13TH ANNUAL CRITICAL CARE SYMPOSIUM AND CCM-L MEETING

THURSDAY 28TH AND FRIDAY 29TH APRIL 2016

MANCHESTER TOWN HALL
ALBERT SQUARE, MANCHESTER, M2 5DB
FACULTY:

Dr Paul Barach, USA
Dr Anna Batchelor, England
Dr Geoff Bellingan, England
Dr Andrew Bentley, England
Professor Thomas Bleck, USA
Professor Karim Brohi, England
Dr Frederico Bruzzi de Carvalho, Brazil
Professor Timothy Buchman, USA
Dr Jose Chacko, India
Dr Donald Chalfin, USA
Professor Jean Daniel Chiche, France
Dr Bernard Cholley, France
Dr Thomas Clark, England
Professor Bill Coplin, USA
Professor David Crippen, USA
Dr Paul Dark, England
Professor Jan De Waele, Belgium
Dr Paul Elbers, Netherlands
Professor Niall Ferguson, Canada
Dr Nick Fletcher, England
Professor Helen Galley, Scotland
Dr Deepak Govil, India
Professor Mike Grocott, England
Dr Eric Hodgson, South Africa
Professor Steven Hollenberg, USA
Dr Faeq Husain, Germany
Dr Farhad Kapadia, India
Dr Roop Kishen, England
Professor Ruth M Kleinpell, USA
Dr Michael Kuiper, Netherlands
Dr Ravi Kumar, England
Professor Marcel Levi, Netherlands
Professor Daniel Lichtenstein, France
Dr Antonios Liolios, Greece
Dr Ashley Miller, England
Professor Xavier Monnet, France
Dr Rui Moreno, Portugal
Dr Paul Morgan, Wales
Dr Marek Nalos, Australia
Dr Andrew Rhodes, England
Dr Murillo Santucci Cesar de Assuncao, Brazil
Associate Professor Ian Seppelt, Australia
Dr Manu Shankar-Hari, England
Professor Michel Slama, France
Professor Fang Gao Smith, England
Dr Peter Spronk, Netherlands
Dr Stephen Streat, New Zealand
Professor Jean-Louis Teboul, France
Professor Martin Tobin, USA
Professor Rick van Saene, England
Professor Jean-Louis Vincent, Belgium
Professor Tim Walsh, Scotland
Associate Professor Leslie Whetstine, USA
Dr Bob Winter, England

SCIENTIFIC COMMITTEE + POSTER JUDGES:

Dr Roop Kishen, England
Professor Fang Gao Smith, England
Dr Andrew Bentley, England
Dr Paul Dark, England
Dr Manu Shankar-Hari, England
Dr Peter Spronk, Netherlands
Associate Professor Ian Seppelt, Australia
Dr Stephen Streat, New Zealand
Dr Frederico Bruzzi de Carvalho, Brazil
Welcome to the combined 13th Annual Critical Care Symposium and Critical Care Medicine List Meeting in the historic Manchester Town Hall.

Critical Care Medicine List (CCML) was started by David Crippen, Pittsburgh, in 1994. It has around 1000 members and promotes medicine, ethics, end of life care and instant referral system to get advice from experts within very short space of time – some times in minutes. On Sundays, it also discusses mundane issues like motor cycles, film reviews and various other non-medical matters. Politics of any kind is never on the agenda. I have been a member of CCML on and off from 1994 and continuously from 2001.

This combined meeting is being held following a suggestion by one of the members and David thought that Manchester was a very good place to hold it. About two years ago we discussed this issue and decided to hold it in this great city, at this venue and here we are today.

This meeting has the largest number of faculty members we have ever had. This is only the third time that we have had more than fifty faculty members from all five continents; the first being in India, the second for the 10th anniversary meeting here and, of course the current meeting! Today we have fifty-eight faculty members participating in this meeting with three parallel sessions running on both days. In addition, there is a masterclass on bleeding and round tables on end of life care and safety in intensive care.

The meeting covers most aspects of intensive care medicine, some as themes and others as topics in intensive care. Besides formal presentations, there are workshops / tutorials on Frank Starling principle, vasoactive drugs, acute pancreatitis, examining comatose patients, interpreting svo2/scvo2, understanding and interpreting various diagnostic tests, primer of safety in ICU, social media and ICM, ultrasound guided procedures in critical care, airway emergencies, interpreting acid-base abnormalities in the third millennium and health economics.

As delegates, you have a wide choice of topics to select from. I hope that you enjoy your choices. I also hope that you will enjoy interacting with colleagues and members of the faculty. May I please request that you complete the evaluation survey which will be emailed to you and let us know how to improve the meeting in the future.

I thank Sandhya Anand Veerappan for the branding and Kirish for maintaining the website.

Mrs Sadie Hartley left this world unexpectedly and this was the shock to me and to Hartley Taylor. I thank Anne and Derry who stepped in along with Julie to continue to run the meeting.

I also thank industry for their support and the ultrasound machine companies for supporting the ultrasound course.

The talks will be available as a link to download from our website www.critcaresymposium.co.uk

Thank you
### GREAT HALL

#### ARDS 1
Chairpersons: Dr Roop Kishen & Dr Paul Morgan

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<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>09.30</td>
<td>Definition and epidemiology of ARDS - exploring the Berlin definition</td>
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<tr>
<td>Prof Niall Ferguson</td>
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<tr>
<td>09.45</td>
<td>ARDS - a snap shot in India</td>
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<td>Dr Farhad Kapadia</td>
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<tr>
<td>10.00</td>
<td>High PEEP is good for the lung and not bad for the heart</td>
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<td>Prof Michel Slama</td>
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<tr>
<td>10.15</td>
<td>From ECMO to ECO2R</td>
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<td>Dr Andrew Bentley</td>
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### SEPSIS - BASICS
Chairpersons: Dr Paul Dark & Prof Fang Gao Smith

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<th>Time</th>
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<tr>
<td>11.10</td>
<td>Sepsis definitions in 2015: finally back to common sense</td>
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<tr>
<td>Prof Niall Ferguson</td>
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<td>11.25</td>
<td>Myocardial injury in sepsis: is there a relation to inflammatory markers</td>
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<td>Dr Murillo Santucci Cesar de Assuncao</td>
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<td>11.40</td>
<td>Microcirculation in sepsis</td>
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<td>Dr Paul Elbers</td>
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<td>11.55</td>
<td>Lactate in sepsis: marker or protector</td>
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<td>Dr Marek Nalos</td>
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### VENTILATION
Chairpersons: Prof Jean Daniel Chiche & Prof Rui Moreno

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<tr>
<td>11.10</td>
<td>Monitoring and improving diaphragm function during mechanical ventilation</td>
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<td>Prof Niall Ferguson</td>
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<td>11.25</td>
<td>Weaning failure due to cardiac origin</td>
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<td>Prof Jean Louis Teboul</td>
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<td>11.40</td>
<td>Ventilator management of patients with neuromuscular disorders: physiology rears its ugly head</td>
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<td>Prof Bill CopIn</td>
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<td>11.55</td>
<td>Is prone position evidence-based</td>
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<td>Prof Jean Daniel Chiche</td>
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### HAEMODYNAMIC MONITORING
Chairpersons: Dr Nick Fletcher & Associate Prof Ian Sappell

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<tr>
<td>11.10</td>
<td>The forgotten right ventricle</td>
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<td>Prof Steven Holtenberg</td>
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<td>11.25</td>
<td>Limitations of pulse pressure variations</td>
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<td>Prof Michel Slama</td>
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<tr>
<td>11.40</td>
<td>Which haemodynamic device should I change?</td>
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<tr>
<td>Prof Xavier Monnet</td>
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<td>11.55</td>
<td>Haemodynamic management of out of hospital cardiac arrest</td>
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<td>Dr Nick Fletcher</td>
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### LORD MAYORS PARLOUR

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<tr>
<td>11.10</td>
<td>Bleeding in ICU</td>
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<td>Prof Timothy Buchman</td>
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<td>11.25</td>
<td>Optimal blood pressure in septic shock</td>
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<td>Prof Jean Louis Teboul</td>
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### COMMITTEE ROOM 2

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<tr>
<td>12.10</td>
<td>Questions</td>
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<td>Prof Martin Tobin</td>
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<td>12.30</td>
<td>Questions</td>
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<td>Prof Karim Brohi</td>
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<td>12.50</td>
<td>Lunch</td>
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<td>Prof Marek Nalos</td>
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### COMMITTEE ROOM 3

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<td>11.10</td>
<td>End of life care</td>
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<td>Dr Stephen Street</td>
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<td>11.30</td>
<td>End of life care</td>
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<td>Dr Eric Hodgson</td>
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<td>Dr Fredrico Brazi de Cavalcio</td>
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<td>Dr Paul Morgan</td>
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<td>Dr Jose Chadok</td>
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<td>Dr Peter Spronk</td>
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<td>Prof Mike Brockett</td>
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GREAT HALL
PRO-CON DEBATE
Chairperson: Dr Thomas Clark
All central venous cannulations should be placed using ultrasound guidance
12.30 – 12.45 PRO
Prof Michel Sama
12.45 – 13.00 CON
Prof Bernard Cholley
13.00 – 13.10 Questions
13.10 – 14.00 Lunch

CONFERENCE HALL
SEPSIS 2
Chairpersons: Dr Paul Elbers & Prof Mike Grocott
13.50 – 14.05 Heterogeneity in case mix in sepsis
Dr Manu Shankar-Hari
14.05 – 14.20 Biomarkers in sepsis: update on NICE diagnostic guidance
Dr Paul Dark
14.20 – 14.35 Sepsis bundles – outcome in Wales
Dr Paul Morgan
14.35 – 14.50 Risk assessment using biomarkers in critical illness
Dr Don Chalfin
14.50 – 15.05 Questions
15.05 – 15.30 Coffee Break

RENAI
Chairpersons: Dr Donald Chalfin & Dr Andrew Bentley
15.30 – 15.45 Hypernatraemia in ICU
Prof Thomas Bleck
14.45 – 15.00 Antibiotic TDM - how to use it
Prof Jan De Waele
15.00 – 15.20 Questions
15.20 – 15.50 Coffee Break

LORD MAYORS PARLOUR
MAN POWER / QUALITY OF CARE IN ICU
Chairpersons: Prof Ruth Kleinpell & Dr Anna Batchelor
14.05 – 14.50 Practitioners 10 years on - have they made an impact in our unit?
Dr Anna Batchelor
14.05 – 14.20 Sleep and sedation practices in Europe
Dr Peter Spronk
14.20 – 14.35 Quality indicator in ICU: HAI or antibiotic use
Prof Tim Walsh
14.35 – 14.50 Handoffs and transitions in Critical Care
Dr Paul Barach
14.50 – 15.05 Questions
15.05 – 15.30 Coffee Break

ROUND TABLE:
Safety in Intensive Care
Chairperson: Prof Timothy Buchman
15.30 – 16.30
Dr Paul Barach
Prof Ruth Kleinpell
Dr Anna Batchelor
Dr Fahad Kapadia
Dr Frederico Bruzzi de Carvalho

THURSDAY 28TH APRIL 2016 | SCHEDULE PAGE 2
13TH ANNUAL CRITICAL CARE SYMPOSIUM & CCM-L MEETING
MANCHESTER TOWN HALL, MANCHESTER M2 5DB
**GREAT HALL**

**FLUIDS**
Chairpersons: Prof Jean Louis Vincent & Prof Tim Walsh

15.50 – 16.05
What could be the fluid resuscitation guideline for the next SSC?
Prof Jean Louis Teboul

16.05 – 16.20
Fluid management in the unstable patient: the SOSD approach
Prof Jean Louis Vincent

16.20 – 16.35
Of babies & bathwater: are we abandoning starches too soon?
Dr Eric Hodgson

16.35 – 16.50
Starches should not be used
Associate Prof Ian Seppelt

16.50 – 17.05
Which intravenous fluid to use
Dr Roop Kishen

17.05 – 17.30
Questions

**CONFERENCE HALL**

**TOPICS 4**
Chairpersons: Dr Peter Spronk & Dr Murillo Santucci Cesar de Assuncao

16.30 – 16.45
Did the results of the last EGDT trials change my clinical practice
Prof Rui Moreira

16.45 – 17.00
Prediction of volume responsiveness in spontaneously breathing patients: an update
Prof Xavier Monnet

17.00 – 17.15
Morbidity or mortality: what should be the focus
Prof Rui Moreira

17.15 – 17.30
Questions

**LORD MAYORS PARLOUR**

**PREVENTION**
Chairpersons: Dr Bob Winter & Dr Stephen Streat

16.30 – 16.45
Did the results of the last EGDT trials change my clinical practice
Prof Rui Moreira

16.45 – 17.00
Pre-hospital care
Dr Bob Winter

17.00 – 17.15
Surgical complications and what predicts
Dr Andrew Rhodes

17.15 – 17.30
Prehabilitation: more than just exercise
Prof Mike Grocott

17.30 – 17.45
Questions

**COMMITTEE ROOM 2**

**TUTORIALS / WORKSHOPS**

16.00 – 17.00
Acute pancreatitis
Prof Jan De Waele

18.00 – 19.00
BUSINESS MEETING OF THE CCM-L
Chairperson: Prof David Crippen

19.30 – 22.30
SYMPOSIUM DINNER
Admission by pre-booked ticket only

**COMMITTEE ROOM 3**

**TUTORIALS / WORKSHOPS**

16.00 – 17.00
Examination in coma
Prof Thomas Black & Dr Michael Kuiper

**CONFERENCE HALL**

19.30 – 22.30
SYMPOSIUM DINNER
Admission by pre-booked ticket only

**AFTER DINNER SPEECH:**
Why has the safety and quality movement been slow to transform Critical Care culture and outcomes?
Dr Paul Barach
### GREAT HALL

**TOPICS 2**  
Chairpersons: Prof Fang Gao Smith & Dr Antonios Liolios  
09.00 – 09.30  
Big science in the ICU  
Prof Steven Hollenberg  
09.30 – 09.45  
Genetic predisposition to sepsis  
Prof Jean Daniel Chiche  
09.45 – 10.00  
New vistas of copyright in the information age  
Prof David Crippen  
10.00 – 10.15  
Consent in ICU: advocating for patients  
Dr Eric Hodgson  
10.15 – 10.30  
Ethical challenges in end of life care in the 21st century  
Associate Prof Leslie Whetstine  
10.30 – 10.50  
Questions  

**PRO-CON DEBATE**  
Chairperson: Prof Jean Louis Vincent  
Computerized patient care information (on rounds) is productive  
11.20 – 11.35  
PRO  
Prof Timothy Buchman  
11.35 – 11.50  
CON  
Prof David Crippen  
11.50 – 12.00  
Questions  
12.00 – 13.45  
Lunch  

**PRO-CON DEBATE**  
Chairperson: Prof Rick van Saene  
SDD “the unused therapy - we should be using”  
11.20 – 11.35  
PRO  
Associate Prof Ian Seppelt  
11.35 – 11.50  
CON  
Prof Geoff Beilin  
11.50 – 12.00  
Questions  

### CONFERENCE HALL

**HAEMATOLOGY**  
Chairpersons: Dr Manu Shankar-Hari & Prof Karim Baghi  
09.00 – 09.15  
Red cell transfusions: what do nice guidelines tell us about Critical Care  
Prof Tim Walsh  
09.15 – 09.30  
Rescue of anticoagulant agents  
Prof Marcel Levi  
09.30 – 09.45  
Coagulation issues in liver disease  
Dr Deepak Govil  
09.45 – 10.00  
Difficulties and controversies in the modern management of trauma haemorrhage?  
Prof Karim Baghi  
10.00 – 10.15  
Questions  
10.15 – 10.45  
Coffee Break  

**ULTRASOUND**  
Chairpersons: Prof Bernard Cholley & Dr Jose Chacko  
10.45 – 11.00  
Haemodynamic monitoring by ECHO  
Dr Marek Nalos  
11.00 – 11.15  
Lung ultrasound in ICU – can we avoid X-rays?  
Dr Ashley Miller  
11.15 – 11.30  
SESAME-protocol (multisite ultrasound in cardiac arrest)  
Prof Daniel Lichtenstein  
11.30 – 11.45  
Transcranial Doppler / optic nerve sheath diameter measurement as a marker of raised ICP  
Dr Jose Chacko  
11.45 – 12.00  
Questions  

### LORD MAYORS PARLOUR

**ANTIBIOTICS**  
Chairpersons: Dr Ravi Kumar & Prof Bill Coplin  
09.00 – 09.15  
Pharmacogenomics in the ICU: an update  
Prof Jean Daniel Chiche  
09.15 – 09.30  
Antibiotics for the uninterested  
Dr Eric Hodgson  
09.30 – 09.45  
Prophylactic antifungals in ICU  
Prof Jan De Waele  
09.45 – 10.00  
The role of procalcitonin and c-reactive protein in antibiotic stewardship: an update  
Dr Paul Dark  
10.00 – 10.20  
Questions  
10.20 – 10.50  
Coffee Break  

### COMMITTEE ROOM 2

**TUTORIALS / WORKSHOPS**  
09.00 – 10.00  
How to interpret SVO2/ScVO2  
Prof Xavier Monnet & Prof Jean Louis Vincent  
11.00 – 12.00  
Understanding diagnostic tests  
Prof Tim Walsh  
12.00 – 13.00  
Social media and ICU  
Dr Antonios Liolios & Dr Paul Morgan  
12.00 – 13.00  
Ultrasonic guided procedures in Critical Care  
Dr Deepak Govil & Dr Jose Chacko
13TH ANNUAL CRITICAL CARE SYMPOSIUM & CCM-L MEETING
MANCHESTER TOWN HALL, MANCHESTER M2 5DB
FRIDAY 29TH APRIL 2016 | SCHEDULE PAGE 2

GREAT HALL

pls provide the full schedule text here
FACULTY BIOGRAPHIES

Dr Anna Batchelor is an anaesthetist and intensivist at Royal Victoria Infirmary, Newcastle. She was one of the first people formally trained in ICM in the UK through the “JACIT” scheme and has been actively involved in both training and politics ever since. She has been Regional Advisor for ICM training, a Council member then President of the Intensive Care Society, a member of IBTICM Board, currently a Council member of RCoA and Dean of FICM. She led the production of the Framework for ACCPs with DH and the current FICM approved curriculum and remains a staunch advocate of the value of suitably trained ACCPs in our ICUs. She co-led the production of the curriculum for training in ICM and is a current CoTa faculty member of the ESICM having been a national co-ordinator during the evolution of the European competency project. She led FICM into the Academy of Medical Colleges. When not thinking about ICM she grows vegetables, keeps chickens and aspires to own alpacas, takes on ridiculous challenges in aid of the Intensive Care Foundation, skis and sails.

Professor Geoff Bellingan is currently Medical Director for Surgery and Cancer Board, covering critical care, anaesthesia, theatres, sterile services and medical physics in the Division. He was previously the clinical director for critical care. He is also Professor in Intensive Care Medicine at UCL and theme lead for the critical care and anaesthesia research theme for the Comprehensive Biomedical Research Centre. He is a chest physician who works clinically only in critical care. Research interests are ARDS, Interferon gamma, SuDDICU.

Andrew Bentley is a Consultant in Intensive Care and Respiratory Medicine at the University Hospital of South Manchester (UHSM) and honorary reader at the University of Manchester. He trained in London, Liverpool, Stoke-on-Trent and Oxford with an MD in airways inflammation from the National Heart & Lung Institute, Imperial College. He moved to Manchester in 1996 as Consultant at Pennine Acute Hospitals before taking up his current post at UHSM in 2004. He is the clinical director of Intensive Care and deputy divisional medical director for Clinical Support Services. He runs one of the largest long-term ventilation services for home non-invasive and tracheostomy ventilation in the UK. He chaired the North West Specialist Commissioning working group on long-term ventilation, developing national clinical standards and service specification template for long-term ventilation. His interests lie in acute severe respiratory failure, delayed weaning from invasive ventilation and invasive ventilation in intensive care. With colleagues in cardiothoracic intensive care he was successful in securing one of the 5 nationally commissioned ECMO services at UHSM. He has been a council member of the Intensive Care Society since 2011, chairs the society’s research grants and awards committee.

Dr Paul Barach is double board-certified in Anesthesiology and Critical care, from the Massachusetts General Hospital affiliated with Harvard Medical School, is a formally trained health services researcher, with advanced post graduate training in quality improvement at Intermountain Healthcare, and medical education from the Harvard Medical School Josiah Macy Program. Dr Barach is a Clinical Professor at Wayne State University School of Medicine, Senior Scientist at the Kaiser Permanente Department of Research and Evaluation and is consultant to the Advisory Board Company advising on quality improvement. Dr Barach has published extensively (more than 400 total publications and nearly 5000 citations) his research examines the changing nature of surgical health systems, transitions of care, team work, standards and accreditation, leadership and management, the structure and culture of organizations and their network characteristics, attracting funding of more than $14 Million. He has conducted a great deal of work over two decades on clinical and organizational performance, health systems improvement and patient safety. He has presented at international and national conferences on more than 500 occasions, including over 60 keynote addresses. His research appears in journals such as British Medical Journal, Analgesia and Anesthesia, Annals of Internal Medicine, Annals of Thoracic Surgery, Medical Care Journal of the American Medical Association, BMJ Quality and Safety, and many other prestigious journals.

Thomas P. Bleck MD FCCM is professor of neurological sciences, neurosurgery, internal medicine (in the division of pulmonary and critical care medicine, and the section of infectious diseases), and Anesthesiology at Rush University Medical Center, where he is the associate chief medical officer for critical care. He serves on the board of directors of the Neurocritical Care Society, is neuroscience editor of Critical Care Medicine, and serves of the editorial boards of Critical Care, Neuro critical Care, and Annals of Intensive Care. Dr Bleck was the founding president of the Neurocritical Care Society. In 2012, he completed his fourth and final three year term as a member of the Council of the Society of Critical Care Medicine. He was elected to two terms on the board of the American Board of Clinical Neurophysiology. He serves on the Part I writing committee of the American Board of Psychiatry and Neurology, and is a member of the American Board of Internal Medicine subspecialty board in critical care medicine.

Professor Karim Brohi is Director of the Centre for Trauma Sciences at Queen Mary University of London, and a Consultant Trauma & Vascular Surgeon at Bart’s Health NHS Trust. He is also the Clinical Director of the London Major Trauma System.

Dr Frederico Bruzzi de Carvalho MD at Hospital Eduardo de Menezes, Belo Horizonte, Minas Gerais, Brazil
Dr Buchman is the founding director of the Emory Critical Care Center (ECCC), which is integrating ICUs throughout the Emory Healthcare system and bringing together clinicians and investigators from diverse disciplines to conduct research to define best clinical practices and inform public health policy. Currently, the ECCC offers adult surgical intensive care, medical intensive care, cardiothoracic surgical intensive care, neuroscience critical care, and cardiac care in three of Emory Healthcare’s six hospitals: Emory University Hospital (EUH), Emory University Hospital Midtown, and Emory Saint Joseph’s Hospital (ESJH). In 2012, the ECCC opened a new ICU at the midtown hospital that was designed by a multi-disciplinary team of specialists and experts coordinated by Dr. Buchman. The design incorporated feedback from families of former patients and technology that has made care teams more efficient.

In 2014, the Emory Electronic ICU (eICU) officially began operations. Initiated by Dr. Buchman and funded by a Health Care Innovations Award (HCA) from the Centers for Medicare and Medicaid Services, the eICU is located in the Doctor’s Center Building at ESJH and is linked to ICUs at ESJH, EUH, EUH Midtown, East Georgia Regional Medical Center, and Emory Johns Creek Hospital by HIPAA-secure, bi-directional AV technology and digital connections that carry encrypted medical data. All hardware/software derived patient data from the ICUs routes to the eICU and its 24-7 monitoring personnel, who work closely with providers in the member ICUs as they treat patients.

The ECCC offers comprehensive training to fourth-year Emory medical students; interns and residents from internal medicine, general surgery, anesthesiology, emergency medicine, neurology, and neurosurgery; and advanced fellows who are studying to become intensive care physicians. It also offers a one-year NP/PA post graduate residency and a six-month HCIA residency for both new graduates or providers who have been practicing in a field other than critical care.

Dr. Buchman’s research spans the bench-to-bedside and encompasses studies of physiological dynamics, predictive biology, patient monitoring, the genetics of sepsis, and ICU end-of-life care. He is working towards ICU clinicians being able to predict and plan for the future of each patient. His current investigations include a streaming data analytics research project in the EUH ICU that’s helping healthcare providers analyze reams of bedside monitor data in real time. The process combines IBM’s real time streaming analytics system with Excel Medical Electronics’ bedside monitor data aggregation application, which captures data in motion, identifies patterns in physiological data, and alerts healthcare providers to serious complications like sepsis, heart failure, or pneumonia. More than 100,000 data points per patient per second are collected and analyzed in real time, enabling clinicians to make split-second medical decisions.

Before joining Emory, Dr. Buchman was the Edison Professor of Surgery, Anesthesiology and Medicine at Washington University in Saint Louis, where he founded and directed the Section of Acute and Critical Care Surgery and Barnes-Jewish Hospital’s nationally verified level 1 trauma center. Prior to his 15 years in Saint Louis, Dr. Buchman was on the faculty of Johns Hopkins Medical Institution in Baltimore, where he built the SICU service and founded the Adult Trauma Service. He completed the Halsted Residency in General Surgery at Hopkins and his trauma/critical care training at Baltimore’s Shock Trauma Center.

Dr Murillo Santucci Cesar de Assunção is a Consultant Intensivist in adult-ICU at Albert Einstein Hospital, Sao Paulo, Brazil. He is also coordinator of managed of sepsis protocol in Albert Einstein Hospital, coordinator of support group in hemodynamic at adult ICU, Albert Einstein Hospital and Master in Health Science at Federal University of Sao Paulo - Brazil.
Bernard Cholley is Professor of Anesthesiology & Intensive Care Medicine at Hôpital Européen Georges Pompidou and Université Paris Descartes, Paris, France. He works mainly in cardiac surgical intensive care and his areas of interest include haemodynamics (physiology, pathophysiology, monitoring,...) and the perioperative management of high-risk surgical patients. He has also been involved for a long time in promoting and teaching the use of ultrasound techniques in the anesthesiology/critical care environment. He is an active member of the European Society of Intensive Care Medicine.

Dr Thomas Clark is a Consultant in Intensive Care Medicine and Anaesthesia at Torbay Hospital, South Devon Healthcare NHS Foundation Trust. He graduated from the University of Bristol in 2004 and undertook his post-graduate training in the South West Peninsula Deanery. He has a specialist interest in intensive care echocardiography and holds the British Society of Echocardiography trans-thoracic accreditation. He sits on the Intensive Care Society's CUSIC (Core Ultrasound Skills in Intensive Care) committee. Other interests include cardio-pulmonary exercise testing and collaborative research - he is the current chairman of the Research and Audit Federation of Trainees (a national anaesthetic trainee research co-operative) and is a co-opted member of the National Institute of Academic Anesthesia Board, Health Sciences Research Centre and the National Institute for Health Research Anaesthesia, Peri-operative Medicine and Pain Management National Specialty Group.

Professor Bill Coplin is Director, Neurocritical Care & Neurosciences Medical Director at St. Anthony Hospital/Centura Health, Denver Colorado. He has presented papers in the ESICM and the famous Brussels’ Meeting. He is a very good teacher.

Professor David Crippen started the CCM-L in 1994 which informed the world about SARS and a very active list in disseminating information and a quick consult for human to animal health problems. He is part of the CODES – a music group and very involved in motorcycles.

Professor Jan De Waele is an Intensivist at Ghent University Hospital - Senior Lecturer at Ghent University, Ghent, Belgium. He is a surgeon and the past president of the World Abdominal Compartment Syndrome Society.

Dr Paul Dark originally studied undergraduate physics and then medicine. Graduating from The Manchester Medical School in 1989, he went on to study clinical academic surgery, emergency medicine and critical care at the Universities of Glasgow and Manchester in the UK, and at the Catholic University of Leuven, Belgium. He returned to Manchester in 1998 as MRC Clinical Training Fellow, completing his PhD supervised by Professor Rod Little at the MRC Trauma Unit in 2002, where he developed non-invasive methods to transduce and study dynamic cardio-respiratory responses to tissue injury and haemorrhage. He was appointed to his current clinical academic post at the University of Manchester in 2003, carrying out clinical duties in Intensive Care Medicine as Honorary NHS Consultant at Salford Royal NHS Foundation Trust. Over the last few years he has provided leadership of a programme of work funded by the National Institute of Health Research (NIHR) developing and assessing the diagnostic utility of emerging molecular technologies in the setting of sterile tissue injury and severe infection - focused on matrices in blood and breath. Funded by Innovate UK (formerly Technology Strategy Board) he is also leading a programme of work developing novel technologies aimed at rapid point-of-care infection/sepsis diagnosis and he is collaborating with colleagues internationally in next generation DNA sequencing. In addition to NHS/NIHR R&D leadership roles regionally and nationally, he holds senior academic leadership positions in the Faculty of Medical and Human Sciences, University of Manchester, focussed on developing innovations in undergraduate medical curricula and promoting academic engagement with medical science education within a research intensive Russell Group University.

Dr Paul Elbers combines patient care, education, scientific research and management.● Efficiency and overview but with attention for details.● Pharmacokinetics, acid-base physiology, microcirculation/Intensive care ultrasound.● Information technology, databases, patient data management systems.● Administrative and management functions International network
Dr Niall Ferguson is Head of Critical Care Medicine at the University Health Network and Mount Sinai Hospital, and Associate Professor of Medicine and Physiology at the University of Toronto. He is a Scientist in the Toronto Western Research Institute, and the Critical Care Lead for the Toronto-Central Local Health Integration Network. He received his MD with honours from the University of Toronto in 1995, and went on to complete postgraduate training in internal medicine, respirology and critical care medicine. Dr Ferguson completed a Master’s degree in Clinical Epidemiology and Health Care Research at the University of Toronto in 2002, and subsequently undertook a Post-doctoral Fellowship in Madrid, Spain. He receives research funding from local, provincial, and national agencies, including the Canadian Institutes of Health Research. Dr Ferguson’s research, which is published in high-impact journals including the New England Journal of Medicine, JAMA, and the American Journal of Respiratory & Critical Care Medicine focuses on: (1) mechanical ventilation (epidemiology; weaning and liberation; exubation and tracheostomy); (2) acute respiratory distress syndrome (definitions; ventilatory management; trial design); and (3) novel modes of mechanical ventilation. Dr Ferguson is also the Scientific Programme Chair for Critical Care Canada Forum, Canada’s premier critical care conference. He is a frequent invited-speaker at national and international meetings, having given over 200 such talks.

Dr Nick Fletcher is a Consultant in Cardiac Critical Care and Cardiac Anaesthesia, St Georges University Hospital NHS Trust and Honorary Senior Lecturer, St Georges University of London. He is President of the Association of Cardiothoracic Anaesthetists (ACTA) and lead for the Cardiac Intensivists in ACTA (CIA). He is a member of the FICM training and accreditation committee. He was a member of the British Society of Echocardiography (BSE) Council and is involved with accreditation for TOE and critical care echo for the BSE and ESIICM. He was a member of the BSE/ICS working group to establish critical care echo accreditation and is a faculty member of the postgraduate echo courses for ESIICM and the ESA. He is involved in a number of workstreams for the Faculty of Intensive Care Medicine. He is a member of the editorial board for the BJCA education journal and Echocardiography Research and Practice journal. He has published numerous research articles, book chapters and reviews. Twitter: @Echotrainer

Helen Galley obtained her PhD from the University of Leeds in 1989 and was appointed Lecturer in Anaesthesia and Intensive Care at the University of Aberdeen in 1995 with promotion to Senior Lecturer in 2002 and Professor in 2010. She has published over 80 research papers and 40 reviews/editorials, contributed 12 book chapters and edited 13 books. Her research interests focus on modulation of inflammatory and immune responses in the critically ill, notably using antioxidants. Professor Galley was awarded the Sir Humphrey Davy medal and is a Fellow by election of the Royal College of Anaesthetists and the Society of Biology. She is one of the Editors of the British Journal of Anaesthesia and represents the Anaesthetic Research Society on the Research Council of the National Institute of Academic Anaesthesia. She is also Chair of the North of Scotland Research Ethics Committee Service.

Mike Grocott is the Professor of Anaesthesia and Critical Care Medicine at the University of Southampton (UoS) and heads the UoS Centre for Human Integrative Physiology. He is a consultant in Critical Care Medicine at University Hospital Southampton (UHS) and leads the critical care research area of the UHS-UoS NIHR Respiratory Biomedical Research Unit. Mike has co-authored more than 150 peer reviewed manuscripts and been awarded more than £13 million in grants as CI/CoI. He leads the Xtreme-Everest Oxygen Research Consortium and the Fi4-Surgery Group. Mike is joint Editor-in-Chief of the BioMedCentral journal Extreme Physiology and Medicine (http://www.extremephysiolmed.com). His research interests include human responses to hypoxia, measuring and improving outcome following surgery, lung injury, and fluid therapy. Mike is the national specialty group lead for Anaesthesia, Perioperative Medicine and Pain within the NIHR Clinical Research Network. Mike was the founding director of the National Institute of Academic Anaesthesia Health Services Research Centre and chairs the National Emergency Laparotomy Audit. He is an elected council member of the Council of the Royal College of Anaesthetists and an elected board member of the UK Faculty of Intensive Care Medicine.

Eric Hodgson is a specialist anaesthesiologist who manages 19 operating theatres in a tertiary referral hospital in eThekwini-Durban, South Africa. He spends 1 day a week in the level 1 Trauma centre including the Trauma ICU. His special interests include airway management, ethics in resource constrained environments, coagulation and feeding.

Steve Hollenberg is a Professor of Medicine at Cooper Medical School of Rowan University, and director of the coronary care unit at Cooper University Hospital in Camden, NJ. He was educated at Amherst College and Emory University School of Medicine, and then trained in internal medicine at The New York Hospital-Cornell Medical College, in critical care medicine at the National Institutes of Health, and in cardiovascular diseases at Johns Hopkins Hospital. Research interests relate to microvascular and myocardial function, with emphasis on the pathophysiology of shock. Clinical interests include septic and cardiogenic shock, acute heart failure, and acute coronary syndromes. Current laboratory investigations include measurement of cardiovascular hemodynamics in a murine model of sepsis using echocardiography, and analysis of blood pressure and heart rate variability in that model, with translation into clinical projects measuring similar parameters in critically ill patients by acquiring hemodynamic data from bedside monitors.
Faeq Husain-Syed is a Consultant in Pneumology, Nephrology and Critical Care Medicine at the University Clinic Giessen and Marburg, Germany.

Farhad Kapadia is a Consultant Physician and Intensivist at Hinduja Hospital, Mumbai, India and Visiting Consultant Intensivist and Physician at Breach Candy Hospital, Cumballa Hill Heart Hospital and Parsee General Hospital. He is a member of the Editorial Board of Intensive Care Monitor and the Indian Journal of Critical Care Medicine, a member of the Clinical Research & Ethics Committee, the Institutional Committee for Stem Cell Research & Therapy, the Infection Control Committee and Coordinator for Clinical Meetings at Hinduja Hospital. His other interests are participating in marathons and national track & field events, raising money for charity and playing saxophone in the amateur section of jazz & rock bands.

Dr Roop Kishen was a Consultant in Intensive Care Medicine and Anaesthesia at Hope Hospital, Salford Royal NHS Foundation Trust and Honorary Lecturer in Translational Medicine & Clinical Neurosciences at the University of Manchester. He is now retired from both posts. Dr Kishen’s special interests are acute kidney injury in the critically ill, nutrition in the critically ill, metabolic disorders and acid-base disturbances in the critically ill, post-intensive care follow-up and care of bereaved families and relatives of deceased ICU patients. Teaching and training: advance life support courses and trainees teaching. He is co-editor of Critical Care Update. He is a member of the editorial board of International Journal of Internal and Translational Medicine and main author of Standards for Renal Replacement Therapy in the Critically Ill (on behalf of the Intensive Care Society, UK), 2009.

Prof Ruth Kleinpell is currently the Director of the Center for Clinical Research and Scholarship at Rush University Medical Center and a Professor at Rush University College of Nursing in Chicago Illinois. She is certified as an Acute Care Nurse Practitioner and maintains active practice. She has served as a Visiting Professor at Vanderbilt University School of Nursing since 2012. Dr Kleinpell is an experienced researcher, clinician and educator in the areas of acute and subacute care and advanced practice nursing roles. She presents and publishes widely and is a member of the editorial boards of the American Journal of Critical Care, Critical Care Medicine, Journal of the American Academy of Nurse Practitioners, and Nurse Practitioner. She is a Council Board member of the Society of Critical Care Medicine, a Board member of Critical Care Medicine Subspecialty, American Board of Internal Medicine; the Institute of Medicine of Chicago; the American Academy of Nursing; and the Collegiate Commission on Nursing Education. She is a Fellow of the American Academy of Nursing, the American Academy of Nurse Practitioners, the Institute of Medicine of Chicago and the American College of Critical Care Medicine. Dr Kleinpell is currently completing a second 2-year term as President of the World Federation of Critical Care Nurses, an international organization with over 40 country members representing over 500,000 critical care nurses worldwide.

Prof Daniel Lichtenstein is the father of Lung Ultrasound and Pink, Blue and Sesame protocols.

Michael Kuiper is a neurologist-intensivist, working in Leeuwarden, the Netherlands. He has a special interest in resuscitation medicine. He is the president of the Scientific Board of the Dutch Resuscitation Council and he is involved in several committees concerning resuscitation and organ donation, including the committee of the Health Council of the Netherlands on determining death in postmortal organ donation. Current research projects include studies on target temperature management and neuroprognostication in comatose patients after cardiac arrest. He has published over 100 peer-reviewed papers and has given many lectures on the topic of resuscitation.

Dr Ravi Kumar is in charge of the European Diploma in Intensive examination in UK. He is very enthusiastic in teaching and an excellent teacher.

Marcel Levi (1964) is Professor of Medicine, Dean of the Faculty of Medicine of the University of Amsterdam, and Chairman of the Executive Board of the Academic Medical Center in Amsterdam, the Netherlands. After his medical training and specialization in Internal Medicine he obtained his PhD (1991) and was appointed as a Fellow by the Royal Netherlands Academy of Science. He followed a MSc program at the University of Oxford in Evidence-based Health Care and worked at the University of Parugia, Italy and the Center for Transgene Technology and Genetherapy of the University of Leuven, Belgium. He has published more than 700 articles in international scientific journals, has been awarded several international research awards, and serves as an associate editor for many international scientific journals. He is currently vice-chairman of the Netherlands Organization for Medical Research (ZON-MW). He was elected as a honorary fellow of the Royal College of Physicians in the UK and as a member of the Royal Netherlands Academy of Science (KNAW) and is a member of the European Medical Research Council.

Prof Daniel Lichtenstein is the father of Lung Ultrasound and Pink, Blue and Sesame protocols.
Dr Antonios Liolios is a smiling Greek who now works in Scarborough, United Kingdom. He is the expert in media and had done the Greek Air Force Critical Care meetings.

Ashley Miller is an Intensivist at the Royal Wolverhampton Hospitals. His specialist area of interest is in critical care ultrasound. The 1st person to become BSE accredited in Critical Care Echocardiography, he is also on the BSE Critical Care Accreditation Committee as well as being a BSE examiner. As a member of the Core Ultrasound in Intensive Care (CUSIC) committee he has helped introduce a curriculum and accreditation pathway for lung, vascular and abdominal ultrasound for critical care doctors. He runs the ICS lung ultrasound seminar and teaches on numerous other ultrasound courses around the country.

Xavier Monnet is Professor of Intensive Care at the Paris-South University. He is working in the Medical Intensive Care Unit of the Bicêtre Hospital (Paris-South University Hospitals). Dr Monnet completed his medical studies at the Paris-6 Medical School and he earned his medical degree in 2000, with specialty in Cardiology and Intensive Care Medicine. In 2004 at age 33, he obtained his PhD from the Paris-South University. Dr Monnet’s main fields of research investigation are acute circulatory failure and its treatment, haemodynamic monitoring and heart-lung interactions. Since 2001, he has signed more than 100 articles in peer-reviewed scientific journals and is the author of several didactic reviews and book chapters. Dr Monnet is presently the General Secretary of the French Intensive Care Society.

Prof Rui Moreno was the Past President of the ESICM, he is actively involved in EDIC and an excellent host.

Dr Paul Morgan has been an Intensive Care Consultant in Cardiff since 1996, initially part-time with anaesthesia but since 2004 has been a whole-time Intensivist. His primary interests are tracheostomy care (having helped write local and national guidance) and sepsis. Like all Intensivists, sepsis makes up a substantial part of his work but he has been disappointed by the repeated failures of clinical trials to show benefits for various treatments over many years. In recent years, his interest in sepsis has led him to try to drive change in sepsis recognition and care outside the critical care environment, working with staff from primary and secondary care so that sepsis can be spotted early, enabling timely intervention and thereby reduce the need for critical care admission. Ultimately, he hopes this will reduce not just mortality from sepsis but also the morbidity which results in long-term health problems for sepsis survivors. To this end, Paul became the Lead Volunteer in Wales for the UK Sepsis Trust. He is also a CCrISP Instructor and Course Director. Paul has also worked with Welsh Government and the Welsh critical care networks on end-of-life care in Critical Care.

Dr Marek Nalos is a Consultant in Intensive Care Medicine and Director of Trauma Services at Nepean Hospital, Penrith, NSW, Australia. He graduated from the Medical Faculty of Charles University in Plzeň, Czech Republic in 1995. He was a research Fellow in the Critical Care Research Program, Kuopio University, Finland under Prof Jukka Takala and in the Department of Anaesthesia and Critical Care, University of Ulm, Germany under Prof Peter Rademaker. He is a Senior Lecturer at the University of Sydney, Nepean Clinical School. He is a Fellow of the Australian and New Zealand College of Intensive Care Medicine and holds the European Diploma in Intensive Care. His current clinical appointments are at Nepean, St George and Wagga Wagga Base Hospitals in NSW, Australia. He has an interest in critical care sonography and is teaching at national and international ultrasound courses. His other research interests include immune function and lactate metabolism in critical illness.

Professor Andrew Rhodes trained in Medicine at the St George’s, University of London qualifying in 1990. He underwent specialist training in Anaesthesia and Intensive Care Medicine and became a consultant at St George’s Hospital, London in 1999. He is currently the Chair of the Children’s, Women’s, Diagnostics, Therapies and Critical Care Division of St George’s Healthcare NHS Trust and is a Professor in Anaesthesia and Intensive Care Medicine at the St George’s University of London. Andrew has held leadership roles at both a national and an international level. He currently represents the South London Senate to the Adult Critical Care Clinical Reference Group at NHS England. He is a Council member of the Faculty of Intensive Care Medicine (FICM) and a past president of the European Society of Intensive Care Medicine (ESICM). He is the current co-chair of the Surviving Sepsis Campaign.

Dr Ian Sappelt is a clinical intensivist and researcher at Nepean Hospital, University of Sydney. He is an executive member of the ANZICS Clinical Trials Group and has participated in many of the landmark ANZICS CTG trials. He is interested in the gut microflora in ICU and the role of selective decontamination, and is leading the Australian and New Zealand arm of the SuDDICU initiative. Other interests include fluid resuscitation and echocardiography in the ICU, and clinical research ethics. He is part owner of a very nice vineyard near Orange in central NSW and in his spare time is horse transport technician for his wife and children.
Dr Manu Shankar-Hari joined Guy’s and St Thomas’ Critical Care Team as a consultant physician and clinician researcher in 2009. He is the chairman of the Sepsis Quality Improvement Project in the hospital. Manu’s research focuses on lymphocyte biology and epidemiology of sepsis. His immunology research explores the acute changes in immunoglobulin molecules, free light chains and lymphocyte abnormalities in sepsis related critical illness. His epidemiology research explores the reasons for international variations in sepsis epidemiology, and the determinants of long-term mortality in acute illness survivors.

Prof Michel Siana is full Professor of Critical Care, co-chairman of an INSERM unit (research team) and chairman of Medical Intensive Care Unit at Amiens Hospital. He is also Vice President of Picardie University.

Prof Fang Gao Smith is Professor in Anaesthesia, Critical Care and Pain, Perioperative Critical Care and Trauma Trials Group, University of Birmingham. After completing her senior registrar post in Hammersmith Hospital in 1997, Fang took a consultant post in Birmingham Heartlands Hospital, Heart of England NHS Foundation Trust. She specialised in critical care and paediatric anaesthesia for ENT surgery. She created Academic Department of Anaesthesia, Critical Care and Resuscitation 2005 with focus on clinical research in these areas. The department is registered with the Royal College of Anaesthetists, based at MIDRU building, Heartlands Hospital, and affiliated with University of Birmingham and University of Warwick. She currently also leads the Perioperative, Critical Care and Trauma Trials Group (PACCT group), University of Birmingham. Their team and PACCT group have strong track record in obtaining major grants from MRC, Wellcome Trust, NIHR, HTA and charity funding bodies. They have now obtained the status of a complete NIHR Academic pathway in Anaesthesia with NIHR Clinician Scientist, NIHR Clinical Lecturer and NIHR Academic Clinical Fellowship.

Dr Peter Spronk is working as an intensivist in the mixed medical-surgical ICU of the Gelre Hospitals in Apeldoorn, the Netherlands. He is ICU director, coordinator of research and an established clinical investigator in collaboration with the department of Intensive Care Medicine of the Academic Medical Center in Amsterdam. His main focus is on long term effects of critical illness such as ICU-acquired weakness, delirium, health related quality of life issues, and also on futility and quality of death and the implementation and evaluation of routine protocols and procedures in daily practice. He strives for further collaboration between ICU centers to facilitate clinical research and chairs a non-profit foundation called “HERMES Critical Care Group”.

Dr Stephen Streat has been an Intensivist in the Department of Critical Care Medicine, Auckland City Hospital since 1985, Deputy Chair of the Northern regional Clinical Practice Committee since 2005 and Clinical Director of Organ Donation New Zealand (New Zealand's national agency for organ donation from deceased persons) since 2005. He was a member of the Australian and New Zealand Intensive Care Society (ANZICS) Committee on Death and Organ Donation from 2005 till 2015. He is a member of the RACP working party on end of life care responsible for the recently completed statement by the RACP on these matters which will be promulgated at the RACP Annual Scientific meeting in Adelaide in May 2016.

Prof Jean Louis Teboul is Professor of Therapeutics and Critical Care Medicine, at the University Paris-South in France. Clinical activity at the Medical ICU of the Bicêtre University Hospital next to Paris. His research interests are in heart-lung interactions, cardiovascular performance, regional blood flow assessment, tissue oxygenation, haemodynamic monitoring, and assessment of volume status in critically ill patients. Proposals of new tests to assess fluid responsiveness such as Pulse Pressure Variation and Passive Leg Raising. He has written 194 articles (referenced in Pubmed) and around 204 book chapters/didactic articles, almost all of them in the field of haemodynamics. He is Editor-in-Chief of Annals of Intensive Care. He has delivered 617 invited lectures including 450 in international congresses. He is currently Chair of the cardio-dynamics section of the European Society of Intensive Care Medicine (ESICM).

Martin Tobin went to medical school at University College Dublin (1969-75). Since 1990, he has served as Professor of Medicine at Hines VA Hospital and Loyola University Medical School in Chicago. He has published original research on mechanical ventilation, control of breathing, respiratory muscle function, and other areas of pulmonary and critical care medicine. Between 1999 and 2004, Dr Tobin served as Editor-in-Chief of the American Journal of Respiratory and Critical Care Medicine.
Dr Redmund Tully’s undergraduate studies took place at University College London where he gained MBBS and an intercalated BSc in medical anthropology. He then trained in anaesthesia and intensive care medicine in the North West of England as well as undertaking further training in intensive care at the Royal North Shore Hospital, Sydney, Australia. He is a Fellow of the Faculty of Intensive Care Medicine and Fellow of the Royal College of Anaesthetists. His clinical interests include intensive care echocardiography which he was taught while in Sydney. He is a FICE mentor. His other clinical interests include ARDS ventilation.

Hendrik van Saene studied medicine at the University of Leuven (Belgium), and was awarded an MD in 1973. He trained and qualified as a medical microbiologist at the University of Groningen (The Netherlands) in 1977. Following this, he embarked on a PhD thesis whilst setting up a specialized laboratory for the prevention of infection in the Department of Medical Microbiology at the University of Groningen. The concept of this laboratory was based on the monitoring of the level of carriage of potential pathogens by means of quantitative microbiology of surveillance samples of throat and rectum in subsets of patients at high risk of infection. His research into the role of Escherichia coli in inflammatory bowel disease led to a PhD in 1982. In the same year, in collaboration with Dr Stoutenbeek he started a major clinical project entitled ‘Infection prevention in the severely traumatized patient.’ A reduction of infection from 80% to 16% was obtained in trauma-patients after long-term oropharyngeal and gastrointestinal application of aminotic antimicrobials, polymyxin/tobramycin, in combination with a short-term parenteral antibiotic, cefotaxime, an antimicrobial prophylaxis termed selective decontamination of the digestive tract. During 1985 and 1986, the underlying mechanisms explaining the success of this prophylaxis were investigated in the Department of Pharmaceutical Microbiology. Faecal inactivation of antimicrobials, reduction of intestinal endotoxin pool and development of resistance were the three major issues studied. In 1987 he was appointed as senior lecturer in Medical Microbiology at the University of Liverpool (U.K.) and consultant microbiologist at the Royal Liverpool Children’s NHS Trust (Alder Hey Hospital). He now holds an honorary position with the University of Liverpool. The validity of this strategy has been confirmed in individual trials and recent meta-analyses showing a significant survival benefit (American Journal of Respiratory and Critical Care Medicine 2002; 166: 1020-1037; Lancet 2003; 362: 1011-1016; The Cochrane Database Systematic Reviews, 2009; CD000022, New England Journal of Medicine 2009; 360: 20-31). Dr van Saene has been awarded European research prizes, the Fellowship of the Royal College of Pathologists, Merit Awards and Readership for his infection prevention work using selective decontamination. During the last four years, Dr Silvestri and he meta-analysed all 60 randomised controlled trials on SSD, in five different meta-analyses. He is the author and/or co-author of 350 publications, of which nearly 300 are available on the internet.

Professor Jean-Louis Vincent is Professor of Intensive Care at University of Brussels, and intensivist in the Department of Intensive Care at the Erasme University Hospital in Brussels. Specialist in Internal Medicine, he spent two years of training at the University of Southern California with Prof Max Harry Weil. Prof Vincent has signed more than 850 original articles, some 400 book chapters and review articles, and 930 original abstracts, and has edited 99 books. He is co-editor of the Textbook of Critical Care (Elsevier Saunders, 7th Edition) and the “Encyclopedia of Intensive Care Medicine” (Springer). He is the editor-in-chief of “Critical Care”, “Current Opinion in Critical Care”, and “ICU Management” and is a member of the Editorial Boards of about 30 journals. He is a Past-President of the Belgian Society of Intensive Care Medicine (SIZ), the European Society of Intensive Care Medicine (ESICM), the European Shock Society (ESS), and the International Sepsis Forum (ISF). He is member of the Royal Medical Academy of Belgium. For 35 years he has organized an International Symposium on Intensive Care and Emergency Medicine which is held every March in Brussels. He has received the Distinguished Investigator Award of the Society of Critical Care Medicine, the College Medalist Award of the American College of Chest Physicians, was the Recipient of the “Society Medal” (lifetime award) of the European Society of Intensive Care Medicine and has received the prestigious Belgian scientific award of the FRS-FNRS (Prix Scientifique Joseph Maisin-Sciences biomédicales cliniques).

Dr Leslie Whetstine is an Associate Professor of Philosophy and Chair of the Institutional Review Board. She is experienced in both academic and clinical issues in bioethics and specializes in ethical issues in transplantation, the definition of death, and end of life care. Her current research interests are in exploring the moral questions inherent in various reproductive technologies and the use of cognitive enhancement in the absence of pathology.

Professor Tim Walsh’s clinical training was in Anaesthesia and Critical Care Medicine, mostly in Edinburgh. He undertook an MD degree in the Scottish Liver Transplant Unit, studying oxygen transport and metabolism in patients with acute liver failure and undergoing liver transplantation. After appointment to an NHS Consultant position in Edinburgh in 1999 he continued to build a research programme with major interests in transfusion medicine and sedation monitoring. He undertook a Masters degree in Public Health Sciences to improve his skills in clinical studies, epidemiology, and trial design. Following this his focus was increasingly on large scale clinical trials and health services research, while collaborating closely with basic scientists to promote translational research projects. After a period as an NHS based Honorary Professor he formally moved to take up the first University Chair of Critical Care in 2011.

Bob Winter is a Consultant in Intensive Care and Major Trauma at Nottingham University Hospitals. He is also medical lead for the East Midlands Major Trauma Network and Mid-Trent critical care network. He works on a mixed general and neurosurgical ICU in a 1400 bed teaching hospital. He has been President, Honorary Secretary and Council member for the Intensive Care Society and represented the Society on various groups for the UK Department of Health. He is currently National Clinical Director for Emergency Preparedness and Critical Care and is a board member of the Faculty of Intensive Care Medicine.
Melatonin as a potential therapy in sepsis
Professor Helen Galley

Sepsis-related organ dysfunction is a common cause of death in the intensive care. Marked oxidative stress as a result of the inflammatory responses inherent with sepsis initiates changes in mitochondrial function which may contribute to organ damage. Normally, a complex system of interacting antioxidant defences is able to combat oxidative stress and prevents damage to mitochondria. Antioxidant therapy which specifically protect within mitochondria may be useful.

Melatonin is known for its effect on the sleep-wake cycle, but at high doses it is a powerful antioxidant and anti-inflammatory agent. It reacts with both oxygen- and nitrogen-derived reactive species, and in addition, several of its metabolites also have antioxidant activity. Melatonin is both lipophilic and hydrophilic, and the highest levels in the cell are found within mitochondria. It has both anti-inflammatory and antioxidant activities, scavenging hydrogen peroxide, augmenting endogenous antioxidant pathways, and decreasing nitric oxide production. Melatonin prevents mitochondrial dysfunction, energy failure, and apoptosis and ameliorates inflammatory cytokine release in cells and animal models of oxidative injury. Administration in animal models of sepsis reduces biomarkers of inflammation and oxidative stress, prevents mitochondrial damage and improves survival. Even at high doses melatonin is well tolerated and appears free of side effects.

Melatonin is a powerful antioxidant and anti-inflammatory agent which may be useful as a novel treatment in sepsis.
14.30 - 14.45
Hyponatremia in the Intensive Care Unit
Professor Thomas P Bleck

Hyponatremia is a common problem in the intensive care unit, and its diagnosis and management require a broad range of knowledge. The first step in analysis is to determine whether the patient is truly hyponatremic. Examination of other values obtained from the same sample may suggest that the specimen was diluted by intravenous fluid, for example. The next step is to consider the presence of osmotically active substances that shift water from the intracellular space to the extracellular space, such as glucose, methanol, ethanol, ethylene glycol, etc. One can correct for these if their concentration is known, but the most efficient screen is to measure the serum osmolality. One should also exclude known laboratory confounders, such as hyperlipidemia and increased concentrations of serum proteins. Understanding their effects requires knowledge of how the laboratory is assaying the sample. Again, measuring the serum osmolality provides the clue to understanding this problem. Once most also keep in mind the distinction between osmolality and tonicity.

If the patient is hypo-osmolar, the next step is to appraise the patient’s intravascular volume. While no rule fits all cases, hypovolemic hyponatremic patients almost always have depletion of both salt and water; their salt deficit is worse than their water deficit, and the best approach is to replete volume, usually with normal saline or other isotonic fluids, and then deal with the hyponatremic state. Hypervolemic patients are in a state of both salt and water excess, but with the latter in greater excess. Diuresis and limitation of salt and water intake are typically the best approach, along with an attempt to deal with the underlying problem that triggered this state (e.g., heart failure, cirrhosis, renal disorders, etc.).

Drugs are a common, and often ignored, stimulus for free water retention and should always be considered as a cause, often among others, of hyponatremia. Morphine is a frequent culprit. Endocrine disorders must also be considered. True Addison’s disease results in hyponatremia, hyperkalemia, and acidosis, but pure glucocorticoid deficiency generally produces euvoeemic hyponatremia because of difficulty clearing free water. Hypothyroidism similarly impairs free water clearance. These problems may be superimposed on abnormalities of volume regulation.

Euvoeemic hyponatremia generally indicates an excess of water in a patient with relatively normal total body sodium. However, there are conditions in which the patient seems euvoeemic but is just at or slightly beyond the actual limit as far as the hypothalamus and the atria are concerned. Cerebral salt wasting patients are actually volume depleted, but the catecholamine excess that accompanies subarachnoid hemorrhage and most other (albeit very rare) causes of CSW may mask their volume abnormalities. Patients with CSW are in negative fluid balance for days before the hypothalamic response to volume depletion triggers sufficient appropriate ADH release to cause hyponatremia. Patients with SIADH are at the upper limit of normal regarding fluid balance.

Management of hyponatremia depends on (1) how quickly it developed and (2) the gravity of the symptoms produced. Rapidly (over hours) developing hypotonic states can cause seizures and elevated ICP, which should be treated with hypertonic saline. More slowly developing hypotonicity should generally be treated according to its etiology, and typically involves free water restriction once the patient’s intravascular volume disorder has been corrected to the extent possible.
14.45 - 15.00
Antibiotic TDM - how to use it
Professor Jan De Waele

Therapeutic drug monitoring (TDM) is frequently used for different types of drugs in the ICU. The concept is simple and straightforward: after the patient has received a drug, the drug concentration in the plasma is analysed, and the dose adapted when either the concentration is outside the therapeutic range, or toxic concentrations are present. Often this is used for antiepileptic and immunosuppressive drugs.

For certain antibiotics, TDM has been used for many years. This only involved drugs with a narrow therapeutic range and potential for toxicity. As such TDM was used in order to avoid toxicity from increased concentrations, and this has been the classical paradigm until now. Typical examples include glycopeptides (vancomycin and teicoplanin) as well as aminoglycosides. For both drug trough levels were used to adapt the subsequent doses, or to postpone the next dose until the concentration fell below a certain threshold.

As our understanding of antibiotic pharmacokinetics has evolved and the inter-patient variability has been documented, different approaches to appropriate antibiotic dosing are required. Although population PK modelling may be an interesting strategy to improve target attainment in antibiotic administration, these may not be perfect and TDM may be integrated in this optimized, personalised approach to antibiotic dosing. The preferred strategy depends on the antibiotic used and infusion strategy. A crucial element in using TDM is the susceptibility of the pathogen; when administering empirical therapy and the MIC is yet unknown, the susceptibility breakpoint of the target pathogens is used (typically Pseudomonas for Gram-negative pathogens – effectively considering a worst-case scenario).

For aminoglycosides, antibiotic efficacy is determined by the ratio between $C_{\text{max}}$ and MIC, so measuring the $C_{\text{max}}$ can help to optimize therapy. For this purpose, the peak antibiotic concentration can be measured, typically 30 minutes after the end of the infusion. Target concentrations are 8-10 times the target MIC. Trough concentrations can also be helpful to determine the optimal timing of the next doses in the patient.

In patients receiving vancomycin, TDM can be used for efficacy as well. Specifically, in continuous infusion the approach is easy to apply. Considering a target of AUC24/MIC of 400 or more, concentrations should be higher than 20mg/L for a pathogen with an MIC of 1.

Finally, for beta-lactam antibiotics TDM has been developed and studied specifically for optimizing exposure. Currently there is an ongoing debate as to what targets need to used in critically ill patients. Some assume that the minimal targets of 40-60% of the time above the MIC is adequate but recent data suggest that 100% of the time above the MIC or multiples thereof is necessary. In patients treated with continuous infusion different targets may apply. Currently minimal thresholds have not been defined which and more data are needed.

It should be acknowledged that TDM focuses on plasma concentrations of the drug, and usually measures total concentrations, which may overestimate the biologically active concentrations. Protein binding is different though but may be very significant. Furthermore, it is unclear how plasma concentrations relate to infection site concentrations which ultimately is the target. Finally, also the actions taken based on the TDM results are important and should be considered.
What could be the fluid resuscitation guidelines for the next SSC?

Professor Jean-Louis Teboul

The current Surviving Sepsis Campaign (SSC) [1] recommends to use an early goal-directed therapy (EGDT) at the initial phase of septic shock. Fluid resuscitation is thus the first step of the hemodynamic management of septic shock since hypovolemia is constant at the early phase. According to the current guidelines, the central venous pressure (CVP) is the main parameter used in the EGDT to guide fluid therapy [1]. However, CVP has been repeatedly shown to fail to predict fluid responsiveness and to guide fluid therapy in critically ill patients including the patients with sepsis [2]. In addition, recent multicentre randomised clinical trials failed to confirm the superiority of EGDT over standard care at the initial phase of septic shock [3].

A more pragmatic approach of fluid resuscitation is described below knowing that it is important to distinguish “out-of-hospital” septic shock from “in-hospital” septic shock.

Patients suffering from “out-of-hospital” septic shock generally have a profound hypovolemia that requires substantial correction at the early phase. It seems reasonable to infuse crystalloids at an average rate of 10 mL/kg over the first hour. A larger volume should be considered in cases of low pulse pressure (suggesting a low stroke volume), mottled skin, increased capillary refill time, high body temperature, evident fluid losses, abdominal origin of sepsis. In cases of sudden appearance of dyspnœa, the volume of fluid should be reduced. If signs of shock persist after around one hour of resuscitation, it is important to assess fluid responsiveness. Indeed, continuation of fluid administration in patients who are nonresponders, is at risk of fluid overload without any benefit in terms of haemodynamics. The response of stroke volume (measured by echocardiography) to passive leg raising or the use of dynamic variables as pulse pressure variation (using an arterial catheter) if applicable, are helpful to assess fluid responsiveness. In case of preload responsiveness, it is logical to continue fluid infusion unless signs of pulmonary oedema appear. In case of preload unresponsiveness, other therapies should be considered.

Patients suffering from “in-hospital” septic shock are generally less hypovolemic so that an average rate of 5 mL/kg crystalloids over the first 30 min seems reasonable. A larger volume can be infused in cases of low pulse pressure, mottled skin, increased capillary refill time, high body temperature, evident fluid losses, and abdominal origin of sepsis. After the first 30 min, fluid responsiveness should be assessed and the same schema as above described could be applied.

Norepinephrine should be initiated in cases of life-threatening hypotension as defined by a low arterial diastolic pressure (a marker of low arterial tone), whatever the degree of hypovolemia.

In conclusion, the same fluid resuscitation protocol cannot be applied in every patient. It is important in a first step to use the clinical signs and the context and in a second step to assess fluid responsiveness.

References:
3. Angus et al. Intensive Care Med 2015; 41:1549-
GREAT HALL: FLUIDS

16.20 - 16.35

Of babies and bathwater: are we abandoning starches too soon?

Dr Eric Hodgson

There are few issues that generate more heat and less light than the role of hydroxyethyl starch (HES) colloid solutions in the perioperative and critical care settings. In the wake of the publication of the CHEST trial comparing HES with saline in 2012(1), the European Medicines Agency (EMA) through its Pharmacovigilance Risk Assessment Committee (PRAC) initially withdrew marketing authorisation for HES, but later reinstated authorisation limiting the use of HES to patients with acute hypovolaemia without coagulopathy or renal dysfunction. This led to an open letter(2), with a long and impressive list of authors, critical of the decision followed by a counter letter(3), with an equal but opposite list of authors, supportive of the decision. A highly technical debate regarding allocation of patients and intention to treat analysis in CHEST is currently under way in the NEJM(4) and BMJ(5).

How should these extensive debates affect the practice of intensivists, anaesthesiologists and other members of the perioperative care team with regard to fluid therapy?

There is clear evidence that positive fluid balances are detrimental after major surgery and in the ICU. All clear fluids have adverse effects including dilutional coagulopathy and generation of oedema that is detrimental to all organs, particularly bowel anastomoses(6).

Oedema is reduced primarily by limiting the volume of fluid administered.

Where the endothelium is considered to be normal (e.g. after acute blood loss) a colloid solution should be considered as this solution will be more likely to remain intravascular with an intact endothelium than a crystalloid solution that leaks through intact endothelium(7).

The best colloid is blood. However in situations commonly encountered during major elective surgery (spine, arthroplasty) where patients suffer significant blood loss but will not require transfusion, colloid solutions such as HES seem a logical choice. Should transfusion be considered necessary, all clear fluids should be withheld in favour of blood products(8).

Colloid solutions, including albumin and HES, are less useful with endothelial dysfunction that occurs in in sepsis, as leakage of colloid into the interstitial space raises the oncotic pressure of the interstitium, making resolution of oedema more prolonged with recovery of endothelial function. The use of colloid solutions in the setting of sepsis cannot be recommended on current evidence(9). However a ban in patients with burns(10) and in all critical care patients, many of whom may not have endothelial dysfunction(11), is much more difficult to justify.

HES was banned for a brief period in South Africa. The effect was a marked increase in expense due to use of albumin in place of HES and depletion of the limited albumin resources available in the country. HES, like all medicines, has indications, contraindications and adverse effects but has benefits for patients when used appropriately(12).

References:

4. Doshi P. Data too important to share: do those who control the data control the message? BMJ 2016; 352: i1027. doi: 10.1136/bmj.i1027.

Conflict of Interest:

Dr Hodgson has received speaker honoraria and travel support from and is an advisory board member for Fresenius Kabi South Africa.
Fluid infusion is the commonest intervention in hospitalised patients; however, this ubiquitous intervention is mostly based on clinician preference or availability of a particular fluid. After nearly 200 years of first therapeutic application there now seems to be a need for ‘guidelines’ and ‘protocols’ for their ‘appropriate’ use, perhaps indicating that we still do not fully understand the physiology of IV fluid therapy. There is no hard evidence in literature about which fluid to use, especially in the critically ill. There are also a number of misconceptions about fluid therapy that just won’t go away despite ‘experience and sensible expert opinion’.

First, we hear about different fluids being ‘advocated’ as ‘the ideal fluid’ in a particular clinical situation. Second, crystalloid/colloid controversy has gone on for a long time and the debate just won’t die away! Third, clinicians believe that ‘pH balanced’ fluids are ideal as they cause no or least acidosis when infused. Fourth, it is often forgotten that IV fluids are drugs and, like drugs have both beneficial and adverse effects related to their content as well as the quantity infused. Other difficulties include problems in recognition and assessment of fluid deficit, timing and speed of intervention as well as problems in recognition of patient responses and the end points of resuscitation.

- Ideal resuscitation fluid does not exist. Each fluid has its merits and demerits and fluid therapy should be individualised depending on clinical circumstances and patients’ requirements. Fluids for resuscitation and maintenance may be different in the same patient at different times. Patient’s response is the best indicator for continuing or curtailing fluid infusion.

- Colloids are being advocated for their ‘plasma expanding’ property as well as their ‘volume sparing’ effect. Although albumin is effective in many situations, its cost makes it prohibitive for use in all situations and it has been shown to be detrimental in patients with head trauma. Besides, the circulatory advantage suggested for colloids has not been convincingly demonstrated in randomised controlled trials. Synthetic colloids are also known to cause kidney injury in the critically ill. For crystalloids, there is no definite evidence of their advantage. ‘Normal’ saline is anything but ‘physiologically normal’! Its composition is unphysiological and may well have adverse systemic effects, a narrow strong ion difference (SID) acidosis being one such example. Saline may also cause acute kidney injury in some critically ill patients, although this has been seen in observational studies only. Balanced salt solutions come closer to being ‘ideal’ but many are hypo-oncotic and thus may not be suitable in some situations (e.g., head injury).

- The so called ‘pH balanced’ fluids do not exist. A solution of 0.9% ‘pure’ saline (pH 7.0 at 25°C) has similar acid-base effects as that of 0.9% saline equilibrated with atmospheric CO₂ (pH 5.6 at 25°C). The effect is purely due to electrolyte content of 0.9% saline and has erroneously been called hyper-chloraemic metabolic acidosis (HCMA) when actually it is because of imbalance in strong ions caused by infusion of a zero SID fluid. Other zero SID fluids like 5% dextrose or mannitol have a similar effect on pH as 0.9% saline!

- IV fluids are drugs and clinicians should never forget this fact. Infusion of fluids will have beneficial (e.g., restoration of circulating volume) as well as deleterious (e.g., fluid overload, SID changes or other electrolyte disturbances) effects. Just like a drug, care must be exercised in terms of nature (i.e., type) and the dose (i.e., volume) of particular fluid prescribed and infused.

So which IV fluid should we use? It depends on what we want to achieve, keeping in mind the limitations and adverse effects of available fluids. As there is no ideal IV fluid, we should be cautious in their use. Fluids should be tailored to clinical situation and patients. We should also be pragmatic and have sensible ‘guidelines’ in place. I believe that there is little to be gained by using ‘synthetic colloids’ as potential for harm exists; the best colloid being blood, should it be required. Of the crystalloids, 0.9% saline in modest quantities may well be ‘ideal’ in many circumstances; however, for larger infusions and probably in the elderly, balanced salt solutions should be preferred. Clinicians should always assess patients frequently and regularly to evaluate response to fluid therapy and modify it accordingly. That fluids are drugs and should be treated as such cannot be overemphasised.

Finally, we must not forget that our first and final responsibility is to the patient. ‘Primum non nocere’ should be the guiding principal. We will do well to remember the observations of one of first users of IV fluids for therapeutic effect almost 200 years ago “The quantity (of fluid) necessary to be injected will probably be found to depend upon the quantity of serum lost; the object being to place the patient in nearly his ordinary state as to the quantity of blood circulating in the vessels”. I could not agree more.
References:


Weaning failure of cardiac origin
Professor Jean-Louis Teboul

Mechanical ventilation can exert deleterious hemodynamic effects in patients with normal cardiac function owing to the reduction in venous return induced by positive intrathoracic pressure. By contrast, mechanical ventilation could be beneficial on the cardiovascular system in patients suffering from left heart disease. Accordingly, mechanical ventilation is used routinely as a therapy of acute heart failure even using a non invasive mode. Conversely, the cardiovascular consequences of abrupt transfer from mechanical ventilation to spontaneous breathing could be responsible for weaning failure in patients with left heart disease.

Because of the respiratory muscles activity, spontaneous breathing results in an increase in global oxygen demand and hence in cardiac work and myocardial oxygen demand with subsequent risks of onset of myocardial ischemia in patients with coronary artery disease. Weaning from mechanical ventilation also results in negative intrathoracic pressure. This leads to both an increase in systemic venous return pressure gradient and a decrease in left ventricular ejection pressure gradient. The increase in systemic venous return pressure gradient can be responsible for an increase in central blood volume with subsequent risks of pulmonary edema formation. In addition, during spontaneous inspiration, the pressure surrounding the left ventricle decreases while the pressure surrounding the extrathoracic arterial compartment remains unchanged. Consequently, the left ventricle must generate a higher pressure - i.e. transmural pressure - before the blood can leave the thorax. This condition is sensed by the left ventricle as an increase of its afterload. Finally, the catecholamine discharge, related to the emotional stress due to the sudden transfer from mechanical ventilation to spontaneous breathing, results in tachycardia, increase in global oxygen demand, increase in systemic venous return and arterial hypertension. All these mechanisms - increased work of breathing, decreased intrathoracic pressure and increased sympathetic tone – can result in myocardial ischemia and cardiogenic pulmonary edema during weaning in patients with previous left ventricular dysfunction and/or coronary artery disease, in particular when chronic obstructive pulmonary disease coexists.

Weaning failure from cardiac origin can be diagnosed by monitoring the spontaneous breathing trial (SBT) with either a pulmonary artery catheter or echocardiography or biological variables. Increase in pulmonary artery occlusion pressure [1] and/or decrease in mixed venous oxygen saturation [2] during the SBT have been proposed as good markers of weaning failure related to cardiac dysfunction. Left ventricular filling pressure can also be estimated from transmural flow and tissue Doppler imaging variables (E/A, and E/E' ratios) obtained with echocardiography. An increase in both E/A and E/E' is a good indication of weaning-induced pulmonary edema [3]. An increase in B-type natriuretic peptide (BNP) or in NT-pro-BNP (biological markers of ventricular distension) has also been reported in weaning-induced cardiac dysfunction [4, 5]. Because cardiogenic pulmonary edema results in a transfer of a hypovascular fluid from the lumen of the pulmonary capillaries toward the interstitium, weaning-induced pulmonary edema can be easily detected by measuring changes in plasma protein and/or hemoglobin concentration during a SBT [6]. An increase of extravascular lung water measured using transpulmonary thermodilution during a SBT was demonstrated to perform as well as hemoconcentration biological markers and better than BNP to detect the occurrence of cardiogenic pulmonary edema during weaning [7]. Finally, it is also possible to identify weaning failure from cardiac origin by performing a passive leg raising (PLR) test before the SBT [8]. It is likely that failure to wean in patients with preload independence (detected by the PLR) is of cardiac origin [8].

Diagnosis of weaning-induced pulmonary edema is important to make since it can lead to a specific therapy such as diuretics and/or nitrates [1, 9] that may eventually result in weaning success [10].

References:


How to be successful in ventilator weaning

Professor Martin J Tobin

Delays in weaning are a major cause of unnecessary death in the ICU. To shorten weaning time, it is imperative to start weaning at the right time and use the right technique. Physicians realize that writing a weaning order constitutes a clinical decision, but fail to recognize that not writing a weaning order also constitutes a decision: that the patient is not weanable at that time. The purpose of weaning predictor tests is to alert an unsuspecting physician to a patient’s readiness to tolerate unassisted ventilation hours or days before the physician would otherwise order a spontaneous-breathing trial. A test to screen for weaning readiness should have a high sensitivity and be performed when the pretest probability of weaning success is low (ideally less than 15%). Frequency-to-tidal volume ratio ($f/V_T$) has been evaluated by 27 groups and achieved sensitivities above 0.90. A spontaneous-breathing trial is unsuited as a screening test. Weaning decisions should not be constrained by numbers, but individualized to a patient’s condition and physiology. Once a physician has decided a patient has reached the right time for ventilator removal, two approaches exist: intermittent unassisted breathing (zero ventilator support) or gradual reduction in pressure support. During pressure support, a clinician’s ability to judge weanability is clouded because the patient is receiving ventilator assistance and it is extremely difficult to distinguish between how much work the patient is doing and how much work the ventilator is doing. During a T-tube trial, respiratory work is determined solely by the patient (the ventilator cannot do any work), and a physician has an unhindered view of the patient’s respiratory capabilities. Many physicians think weaning is complete when they reach pressure support of ~5-7 cmH$_2$O, often combined with PEEP 5 cmH$_2$O, and extubate patients from these settings. But CPAP of 5 cmH$_2$O decreases patient work of breathing by ~40%; pressure support of 5 cmH$_2$O, decreases patient work by 30-40%. When evaluating a patient’s readiness for extubation, the thing a physician most wants to avoid is a decrease in patient work compared to what it will be following extubation. Most patients can cope with a 40-60% increase in work of breathing at the point of extubation, but a fragile patient may not. To extubate a fragile patient directly from CPAP of 5 or from pressure support of 5 is to unnecessarily risk killing that patient.
Sepsis is defined as life-threatening organ dysfunction caused by a dysregulated host response to infection\(^1\). Epidemiology of sepsis is challenging and a reason for improving outcomes could be enhanced case detection\(^2\).

Clinical heterogeneity refers to the differences in participants, outcomes, interventions (if referring to a clinical trial) and setting. This lecture highlights this concept by reporting the sepsis epidemiology from ICU’s in England and showing illustrative comparisons to the report from Australia and New Zealand\(^3\).

There are differences in the impact of definitional elements such as infection site and organ dysfunction type, number and combinations on unadjusted hospital mortality. These differences are seldom considered when making international comparisons of sepsis outcomes. There is an urgent need to identify sepsis-reporting elements for accurate international comparisons.

References:
Biomarkers in sepsis: update on NICE diagnostic guidance

Dr Paul Dark

The National Institute for Health and Care Excellence in the UK have recently evaluated the likely clinical and cost effectiveness of using tests designed to rapidly detect and identify bacterial and fungal DNA (‘pathogen biomarkers’) in the bloodstream of patients with suspected sepsis. I aim to review the subsequent evidence-based NICE diagnostic guidance and consider international evidence gaps that need to be addressed to improve the diagnosis of sepsis beyond current definitions. Related new NICE diagnostic guidance on ‘host-response’ biomarkers in sepsis will be covered in another presentation [29th April 2016: 09.45 – 10.00 The role of procalcitonin and c-reactive protein in antibiotic stewardship: an update. In the Lord Mayor’s Parlour].
CONFERENCE HALL: SEPSIS 2

14.20 - 14.35
Sepsis bundles – outcomes in Wales

Dr Paul Morgan

In his talk, Dr Morgan will briefly describe the history of sepsis care bundles and the issues surrounding adoption affecting the successes and failures of their use. He will describe how patient safety projects have been implemented across Wales leading to standardised approaches to recognition and treatment of patients with sepsis, and the impact this has made on sepsis mortality. He will also discuss the as-yet unsolved issues and future developments and challenges, particularly given the launch of the new international consensus definitions for sepsis.
Drug induced kidney injury in the critically ill

Dr Roop Kishen

Incidence of Drug Induced Kidney Injury (DINKI) in all hospitalised patients is thought to be about 7% and constitutes the third most leading cause of acute kidney injury (AKI) in the critically ill. Whereas sepsis and haemodynamic perturbations account for majority of patients with AKI, DINKI forms a small but significant population of ICU patients (5-20%). The reasons for this are not difficult to find. Critically ill have haemodynamic disturbances (at least in the initial phase of their ICU stay), many have associated sepsis and may have concomitant risk factors. They receive multiple drugs during their ICU admission, often twice as many as compared to non-critically ill, many of which are actually or potentially nephrotoxic. The incidence of DINKI may be on the increase probably due to increasing age and multiple concomitant comorbidities of current ICU population.

Several factors make kidneys particularly vulnerable to DINKI. Kidneys receive 25% of cardiac output and therefore receive a large proportion of a drug (circulating in blood) per unit of tissue mass compared to the rest of the body. Kidneys contain specialised transport and enzyme mechanisms and thus play an important role in elimination of drugs (unchanged, activated or modified) as well as their metabolites, some of them still active and nephrotoxic. Thus kidneys are exposed to a high concentration of drugs and their often active (and sometimes toxic) metabolites as well as other unrelated chemicals, making them vulnerable to injury.

Drugs can cause renal injury by various mechanisms and several of these mechanisms may be responsible for a given drug’s nephrotoxicity. Mechanisms by which drug induce renal injury comprise of:

- Haemodynamic perturbations and disturbances in glomerular filtration pressure (often referred to as ‘pre-renal failure’); e.g., hypotension caused by angiotensin converting enzyme inhibitors (ACEIs), angiotensin receptor blockers (ARBs), non-steroidal anti-inflammatory drugs (NSAIDs) etc.
- Direct tubular cell toxicity e.g., aminoglycosides, calcineurin inhibitors (cyclosporine A, tacrolimus) etc.
- Interstitial nephritis; e.g., beta-lactams, NSAIDs, thiazide and loop diuretics.
- Crystal deposition; e.g., acyclovir, methotrexate.
- Thrombotic microangiopathy; e.g., calcineurin inhibitors, cisplatin etc.
- Osmotic nephrosis; e.g., mannitol, dextrans, starches.
- Rhabdomyolysis; e.g., statins, recreational drugs, suxamethonium etc.

Radiological contrast-induced renal injury, an important form of DINKI, is highly relevant to ICU patients and has been extensively studied. Rare forms of DINKI include some herbal medicines and ‘on-line’ slimming pills (usually contain heavy metals).

The risk of DINKI is more pronounced in patients with coexisting risk factors which may be patient or drug related.

Patient related:

- Age; elderly at increased risk of DINKI.
- Gender (female) preponderance
- Pre-existing renal dysfunction, chronic kidney disease (CKD)
- Diabetes, hypertension
- Intravenous volume depletion, reduced cardiac output, hypotension
- Sepsis by far the most important risk factor in critically ill
- Sodium depletion and concomitant use of diuretics and other nephrotoxins
- Acid-base disturbances, hypoalbuminaemia
- Multiple myeloma
Drug related factors:

- Inherent nephrotoxicity of the drug.
- Dose
- Prolonged administration e.g., aminoglycosides
- Rate and route of administration as well as the drug formulation

Prevention:

As clinicians we should always be aware of potential harm to our patients. We can modify drug related nephrotoxicity with individual risk assessment by paying regard to patient related risk factors, duration of nephrotoxin therapy, daily and cumulative dose of nephrotoxin as well as drug interactions. Strategies must be in place to alert the clinician of developing DINKI as well as strategies to prevent its occurrence. Electronic patient records, reporting of eGFR and early detection of DINKI are some of these strategies that can be developed locally or even nationally. The best way to prevent DINKI is awareness, risk assessment and a high level of suspicion. One of the great challenges is managing DINKI once it has developed. Stop nephrotoxin if possible, ensure adequate volume status, haemodynamic monitoring (invasive if required), monitor serum creatinine and urine output and avoid hyperglycaemia.

DINKI contributes significantly to mortality and morbidity in our ICUs. We should be aware of nephrotoxic nature of prescribed drugs, their interaction with other drugs as well as patient related risk factors in relation to DINKI. We should also be aware of ‘unintentional double and sometimes triple whammies’ (prescribing two or three mildly or potentially nephrotoxic drugs) in patients at risk.

References:

Renal function reserve

Dr Faeq Husain

Diagnosing acute kidney injury presents different challenges, particularly in the ICU setting. The current definition of AKI aims to detect kidney dysfunction based on urinary output and/or changes in serum creatinine level. Serum creatinine may not increase above normal unless more than 50% of renal function is lost. Furthermore, factors such as hydration, and reduction in muscle bulk, coupled with reduced creatinine generation further confound the diagnosis, which may lead to an overestimation of renal function; ideally, early detection of renal dysfunction leading to early treatment will improve outcomes.

The concept of renal functional reserve (RFR) represents the capacity of intact nephron mass to increase GFR, and describes actual and maximal glomerular filtration capacity after protein load. When subclinical damage is present and creatinine is still normal, a loss of RFR may identify the patient at increased risk of acute kidney injury. However, it remains to be seen whether the increase in GFR in response to stress is the result of increased RBF and/or the presence of “dormant nephrons” uninvolved in filtration during resting conditions but potentially recruitable. RFR has been studied in healthy volunteers, elderly persons, pregnant women, patients with chronic kidney disease and COPD.
Prediction of volume responsiveness in spontaneously breathing patients: an update

Professor Xavier Monnet

In a patient with a hemodynamic failure, volume expansion is aimed at increasing cardiac output in order to improve tissue oxygenation. Nevertheless, due to the curvilinearity of the relationship between cardiac output and preload, the expected increase in cardiac output does not systematically occur. This supports the concept of predicting fluid responsiveness. Also, evidence is growing that administering to much fluids in critically ill patients impairs organ function and increases mortality. Thus, avoiding a potentially harmful volume expansion if it is hemodynamically ineffective is a crucial goal. This supports the concept of predicting fluid unresponsiveness.

There is today solid evidence that fluid responsiveness/unresponsiveness cannot be predicted by static markers of cardiac preload, like central venous pressure for instance. Today, the strategy of using of central venous pressures to decide to administer fluids or not should be definitely abandoned. By contrast, using a dynamic approach of fluid responsiveness prediction has been increasingly demonstrated as valid and useful.

Different methods are today available at the bedside for this dynamic approach. The method that was initially described consists in observing the changes in stroke volume during invasive mechanical ventilation. Mechanical ventilation induces changes in intrathoracic pressure that induce cyclic changes in cardiac preload. If such changes result in significant changes in stroke volume, volume responsiveness is very likely.

The variable that is the easiest and the best demonstrated to assess such respiratory variations is pulse pressure variation (PPV). Nevertheless, it is important to keep in mind that PPV cannot be used in some instances. The main one is spontaneous breathing, even under mechanical ventilation, because in that case, the changes in stroke volume reflect the inhomogeneity in the respiratory cycle, not preload responsiveness.

In such instances, the passive leg raising (PLR) test can be used as an alternative of PPV. Moving a patient from the semi-recumbent position to a position in which legs are elevated at 45° and trunk is horizontal transfers some blood from the legs and the splanchnic compartment toward the cardiac chambers and increases cardiac preload. If this results in a significant change in cardiac output, volume responsiveness can be predicted with a good sensitivity and specificity. A meta-analysis with almost 1000 adult patients confirmed the reliability of the PLR test. The main drawback of the PLR test is that it requires a direct measurement of cardiac output, since the simple measurement of arterial pressure induces some false-negatives.

The end-expiratory occlusion (EEO) test is another test that allows the prediction of volume responsiveness without administering fluid. Like PPV, it is based on heart-lung interactions. Interrupting mechanical ventilation at end-expiration during 15 sec, like for measuring the intrinsic positive end-expiratory pressure, interrupts the cyclic impediment in venous return induced by insufflation. If this increase in cardiac preload increases cardiac output, it is likely that volume expansion will result in a similar effect. The EEO test can be used in case of cardiac arrhythmias, ARDS and spontaneous breathing, provided that the inspiratory efforts are mild enough to enable a 15-sec EEO. The EEO test is very simple to perform when it is assessed with a continuous measurement of cardiac output.

A quite large panel of tests is thus today available in order to predict volume responsiveness, each having its advantages and drawbacks. This clinician should choose between these tests depending on the context, the available hemodynamic monitoring and the patient’s condition.
The physiology of the right ventricle differs dramatically from that of the LV. The RV is not simply a weak LV. The easily distensible RV pumps blood into the low-pressure pulmonary circuit, which allows it to accommodate dramatic variations in venous return while maintaining constant cardiac output, generating 1/6 the work of the LV while moving the same volume of blood. Unlike the systemic circulation, in which most resistance is at the microvascular level and compliance in the aorta, in the pulmonary circulation, resistance and compliance are distributed throughout the pulmonary tree. This has implications for therapy, because the RV is sensitive to changes in afterload, and its afterload depends both on pressure and pulmonary vascular volume. Understanding the determinants of RV function and causes of RV dysfunction can help clinicians in patient management, particularly in the presence of acute lung injury.
LORD MAYORS PARLOUR: HAEMODYNAMIC MONITORING

11.55 - 12.10

Haemodynamic management of out of hospital cardiac arrest

Dr Nick Fletcher

Pathophysiology following cardiac arrest may be variable depending on individual factors. The following maybe be relevant to consider.

- Poor forward flow, low cardiac output syndrome
- Compensatory hyperdynamic cardiac function
- Hypothermia from exposure with vasoconstriction
- Vasodilatory shock following reperfusion
- Effects of drugs – vasodilators, constrictors, inotropes
- Possible concealed haemorrhage following ECM

I will discuss some of the available evidence for this topic, which is limited, but the approach will be predominantly practical. I will discuss in particular the following areas:

- Diagnosis
- Pathophysiology following cardiac arrest
- Monitoring
- Fluids
- Pharmacological support
- Arrhythmias
- Mechanical support

References:

Sleep disturbances are common in critically ill patients treated in the intensive care unit (ICU) with the potential for serious consequences and long term effects on health outcomes and patient’s morbidity. A recent multicenter, self administered survey was sent to nurse managers of all adult ICUs across 10 countries to evaluate the international organization of sedation and sleeping practices and evaluate roles and responsibilities of the ICU staff in relation to key sleep and sedation decisions. Preliminary results of that study in relation to current literature will be discussed.
Handoffs are transfers of patient care and accountability that are a well-recognized risk factor for adverse events in healthcare such as medication errors and delays in diagnosis or treatment. Handoffs are ubiquitous in medicine due to the specialization of care across providers, disciplines and care settings. Despite mounting evidence that handoff standardization is beneficial, variability in handoff processes persists in all the areas associated with medical, surgical and anesthetic practice. Of particular concern is the handoff occurring for patients admitted from the operating room (OR) or recovery room to the intensive care unit (ICU). These transfers are high risk because they involve physical movement of patients and multiple hand-offs among providers of different disciplines (anesthetist to critical care clinician, surgeon to critical care clinician, operating room nurse to critical care nurse, residents and registrars, et cetera). Also, the patients whose care is transferred are often incapacitated and thus unable to participate, making them vulnerable to error and preventable harm. Most studies of OR-to-ICU handoffs have focused on the effectiveness of interventions to standardize this process. However, implementing such a complex intervention requires a systematic approach, including identification of local champions, development of an acceptable protocol, clinician engagement and education and rigorous evaluation methods. Most published reports in this field limit description of the implementation process leaving unexplained crucial details about how to make the process actually work.

After this session, participants will be able to:
1. Appreciate magnitude and harm of current critical care handoff practices
2. Discuss best practices for critical care handoffs
3. Explore challenges of implementation and evaluation of handoff improvement interventions

References:
LORD MAYORS PARLOUR: ROUND TABLE

15.30 - 16.30
Safety in Intensive Care
Professor Ruth Kleinpell

Patient safety and prevention of errors is a major focus in healthcare, as well as an international area of concern. Ensuring patient safety in the ICU is especially important due to the complexity of care and patient acuity levels. Several important factors play a role in fostering patient safety in the ICU including having a culture that supports and promotes safety activities, medication reconciliation and prevention of medication errors, and enhancing communication and collaboration. This session will review key concepts related to patient safety in the ICU, share exemplars from initiatives targeting safety in the ICU, and highlight implications for clinical care.
Prehabilitation: more than just exercise

Professor Mike Grocott

The time between contemplation of surgery and the procedure itself offers a window of opportunity to optimise patients' nutritional, functional and psychological state prior to surgery. Traditionally pre-operative pathways have focused on the underlying disease process and 'fitness for surgery' with physical pre-assessment and risk counselling occurring late in the pathway when there is little time available to intervene. Consequently a key opportunity to improve health in preparation for the physiological challenge of the surgical episode has been lost.

The period around the time of surgery is characterized by increased focus on personal health along with multiple interactions with healthcare professionals and may provide a particular opportunity for improving health in general, and physical fitness in particular. In particular they may offer an opportunity to embed sustained changes in behavior at a time when patients are particularly focused on health improving behavior.

Multimodal prehabilitation programmes may improve surgical outcome, facilitating rapid recovery from surgery and limiting postoperative functional dependence. Patient education and engagement is important if compliance with behavioural change is to be achieved and maintained. To date there is supportive evidence for pre-operative exercise training, smoking cessation, reduction in alcohol intake and psychosocial support. Further research is needed to identify the most effective elements of these complex preoperative interventions, as well as their optimum timing and duration.

References:
Acute pancreatitis

Professor Jan De Waele

Insights in the pathophysiology and management of acute pancreatitis have changed significantly in recent years with important implications for the daily management of patients admitted to our ICUs. The adagio ‘less is more’ seems to be applicable for a number of strategies that were once considered essential in the care of patients with acute pancreatitis, namely fluid resuscitation, intra-abdominal pressure, antibiotic therapy and aggressive surgical debridement.

Appropriate risk stratification remains one of the major challenges in the emergency room and during the first hours after admission. Little if any advances have been made, and largely, organ dysfunction is still the major trigger for ICU admission. The updated classification is now better suited to the evolved insights in the pathophysiology.

Intra-abdominal hypertension (IAH) frequently complicates the early course of severe acute pancreatitis, with a number of factors contributing, not the least fluid resuscitation. Although progression to full blown abdominal compartment syndrome is less frequently observed – mostly through early recognition of the problem, and preventive strategies including conservative fluid management and percutaneous drainage – IAH should be suspected in all patients presenting with organ failure and intra-abdominal pressure monitoring is imperative.

Fluid therapy – and mostly overzealous fluid resuscitation – has been a classical cookbook recipe in the early approach to acute pancreatitis patient. In recent years we have learned that it is an important contributor to intra-abdominal hypertension and several studies have coined over-resuscitation as a contributor to rather than therapy of organ dysfunction.

Antibiotic prophylaxis has no demonstrated benefit, not in terms of reduced pancreatic infection rates, decreased mortality or delayed infection, but still is used extensively. Its effect on subsequent abdominal infections is present however, with antibiotic resistant organisms more frequent after antibiotic prophylaxis.

Finally, surgical strategies have changed fundamentally in the last decade. Whereas early debridement used to be the standard in the 1990s, this has been replaced with an overall restrictive approach to pancreatic necrosis. When infection does occur, percutaneous drainage – as part of a step-up approach mostly – has successfully been used to treat pancreatic collections and avoid surgery. If required, surgery should be as conservative as possible, with minimally invasive strategies preferable, and open transabdominal debridement only as a last resort or in case of complications. Newer techniques such as endoscopic transgastric drainage are being developed, but their exact role has yet to be defined and should be used judiciously in critically ill patients.
Coma is a state in which a patient lies motionless with eyes closed and makes a psychologically understandable response neither to internal need or external stimuli. It results from either the loss of brainstem reticular driving of the cerebral hemispheres, dysfunction of both cerebral hemispheres, or a disconnection of these systems. This workshop will focus on the initial evaluation of such patients, focusing on their physical examination to determine the likely mechanism in a given patient, which will guide subsequent investigations and management.

The first step in this evaluation is to ensure systemic stability by attention to the elements of basic life support. The second step is to be certain that the patient is actually comatose, and not ‘locked-in,’ as, for example, may be seen with pontine infarction due to basilar artery thrombosis (there are other causes for the locked-in syndrome). Next one proceeds with a systematic evaluation of these functions:

- Pupillary reflexes
- Eye movements (spontaneous or stimulated)
- Respiratory pattern
- Motor responses

This evaluation takes about 90 seconds (unless caloric stimulation of the vestibule-ocular response is required, which will take a few minutes); at the end of this time, the examiner should have a reasonable hypothesis regarding whether the major problem rests in the brainstem (which will lead to emergent imaging), or the cerebral hemispheres (which will lead to a search for metabolic or toxic disorders).

The workshop will focus on initial stabilization, the techniques used to test these functions, including some pitfalls; the analysis of the responses elicited, and planning for further investigation. Depending on the interests of the participants, we can also include some discussion of controversial topics such as the use of imaging to detect responses that cannot be seen on examination.
AFTER DINNER SPEECH

Why has the safety and quality movement been slow to transform healthcare culture and outcomes?

Dr Paul Barach

Health systems around the world are confronting ever-rising costs, poor outcomes and economic inefficiencies. Patient safety and patient-centred care are emerging as worldwide key drivers in healthcare reform. Things have changed in healthcare but often as a byproduct of financial reform. Belatedly, safety and quality benchmarks are being integrated into all healthcare strategic goals. There is more focus on patient-centred care, however still experience needless harm and often struggle to have their voices heard, widespread normalized deviance remains a challenge and costs continue to rise at alarming rates while quality issues remain.

Major changes are needed in the delivery model. Given the pressures on healthcare, the systems that will thrive will focus on quality of care (including cost efficiency), through innovative healthcare delivery that creates reliable and engaged providers. Reliable care that addresses barrier to change will require engagement of clinical staff and particularly physicians who are critical to this change in the design and delivery of effective health-care delivery. New tools from social, behavioral, and organizational sciences are needed to diagnose, develop, evaluate and implementate organizational changes.

Central to this success in improving care is a ‘brutal and uncomfortable transparency’, something that physicians in particular continue to grapple with. Improving care requires those who manage care to have an ability to make clinical sense of these changes. Despite the growing interest in producing and publishing more quality indicators, the context of everyday clinical experience is not captured well by evidence-based statistical measures.

The challenge for hospital executives and policy-makers around the world is that there is no readily available process for controlling future events, predicting rare events, or how clinicians might respond to uncertain situations. Knowing the clinical workplace, attending to what clinicians value and hold dear to their hearts, applying smart automation and data analytics, building a trustful culture of safety - all are keys to the successful engagement of clinicians and thus to meaningful patient safety and reliable outcomes.

References:

• Phelps G, Barach P. Why the safety and quality movement has been slow to improve care?
“Big science” can mean different things to different people. Big science can involve approaches to Big Data, defined as datasets of a scale either too large to be stored on and manipulated on a single computer or, more commonly, too complex to be analyzed and understood easily. Techniques and technologies are evolving to uncover hidden values from diverse and complex large-scale datasets. The ultimate value of big science, however, is to harness the power of big data to serve big ideas – and to apply those ideas to improving health at many levels, from large-scale preventive efforts, to optimizing delivery systems, to novel experimental designs, new therapeutic approaches, and precision medicine applied to an individual patient at the bedside.
New vistas of copyright in the information age
Professor David Crippen

The concept of “copyright” dates back to a time when information was scarce and rigorously controlled by factions with a strong incentive to regulate it. The centralized administration of information allowed censorship and monopoly by “authorized” publishers, if for no other reason than to amass monetary resources. However, the sharing of ideas is central to the evolution of civilization and is how culture is created. In addition, sharing the printed word has always been associated with rebellion and emancipation. Throughout history, humanity has always pushed the limits of information sharing and then gone beyond. Piracy of information dissemination has followed a parallel course, and has never in history been entirely suppressed.

In the new millennium, the concept of controlled, centralized dissemination of ideas has been radically altered by the introduction and evolution of the Internet. The Internet created a decentralized non-hierarchical network of individuals in which anyone is welcome to join and none is more consequential than any other. Services invented and operated by individuals with no identifiable entity in charge. The Internet has given consumers the authority and ability to become producers. EBAY has created a cottage industry of independent sellers. Musicians and film producers have found a market for their material bypassing parasitic middlemen. Talented and informed people have found forums on YouTube. But with the open information arena comes burps and hiccoughs within the realm of intellectual property.

Simply put, decentralization inevitably affects intellectual properties. Information packages of information on the Internet are no different than any other such parcels and considered fair game by the information age. Once information is out there, it’s no longer the property of anyone. Attempts to maintain the marketing/selling model have roundly been met by resistance, and when legal sanctions have been introduced, the result has simply been more decentralization and an inability to identify scofflaws.

The battle for sharing of information is already lost. Everything the entertainment industry has tried has failed. Identifying and suing a relative few users for copyright infringement, akin to keeping the village in line by chopping off a few heads and displaying them at the gate on poles. The villagers responded by creative, untraceable subterfuges, one step ahead of the regulators.

Creating producers from consumers has changed all that. Making money is no longer the point. Making something is the point and this will evolve on it’s own course. The public no longer needs the entertainment industry to create entertainment. Music didn’t begin with the phonograph and won’t end with Peer-2-Peer sharing. Film didn’t begin with multiplex cinema and it won’t end with The Pirate Bay. The same innovative spirit that created, nourished and extended the Internet will have to come to bear in the entertainment industry or they will die.
Consent in ICU is a contentious issue, with patients usually incapable of expressing their wishes and surrogates unsure of these wishes and subject to their own stresses and biases\(^{(1)}\).

Consent in ICU should address at least 5 issues

1. **Validity of consent**
   Consent may only be given by an adult deemed legally competent\(^{(2)}\). Legal competence is assessed on a number of factors including age. In South Africa independent consent may be given by children as young as 12, depending on an unspecified assessment of the child’s maturity. The lower age limit of 12 does not apply to decisions regarding reproduction, including consent to treatment of the child’s child.

2. **Informed consent**
   Informed consent is an ideal required for patients to exercise their right to refuse therapy but not to demand therapy. The patient should be informed in their own language, in terms that are understandable and with sufficient time available for reflection\(^{(3)}\). In the time pressured environment of the ICU this ideal is seldom achieved but as much information as possible should be conveyed by means of family meetings\(^{(4)}\).

3. **Departing from informed consent**
   Consent involves the disclosure of diagnosis and potential therapies including the likely benefits and burdens of therapies. Patients and families should be allowed to express the level of information they are comfortable with receiving. Submission to the suggestions of the intensivist without participation in the process is not consent\(^{(5)}\). Conversely, intensivists should not provide a menu of possible therapies and leave the family to make, and take responsibility for, a decision regarding the death of a loved one\(^{(6)}\). A more realistic goal may be to explain the therapies that are likely to be beneficial and not to offer non-beneficial therapies with a definite recommendation to which the family can assent, rather than consent\(^{(4)}\).

4. **Emergency treatment without consent**
   Treatment without consent may be regarded as assault, if treatment is undertaken with willful disregard for patient wishes\(^{(5)}\). If a patient is unable to convey their wishes and a surrogate is not available, intensivists should proceed with therapy that could be deemed in the best interests of the patient\(^{(7)}\). Such treatment need not be continued if found to be contrary to the patient’s wishes\(^{(5)}\).

5. **Consent for research**
   Research is essential to advance the field of critical care. The ability to conduct research in critical care is significantly hampered by the legal requirement for full informed consent\(^{(9)}\). Even if conscious, a critically ill patient is unlikely to be able to assimilate the information required to give consent. Families are also significantly stressed and may not be aware of the patient’s wishes\(^{(6)}\). Deferred consent is possible but the ethics of using data from patients who die prior to consenting is controversial\(^{(8)}\). Waived consent is not deemed acceptable by most ethicists but should remain and option. No-one wishes to see a repeat of research without consent as conducted in Tuskegee or Nazi concentration camps but Institutional Review Boards and Ethics committees could take a more active role in approving studies, allowing clinicians to obtain assent rather than consent from patients and/or their families\(^{(10)}\).

Consent is an essential prerequisite for therapy and research. Critical Care provides unique challenges in the field of consent that may require a new paradigm to protect patients while advancing knowledge\(^{(15)}\).

**References:**


Conflict of Interest:
Dr Hodgson has received speaker honoraria and travel support from and is an advisory board member for Fresenius Kabi South Africa
10.15 - 10.30

Ethical challenges in end of life care in the 21st century

*Associate Professor Leslie Whetstine*

Most lay people happily have little exposure to the critical care setting. When admission occurs, however, patients and their families experience acute stress and anxiety, coupled with unrealistic expectations of what such technological interventions can hope to provide. Intensive care units in the new millennium have become a breeding ground for ethical conflict, especially at the end of life. This discussion explores the role of ethics in critical care and considers how this field of inquiry may be used to help identify and navigate these challenges before they become intractable.
Great Hall: Pro-Con Debate

11.20 - 12.00

Computerized patient care information (on rounds) is productive

**CON: Professor Timothy G Buchman**

Safe and effective critical care depends on timely access to accurate data. The repeating cycle of assessment-decision-action is fueled by those data, most often made available via electronic medical information systems (EMIS). Those information systems include electronic medical records, PACS (radiology) systems, advanced physiologic displays and may be further enhanced via telehealth and real-time analytics.

In order to use these EMIS effectively, we need to abandon current rounding practices that largely consist of herds of COWS (computers on wheels) in favor of team theaters where caregivers can rapidly find current data in predictable location and sequence while at the same time interviewing and assessing patients with advanced audiovisual systems. These practices promote group engagement, robust discussion, efficient decisions and allocation of tasks, thus enabling caregivers to augment quality time at the bedside instead of in the corridor listening to inaccurate presentations.

It is equally important to build reliable and well-annotated data sets to provide for continuous learning and decision-support tools. We cannot afford to have care depend in experience and eminence. The long learning curve for caregivers can and must be shifted to ensure better performance sooner in career.

Well-engineered EMIS enhances caregiver effectiveness, freeing caregivers from “chasing down results” and allowing them to focus on precision medicine. Well-trained teams must use EMIS, and use EMIS effectively.

“In God We Trust, all others bring data.”

**PRO: Professor David Crippen**

Soulless technology is progressively upstaging physical medical care. Modern residents and fellows are learning that nothing can be trusted unless they can see it on echo, MRI, or a computer screen. Direct patient care is being taken over by mid-level providers: physician’s assistants and nurse practitioners. Robots with TV screens are examining patients for providers miles away. As these “advances” infiltrate clinical medicine, physicians incrementally lose the ability to actually see and feel patients.

The onset of “computerized medical records” has covalently bonded physical computer hardware to medical trainees. They go nowhere without trailing them. Any needed and necessary patient information much be tapped into like Google searches, treating patients as insentient objects and bill-payers (1). Physicians are bound to a soaring learning curve, previously a few seconds to access information now takes many minutes that add up quickly in a busy day. Physicians desiring to use less complex patient data are penalized.

Rampaging technology advances continue to mandate soaring Information Technology costs, increasing complexity of clinical practice and the stagnation of innovation. The U.S. Senate Finance Committee has amassed a thick file of testimony alleging serious computer flaws from doctors, patients and engineers unhappy with current systems (2).

As patient focused medical care providers, we should re-think the real benefits of this clunky, expensive “service”.

References:
GREAT HALL: PRO-CON DEBATE

12.15 - 12.30
SDD - the unused therapy we should be using

CON: Professor Geoff Bellingan

I will develop the theme that although the trials show a benefit for individual patients and patients in an ICU they do not sufficiently address the issue of antibiotic resistance and given the real danger of developing resistance and the lack of effective antibiotics in the pipeline, this is an area we should pay rigorous attention to. This applies not only to resistant organisms but to the risks of c diff and other effects on the guy microbiome. I will also address the question of the impact that we have had on VAP from other approaches including VAP bundles and oral decontamination and the potential for further benefits from approaches such as subglottic suction. Moreover the time-course of antibiotic treatments have reduced significantly and may again alter the picture. If these are included in our armoury then the need for SDD may need to be questions.
Scientific evaluation of protocols in clinical medicine: lessons from ventilator weaning and sepsis

Professor Martin J Tobin

Protocols have been studied intensively in two areas that involve complex decision-making: ventilator weaning and sepsis management. Protocols did not improve outcome in either area. Two fundamental reasons explain these results. One is the fallacy that medicine functions as an episteme, in the manner of geometry. An episteme enables the formulation of precise, invariant laws, and, thus, its rule-governed consequences can be predicted accurately by formal deductive logic. Instead, clinical medicine operates through phronesis (practical reasoning), which deals with events that are discrete or change over time. Phronesis considers each patient unique: decisions are customized for each. The second fundamental problem with protocols is the Whig-interpretation-of-history fallacy. Outcomes in history seem inevitable – every sequence of events appears as though it could not have happened otherwise – but this is only after the fact. There are no conclusive reasons a series of events turned out the way they did – each could have turned out otherwise. Likewise in ventilator weaning or sepsis management, there is no determinate, enumerable set of factors, the totality of which comprises the situation, like an episteme in geometry. At least six groups of investigators have undertaken randomized controlled trials that demonstrate that weaning protocols do not result in improved patient care. Several randomized controlled trials in sepsis management show no improvement with protocolized management compared with usual care. These studies simply show the protocols are worthless; the studies were not designed to detect the harm caused by protocols. One harmful consequence of protocols is their effect on resident training. More than learning facts, trainees need to learn judgment – how to make life-and-death decisions in an uncertain field: phronesis. Involvement in a large number of difficult cases, and storing them in memory, is the road to phronesis (becoming a wise physician). In trying to acquire phronesis, protocols sell trainees short.
GREAT HALL: ARDS 2

14.25 - 14.45
New therapies in ARDS
Professor Geoff Bellingan

This talk will look at the pathophysiology of the syndrome of ARDS briefly so we can understand where to aim new therapies. It will discuss our understanding of lung leak and of the mechanisms controlling this as well as outline our knowledge now of the timing of fibrosis in ARDS. I emphasise the word syndrome as it is the lack of specificity in the aetiology of ARDS that leads in many cases to problems in trial design and may well lead (and have led) to valid treatments being discarded as beneficial effects focused on some patients with ARDS from one cause (or some patients at one end of severity or at one stage of disease evolution) could be outweighed by harmful effects on other patients with other aetiologies (or with a different severity or at a different stage of disease).

I will outline some of the recent advances that have not progressed – including statin therapies where there have been three trial but overall the signal was either of harm or of no benefit. I will mention the keratinocyte growth factor study which also failed and go on to discuss some that are in progress including aspirin, heparin, mesenchymal stem cell therapies and interferon beta. I will focus on the stem cell and interferon beta studies as these are more advanced and with ongoing recruitment in the UK, are more topical.
GREAT HALL: ARDS 2

14.45 - 15.05
ARDS - update

Professor Fang Gao Smith

In this talk, I will cover new definitions of ARDS, stepwise approach to mechanical treatment of ARDS before to discuss pharmacological treatments in ARDS.

Overcoming the limitations of the old definition, the new Berlin definition of ARDS clearly defines the timing, use of CXR or CT as well as ARDS and cardiac failure may co-exist. The Berlin definition removed the term acute lung injury, instead divided severity of hypoxemia into 3 levels: mild, moderate and severe with clear cut off values and minimum PEEP of 5, which is associated with different ICU mortality. The Berlin definition however is still far from perfect.

I will discuss the stepwise approaches and evidenced based interventions for treatment of ARDS for their severity. I’ll outline some potential pharmacological treatments based on clinical trials outcomes. Then I’ll then present our Balti-2 trial to demonstrate harmful effects of use iv salbutamol infusion in ARDS patients.
Oxygen therapy in critical illness

Professor Mike Grocott

Oxygen is essential for maintenance of life in multicellular animals. On the other hand, reactive oxygen species are harmful and hyperoxaemia is associated with a variety of potentially physiological harmful mechanisms. So where does the balance lie between avoidance of hypoxaemia and cellular hypoxia, and the potentially harmful effects of hyperoxia?

Recent clinical data from well-designed clinical trials in a variety of clinical contexts recapitulate data from more than half a century ago suggesting that high levels of inspired oxygen, when compared with lower levels, may be harmful in patients who are not hypoxaemic. Observational data from large cohorts are consistent with this signal. A variety of physiological and molecular mechanisms might explain such a phenomenon. Such data suggest that the unrestricted administration of oxygen, with no concern for the possible consequences of hyperoxia, might not be in the best interest of our patients. Furthermore, the well recognized capacity of normal individuals to adapt over time to low levels of oxygen at altitude, so called altitude acclimatization, suggests that similar adaptative processes may pertain in patients exposed to sub-acute or sustained hypoxia.

These observations raise questions as to what optimal level of oxygenation to target in patients and how we might target oxygen therapy to individuals, between whom a high-level of variability of response might be expected. These questions in turn point to further challenges in identifying biomarkers of susceptibility to and tolerance of both hyperoxia and hypoxia. Concepts such as precise control of arterial oxygenation and permissive hypoxaemia may become increasingly important clinically as this area develops.

References:
Reversal of anticoagulant agents

Professor Marcel Levi

Recently, a new generation of oral anticoagulants (NOACs) with a greater specificity towards activated coagulation factors have been introduced based on promising results regarding efficacy and safety in clinical studies. An initial limitation of these new agents was the lack of an appropriate strategy to reverse the effect if a bleeding event occurs or an invasive procedure has to be carried out.

Recently specific antidotes for NOACs have become available and are now evaluated in clinical studies. For the anti-factor Xa agents (rivaroxaban, apixaban, and edoxaban) a number of studies have shown that the administration of prothrombin complex concentrate resulted in a correction of the prolonged prothrombin time and restored depressed thrombin generation after rivaroxaban treatment in a controlled trial in healthy human subjects [1, 2]. In view of the relatively wide availability of prothrombin complex concentrates, this would be an interesting option, if the results can be confirmed in patients on oral factor Xa inhibitors who present with bleeding complications. More specific reversal can be achieved with a new agent that competitively binds to the anti-Xa agents and that is currently in development [3-5]. Monitoring of the reversal of the anticoagulant effect of factor Xa inhibitors is most simply done by measuring the prothrombin time, although there is some variability between prothrombin time reagents and for some agents the anti-factor Xa assay is more reliable [6].

For the direct thrombin inhibitor dabigatran the administration of prothrombin complex concentrate showed variable results in various volunteer trials and efficacy at relatively high doses in animal studies [1, 7]. Recently, a Fab fragment of a monoclonal antibody was shown to be an effective reversal agent for dabigatran [8]. Monitoring of the anticoagulant effect of thrombin inhibitors in routine clinical practice is difficult. The activated partial thromboplastin time (aPTT) is not very useful. An ecarin clotting time may be more accurate but is not readily available in most routine clinical settings.

References:
Coagulation issues in liver disease

Dr Deepak Govil

The liver plays several key roles in blood coagulation in providing primary and secondary hemostasis. Patients having liver disease present with a variety of hemostatic abnormalities, resulting in “rebalanced” hemostasis leading to increased risk of both bleeding and thrombosis. In liver disease all stages of hemostatic process may be abnormal, including primary hemostasis (platelet deposition and activation), coagulation (generation and crosslinking of fibrin), and fibrinolysis (clot dissolution).

Bleeding still remains to be a major problem in liver disease patients as most laboratory test like prothrombin time (PT) & International Normalised Ratio (INR) reveal factor deficiency but does not provide information on mechanism of bleeding. Most life-threatening haemorrhages are due to portal hypertension rather than the net function of clotting cascade. Nonetheless there are major hemostatic alterations in liver disease like deficiency of clotting factors, hypofibrinogenemia, renal failure and hyperfibrinolysis which all contribute to increased incidence of bleeding.

Thrombocytopenia, due to hypersplenism is common in patients with cirrhosis. It is generally as a result of deficiency of thrombopoietin production. Vitamin-K derived coagulation factors like II, VII, IX, X may become deficient in functioning. These coagulopathies generally do not result in spontaneous bleeding but onset of complications of cirrhosis like bleeding, sepsis or infection may worsen the coagulation status.

The liver disease patients are also at an increased risk of thrombotic complications and despite being coagulopathic, they should not be considered “anti-coagulated”. The modern test of coagulation do not tell the relative ratio of pro-coagulant and anti-coagulant factors and hence is not able to assess coagulation status in vivo. Minor bleeding like gum bleeding and epistaxis is common with coagulopathy but major bleeding mostly results from disbalanced coagulation balance and hyperfibrinolysis.

Other dynamic test of coagulation like Thromboelastogram (TEG®) has been used to assess the various pathways of coagulation cascade and helps in ascertaining the various factor deficiency. This test also guides the clinician about the specific management in the event of major bleeding in these patients.

The use of various agents available for managing the bleeding episodes in liver disease patients depends on the nature and the rapidity of bleeding. Major bleeding from esophageal varices requires rapid correction with Fresh Frozen Plasma (FFP) to replenish factor deficiency and transfusion of cryoprecipitate to correct hypofibrinogenemia. Performing TEG also guides about the need of platelet transfusion if the clot strength is weak as depicted by Maximum Amplitude (MA) on TEG tracing. Prothrombin Complex Concentrate (PCC) is the product of choice in such coagulopathic patients as they provide rapid correction of various factors without volume overload.

Vitamin K injection can be given to replenish the deficient stores but the effect would be slow and represents correction for chronic deficiency. All acute liver failure patients have a deficiency of factor VII and this factor can be replaced in episodes of life threatening bleeds.

In nut shell, coagulation disorders in liver disease is a combination of both bleeding and thrombosis and the management of such patients purely depends on clinical suspicion of bleeding as all test of coagulation will depict the factor deficiency but fail in predicting spontaneous bleeding.
Haemodynamic monitoring by echocardiography

Dr Marek Nalos

Echocardiography has become an indispensable tool for diagnosing structural and functional cardiac and pericardial disease in the critically ill. Its role in the assessment of hemodynamics is increasing due to improved training, more data supporting the interpretation of findings and availability of portable ultrasound devices. Since technology for acquisition and processing of images is getting better, many more patients can be examined successfully by transthoracic echocardiography, diminishing the need for trans-oesophageal echo. This makes echocardiography non-invasive and much less cumbersome than inserting and interpreting data from e.g. the Swan-Ganz catheter. Sonographic assessment by a trained intensivist is a useful guide to the appropriate therapy in patients with compromised circulation or breathing. The choice and the effects of interventions such as intravenous fluid administration, mechanical ventilation, vasopressor or inotropic agents can be monitored when echocardiography is performed serially and in conjunction with other monitoring modalities and perfusion indicators. Chest ultrasound and dynamic manoeuvres such as respiratory variations or passive leg raising during echocardiographic examination can guide the hemodynamic management of almost any critically ill patient, including those post cardiac surgery. The lack of continuous assessment and somewhat subjective nature of certain hemodynamic evaluation remain an acceptable drawback of echocardiography in the critically ill.
CONFERENCE HALL: ULTRASOUND

11.15 - 11.30
SESAME protocol (multisite ultrasound in cardiac arrest)

Professor Daniel Lichtenstein

The most critical application of critical ultrasound - cardiac arrest - is the opportunity for technical considerations. The necessity to immediately detect reversible causes is integrated in the concept of holistic ultrasound. Holistic ultrasound is defined as a discipline where each element interacts with the others, and where the understanding of each of them allows understanding the whole. A narrow machine (not necessarily a laptop), a fast start-on time, a simple keyboard highlighting three useful buttons, a universal microconvex probe able to immediately detect pneumothorax, then deep venous thrombosis, then abdominal bleeding, then pericardial tamponade, then cardiac anomalies will allow a fast protocol. The concept of holistic ultrasound is particularly on focus in the first step done at the lung (search for pneumothorax and clearance for fluid therapy), since the best image is obtained with the simplest equipment devoid of traditional facilities (image filtering, harmonics, time lag, Doppler...). The same simple gray-scale equipment is used for the other steps, all what is needed is to see the real-time image of what is facing the probe: the very principle of visual medicine. The same approach can be used with no change, just more quietly, for many less urgent settings.
How a clinical practice committee helps to prioritize innovations

Dr Stephen Streat

New technology drives health care costs but funding limitations make prioritizing services an unavoidable necessity. Traditionally such decisions have been influenced by the actions of healthcare professionals, patients and advocacy groups, health services managers, third-party funders, media and politicians.

In 2005 the Auckland District Health Board created a Clinical Practice Committee (CPC) to evaluate proposed new technologies. The CPC consists of ~12 clinicians, chosen not to represent service groups, but for their expertise in assessment of evidence and perceived immunity to influence.

The evaluation process requires a description of the nature and size of the patient group to which the intervention will be applied, along with the current and proposed treatment pathways, associated clinical and financial outcomes and the relevant medical literature. A scoring tool is used which gives points to the strength of evidence of benefit for proposals. Higher scores are given for interventions which reduce mortality than for those that reduce morbidity, and for cost-saving interventions, compared to cost-neutral or more costly ones. Additional points are given for very favourable cost-utility ratios. The CPC report to management includes the score along with a recommendation about whether the proposal should be supported and possible conditions. The CPC is not responsible for decisions, only for an evidence-based recommendation to management.

Between July 2005–December 2015 the CPC held 135 meetings, reviewed 68 proposals and 25 other requests. Fifty of 68 proposals (74%) were scored. Scores ranged from 0 (high-dose IV Vitamin C for H1N1) to 115 (Sacral nerve stimulation for faecal incontinence), with a median of 35 (ketogenic diet for paediatric epilepsy). Proposals with scores >60 were significantly more likely to be implemented than those with lower scores. Most proposals scoring <30 were rejected or disinvested. In early 2015 the CPC was expanded to now include clinicians from three adjacent district health boards covering ~1.7 million people.

A CPC, using a simple scoring tool, allows objective comparison of a wide range of health technologies and facilitates decision-making about prioritizing services at local and regional levels.
14.15 - 14.30
Critical Care in low income countries

Dr Frederico Bruzzi de Carvalho

Learning objectives:
To discuss and identify limitations and pitfalls in providing critical care in resource-limited health care systems.

Introduction and background:
Intensive care medicine is expensive and its value to improve a population health status was not well demonstrated yet. Nevertheless, in many countries ICUs are firmly established as a vital element of hospital care, and many of the technics used in critical care may save people’s lives in other settings. Resource-poor countries may vary widely from the complete inexistence of critical care beds to almost the same technology and availability that may be found in rich countries. Brazil has both (and many other) scenarios within the country.

Methods:
Review of relevant data from publications in intensive care medicine in Brazil and other low-income countries.

Results and main message:
Brazil is the world’s fifth largest country, both by geographical area and by population. The Brazilian economy is the world’s eighth largest economy by nominal gross domestic product (GRP) and the ninth largest by purchasing power parity. Despite the economic panorama, Brazil is rated as 73th country in the Human Development Index, by the UNO, 75th in the Corruption Perception Index, by the Transparency International, and is one of the worst countries listed in income inequality metrics. Brazil has two health care systems, one public and another private. Sepsis population research has brought some interesting data on outcomes and costs of both systems and of a developing country performance in various aspects of care in a typical low-income population. Beyond educational and economical aspects, ethical concerns about autonomy-based health care should be discussed.

Take-home message:
Intensive Care is useful in many scenarios in low income countries. Outcomes of critical illnesses may be worse in low income countries. Adapting best evidence from clinical studies done in resource-rich countries may be difficult, mostly because not all variables in care are similar. The environment has to play a role in ethical discussions.
13th Annual Critical Care Symposium & CCM-L Meeting

Faculty Abstracts - Friday 29th April

Conference Hall: Infections

14.45 - 15.00
Where are we now in reducing infections

Professor Rick van Saene

The key to infection control in critically ill patients requiring long term treatment on the intensive care unit (ICU) is to appreciate that there are three different types of infection due to fifteen (six ‘normal’ and nine ‘abnormal’) potential pathogens and each require a different prophylactic manoeuvre.

Exogenous infection can only be controlled by a high level of hygiene, primary endogenous infection by the immediate administration of parenteral antibiotics and secondary endogenous infection by the application of enteral antimicrobials in throat and gut.
Dengue and Zika virus impact in the ICU

Dr Frederico Bruzzi de Carvalho

Learning objectives:
To discuss and identify the impact of emerging pathogens, focusing on two Flavivirus, Dengue and Zika, in causing disease in humans requiring intensive care treatment.

Introduction and background:
Dengue and Zika are mosquito-borne diseases with an explosive dissemination in several countries, including Brazil.

Methods:
Review of relevant data from publications related to Dengue and Zika virus causing diseases that may need ICU treatment.

Results and main message:
We performed a longitudinal, multicenter case series study was conducted with laboratory-confirmed dengue patients admitted to nine Brazilian ICUs situated in Minas Gerais state, southeastern Brazil from January 1, 2008, to December 31, 2013. Demographic, clinical and laboratory data; disease severity scores; and mortality were evaluated. A total of 97 patients were studied. The in-ICU and in-hospital mortality rates were 18.6% and 19.6%, respectively. Patients classified as having severe dengue according to current World Health Organization classifications showed an increased risk of death in a univariate analysis. Nonsurvivors were older, exhibited lower serum albumin concentrations and higher total leukocyte counts and serum creatinine levels. Zika virus was initially linked to many changes in newborn brain development, as new data is being published Zika virus infection may correlated to the development of myelitis and Guillain-Barré syndrome in adults, leading to ICU admission.

Take-home message:
Emerging pathogens may present an additional challenge to ICU physicians. Dengue and Zika virus infection may have severe disease presentations.
Antifungal prophylaxis refers to administration of antifungal drugs to patients who are at increased risk of developing invasive candidiasis (IC). IC is a severe condition which carries a high cost and is associated with significant mortality, that exceeds 50% in many studies. Clinically IC is difficult to recognize and diagnosis is typically based on microbiology, with usually delayed diagnosis and therefore delayed therapy. Therefore, preventing IC is highly desirable; as the risk factors are known, an intervention is available and a window of opportunity exists, it may be logical to pharmacologically prevent IC. IC typically occurs after several days of ICU stay, and is preceded by colonisation in most patients. Although the potential advantages are clear, administering antifungals may be associated with toxicity as well as development of resistance. Although pre-emptive therapy is often confused with prophylaxis, therapy based on lab results such as beta-D glucan concentrations is considered pre-emptive therapy. The concept of antifungal prophylaxis was based initially on retrospective studies that showed that patients who were treated with antifungals had better outcomes. This was confirmed in small, often uncontrolled studies, and this has sparked a widespread application of antifungal prophylaxis to patients with risk factors. When considering antifungal prophylaxis, the low incidence of IC should be considered. This implies that many patients would require therapy to prevent 1 episode of IC. Therefore, identifying high risk patients is crucial to make antifungal prophylaxis efficient; the incidence of IC in a population that could benefit from prophylaxis needs to be 10% or higher.

Several strategies have been devised, such as the colonisation index, the Candida score and various predictive rules. The colonisation index has many drawbacks and has been studied in small patient populations mainly. The Candida score was derived from a large Spanish database, and prospective validation is necessary. The clinical prediction rule is more complex and has recently been further improved. All of these have low positive predictive values whereas negative predictive value is high but still many episodes of IC could not be predicted by the scores. Current strategies are either too sensitive or too specific, limiting their role in clinical practice. Also there seems to be considerable geographical variation.

A recent study in what was considered a population to be at the highest risk of IC, patients with abdominal infections in the ICU, could not demonstrate any advantage of echinocandin prophylaxis. Similarly, caspofungin prophylaxis could not impact IC rates in high risk ICU patients.
LORD MAYORS PARLOUR: ANTIBIOTICS

09.45 - 10.00
The role of procalcitonin and c-reactive protein in antibiotic stewardship: an update

Dr Paul Dark

The National Institute for Health and Care Excellence in the UK have recently evaluated the likely clinical and cost effectiveness of using procalcitonin testing with standard clinical practice to guide antibiotic treatment duration for critically ill patients with suspected sepsis. I aim to review the subsequent evidence-based NICE diagnostic guidance, consider related evidence emerging with c-reactive protein and consider international evidence gaps for these ‘host-response’ biomarkers that need to be addressed to help guide antibiotic treatment duration in sepsis. Related new NICE diagnostic guidance on ‘pathogen-related’ biomarkers in sepsis will be covered in another presentation [28th April 2016: 14.05 – 14.20 Biomarkers in Sepsis: update on NICE diagnostic guidance. In the Conference Hall].
Modelling sepsis research  
Professor Helen Galley

Sepsis continues to be a major cause of death on the Intensive Care Unit (ICU), with an overall mortality rate of around 30%, rising to over 70% in patients who develop multiple organ dysfunction. Treatment continues to be supportive and reactive and testing of novel potential therapies relies heavily on modelling sepsis, in vitro, ex vivo, in vivo in animals and even in human volunteers. There are many cell types which can be used and many compounds which can generate the conditions of sepsis such as lipopolysaccharide, peptidoglycan, fungal proteins, bacteria or even serum from patients with sepsis. Almost every animal species has been used, with various means of precipitating sepsis, for example caecal ligation and puncture or administration of live bacteria or bacterial proteins. However the relevance of these animal models of sepsis has been questioned. A good animal model of sepsis would replicate the human condition perfectly, with the same causes, the same patterns of inflammation and the same metabolic changes. The same invasive monitoring and treatments used in patients would be employed and the time course and outcomes would be similar. Clearly this perfect model does not exist. In addition the balance between animal welfare issues and scientific endeavour need to be considered. Human volunteers given substances such as lipopolysaccharide to replicate sepsis, have also been used to model low grade sepsis, but ethical considerations mean that the severity of the illness does not compare with that seen in ICU patients. Each approach to modelling sepsis has its uses and the data obtained need to be interpreted carefully. However it is clear that new therapies are likely to require initial testing in several models, both in vitro and in preclinical models in vivo.
Benefits of a national approach to the implementation of new technologies

Dr Stephen Streat

Health care expenditure growth is driven by new technology, demographic changes and indication creep. Countries with extensive publicly funded health services (including New Zealand, Australia, Canada and the UK) struggle to meet community expectations within funding constraints, especially in uncertain and economically unfavourable times. Traditional government responses to this dilemma involve setting fixed limits on allocation of public funds within government budgets. These limits are typically coupled with political pronouncements about how these will suffice because of increases in ‘efficiency’, ‘productivity’, ‘innovative ways of working, including constructively with the private sector’ and ‘re-distribution of resources to front-line services’. Health care service providers (district or area health boards, NHS trusts, hospitals and health professionals) are under pressure from the public, device manufacturers and enthusiastic clinicians to use new technologies in providing alternatives to existing treatment pathways or to newly treat patients for whom existing pathways might not be suitable. Health technology assessment (HTA) usually involves an assessment of the efficacy, safety, cost and cost-utility of a new or replacement technology. HTA can provide useful information to managers and clinicians who are decision-makers about funding, assisting them in making hard choices about how resources should best be allocated. However, HTA is conducted in most countries in a way which is not explicitly linked to resource allocation decisions. Furthermore, it seldom compares the outcomes and costs of the existing treatment pathway in a head to head comparison with a new pathway involving the new technology, provided locally. Finally it can lead to recommendations about implementation which are impractical or unaffordable at a local (service provider) level.

Experience in an enterprise which has done such a fine-grained assessment process on a local then regional basis has revealed ways in which failure to provide an integrated process of HTA and associated funding allocation on a national basis can lead to unfortunate outcomes. These can include failure to implement appropriate technology, increasing funding pressures elsewhere within the healthcare system if new technology is ‘creatively funded’ without additional funding, and failure to provide best use of healthcare expenditure if new technology is implemented in a manner which freely allows ‘indication creep’ or ‘unjustifiable clinical practice variation’. Personally familiar examples include ex-vivo hypothermic perfusion of kidneys from deceased donors, trans-catheter aortic valve implantation, idarucizumab for dabigatran reversal and genetic screening in relatives of young victims of sudden cardiac death. New Zealand disestablished two short-duration institutional attempts to integrate HTA with funding from a national perspective. A national body (PHARMAC), responsible for pharmaceuticals, is beginning to enter the devices arena but pharmaceutical HTA is not readily transferable to the comparative assessment of complex treatment pathways.

Intensivists are often at the nexus of clinical consequences of these complex political and administrative issues. We can find ourselves unexpectedly confronted by resultant clinical and ethical problems. At the same time, there are aspects of intensivists practice (overview of many clinical services, multidisciplinary understanding, evidence-based and efficient practice) that provide a strong platform for us to take on leadership and governance roles in these matters.
Promoting patient and family centered care

Professor Ruth Kleinpell

It is well accepted that healthcare has evolved away from a “disease-centered model” to a “patient-centered model” of care, where patients are active participants in their own care. However, focusing on patients’ needs and preferences requires that healthcare clinicians are knowledgeable of the findings of research related to patient-centered outcomes, are equipped with tools for assisting patients and their caregivers to make informed healthcare decisions, and can implement the findings of patient centered outcomes research into clinical practice. To address these needs, a three year project was launched to promote dissemination of patient-centered outcomes research in the ICU, focusing on patient and family centered care. The project used various educational strategies including an interactive website platform, social media, newsletters, podcasts, and a webinar series to disseminate patient centered outcomes research. This session will review the outcomes of the project, highlighting implications for ICU care.

Funding Acknowledgement:
Severe critical illness requiring treatment in the Intensive Care Unit (ICU) may have a serious impact on patients and their families. However, optimal follow-up periods are not defined and data on health-related quality of life (HRQOL) before ICU admission, as well as those beyond 2 years follow-up are limited. Data will be presented on the effects of long-term follow-up at 1, 2, and 5 years after ICU stay using the SF-36 as a HRQOL measure. The impact of critical illness on all domains of the SF-36 will be demonstrated. If pre-ICU HRQOL is regarded as baseline, the question whether patients will generally reach the goal of getting back to baseline after recovery from critical illness will be discussed.
Stoke intervention in the era of stent-retrievers

Professor Thomas P Bleck

The history of modern acute stroke therapy really began with the introduction of intravenous thrombolysis in the 1990s. Prior to that, the major emphases had been on prevention of complications and secondary prevention, as occurs with the use of stroke units. Although some continue to doubt the efficacy of intravenous thrombolysis, I believe that the initial data suggesting a 30% increase in the likelihood of being neurologically normal or near normal (mRS 0 or 1) have held up over time. However, attempts to improve on this improvement with intra-arterial therapy failed to show any clear benefit for the next two decades.

This situation changed in 2015, with the publication of five separate trials of intra-arterial stent-retriever therapy. This technique uses a self-expanding stent to trap and remove the thrombus causing a large arterial occlusion. The figure below summarizes the data:

![Figure 2. Functional Outcomes of Endovascular Therapy vs Standard Therapy](image)

The modified Rankin scale measures functional outcome on a 7-point ordinal scale: 0, no symptoms at all; 1, no significant disability despite symptoms; 2, slight disability; 3, moderate disability; 4, moderately severe disability; 5, severe disability; 6, death. Data on modified Rankin scale score at 90 days was not available for 19 patients in the endovascular therapy group and 8 patients in the standard medical treatment group in IMS III, 28 patients in the endovascular therapy group and 3 patients in the standard medical treatment group in ESCAPE, 29 and 5 patients in the standard medical treatment group in SWIFT-PRIME 30 due to losses to follow-up in these trials.

A. Pooled distribution of modified Rankin scale scores at 90 days stratified by treatment group.

B. Meta-analysis of endovascular therapy vs standard therapy for the outcome of proportional treatment benefit across modified Rankin scale scores at 90 days. Size of data marker for each study is proportional to its weight.

14.30 - 14.45
Prognostication in cardiac arrest

Dr Michael Kuiper

Predicting outcome of patients who are comatose after cardiac arrest remains challenging. The reliability of some methods of neurological prognostication after out-of-hospital cardiac arrest has been questioned since the introduction of induced hypothermia.

The aim of the presentation will be to elucidate the methods that can be used for prognostication after cardiac arrest and to provide data for the prognostic accuracy of clinical neurological findings, the electro-encephalogram (EEG) and the somatosensory evoked potentials (SSEP) in comatose patients.

In the Targeted Temperature Management (TTM) study, a GCS M ≤ 2 had a false positive rate of 19.1% to predict poor outcome. Bilaterally absent pupillary reflexes had a false positive rate of 2.1% and absent corneal reflexes had a false positive rate of 2.2%. The false positive rate for bilaterally absent SSEP N20-peaks was 2.6%.

Bilaterally absent pupillary and corneal reflexes and absent SSEP N20-peaks were reliable markers of a poor prognosis after resuscitation from out-of-hospital cardiac arrest but low GCS M score was not.

A highly malignant EEG in comatose patients after cardiac arrest after rewarming in patients treated with TTM reliably predicted poor outcome in half of patients without false predictions. An isolated finding of a single malignant feature did not predict poor outcome whereas a benign EEG was highly predictive of a good outcome. Targeted temperature management did not alter the reliability of the tests.
Primer on designing safety and reliability into the ICU

Dr Paul Barach

The critical care setting is one of the most complex environments in a healthcare facility. Critical care units must manage the intersecting challenges of maintaining a high-tech environment and ensuring staff competency in operating the equipment, providing high-quality care to the facility’s sickest patients, and tending to the needs of staff members working in stressful environments. While other hospital units may need to manage one or two challenges at a time, critical care settings must manage them all simultaneously and reliably while remaining focused on the delivery of safe patient care.

There has been an important re-conceptualization of clinical risk through emphasizing how upstream ‘latent factors’ enable, condition, or exacerbate the potential for ‘active errors’ and patient harm. Understanding the characteristics of a safe, resilient and high performing system therefore requires research to optimize the relationship between people, tasks and dynamic environments. The socio-technical approach suggests that adverse incidents can be examined from both an organisational perspective that incorporates the concept of latent conditions and the cascading nature of human error commencing with management decisions and actions.

Some ICU teams are able to recover from errors reliably without leading to patient harm, while others do not learn and repeat the same errors. This ‘systems approach’ draws attention to the wider organisation, management, and culture of healthcare. Research reveals, for example, that threats to safety in the ICU are shaped by inter-departmental relationships, attitudinal differences, and cultures that normalize risk.

Efforts to ensure effective participation of patients and families in ICU care are called by many names — patient centredness, patient engagement, patient experience. We will explore the principle’s implications and challenges for service delivery system design and for understanding and measuring benefit in healthcare services.

At end of workshop, participants will be able to:

1. Review the patient and staff harm data from critical care.
2. Explore human factors, work assessment and social technical and reliability theories that underpin moving towards safe and reliable ICU care.
3. Appreciate how successful intensive care improvement initiatives can yield a wide range of safety, quality and service benefits that are both qualitative and quantitative.
4. Recognize and learn to effectively address barriers for change in clinical practice.
5. Appreciate the power of authentic co-production of ICU outcomes.

References:

Death from multi-organ failure associated with disseminated varicella zoster virus (VZV) infection in an immunosuppressed patient: presentation and management in critical care

BL Powell; AJ Churton
Chesterfield Royal Hospital

Introduction:
The authors present the case of a 43 year old man who developed multi-organ failure from disseminated VZV infection whilst receiving immunosuppressives for ulcerative colitis (UC) treatment. Whilst usually VZV is a self-limiting infection, in certain susceptible adults it can present secondary life-threatening complications.

Case:
A 43 year old man presented to A&E with acute abdominal pain and a rash on his forehead. The rash was not described in the medical notes initially. He had a background of UC treated with sulfasalazines and high-dose prednisolone. He started mercaptopurine 3 days previously as part of a research trial. He was treated for constipation and discharged the next day. The following day, he returned to A&E when his wife found him in a semi-conscious state with a swollen face and tongue, and bleeding blisters over his face. It was then noted that his two children were recovering from chickenpox at the time. He had developed a widespread haemorrhagic rash to his face and torso, with pustules discharging seropurulent fluid. Treatment for anaphylaxis plus IV acyclovir was given. The facial swelling warranted intubation and he was taken to ITU. Blood tests showed acute renal failure, acute hepatic failure and abnormal clotting suggesting disseminated intravascular coagulation (DIC). (PT 37.9, APTT 59.8, and fibrinogen unobtainable). CT scans of the thorax and head revealed pneumonitis and a small intracerebral haemorrhage. Despite transfusions of cryoprecipitate, fresh frozen plasma and platelets for DIC, and inotropic support, he deteriorated, developed unresponsive hypotension and died. The time from first admission to death was 3 days.

Discussion:
Chickenpox is a common infectious disease of childhood caused by VZV. It is highly contagious but usually self-limiting, and rarely causes secondary complications.[1] Adults and immunosuppressed patients however are at increased risk of the potentially life-threatening complications of a primary VZV infection; with adult males generally being more severely affected than adult females or children.[2] Reported complications in the immunosuppressed include pneumonia, encephalitis, hepatitis, and haematological disorders such as DIC, as demonstrated in this case.[1,3] Mortality rate is high in the immunosuppressed, with one study reporting a rate of ~30% in renal transplant patients.[4] DIC can complicate various disease processes, with bacterial sepsis being one of the most common and well known associations. Some degree of DIC frequently occurs with varicella, as well as hepatitis and cytomegalovirus infection; it is mostly with the immunocompromised that the clinically apparent and life-threatening manifestation is seen. Early treatment is of utmost importance, via aggressive antiretroviral treatment and supportive measures.[5]

Conclusion:
This case highlights the importance of early diagnosis and treatment of both VZV infections in adults, and DIC to prevent life-threatening complications. Treatment should begin early, and involve aggressive antiviral treatment and supportive measures. Whilst DIC is less frequently seen in viral infections than in bacterial sepsis, clinicians should be aware of this complication, especially in the immunosuppressed. Vaccination of susceptible adults against VZV should perhaps be considered to decrease morbidity and mortality from complications.

References:
Invasive systemic aspergillosis associated with a primary immunodeficiency disorder: presentation and management in critical care

AJ Churton; BL Powell
Chesterfield Royal Hospital

Introduction:
This case report discusses the difficulties in diagnosing invasive aspergillosis (IA) in patients with a primary immunodeficiency disorder (PID), and what guidance is available to assist diagnosis and management.

Methods:
A 28 year old man with a history of PID, autoimmune enteropathy, PCP chest infections, reoccurring pyloric stenosis, and a 6-9 month decline in health, was admitted with diarrhoea for which a bowel biopsy was taken. This bled profusely requiring transfusion, and he was later discharged. 3 days later he was admitted with abdominal pain, shortness of breath, confusion, and sepsis thought to be due to bowel perforation. The patient was in metabolic acidosis, admitted to ITU and the colonoscopy was found to show no active colitis. Bowel perforation was ruled out. Broad cover was started for fungal, viral and bacterial infections. PCP and CMV PCRs were negative, however beta-D-Glucan and serum galactomannan were raised and a sputum culture grew aspergillus: strongly suggestive of IA. His respiratory function declined, resulting in intubation and ventilation. A profound metabolic acidosis developed despite ventilation. Treatment was withdrawn and the patient died. Post-mortem showed IA in brain, liver and lungs.

Results:
IA is typically a disease found in those with haematological cancer, but has recently become more prevalent in ICUs. Immunosuppression not secondary to malignancy are also at higher risk of IA, with a study showing 64% of IA cases without underlying malignancy[1]. IA has a mortality rate of >60%[2], and does not have reliable symptoms so diagnosis is often missed. PID covers a range of diagnoses including innate and adaptive immune deficiencies (e.g. neutropenia, B-cell, T-cell, combined immunodeficiency) which require extensive management and carry a high risk of opportunistic infections. The agreed definitions of IA remain a tool for research[3], and is only validated in a narrow subset of patients[1], although algorithms are now available to aid diagnosis in broader populations.

Conclusions:
This report discusses the presentation and critical care management of PID and IA. An externally validated clinical algorithm, serum investigations and high suspicion of atypical infections, may help guide decisions in similar situations.

References:
Oxycodone and sertraline - an uncommon but serious drug interaction

Dr H Ivatt
North West Deanery

Description:
A 41 year old male was brought to A+E by paramedics after becoming increasingly agitated whilst on holiday with friends. He presented in a highly anxious state and was experiencing hallucinations and myoclonus. He was tachycardic, pyrexial and diaphoretic. Initial blood results showed a profound acidosis and creatinine kinase of over 2000. He was intubated and ventilated after becoming unmanageable and risking further personal injury. His past medical history included depression and chronic back pain. He was prescribed sertraline and oxycodone, and also took regular paracetamol and ibuprofen. His oxycodone use had recently increased due to uncontrolled pain and physical dependency. A diagnosis of serotonin syndrome secondary to oxycodone and SSRI use was made. He was extubated after 48 hours, renal function and creatinine returned to normal and his pyrexia and sympathetic plethora resolved.

Discussion:
Several drugs commonly used to treat chronic and acute pain have serotonergic activity and can, when co administered with patients regular medications, cause the potentially fatal and poorly recognized serotonin syndrome. The opioids of the phenylpiperidine series have been frequently associated with serotonin syndrome as they are weak serotonin reuptake inhibitors [1]. The non serotonergic opiate oxycodone is not a well recognized precipitants for the syndrome with only 5 cases found in the literature [2-6]. With oxycodone being increasingly used in chronic and acute pain, especially when morphine is poorly tolerated [7] it is important for the intensivist to recognize the interaction as a potential differential for the patient on SSRI’s presenting with agitation and sympathetic plethora.

Acknowledgements:
Submitted with the verbal permission of the patient

References:
2. Walter C, Ball D, Duffy M, Mellor M, J.D, An Unusual case of Serotonin Syndrome with Oxycodone and Citalopram, Case reports in oncological medicine 2012, 2090-6714
Warrington stabilisation trolley

R Fijten, A Old, A Abdulgalil, V Chetty
Warrington and Halton Hospitals NHS Foundation Trust

Introduction:
When deteriorating patients are admitted to ICU the first few hours involve a process of stabilisation. This process is very complex. It involves: anaesthetising the patient with anaesthetic drugs, intubating with airway equipment, maintaining ventilation with sedation drugs, providing IV fluids and inotrope drugs. This process is time critical and good outcomes very much depend on speed of action.

Our ICU staff grade Anaesthetists had commented on a lack of efficiency in stabilizing deteriorating patients admitted to our ICU. Often it was incoherent and disjointed taking 30-45 mins to complete. All of the elements mentioned above were quite often stored in different places, at a distant site from the patient. This makes it time consuming to organise and in a time critical process may result in poor outcomes.

Method:
During the months of July and August 2015 we sent an email to all medical and nursing staff on Warrington ICU to inform them of our intention to develop a single trolley and asked them to feedback on what they felt should be included.

Results:
At the end of this period we reviewed the feedback and prepared the trolley.
Custom made anaesthetic box and drugs and labels
Airway equipment and intubation equipment
Rapid Sequence Induction checklist (for intubation)
Sedation drugs and inotrope drugs and infusion equipment
IV fluids and infusion equipment
NG feeding tube
Aseptic Pack (dressing pack, hat, mask etc.)

In September 2015 we carried out a stabilization trolley simulation on our ICU. We developed a deteriorating patient scenario and found that without the trolley the scenario was completed in 21 mins. With the trolley the scenario lasted 10 mins. The most significant change we noted was that with the trolley no staff exited the stabilization zone.

Conclusion:
We are unaware that there is a similar trolley in any ICU in the UK. ICU have as standard, a resuscitation trolley and following the NAP4 report, a difficult airway trolley. Both are required to meet the need to have the right equipment in the right place at the right time. But despite their presence they are rarely used. All deteriorating patients admitted to ICU need stabilisation and this involves a myriad of drugs and equipment. It seemed obvious to us that a Stabilisation Trolley would be more often needed and used and therefore even more necessary. Assembling the Trolley was a Team building exercise in itself. The inclusion of a Rapid Sequence Induction checklist for intubation was an excellent suggestion. We know from the WHO surgical checklist that checklists improve outcomes and we may be able to repeat this for ICU. There has been an upsurge in requirement for better Teamwork and Leadership and communication skills. This has followed on from reports by Francis and Berwick. Already our Stabilisation Trolley has engendered a culture of better Teamwork and communication. We hope to use it also to assist in simulation training and developing Leadership roles. We hope in time all ICUs and all areas where urgent stabilisation is needed will incorporate the Warrington Stabilisation Trolley. In the Keogh Report, ambition No1 was a challenge to us to address improvements in deteriorating patient I think we have identified a need in the management of the deteriorating patient and filled it with our innovative idea.

References:
1. www.rcoa.ac.uk/nap4
3. Review into the quality of care and treatment provided by 14 hospital trusts in England: overview report Professor Sir Bruce Keogh KBE 16 July 2013
New ICU IV fluids - very NICE

A McNally, J McCann
Warrington and Halton NHS Hospitals Foundation Trust Acute Care Team

Introduction:
Following a review of NICE IV Fluid Guidelines CG1741, Warrington Hospital’s Acute Care Team introduced a new Trust IV Fluids policy in August 2015. ICU’s are exempt from the guidelines.

“They also do not apply to patients needing inotropes and those on intensive monitoring, and so they have less relevance to intensive care settings “

However, our ICU was looking to standardise our approach to maintenance fluids. On review of the new ICS standards2 we could find nothing regarding IV fluid therapy. Therefore, senior clinical staff on our Unit felt that the NICE regime of IV 4% dextrose and 0.18% sodium chloride at a volume of 25-30ml/kg/day as the maintenance fluid, should also be our standard.

Method:
Following the introduction of the Trust policy in August 2015, data was collected prospectively from patients on the ICU in Nov/Dec 2015. Patients started on a 24hr maintenance fluid were identified during the daily Consultant ward round. We examined: the IV fluid prescribed to the patient, the rate of infusion, the patients weight and the amount of fluid prescribed over a 24 hour period.

Results:
The most commonly prescribed fluid for these patients was 4% dextrose with 0.18% sodium chloride, which was prescribed to 16 out of the 17 patients (94.1%). The remaining patient was prescribed Plasma-Lyte as their maintenance fluid (5.9%). When comparing the rate of infusion in millilitres per hour, as a ratio of the patient’s weight, an average of 1.072 ml/kg/hr was administered across the 17 patients. The range of values varied from 0.714ml/kg/hr to 1.96ml/kg/hr.

Using the NICE guidance of a patient receiving 25ml/kg/day of water, 12 of the 17 patients received less maintenance fluid than the recommended amount (70.59%), with a variance between 1100 ml and 75 ml less than recommended. 3 patients received more IV fluid over a 24-hour period than NICE recommendations (17.64%), with a variance of 100ml to 200 ml more than recommended. 2 patients received the correct amount of IV fluid over the 24-hour period (11.76%).

Conclusion:
As can be seen from the above results, fluid prescribing on our unit is generally well managed and performed to a high standard in accordance with NICE guidelines. Of the 17 patients prescribed IV fluids, all were placed on appropriate maintenance fluids, with 16 of the patients placed on the fluid recommended by NICE and the ICU as first line therapy. We made 3 other observations: the old habit of 125ml/hr standard has gone, we had less K bolus episodes when using 20mmol K with maintenance and bolus fluid with colloid was infrequent. In conclusion, our ICU has chosen to adopt NICE guidance on the use of IV 4% Dextrose and 0.18% Sodium Chloride at a volume of 25-30ml/kg/day, as the maintenance fluid of choice. The vast majority of patients were prescribed this fluid and at a volume close to expected. In the absence of any ICS or Critical Care Network standards we propose that NICE guidelines CG174 should be used in ICU and will help to standardise fluid prescription and could improve outcomes.

References:
1. www.nice.org.uk/guidance/cg174
Preoperative rationalisation of critical care requirements for EVAR patients

Dr Euan Mackay, Dr Jochen Seidel
Doncaster and Bassetlaw NHS Foundation Trust

Introduction:
There is a heterogeneous approach to the postoperative care of EVAR patients. The utilisation of critical care facilities varies widely between institutions, with Doncaster Royal Infirmary (DRI) indiscriminately admitting all patients to critical care.

This project aimed to validate a pragmatic and evidence based tool to facilitate preoperative rationalisation of the need to book postoperative critical care facilities for elective EVAR patients in DRI.

A literature review was carried out to establish the relationship between postoperative EVAR outcomes and critical care utilisation. A variety of retrospective observational studies compare preoperative risk factors with early postoperative mortality, however none collected data on critical care utilisation. As such, the effect of a higher level of care on postoperative outcomes is yet to be determined.

The largest observational study, which analysed 22830 Medicare EVAR patients in the USA, used regresional analysis to make associations between the preoperative factors and in-hospital mortality. Risk factors were advanced age, female gender, renal failure, dialysis dependency, chronic heart failure and cerebrovascular or peripheral vascular disease.¹ A simple additive scoring system was developed to quantify the risk of early mortality (Table 1).²

The Medicare EVAR risk score was chosen for analysis on the Doncaster population because it is a user friendly scoring system and because it was developed using a highly powered observational study. The aim was to identify a cut-off for the risk score which would safely reduce the volume of critical care admissions based on the critical care interventions received by previous patients.

Methods:
Data was retrospectively collected on all elective EVAR patients in Doncaster Royal Infirmary between the 03/04/2013 and 25/03/2015. Preoperative variables collected included those necessary to calculate the Medicare risk score along with others including the ASA and ECHO results.

Records were made of the postoperative number of days of cardiovascular (CVS), respiratory (RS) and renal support along with the level of care and delays in discharge from critical care.

The above information was gathered from the national vascular database and the local critical care, radiology, laboratory and ECHO databases. The paper notes were reviewed in cases with incomplete data.

After tabulating the results and calculating the Medicare risk scores, data analysis was undertaken to establish a link between the preoperative and postoperative variables.

Results:
All elective EVAR patients were booked for critical care postoperatively, with 4 patients being cancelled due to the unavailability of a bed postoperatively. 60 patients went on to have the procedure, with no deaths before hospital discharge.

Of the 60 patients, 13 received intravenous infusions for cardiovascular support. Table 2 compares the features of the cohort who received CVS support to those who did not. Table 3 demonstrates the accuracy of a Medicare risk score of ≥11 at differentiating the need for CVS support.

One patient was invasively ventilated on critical care postoperatively. Prophylactic CPAP was administered to 20 of the 60 patients as part of another trial.

None of the patients were dependent on dialysis preoperatively and none received postoperative renal replacement therapy.
Discussion:

This was a retrospective study and as such CVS support was delivered at the discretion of the critical care physician as per the local EVAR postoperative guidelines. The care package includes a goal to maintain the mean arterial blood pressure within 20% of a value which the operative Anesthetist stipulates.

Applying the cut-off of a score ≥11 as the threshold for booking critical care would exclude 52% of this cohort from planned admission. In terms of assessing the need for postoperative CVS support the score had a sensitivity of 62%, specificity of 55%, positive predictive value of 28% and negative predictive value of 84%.

The primary concern is the risk of causing harm by depriving patients of critical care, especially if they would have otherwise received a specialist intervention. Based on the above statistics, only 8% of the patients would be assessed as low risk yet would have otherwise gone on to receive CVS support. The service must be responsive to the needs of this cohort, and it is hoped that patients can mostly be identified prior to departing the postoperative recovery area in order for an unplanned critical care admission to be arranged.

Respiratory disease is not a predictor of post- EVAR mortality¹ and prophylactic CPAP did not reduce the need for advanced respiratory support postoperatively in EVAR patients in a separate trial in DRI. Analysis of the association between preoperative factors and postoperative respiratory support was therefore not undertaken.

Conclusion:

The Medicare risk score is easy to use and it can be used to assess the need for planned critical care admission. This may benefit patients and the health service because of reduced chance of cancellation and reduced length of stay in critical care.

References:


Conflicts:

There are no conflicts of interest to declare and no external funding was received.

Contact:

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A comparison of the Hospital Anxiety and Depression Scale and Intensive Care Psychological Assessment Tool in patients on Critical Care

D Alston, N Mason, DH Conway
Manchester Royal Infirmary, Central Manchester University Hospitals NHS Foundation Trust

Introduction:

Critical illness is associated with high levels of anxiety & depression which can be long lasting, affecting both patients and their families and impacting on quality of life (1, 2). Some will develop post-traumatic stress disorder following the acute illness and the NICE guideline CG83 recommends that patients are assessed for acute distress (3).

Hospital Anxiety and Depression Scale (HADS) was developed as a snapshot assessment of psychological morbidity for hospital in-patients and has been validated in Critical Care Follow Up Clinic patients with a cut-off of ≥8 /14 for each domain for mild distress and ≥11/14 for significant morbidity(4).

The IPAT tool has been validated in critically ill patients as a screening tool to detect acute distress in critical care patients once they are awake, alert & orientated, with a cut off ≥7 / 20 indicating morbidity.(5).

The aims of this survey are to measure and compare screening of acute distress in patients recovering from critical illness or major surgery, being cared for in the critical care ward, using IPAT and HADS at the two cut-offs for severity.

Method:

Prospective data was collected by interviewing critical care patients. The assessment tools were administered to patients who were off sedation>24hours and CAM-ICU negative. Data were collected between May and July 2015 and uploaded to an electronic database as part of a service improvement project. We analysed data using SPSS v22 for sensitivity and specificity and measured the area under the receiver operating characteristic (ROC) curve.

Results:

50 patients completed HADS & IPAT simultaneously. 11 patients scored ≥8 & 9 ≥11 for HAD Anxiety. 18 scored ≥8 & 8 ≥11 for HAD depression. 19 scored ≥7 on the IPAT. Compared to the combined borderline and abnormal HADS ≥8 the IPAT was found to have good sensitivity (0.6) and specificity (0.7308). The ROC curve demonstrates an area under the curve of 0.665 (95% CI 0.504-0.827), see Figure 1.

Compared to abnormal HADS ≥11 the IPAT showed a sensitivity = 0.7692 and specificity =0.7273 area under the ROC curve of 0.748 (95% CI 0.588-0.909) see Figure 2.

Figure 1: ROC curve comparing IPAT to combined abnormal/borderline HADS
Conclusion:
IPAT can be administered to many communicative, non-delirious patients in critical care. There was reasonable agreement with HADS when assessing psychological distress.

References:

Declaration of Interests:
DC has received travel expenses and speaker fees from Orion Pharma.
Donor optimisation 2016 – where are we?

Appukutty Jithesh
Norfolk and Norwich University Hospitals NHS Foundation Trust

Introduction:
Donor optimisation has been introduced nationally as a care bundle to promote consistency, as the percentage of organs transplanted has been consistently lower than the potential. This is recognized in 2015 strategy publication Taking Organ Transplantation to 2020.

Methodology:
Data was collected for patients who had fulfilled the criteria for brain stem testing over a two-year period in a large teaching hospital. The donor optimisation care bundle document was used to record the data collected.

Results:
The compliance with the major components of the bundle was >50% except with methylprednisolone, where it was 17%. The extended care bundle had varied compliance among the various modalities.

Conclusion:
The compliance with the care bundle was variable among the components with good compliance with entities closely related to normal clinical practice. Significant areas of improvement were highlighted, which has prompted the need for a standard operating procedure along with small changes, which would help in early identification of donors and optimising the physiological changes associated with brain stem death.

Data to support:
Twenty-three donors were included in the study from 2012-2014.

Figure 1: Care bundle
**Figure 2: Extended care bundle**

**References:**

**Conflict of Interest:**
No conflict of interest
End tidal carbon dioxide and capnography, the importance of a change in culture: an 18 month audit and quality improvement project

J Hickman, N Rashid, C Walker
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Introduction:
The fourth National Audit Project (NAP4) raised particular concerns about complications of airway management in the Intensive Care Unit (ICU). The failure to use, or absence of, end tidal carbon dioxide (etCO2) monitoring (wave form capnography) was a significant contributor to 70% of those deaths related to an airway complication in the ICU. Subsequently the Association of Anaesthetists of Great Britain and Ireland stated that compliance with its use must be 100%. Despite the significant contributions of continuous capnography monitoring to patient safety its universal use was still noted to be lacking. We evaluated the level of compliance in this ICU and consequently implemented sustainable change to maximize patient safety over an 18 month period.

Methods:
A data collection tool was used on 4 selected weeks at intervals 0, 6, 12 and 18 months. See table 1 for data fields collected. During data collection weeks the tool was used on the ICU morning ward round. Between 0 and 6 months the following primary actions were taken to improve compliance; Addition of capnography/etCO2 to the nursing intentional round and raising awareness amongst the nursing staff during handover and on study days. Between 12 and 18 months the following further actions were taken to improve compliance; Implementation of a visual prompt on all work stations, all nursing staff trained how to adjust channels on monitor, teaching sessions on NAP 4 to raise awareness amongst medical staff and finally encouraging a culture of joint responsibility amongst the multi-disciplinary team (MDT).

Results:
Table 1. Data collected from 449 patients over the 18 month period

Conclusions:
In order to change clinical behaviours it is important to address both technical and cultural barriers. In doing so over an 18 month period we were able to bring about an increase in the use of wave form capnography and etCO2 monitoring. Increased use has resulted in a reduction in adverse clinical events during the past 6 months related to airway dislodgment. These data have highlighted the time necessary and importance of engaging the whole MDT when initiating change on such a large scale.

References:
Secondary Survey’s in Major Trauma Patients Admitted to Critical Care at Salford Royal Foundation Trust

Amrit Rai
Salford Royal Foundation Trust

Background:

Salford Royal Foundation Trust (SRFT) is the lead Major Trauma Centre’s (MTC) in the Greater Manchester Trauma Network. It is also a Neurosciences Tertiary Centre. It receives a high volume of major trauma patients (MTP) and patients with traumatic brain injuries (TBI) - a significant proportion of these patients are transferred to the Critical Care Unit (CCU). Literature reviews of MTP and Secondary Survey’s (SS) show a significant amount of missed injuries and delayed diagnoses, ranging from 1.3-39%, 15-22.3% of these are clinically significant. Furthermore and pertinent to SRFT - these numbers increase when patients are admitted with a Glasgow Coma Score <8. I wanted to audit SRFT performance in this respect to assess if there was room for improvement.

Method:

Analysis of electronic patient records (EPR) and radiology of 25 consecutive MTP’s admitted to CCU, either directly or indirectly. The list of patients was acquired from the Major Trauma Team, patients are classified as MTP’s if they have an Injury Severity Score (ISS) > 15. I assessed what percentage of patients received SS’s, how long this took, whether SS was repeated, whether a tertiary survey was performed, were any new injuries found - including after discharge from CCU.

Results:

Only 48%, (12/25) patients received a SS

0% of indirect admissions (6/25) received a SS

Mean time to SS: 07:01 hrs

Only 16.6% (2/12) had their SS repeated

16% (4/25) had a Tertiary Survey

28% (7/25) found to have further injuries: displaced fractures of distal 2nd and 4th phalnix with avulsion fracture of 5th proximal phalynx, Soft tissue elbow injury, Large scalp laceration, haematoma R hip (no fracture), 3 x lacerations

0% had any injuries discovered post-discharge from CCU

Conclusion:

Despite there not being injuries documented post-discharge from CCU, analysis of the results shows significant room for improvement. There is a low number of patient’s receiving SS’s. It is also worth noting that 0% of patient’s admitted indirectly received a SS - this could be for a number of reasons such as doctor’s assuming one had already been done, viewing TBI patient’s as separate from MTP’s and assumption of a patient’s stability as a precursor to transfer. SS’s were not repeated often enough, by the nature of SS’s they are an assessment which should be repeated at regular intervals to minimise the risk of missing pathology. The results also showed there is significant room for improvement in the performing of tertiary surveys. Given the small sample size it would be beneficial to perform a larger study. The current study has highlighted that not only are there areas of improvement but suggest clinicians would benefit from further teaching regarding MTP’s and morbidity, SS’s and tertiary surveys.

References:


Acknowledgements:

SRFT Major Trauma Team
SRFT Audit Team
Dan Horner and Tony Thomas - audit and trauma leads
New-onset atrial fibrillation in Intensive Care: incidence, management and outcome

Sophie Jenkins, Ruth Griffin

Intensive Care, The Hillingdon Hospitals NHS Foundation Trust, Middlesex

Introduction:
Atrial fibrillation (AF) is a common arrhythmia in critically ill patients. However, data evaluating AF in the non-cardiac intensive care setting are limited. The objective of this study was to describe the incidence, management and outcome of new-onset AF in patients admitted to non-cardiac intensive care.

Methods:
We performed a retrospective review of consecutive patients admitted to the intensive care unit (ICU) of a district general hospital over a 10-month period. Patients with pre-existing AF and ICU admissions for routine postoperative monitoring were excluded.

Results:
The study population consisted of 330 critically ill patients admitted to the ICU during the 10-month period. The incidence of new-onset AF was 10% (n = 33). 55% of patients with new-onset AF were male and mean age was 73 ± 11 years. The medical notes were available for review for 26/33 patients. Patients with new-onset AF frequently had evidence of sepsis (81%), respiratory failure (62%), circulatory shock (38%) and acute kidney injury (31%). Mean ICU day when AF occurred was 2.7 (range 1 - 10). Rhythm control strategy was used as first-line therapy for the majority of patients: 81% received intravenous amiodarone and 12% underwent electrical cardioversion for haemodynamic instability. 23% received beta-blockers and 23% digoxin as second-line therapy. 69% of patients were anticoagulated with heparin infusion or therapeutic-dose low-molecular-weight-heparin. 31% remained in AF at time of ICU discharge. New-onset AF was associated with longer ICU length of stay (median 6 days versus 3 days, \( p = 0.04 \)) but not hospital mortality.

Conclusion:
New-onset AF occurs in 10% of patients admitted to non-cardiac intensive care and is associated with longer ICU length of stay. Further multicentre studies are needed to determine the optimal management and anticoagulation strategies for new-onset AF in critically ill patients.
Improving the safety of airway management for patients in intensive care through multi disciplinary education

R Frank, R Hine, P Frank, M Smith, L Bates

On behalf of Greater Manchester Critical Care Network RICON Airway group

1Royal Preston Hospital, 2University Hospital South Manchester, 3Bolton NHS Foundation Trust

Introduction:
In March 2011 the 4th National Audit Project (NAP4) found a disproportionate number of reported airway events occurred on intensive care units (ICUs). Reasons highlighted for this included a lack of; skilled staff, planning, equipment and appropriate responses to unfolding events. Inadequacies in education and training were felt to contribute in 58% of adverse events. In response to this the Greater Manchester Critical Care Network have developed a multidisciplinary team (MDT) training day on safe airway management in ICU.

Method:
The first Safe Airway Management on ICU (SAMI) training day was in April 2014. The course was designed to meet the individual learning needs of the MDT by providing information and experience relevant to their role in airway management on ICU.

The aims of the course were to
- Improve patient safety when intubating on ICU
- Develop the MDT skills required for intubation in an ICU patient
- Train key people across the region with the aim of creating a core of skilled people to distribute it to their own trusts

By the end of the course candidates should be confident to undertake their role in; an emergency intubation, a difficult intubation and a can’t ventilate situation on ICU.

The day was developed, using feedback from the candidates, to include pre and post course reflection, on-line pre-course material, practical airway stations, simulation scenarios and group discussion on human factors.

All candidates were asked how confident they felt in managing the airway on ICU before and after the course and for their feedback on the course.

Results:
Four SAMI courses have subsequently run since 2014, with sixty four nurses and twenty five doctors attending from twelve hospitals across the Greater Manchester region. Feedback found that 99% would recommend the course to a colleague and 99% said the course mostly or fully met their learning needs. 98% agreed or strongly agreed that the aims of the course were met. Comments from the most recent course include; “excellent course”, “enjoyed it very much”, “it was a great day” and “all ICU nurses should so it compulsorily”.

Candidates were asked to rate their confidence in an emergency intubation, a difficult intubation and a can’t ventilate situation on ICU, between 1-5 (where 1=not at all confident and 5=extremely confident), before and after the course. The percentage of candidates who described themselves as confident or extremely confident went from 52% to 91% when performing an emergency intubation, from 19% to 79% when performing a difficult intubation and from 8% to 66% when encountering a can’t intubate and can’t ventilate situation on ICU.

Conclusion:
As demonstrated by NAP4 there is a need to improve safety in airway management on the ICU, training is an important part of that process. The SAMI course provides MDT education using a range of different teaching techniques and is shown to improve the confidence of all in the management of the airway on ICU.

References:

Acknowledgements:
The SAMI course is funded by the Greater Manchester Critical Care Network.
Trends in inspired oxygen fraction during general anaesthesia: a retrospective audit

Reynard Knoetze, Timothy Wigmore
The Royal Marsden NHS Trust

Introduction:
Oxygen supplementation is a key therapy in anaesthesia, but recent evidence points to detrimental effects. According to human and animal studies, high concentrations of inspired oxygen can cause a spectrum of lung injury, ranging from mild tracheobronchitis to diffuse alveolar damage. With this in mind, using the least amount of oxygen to maintain homeostasis seems logical. Data on intraoperative oxygen use and trends in the literature is scarce. This audit determines current anaesthetic practise in a cancer centre over 5 years.

Methods:
To describe trends in intraoperative supplementation of oxygen an audit in patients undergoing general anaesthesia from 2010 to July 2015 was performed.

Results:
The fraction of inspired oxygen (FiO2) was recorded in a total of 18,529 anaesthetics in the study period. The average FiO2 per anaesthesia was calculated and from that the average FiO2 per year was determined.

<table>
<thead>
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<th>Year</th>
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<td>2010</td>
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<td>2014</td>
<td>57.30</td>
</tr>
<tr>
<td>2015</td>
<td>36.03</td>
</tr>
</tbody>
</table>

Conclusions:
Over the last five years, the average FiO2 during general anaesthesia has decreased. This trend corresponds to a growing body of evidence and awareness that FiO2 should be reduced to as low as needed during anaesthesia.
Combining the SIRS criteria and EWS to aid early prediction of sepsis

Haroon Waqar-Uddin¹, Sarah Ingleby², Steve Jones²
¹Northwestern Deanery, ²Central Manchester Foundation Hospitals Trust

Background:
The early diagnosis of infection can be challenging. Clinical signs are often non-specific. Microbiological diagnosis at present can take days but evidence shows that the early diagnosis and treatment of infection improves outcomes, specifically giving antibiotics within one hour [1]. This led to the development of the SIRS criteria which comprised of physiological variables together with the white blood cell count. These could all be done rapidly to work as a screening tool for patients with sepsis. The gold standard for diagnosis of infection is positive microbiological samples. However, C-reactive protein (CRP) has been used as a non-specific marker or inflammation or infection. Research shows that a raised CRP has a high sensitivity but low specificity so could potentially be useful as a rule out test for sepsis [2]. The SIRS criteria has been criticised as having a low specificity for sepsis. Recent research has suggested that Early Warning Scores (EWS) may be a better indicator [3]. The aim of this study was to assess if a composite score of 2 or more SIRS criteria and EWS greater than or equal to 3 could be useful as a predictor to improve early diagnosis of sepsis. Because definitive diagnosis of sepsis is difficult, we used either an abnormal CRP (>3mg/l) or positive blood cultures as evidence of possible infection.

Method:
In our institution there is a computer based system which collects physiological variables along with the patient’s WCC and if the patient scores 2 or more on the SIRS criteria, the clinical team can be alerted as to the possibility that their patient has SIRS and therefore to screen them for infection. Using a computer database, we retrospectively looked at all the patients who scored 2 or more on the SIRS criteria. We then looked at these patients early warning scores (EWS), the patients CRP and whether they went on to have any positive blood cultures.

Results:
We looked at 300 consecutive patients who scored 2 or more on the SIRS criteria. Of these patients, 208 had an EWS of less than or equal to 3 and 92 had an EWS of 3 or more. Of the 92 patient who had 2 positive SIRS criteria and EWS greater than 3, 90 had an elevated CRP or positive cultures, whilst 118 had a normal CRP and negative cultures. Of the 92 patients who score on SIRS criteria but not had an EWS of less than 3, 46 had an abnormal CRP or positive cultures and 46 did not. Using a two by two contingency table, this gives a sensitivity of 34%, a specificity of 72% and a positive predictive value of 0.5.

Discussion:
A CRP of less than 3 is a reasonable (though not absolute) indication that a patient is unlikely to have an infection, i.e. a rule out test. Positive blood cultures may also indicate the presence of infection. Unfortunately, combining the EWS and SIRS criteria to form a composite score did not accurately predict either an abnormal CRP or positive blood cultures. However, there are a number of limitations of the study. Firstly, there is no definitive diagnosis of infection. As explained above, we used a normal CRP of less than 3 as a rule out test for infection. Clearly this is not ideal as it is non-specific for infection. In addition, it is retrospective analysis involving relatively small numbers. However, there is no indication from this data that using a composite score of SIRS and EWS would be clinically useful for predicting those patients who may have an acute infective or inflammatory illness.

References:

Acknowledgements:
Thanks to Darren Griffiths, Data Manager, Central Manchester Foundation Hospitals Trust
Propofol infusion syndrome (PRIS) in an 18 year old male with traumatic brain injury

S Chandrashakeriaiah, A Herbert, JR Adams
Royal Preston Hospital

Introduction:
Propofol is the commonly used sedative agent in adult intensive care units (ICU). Its short elimination half-life makes its use ideal during prolonged periods of sedation. Propofol infusion syndrome (PRIS) is a rare but life-threatening complication of such sedation. The clinical features of PRIS include severe metabolic acidosis, rhabdomyolysis and renal failure, cardiac failure and cardiac arrest. Patients on a Propofol infusion over 48 hours at a rate greater than 5mg/kg/h are more prone to developing PRIS. However, cases have also been reported with infusions at lower doses. Other risk factors include patients on steroids, low carbohydrate diet, vasopressors, and acute neurological or inflammatory illnesses.

Mortality is around 51% and incidence is just over 1%. Traditionally described in paediatric patients, there have been increasing case reports of PRIS in the adult population.

Case Report:
We describe a case of PRIS in an 18-year-old male with a traumatic brain injury who suddenly suffers an asystolic cardiac arrest. Since his injury he has been intubated and ventilated on a neuro-intensive care unit and has been receiving high dose sedation for maximal management of his intracranial pressure. There is no past medical history of cardiac or metabolic disease.

He has return of spontaneous circulation and is investigated for the cause. Previously in atrial fibrillation, the ECG now shows 1mm ST elevation V3-V4 which dynamically changes to left bundle branch block. A profound hypokalemia secondary to diabetes insipidus has unexpectedly climbed to 7.2mmol/ml, but without cardio-toxic ECG changes. His unexplained cardiac dysfunction is supported with inotropes and vasopressors. The serum creatinine kinase, lactate and potassium continue to rise with a concomitant acute kidney injury, requiring intensive haemodialysis. The combination of events is consistent with a diagnosis of propofol infusion syndrome.

Initially a cardiac cause was suspected and the patient continued to be sedated with propofol for a further 24 hours, until PRIS was considered and the infusion stopped. The patient received multiple organ support over the next few days and steadily improved. He was weaned of all organ support and made good neurological recovery. He had residual renal impairment but did not require long-term dialysis

Discussion:
This case report emphasizes the importance of having a high index of suspicion of PRIS in the adult population. This young man had the risk factors of age, a traumatic brain injury and a Propofol infusion dose exceeding 4mg/kg/hr for several days. Cardiopulmonary resuscitation, cardiac and renal organ support and cessation of the propofol infusion avoided death in this case. We hope such cases widen the knowledge and awareness of this potentially fatal condition across the adult ICU.
Simulation based education for epidurals - reduce fear and error

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Hawkes Bay District Health Board, New Zealand

Background:
Within Hawkes Bay, New Zealand, uncomplicated epidurals for post-operative analgesia are managed on surgical wards with close anaesthetic input. Increasingly, alternative regional techniques have been preferentially utilised for major abdominal operations, but occasionally, there still remains a role for the epidural. Unfortunately, practical and theoretical unfamiliarity with epidurals increase the possibility of errors occurring, and nursing staff report feeling stressed when caring for a patient with an epidural. These human factors expose our patients to potential harm.

Simulation Based Education (SBE) provided an opportunity to introduce a guide that facilitated 3 domains: 1) Primary assessment 2) Troubleshooting and when to escalate 3) Escalation communication framework.

This guide would be located by every epidural pump accessible to every practitioner.

Methods:
Our guide covers the assessment of the ‘normal working epidural’, as well as common problems and epidural emergencies. These were developed in-line with our trusts acute-pain management guidelines. An SBAR style communication aid was developed to facilitate concise, epidural specific information delivery.

Introducing this guide was initially through didactic lectures which covering basic science and physiology. This was followed by a 4 stage demonstration on how to assess and identify problems, and how to communicate problems succinctly and efficiently.

Outcomes:
The epidural guide was popular amongst nursing staff and subjectively felt to improve confidence in routine care of an epidural. The communication guide empowered staff to feel confidence in recognising potential emergencies with application of succinct phrases that conveyed the appropriate level of urgency for review.

SBE to introduce was felt to have greater impact on the individual learner than lectures, with positive feedback highlighting the opportunity to practice in a supervised and psychologically safe setting was unrivalled.

Future directions of would be auditing the practical applications of this guide for those who ‘regularly’ use it.
Cooling down and getting it right, for us: simulating malignant hyperthermic emergencies in Hawkes Bay, New Zealand

Sharda Chandrasekharan¹, Tracey Hanna², Dave Baxendale²
Guys and St Thomas’ Foundation Trust, UK
Hawkes Bay District Health Board, New Zealand

Background:
Within Hawkes Bay, New Zealand, uncomplicated epidurals for post-operative analgesia are managed on surgical wards with close anaesthetic input. Increasingly, alternative regional techniques have been preferentially utilised for major abdominal operations, but occasionally, there still remains a role for the epidural. Unfortunately, practical and theoretical unfamiliarity with epidurals increase the possibility of errors occurring, and nursing staff report feeling stressed when caring for a patient with an epidural. These human factors expose our patients to potential harm.

Malignant Hyperthermia (MH) is a rare anaesthetic emergency that prior to the use of dantrolene, had an expected mortality of >80%. Compared to the national average, the incidence of MH susceptible individuals is greater within Hawkes Bay, New Zealand. A robust systems operational procedure (SOP) for MH management is essential and can be tested by Simulation Based Education (SBE).

Methods:
We tested our existing MH SOP which was developed from the Australasian MH society. An actor was prepped with anaesthetic standards of monitoring, with decoy cannulae and airway. This was presented to unaware delegates as an anaesthetised patient, with signs of MH. Two embedded practitioners (anaesthetist and assistant) declared the emergency.

Participants coordinated the MH treatment using our SOP using expired equipment and drugs. The scenario ended when a treatment dose of dantrolene was delivered, and the patient stabilised for transfer to the Intensive Care Unit.

Feedback evaluating the SOP was collated immediately and presented to the department. Adjustments were re-evaluated by SBE.

Outcomes:
1. SBE facilitated an practical educational opportunity for managing MH within Hawkes Bay Hospital.
2. Feedback exposed the need to reduce cognitive load when calculating the dantrolene dose. The response was weight-based dose-chart.
3. SBE identified unfamiliarity with the location where the MH trolley lies and where additional drugs and equipment can be found.
4. A latent threat exposed that during public holidays, extra dantrolene would not be available. This prompted diversion in resources to permit the private hospital to transfer their supplies during times of their closure.

Conclusions:
SBE and testing existing SOPs allows tailoring of generic protocols to suit local needs. SBE provides an safe opportunity to identify latent threats and human factors that can compromise patient safety and has potential roles that can be extrapolated beyond theatres.
Using in situ simulation to identify latent threats during critical care airway management

*Sharda Chandrasekharan, Colette Laws-Chapman, Chris Langrish*

*Guys and St Thomas' Foundation Trust*

**Background:**
Outcomes from the National Audit Project in 2011 (NAP4), revealed that 20% of all airway incidents occurred in the ICU with over 60% of patients coming to significant harm—death, or significant brain injury. The incidence of harm was much greater than found in anaesthesia, or the emergency departments.

Tracheal intubation within critical care is acknowledged as being more challenging due to patients’ limited cardiorespiratory reserves and urgency.

Multiple human factors contribute. NAP4 highlighted that airway skill mix of doctors and nurses was variable. Rotational staff may be less familiar with intubation setup in new environments. Intensive care units are also a ‘hostile’ environment with crowded spaces and poor patient accessibility.

Training for managing emergency airway situations is an area that GSTT take seriously. Locally adopted strategies to improve airway safety include: regular multidisciplinary education days; dedicated difficult airway trolleys; intubation checklists and equipment dump-sheets.

Within GSTT critical care, we have used in situ simulation to combine these safety strategies and:

1. Identify latent threats when preparing for intubation in Intensive Care (ICU) and High Dependency Units (HDU).
2. Rehearse the management of the unexpected difficult intubation.

**Methods:**
Two scenarios were designed to rehearse an urgent intubation and the management of the unexpected difficult intubation.

Scenarios were conducted in real-time, with multidisciplinary staff that were scheduled to be on shift. These were practised in critical care environments (HDU and ICU) using comparable monitoring and actual equipment that would be used in a real-airway emergency. Delegates were expected to contact appropriate staff for help as they would normally, in real-time.

Post scenario, focused debriefs explored positive actions, management options, and identification of latent threats present within our environment.

**Results:**
Multidisciplinary teams were re-orientated with the set up of intubation trolleys and safety strategies present within GSTT.

Latent threats were identified:

1. Battery malfunction in a videolaryngoscope
2. Shortage of intubation checklists
3. Delays in getting skilled help to distant HDU sites
4. Absence of immediate-equipment for a can’t intubate, can’t oxygenate situation in HDU

**Discussion:**
In situ practice of emergency airways was positively received by both nursing and medical staff as well as patients and their relatives. Strengths included familiarity with infrequently used kit, protocols and airway-trolley design with options to improve to needs. Sharing our identification of latent threats with improvement strategies formed an important part of improving patient safety.

There were drawbacks. One simulation took over 45 minutes to reach the desired end point. This was related to the challenges of getting the right level help to the simulated emergency which was identified as a latent threat. The impact for clinical staff following the simulation added time pressures to their day. On balance however, the educational exposure was felt worthwhile, despite this.
Conclusions:
The benefits of in situ practice allow important staff development and systems testing of high-stakes procedures. Future directions of Critical care simulation need to focus around overcoming barriers to delivery surrounding bed spaces, time pressures and staff availability.

References:
Handover

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Queen Elizabeth The Queen Mother Hospital

Background:
During a patient’s admission, there are many periods in which they may become vulnerable. A key time is during transfer between healthcare teams, particularly from the intensive therapy unit (ITU) to a general medical or surgical ward. This is considered one of the most challenging and high-risk transitions due to the change in environment, staffing ratio, facilities and monitoring available. Timely and accurate transfer between teams regarding the patient’s condition, investigations undertaken and the treatment provided is crucial in ensuring patient’s safety and effective continuation of care plans by receiving providers. Despite organisational practices in place in recognition of this fact i.e. the SBAR handover form, handover between the teams are often suboptimal which may, unfortunately, lead to medical errors and adverse events to patients. This audit was undertaken to establish adherence to current handover practice in view of identifying potential barriers to effective implementation and areas for improvement.

Objective:
The aim of this study was to evaluate whether safe and effective patient handover was occurring at discharge from intensive therapy unit (ITU) to a general medical/surgical ward.

Method:
244 patients were ‘discharged’ from ITU between 1st April 2015 and 31st August 2015, which was identified using Ward Watcher TM software (Critical Care Audit Ltd, Yorkshire, U.K.). The relevant patients’ data was also then collaborated from this software, which also included the date and time of both hospital and unit admission and then the discharge of both, including the patient outcome at hospital discharge. Each patient were then paired with their standardised ICU SBAR handover form and a retrospective analysis was performed, to assess whether they were a quality handed over on discharge with further evaluation regarding the time of discharge. Of the patients who were not handed over, we also assessed their admission outcome and whether there were any variation regarding who was working.

Results:
Of the 244 patients identified who were discharged from ward Watcher TM software, 188 were used for analysis. Of these 188 patients, only 66% patients had a relevant ICU SBAR handover form completed. Only 4 of the standards were met with 100% (reason for ICU admission; treatment to date/progress and events; suggested management in ward and contact of ICU doctor that handed over). Of the remaining standards to be met: position of ICU doctor that handed over; date/time of ICU discharge documentation were particularly poor (<80%). From the 188 patients, 55 patients (29%) were discharged out of hours (weekdays 20:00-8:00 and on weekends) and only 20 of these patients had a SBAR form completed which meant 64% of patients were not safely stepped down from ITU to the receiving medical/surgical team which may have led to potential errors. In total, there were 18 patients who survived ITU but later passed away during their admission (9.5%). Of these 18 patients, 11 patients didn’t have a documented SBAR handover form (61%), of which 8 patients were discharged from ITU during out of hours and only 3 patients were handed over on discharge (37.5%). We also identified who was working during these shifts and whether a standardised handover form had been completed or not. In 40% of cases a trainee was on duty and the remaining 60% a locum/staff grade member was on duty over the period of study. If we look specifically on patients that died and not been handed over, trainees were on duty in 5 cases and locum/staff grade in 6.

Conclusions:
Out-of-hospital discharges from ICU are associated with an increased mortality because patient care is inconsistent during night and weekend hours due to reduced hospital staffing and cross-coverage of physicians. In Australia, New Zealand and Scotland about 15% of the ICU discharges occur out-of-hours. In our period of study, 29% of patients were discharged out-of-hours, most often due to a lack of ward beds. This has been a recurrent problem at the QEWM hospital, which has subsequently been flagged by CQC. Despite more patients been discharged during out-of-hours, hospital mortality rate was slightly better than patients discharged in-hours (4.2% vs. 5.5%). The outreach team have been a viable source in providing an all year round 24/7 service to help maintain the continuity of care for patients who have been stepped down to the ward from ITU.

In conclusion, however, adherence to the SBAR handover form is not meeting its standard. A quality and informative handover must occur for every patient who steps down to a general ward from ITU. In this audit, however, we did find that of the patients who had a documented SBAR handover, the 3 most important standards were met (i.e. reason for ITU admission, treatment to date/progress and
suggested management in the ward) which ensured the minimal appropriate continuation of care in the ward. We discovered 2 main problems from our audit. At the QEQM hospital, two handovers between the ITU medical staff occur before the on-call doctor starts his duty. This may lead to a greater chance of error, depending on the number of patients that need to be handed over. The other problem is that there is a wide coverage, during the out-of-hours, by non-regular staff such as locums or non-ITU staff grade and therefore, they are less familiar with the general 'routine' and standard taken place at the QEQM Hospital.
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