to a likely aspiration pneumonia. This resulted in a second NICU admission. Dexamethasone was re-started.
- The scheduled allergy testing was carried out during this inpatient admission, approximately 8 weeks following the index event. A Basophil activation assay (Histamine release assay, Reflab Copenhagen) did not show positive results for any neuromuscular blocking drugs or chlorhexidine. Skin prick and intradermal tests were negative for all drugs tested (propofol, remifentanyl, chlorhexidine, rocuronium, fentanyl and cisatracurium). This panel of negative allergy tests, in combination with the observed clinical deteriorations when off steroids alongside other endocrine abnormalities, led to a suspicion of hypocortisolaemia being the underlying reason for the index episode of cardiovascular collapse. Regular oral hydrocortisone supplementation was started. A general anaesthetic with additional steroid cover was deemed safe.
- On day 12 of this admission, he underwent the planned neurosurgical procedure (posterior fossa biopsy) via a burrhole incision. The anaesthetic was uneventful, and the drugs used were propofol, remifentanyl and rocuronium. Additional perioperative steroids were given as planned. After initially waking uneventfully postoperatively, he rapidly developed complications related to a posterior fossa bleed. This necessitated emergency posterior fossa craniectomy and haematoma evacuation (see Image 2). Sadly, he failed to recover neurologically from this complication and died from a hospital acquired pneumonia 2 months later. Histology did indeed confirm a non GC type diffuse large B cell lymphoma.

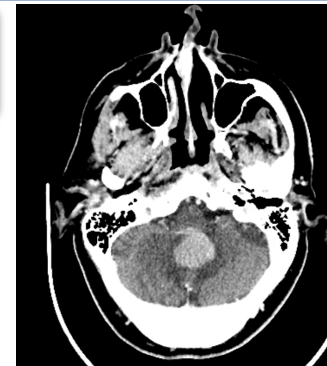


Image 1 – suspected cerebral lymphoma on CT head with contrast.

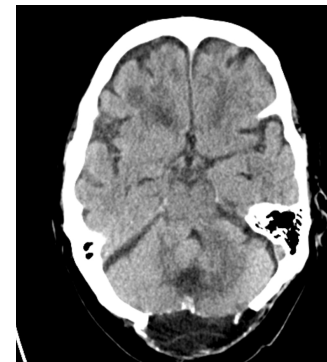


Image 2 – following emergency posterior fossa craniectomy.

Discussion and key learning points

- We believe that the unifying diagnosis for this patient’s apparent anaphylaxis was hypocortisolaemia secondary to intra-cranial pituitary and/or hypothalamic lymphoma infiltration. Anaphylaxis had been ruled out and the drugs used at the index general anaesthetic were used again without incident, once the patient was receiving a maintenance dose of hydrocortisone. Serial imaging was reviewed retrospectively by a neuroradiologist, images were inclusive of the first MRI brain that was performed to investigate diabetes insipidus. Microscopic infiltration that was not visible radiologically is a possible explanation, this has been described in a case series comparing primary CNS lymphoma appearances on MRI and autopsy. [3]
- We felt that this was of relevance to anaesthetic practice due to the unrecognised hypocortisolaemia that presented as anaphylaxis. In NAP6, anaphylaxis presented within 5 minutes in 66% of cases, furthermore hypotension was the presenting feature in 46% of cases. [4] The unexplained anterior and posterior hypopituitarism in this patient, despite normal radiological pituitary appearances, may have been secondary to microscopic infiltration from the suspected intra-cranial lymphoma. Diffuse infiltration has previously failed to correlate with the burden of disease on MRI. [3]
- In summary, patients with evidence of abnormal pituitary function should be specifically considered for peri-operative steroid cover. In this case, there was significant associated immediate morbidity (Takotsubo cardiomyopathy) resulting from the adrenaline required to maintain cardiovascular function. Full guidelines for peri-operative steroid administration are available and include treatment in the post-operative period. [5]

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SIMULATION IN PREPARATION FOR THE COVID-19 PANDEMIC

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Introduction

Healthcare simulation is widely utilised for education at all stages of clinical training and practice, across cognitive, procedural, communication and teamwork domains. Therefore, in anticipation of the uncharted and impending COVID-19 pandemic, we embarked *ad-lib* on a mission to best prepare our clinical staff and systems.

By testing and honing how local and national policies were applied among various professionals in a range of scenarios, we aimed for a proactive and constructive approach to help manage risk, improve patient safety and foster staff morale, at a time of great uncertainty.

Methods

The initial plan was to simulate, video and disseminate a scenario of a COVID-19 patient that required anaesthesia and intubation for severe hypoxaemic respiratory failure.

This soon progressed to planning, running and debriefing a wide range of COVID-oriented scenarios, including:

- Management of cardiac and respiratory arrests
- Intra-hospital transfers of critically-ill patients
- Donning and doffing of PPE
- Ventilator training
- Inserting surgical tracheostomies
- Proning patients

Plus: obstetric and paediatric specialty-focused scenarios.



Results

Over a two month period during the COVID-19 'first wave', 62 simulation sessions were conducted, incorporating 501 participants in total. The extensive consequential learning helped create three instructional videos, improve six clinical guidelines, engineer six clinical action cards/algorithms and nine educational resources (such as checklists and crib sheets).

Figure 1: remote (i.e. non-ITU) version of the crib sheet developed for the four specific members of the COVID-19 intubation/arrest team. An alternative version for ITU events was also produced.

Figure 2: standardised COVID-19 emergency intubation checklist. This was developed from the combination of local and national guidelines, alongside serial 'sim' learning events.



Figure 3: "Print Screens" of two (of the three) instructional videos produced and shared on staff intranet and YouTube. Upper: intubation video (466 views), Lower: donning and doffing (572 views).

Discussion and Conclusions

What started off as an idea for one simulated scenario, soon amplified into a huge undertaking of a broad range of simulations and educational resources. Observed project strengths included: overall scale achieved, problem-based in-situ sim scenarios (rather than task-oriented), multidisciplinary and inter-department approach, reactive faculty focused on debriefing/learning, easily accessible resources and the implementation of a daily simulation for the on-call COVID-19 intubation/arrest team.

Feedback: "extremely proactive in the build up to our pandemic response. Took leadership to facilitate various educational videos, algorithms and lots of simulation scenarios which really contributed to the whole department's preparedness."

Project limitations comprised: *ad-lib* approach, lack of quantitative participant feedback, and finite sim faculty and resources.

Conclusions: Simulation proved pivotal in preparing and testing a multitude of staff and clinical systems, facilitating ongoing evaluation and improvements in advance of being needed for real. In contributing significantly to the Trust's COVID-19 preparedness, simulation helped bridge the gap between policy and practice, empowering staff with safety and assurance when both were hard to come by.



TOTAL ARTERIAL OXYGEN CONTENT IN PATIENTS ADMITTED TO INTENSIVE CARE WITH HYPOXAEMIC RESPIRATORY FAILURE DUE TO COVID-19

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Introduction

In December 2019, SARS-CoV-2 spread worldwide leading to a pandemic.¹ Presenting as a flu-like illness, COVID-19 can cause severe hypoxaemic respiratory failure, similar to acute respiratory distress syndrome (ARDS). Mechanical ventilation carries a high mortality.²

Oxygen is carried in two forms: 98% bound to the intracellular erythrocyte protein haemoglobin and 2% dissolved directly in plasma.³ Measurements of blood oxygen are usually given as the percentage of haemoglobin saturated with oxygen (SpO₂), or as the partial pressure of oxygen in arterial blood (PaO₂). Total arterial oxygen content (CaO₂) is the sum of the two, but there has been limited work to explore its potential as a measure of oxygenation.⁴

$$\text{CaO}_2 = (1.34 \times [\text{Hb}] \times \text{SaO}_2) + (0.023 \times \text{PaO}_2)$$

As a novel cause of respiratory failure, COVID-19 offers a unique opportunity to study a cohort of patients with a similar underlying pathology.

Methods

We performed a retrospective observational study in a single university hospital in the UK between 01/03/2020 and 31/07/2020 inclusive. We included all patients admitted to ICU, aged 18 or over, tested positive for COVID-19, required supplemental oxygen and had one or more arterial blood gas (ABG) samples performed.

Suitable patients were identified using admission records. We studied clinical records and electronic patient data. We collected anonymised baseline patient characteristics which were supplemented by ICNARC unit summary data. We collected ABG data and oxygenation parameters from admission through to discharge from intensive care.

Aim

Establish the trend in CaO₂ over the first 30 days of intensive care admission for patients with hypoxaemic respiratory failure due to COVID-19

Results

| Patient Characteristics and Outcomes | | |
|---|--------------|--|
| Age (years) | Median (IQR) | Severe comorbidities, n (%) |
| Sex, n (%) | 57 (47,65) | Cardiovascular 0 (0) |
| Female | 36 (38.7) | Respiratory 0 (0) |
| Male | 57 (61.3) | Renal 1 (1.1) |
| Ethnicity, n (%) | | Liver 0 (0) |
| White | 51 (60) | Metastatic 1 (1.1) |
| Mixed | 10 (11.8) | Haematological 2 (2.2) |
| Asian | 18 (21.2) | Immunocompromise 5 (5.4) |
| Black | 1 (1.2) | APACHE II score |
| Other | 5 (5.9) | Median (IQR) 15 (13,18) |
| Body mass index, n (%) | | Organ support at any point, n (%) |
| 18.5 | 0 (0) | Basic respiratory 76 (81.7) |
| 18.5-25 | 27 (29) | Advanced respiratory 55 (59.1) |
| 25-30 | 26 (28) | Basic cardiovascular 90 (96.8) |
| 30-40 | 36 (38.7) | Advanced cardiovascular 32 (34.4) |
| >40 | 4 (4.3) | Renal 18 (19.4) |
| Index of multiple deprivation (IMD) quintile, n (%) | | Liver 0 (0) |
| 1 (least deprived) | 8 (9.5) | Neurological 19 (20.4) |
| 2 | 22 (26.2) | Duration of critical care days, median (IQR) |
| 3 | 13 (15.5) | Survivors 9 (3.27) |
| 4 | 30 (35.7) | Non-survivors 6 (3.16) |
| 5 (most deprived) | 11 (13.1) | Outcome at end of critical care, n (%) |
| Dependency prior to admission, n (%) | | Survived 78 (83.9) |
| No assistance | 81 (88) | Died 15 (16.1) |
| Some assistance | 11 (12) | |
| Total assistance | 0 (0) | |

Figure 1: Baseline patient characteristics (n=93). Definitions as defined by ICNARC²

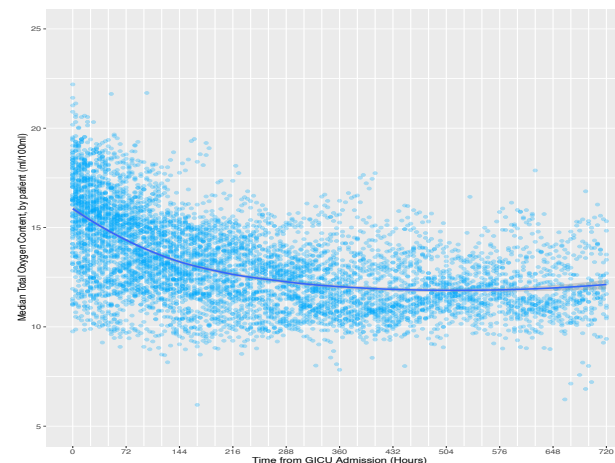


Figure 2: Trend in 4-hour median CaO₂ (ml O₂ / 100ml blood), calculated from 10564 ABGs over the first 30 days of ICU admission (n=93)

Discussion

In patients with hypoxaemic respiratory failure due to COVID-19, CaO₂ trends down before reaching a plateau in the first 30 days of admission to ICU.

Hypoxaemia and anaemia affect nearly all critically unwell patients⁶. CaO₂ is clearly influenced to a greater extent by the concentration of Hb as opposed to PaO₂. Some work has explored the implications of Hb targets in patients with septic shock⁷, and historically a restrictive transfusion regime has been adopted for patients with ARDS.⁸ However, Hb targets in patients with COVID-19 are usually set by individual clinicians based on the contemporary clinical picture.

Limitations of this work include a retrospective observational design in a single centre, using a small data set from a single COVID-19 wave. Nonetheless, this is the first study to explore CaO₂ as an alternative measure of oxygenation in patients with COVID-19, and further work to explore its potential with larger studies may be warranted.

Conclusion

- COVID-19 offers a unique opportunity to study a homogenous cohort of critically unwell patients
- In adult intensive care patients with COVID-19, CaO₂ trends down and then plateaus within the first 30 days
- CaO₂ is easily calculated and further work may demonstrate its usefulness as an alternative measure of oxygenation

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Multi-disciplinary management of an obstetric patient with acute lymphoblastic leukaemia

By Dr S Beeby, Dr P Gill, Dr N Campbell, Dr G Cherian - University Hospital Southampton

Background

The occurrence of leukaemia in pregnancy is reported in 1/75,000 cases. The evidence for the management of haematological malignancy in pregnancy remains limited. A balance is required between foetal and maternal survival in these cases. Delaying chemotherapy can impact maternal outcomes and the likelihood of achieving a remission. However rapid disease progression in pregnancy can have significant consequences for mother and baby. The evidence available recommends a multi-disciplinary approach for the best outcomes.

Case Description

A 32 year old, normally well, Caucasian school teacher presented with a 12 week history of submental and cervical lymphadenopathy. At the time of review, she was a primigravida at 30+1 weeks with an uncomplicated pregnancy. She was subsequently diagnosed with acute T-lymphoblastic lymphoma (ALL), which rapidly evolved into T-lymphoblastic leukaemia. An urgent multi-disciplinary birth plan was devised involving obstetrics, anaesthetics and oncology leading to a semi-elective caesarean section under general anaesthesia at 33 weeks. A male infant was born in good condition and transferred to NICU due to gestational age. The patient was provided with level 2 care by a high dependency level midwife. Following post-surgical recovery, the patient was transferred to the acute haematology ward to start chemotherapy, as per the UKALL14 protocol.

Conclusion

There was a successful outcome despite a complicated clinical case due to the hard work of the anaesthetic, obstetric and oncology teams. Although the patient was delivered earlier than expected due to disease progression, time was spent to ensure that thorough preparations were made perioperatively.

What can we learn from this case?

Anaesthetic Considerations

- 1. Neuraxial vs General anaesthetic:** Patients with ALL are more likely to develop thrombocytopenia or coagulation abnormalities. This is vitally important to check if neuraxial anaesthesia is being considered. With neuraxial anaesthesia and high blast cell counts, there is a theoretical risk of seeding cells into the CSF and should be discussed with oncology.
- 2. Airway risks:** Patients with ALL may have significant lymphadenopathy potentially causing distortion of airway or tracheal anatomy. It is imperative to perform a thorough airway assessment and review of any available imaging for all patients.
- 3. Intraoperative care:** Higher risk of obstetric hemorrhage due to increased bleeding risk. Preparation may include arterial lines, additional IV access, uterotonics and organizing blood products.
- 4. Post-operative location of care:** Patient will likely need intensive nursing and midwifery care in the 48hrs after delivery. It may be more appropriate to admit the patient to HDU for post operative care.

Oncology Considerations

- 1. Tumour lysis syndrome:** This can occur spontaneously or when starting chemotherapy. Prophylactic treatment includes allopurinol, rasburicase and ensuring good hydration.
- 2. Transfusion requirements:** Patients with hematological malignancies often require transfusion of red blood cells or platelets. These may be required in preparation for surgery with target Hb >8 g/dl.
- 3. Antimicrobial prophylaxis:** Cover is required for bacterial, viral and fungal infections. Additionally, surgical antimicrobial prophylaxis should be considered if the baby is born by instrumental delivery or cesarean section.
- 4. VTE Prophylaxis:** Both pregnancy, malignancy and surgery can increase the risk of thromboembolic events. VTE prophylaxis should be started promptly whilst closely monitoring for thrombocytopenia
- 5. Hyperviscosity syndrome:** This is more likely when WCC > 100 x 10⁹/L and close monitoring is required. Patients should be adequately hydrated and treatment may include supportive therapy, plasmapheresis and chemotherapy.

Obstetric Considerations

- **Timing of delivery:** There is a balance between optimizing maternal health and the fetal risks of preterm delivery. Ensure that the patient will be delivered in a centre with an appropriate level of neonatal care.
- **Mode of delivery:** Depending on parity and timing of delivery, consider whether caesarean section or induction of labour will be more likely to be successful and safe.
- **Fetal maturity:** Assessing fetal growth and development with growth scans prior to delivery. Steroids may be required for fetal lung maturation and for oncological pre-phase treatment.
- **Future fertility:** Recommendation for two years disease free before conceiving and therefore contraception will be required.

A new virtual anaesthetic teaching programme designed to overcome the challenges posed by COVID-19.

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1 AIMS

- 1) To complete an assessment of the educational needs of anaesthetic trainees
- 2) To develop a curriculum mapped teaching framework covering both the primary and final FRCA examination syllabi.
- 3) To design teaching that could be delivered in a virtual environment and incorporate different learning styles.

2 BACKGROUND

Anaesthetic trainees at University Hospital Southampton (UHS) reported a lack of formal teaching programme and felt inadequately prepared for college examinations. This was reflected in the GMC national training survey (NTS) from 2019.¹ The report demonstrated that UHS was significantly below the national average for trainee satisfaction for local education.

3 METHOD

A task force consisting of anaesthetic trainees with a consultant lead have developed an education programme covering the primary and final FRCA examination syllabi. The programme has been specifically designed for virtual delivery due to the challenges posed by COVID-19. The teaching sessions are recorded to provide an online teaching bank which can be accessed at any time.

4 RESULTS

The task force has successfully instigated a programme of 46 weekly virtual teaching sessions that run over the period of one year. The programme includes morbidity reviews, interactive examination practice and journal club. It encompasses different learning styles and improve interactivity.

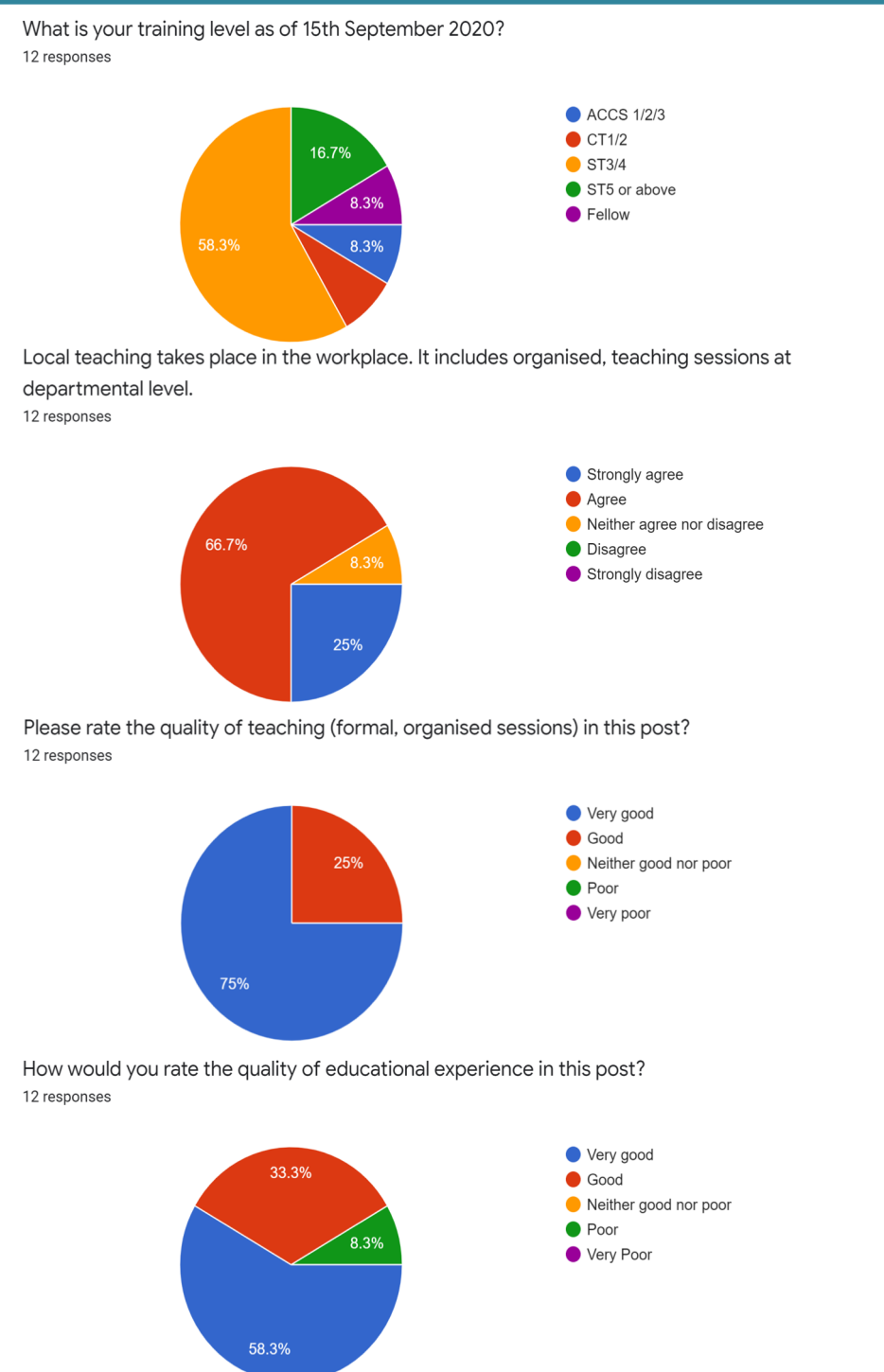
All 27 trainees were invited to anonymously rate the programme after 10 sessions using the same parameters as that of the GMC National Training Survey 2019. These feedback were then compared with the 2019 NTS overall score for anaesthetic training in UHS.

Key Results:

NTS 2019 UHS anaesthetic education score (pre-intervention): 61%

Teaching program feedback score (post-intervention): 90%

100% responses agree that quality of teaching is 'Good' or 'Very good'



5 CONCLUSION

By embracing a virtual learning platform, necessitated due to social distancing requirements secondary to COVID-19, a highly successful teaching programme has been created. A significant improvement in trainee experience has led to tangible improvements in educational delivery quality.

Unintended benefits include:

- Reported improved trainee welfare and hospital placement satisfaction.
- Trainee involvement in the design and delivery of teaching has increased learner participation
- The ability to record talks has created a more flexible approach to internal study leave allocation.

6 Next steps

- Cover the entire FRCA syllabus and develop a permanent electronic learning resource for trainees
- Make available to deanery trainees specific teaching on subjects only found in a tertiary hospital to aid deanery FRCA training
- Acquire formal NTS feedback for 2020 and adapt the programme as necessary
- Continue to develop a culture of continued learning in UHS Anaesthesia

Reference:

1 – General Medical Council. National Training Survey Report. 2019. Available from: <https://webcache.gmc-uk.org/analyticsrep/saw.dll?Dashboard> [Accessed:12/09/2020]

Check and Challenge: Malignant Hyperthermia and implementation of updated Association guidelines



Dorset County Hospital
E Lane, S Orr, K Maclachlin

Introduction: Malignant Hyperthermia is defined as a progressive life threatening reaction occurring during general anaesthesia. The use of dantrolene has significantly improved treatment for MH, but mortality remains at around 4% in the UK. The Association of Anaesthetist published new guidelines in 2020, updating recommended standards of care, and advising the use of activated charcoal filters once MH is identified.

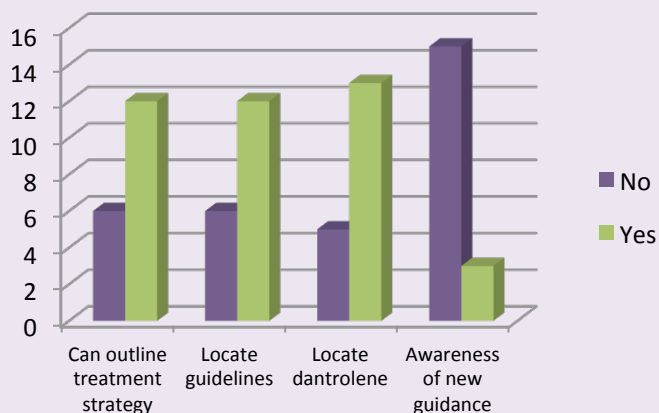


Aim: To ascertain knowledge amongst anaesthetists of the recognition and treatment of malignant hyperthermia and update to recent national guidelines.

Method: An anonymous survey was performed amongst anaesthetists in Dorset County Hospital over a 48 hour period, to ascertain the awareness of the management of malignant hyperthermia, location of emergency guidelines and location of dantrolene. They were also questioned on knowledge of the recent update to association guidelines.

Results: A total of 18 anaesthetists completed the survey. Of these 67% were able to outline an appropriate treatment strategy and locate the emergency guidelines. 72% were able to identify the nearest location of dantrolene. 17% (3/18) were aware of the new guidelines.

Survey Results:



Conclusion: This audit highlighted that although knowledge on management of MH and location of treatment is good, there remains room for improvement. There was poor awareness of the new MH guidelines amongst the department. These results were presented at the monthly departmental meeting, alongside an informative session to increase awareness of recent guideline changes, including the utilisation of activated charcoal filters and location of these within DCH theatres. Updated guidelines have been redistributed, and a re-audit is planned for April 2021.



References: P. M. Hopkins, T. Girard, S. Dalay, B. Jenkins, A. Thacker, M. Patteril and E. McGrady. *Malignant Hyperthermia 2020: Guideline from the Association of Anaesthetists*. October 2020

Our objective

- There is a lot of variability in novice induction programs across the deanery
- Want to make a useful resource base that novice anaesthetists can use at the beginning of their career
- We focus on near peer informal tips and advice, as well as signposting to useful resources

Our content

- Summary induction booklet
 - Guide to areas new to novice anaesthetists
- Recorded lectures
 - Voiced over PowerPoint presentations
- Information slides
 - Useful to look up on a smartphone during a long theatre case



Gas Induction

Clinical Induction

Induction into the anaesthetist's role from pre-assessment through to the recovery room

Anaesthetic recipes

More detailed guidance on providing anaesthesia for common CEPOD cases

Anaesthetic equipment

Simple explanations on key anaesthetic equipment new to the novice anaesthetist

Non-clinical work

Advice on using LLP and exams

Gas Induction

Video lectures, written resources and useful links for anaesthetic novices

How can you help us?

- Its early days in our construction of this website – we are targeting August 2021 starters
- Have a look through the website content provide us some feedback (either via website or email alexfahmy349@hotmail.com)
- Please spread this resource to current and incoming anaesthetic novices!