

Operating Services Critical Care and Anaesthesia research output for 2017/18

Research on Critical Care has expanded with the first recruits in the 65 trial with a trial lead by joint PIs **Jo Pons** and **Gary Mills**. There is some evidence that using vasoconstrictors and inotropes to achieve too high a target blood pressure may worsen outcome and there is on average an optimum level around a MAP of 65 mmHg that may produce the best outcome in most patients. The 65 trial is designed to determine this.

Gary's perioperative research continues to increase with the completion of the world's largest prospective ventilation study (PROBESE), which in the UK was run from Sheffield. Publications are awaited soon.

Two more studies will start soon looking at the best PEEP and lung recruitment levels in one lung ventilation (PROTHOR) and ventilation and postoperative pulmonary complications and potentially how to reduce them in robotic surgery with its physiologically challenging positioning (AVATAR- funding obtained from the NIAA and AAGBI in 2017- **Gary Mills and Rachel Lee**). Both these studies will be led in the UK from STH and are also grant funded.

The examination of major surgery on the lung at the microscopic and functional level will continue with **Gary Mills** and **Jim Wild** with more hyperpolarised helium and xenon MR imaging of the lungs before and during recovery (LUNGSAFAS).

Future studies looking at weaning from ventilator support in spinal injury and the use of NAVA (neurally adjusted ventilator assist) are in development. The first meeting of the INSPIRE study group will take place in May 2018. This multicentre study will test the controversial idea that inspiratory muscle training can reduce postoperative pulmonary complications after major surgery. This is a £2million pound HTA NIHR funded study that will initially start in four sites, which include Sheffield. **Gary Mills** is a co-applicant on the grant.

Ellen Collingwood (BMedSci- supervised by **AH Raithatha and GH Mills**) was awarded the President's Prize at the RCOA in April 2017 for her work on differences in outcome related to ethnicity and deprivation on critical care.

As a follow up to the PREDICTEU study which produced the European Charter for Inclusion of Older People in Clinical Trials which **Gary Mills** had presented to the European Parliament in 2012, which subsequently influenced European Medicines Agency Guidelines, Thomas Atkinson (BMedSci student supervised by **GH Mills and I Wrench**) examined the Anaesthetic Literature since then to see if more older people appropriate outcomes were being included in subsequent trials and older people were being less excluded. Thomas presented this at the 2017 BJA Research Forum / ARS where he won the best presentation award and Hughes Medal.

Danny Bryden supervised B Med Sci Kieran Jankowski (Using a CriSTAL scoring system to identify pre-morbid conditions associated with a poor outcome after admission to Intensive

Care in people 70 years or older). This was awarded 1st prize British Geriatrics Society, Sheffield University medical student prize. Presented at ICS Liverpool, December 2017

Stelios Michael was the local lead for ORDIT (Organ Dysfunction in Trauma) - A national point prevalence study. This is a study of all trauma centre patients in England & Wales, looking at Multi- Organ Dysfunction Syndrome in relation to demographics and Injury Severity Score. Manuscript written by the national lead and will be submitted soon.

The Balanced study also finished in 2017- led in the UK by Gary Mills and run in Sheffield by **Ian Wrench**. This study looked at whether targeting a certain BIS could reduce postoperative complications in older people whilst still keeping them anaesthetised. Results will come soon.

Active research projects for OSCCA:

Authorised studies (recruiting)

1. Perioperative Quality Improvement Programme: Patient Study PQIP. This is a national observational study where data for various major surgeries is collected and collated looking for trends etc. Principle investigators **Ian Wrench** and **Sumayer Sanghera**. Target 100, 15 recruited so far
2. A Multi-Centre Randomised Controlled Trial of Pre-Hospital Blood Product Administration versus Standard Care for Traumatic Haemorrhage. Principle investigator **Gary Mills**.
3. Cluster randomised trial of the clinical and cost effectiveness of the i-gel supraglottic airway device versus tracheal intubation in the initial airway management of out of hospital cardiac arrest – Airways 2. Principle investigator **Gary Mills**. Target 5, 46 recruited.
4. ISARIC/WHO Clinical Characterisation Protocol for Severe Emerging Infections. Principle investigator **Gary Mills**. This project will only recruit when there is an epidemic of an emerging infection.
5. Modelling the physiology of the critically ill. Principle investigator **Gary Mills**; 97 recruited of a target of 120.
6. Direct reporting of awareness in maternity patients. (DREAMY). Principle Investigator **Fleur Roberts, trainee leads Tim Orr, James Briscoe, Catherine Riley**; Recruited 46. Nationally they're up to 2250.
7. Evaluating the clinical and cost-effectiveness of permissive hypotension in critically ill patients aged 65 years or over with vasodilatory hypotension. Principle investigator **Gary Mills/Jo Pons**; 4 recruited of a target of 10.
8. Evaluation of the microstructure and functional changes in the lung before and after major abdominal surgery, anaesthesia and mechanical ventilation, using functional hyperpolarised helium and xenon magnetic resonance imaging. Principle investigator **Gary Mills**; 6 recruited of a target of 14.
9. Cardiopulmonary exercise variables and their association with postoperative morbidity and mortality after major oesophagogastric cancer surgery – A multicentre observational study. Principle investigator **Karen Kerr**: 60 datasets to be collected. No patient recruitment required.

10. Collaborative European NeuroTrauma Effectiveness research in TBI: a prospective longitudinal observational study. Principle investigator **Stefan Jankowski**: Target 10, recruited 47.
11. An analysis of music and background in the operating theatre and its influence on team working: an observational study. Principle investigator **Andrew Davidson**. It is anticipated that recruitment will begin later this year.
12. PREVENTT: A Randomised Double-Blind Controlled Phase III Study to Compare the Efficacy and Safety of Intravenous Ferric Carboxymaltose with Placebo in Patients with Anaemia Undergoing Major Open Abdominal Surgery. Principle investigator **Sumayer Sanghera**; Target 25, recruited 22.
13. Epidemiology of AKI in ICU. Principle investigator **AJ Raithatha**; target 80, recruited 48.
14. Acupuncture for post-caesarean itch. Principle investigator **T Orr**; Target 80, approximately 60 recruited.

Authorised studies (Recruitment has finished)

1. End-of-life practices in intensive care units around the world- The Ethicus II study. Principle Investigator **Danny Bryden** with help from **Claire Cruikshank**. This Europe wide study has now been completed and publication is expected soon.
2. How accurate is the landmark technique to identify spinal anaesthesia insertion level in the lumbar spine for obstetric patients with a BMI >30 using ultrasound to verify the lumbar interspace level? An observational study. Principle investigator **F Roberts**; recruitment and follow up completed. This study is currently being written up.
3. The BALANCED Study: A prospective, randomised clinical trial of two levels of anaesthetic depth on patient outcome after major surgery. Principle investigator – **Ian Wrench**; target 20 recruited 20. Closed to recruitment, in follow up phase.

Registered studies which have not been authorised to begin:

1. An Evaluation of Noise Cancelling Headphones In Primary Hemi arthroplasty performed under spinal anaesthesia. Principle Investigator **Richard Marks**.
2. PROtective ventilation with higher versus lower PEEP during one-lung ventilation for THORacic surgery – PROTHOR: A randomized controlled trial. Principle Investigator **Gary Mills**.
3. Assessment of ventilatory management during general anesthesia for robotic surgery and its effect on postoperative pulmonary complications (AVATaR): A prospective observational multicentre study. Principle Investigator **Gary Mills**.
4. Effectiveness and cost-effectiveness of inspiratory muscle training (IMT) for reducing postoperative pulmonary complications (PPC): a sham-controlled randomised controlled trial (RCT). Principle Investigator **Gary Mills**.
5. Improving Transplantation outcomes by investigation of novel methods of organ procurement, preservation and reconditioning. Principle Investigator **Andrew Davidson**.
6. Medicines Optimisation in Critical Care Areas (MOCCA). Principle Investigator **Richard Bourne**.

7. Understanding of verbal probability expressions of pre-operative risk by patients and anaesthetists. Principle Investigator **Matt Wiles**.
8. Evaluating the delivery of an innovative Exergame prehabilitation intervention in patients undergoing total knee arthroplasty (replacement) surgery: A feasibility study. Principle Investigator **Sally Hoodless**.
9. Critical care outcomes in patients with pre-existing pulmonary hypertension: A retrospective observational cohort study. Principle Investigator **Kris Bauchmuller**.
10. Effect of general anaesthesia on trismus secondary to dental infection. Principle Investigator **Will Lindsay**.