colloquium

# Vail 2020

10<sup>th</sup> Annual Winter Symposium in Intensive Care , Anaesthesia and Emergency Medicine January 12-17, 2020

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## Faculty

Jürg Hammer MD Head, Division of Intensive Care Unit & Pulmonology, UKBB, Switzerland

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Andrew Numa MBBS FRACP FCICM Director, Intensive Care Unit & Honorary Consultant in Respiratory Medicine, Sydney Children's Hospital

Tracey O'Brien MBChB FRACP MHL BSc

Head, Blood & Marrow Transplant Program, Director & Head of Clinical Service, Kids Cancer Centre, SCH

Meredith Ward MBBS FRACP PhD

Neonatologist, Royal Hospital

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## Program



All lectures held in Piney function room, level 3, Four Seasons Vail

#### Sunday January 12

6 - 8 pm Welcome Reception & Registration, Remedy Bar, Four Seasons, Vail

#### Monday January 13

7:30 am	Registration & Breakfast

- 8:00 am Signal & noise: statistical pitfalls in the medical literature Andrew Numa
- 9:30 am Session close
- 4:00 pm Afternoon refreshments
- 4:30 pm The neonatal microbiome John Mills
- 5:30 pm Extubation of the child with difficult airway in the ICU Jürg Hammer
- 7:00 pm Session close

#### **Tuesday January 14**

- 7:30 am Registration & Breakfast
- 8:00 am Recognition and management of the unwell neonate Meredith Ward
- 9:30 am Session close

#### Wednesday January 15

- 7:30 am Registration & Breakfast
- 8:00 am Empyema Jürg Hammer
- 9:30 am Session close
- 4:00 pm Afternoon refreshments
- 4:30 pm Lines, tubes and wires procedural errors in the PICU Kit Newth
- 5:30 pm Oncological emergencies Tracey O'Brien
- 7:00 pm Session close

#### Thursday January 16

- 7:30 am Registration & Breakfast
- 8:00 am CARS, CRISPR, Eugenics and a brave new world Tracey O'Brien
- 9:30 am Session close

#### Friday January 17

- 7:30 am Registration & Breakfast
- 8:00 am Milk John Mills
- 9:30 am Session close
- 4:00 pm Afternoon refreshments
- 4:30 pm Big data, AI and critical care Andrew Numa
- 5:30 pm Conference close

A certificate of attendance will be issued shortly after the event concludes.



#### Signal & noise: statistical pitfalls in the medical literature

Andrew Numa

A rigorous approach to statistical analysis is required in order to adequately interpret findings reported in the medical literature. Significance of reported results depends on many more factors than simply meeting an arbitrary benchmark p (for alpha) = 0.05. The discussion will focus on several of the more common pitfalls await the poorly prepared reader or researcher including:

- Correlation is not causation
- Correlation is not transitive
- Multiple analyses have a high probability of generating a "significant" result
- A large enough study will almost always generate a "significant" result
- Effect size is as important as alpha but is rarely considered
- Lindley's paradox and the importance of power
- Reversion to mean and interval selection

Manipulation of data by selective republication and evidence of substantial biases as suggested by widespread phacking indicate that a large proportion of the literature might well be of dubious merit. A lack of reproducibility of the majority of published research lends further support for this premise. More than a decade after loannidis first asserted that "almost all published research findings are false" little progress appears to have been made.

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#### The neonatal microbiome

John Mills

Understanding of the human microbiome is in its infancy. The neonatal microbiome is even less well understood but significant progress has being made. Events around the time of birth may have a dramatic effect on the development of a newborn infant's gut microbiome, which can persists into childhood. Such changes have been shown to predispose an individual to significant health risks. In particular, mode of birth seems to be a very important factor; attempts to make up for the lack of exposure to microorganisms in the maternal genital tract for infants born by elective Caesarean section is attracting research interest. In the preterm infant, perturbations to the development of a normal gut microbiome are more exaggerated still; the use of probiotics has the potential to safeguard this group from complications of infection. Finally, the challenges faced by many new parents to an infant with fussing ('colic') have also attracted the interest of researchers.

### Extubation of the child with difficult airway in the ICU

Jürg Hammer

#### Recognition and management of the unwell neonate Meredith Ward

Of neonates presenting to ED, 75% do so with feeding and settling problems. Approximately 25% of neonates presenting to ED, however, will be admitted. Signs and symptoms of serious conditions overlap with those of the well but unsettled infant. Rapid triage and accurate risk assessment is therefore vital.

High risk infants include preterm and low birth weight infants, and those with underlying and perhaps undiagnosed cardiac and metabolic disorders. Early discharge from maternity wards, and to some extent from NICUs due to bed issues, may increase likelihood of presentation of neonatal collapse to ED.

Infection, including late onset Group B Streptococcal infection, gram negative sepsis and viral sepsis or encephalitis remain common causes of neonatal collapse post discharge, as are duct dependent cardiac lesions, seizures and intestinal obstruction or malrotation with volvulus.

The unwell or decompensated newborn presenting to ED presents a diagnostic and management challenge even to experienced clinicians. Rapid assessment, routine stabilization, and multipronged treatment for likely causes while awaiting definitive diagnosis are the key to survival with improved outcomes in these infants.

Empyema Jürg Hammer

#### Lines, tubes and wires - procedural errors in the PICU

Kit Newth

In more than four decades of consultant intensive care practice Professor Newth has encountered a wide variety of procedural misadventure. This talk will highlight some of the more egregious examples.

#### **Oncological emergencies**

Tracey O'Brien

Emergencies can occur at any time during cancer. Some emergencies manifest at time of diagnosis, some occur because of therapy and some manifest at time of progression or recurrence of disease. An oncologic emergency may be defined as any acute potentially morbid or life-threatening event directly or indirectly related to a patient's cancer or its treatment. Oncologic emergencies may be categorized by their system of origin, for example, metabolic, haematologic, cardiothoracic or neurological. Four common oncological emergencies will be discussed using case illustrations, including superior vena cava syndrome/ mediastinal mass, tumour lysis syndrome, acute spinal cord compression and hyperleukocytosis and consequent leukostasis.

#### CARS, CRISPR, Eugenics and a brave new world

Tracey O'Brien

Emerging new therapies including gene therapy, immunotherapies and gene editing have the potential to revolutionise modern medicine. CARs have been described by many as the most important medical breakthrough of the decade and CRISPR as the greatest scientific discovery in 30 years since polymerase chain reaction (PCR) was developed. An overview of these new therapeutic tools will be presented with practical focus on relevance to emergency and intensive care providers. Both successes and controversies of these novel therapies will be discussed including concerns about eugenics and the controversial birth of the first CRISPR twins.

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Milk John Mills

#### Big data, AI and critical care

Andrew Numa

It is estimated that the quantity of data in the world has increased 100-fold in the last two decades, and for the first time in history almost 100% of this information is digital. An exponential increase in computer processing power as forecast by Gordon Moore in the early 1970s allows for meaningful analysis of myriad data streams. The "data revolution" has the potential to improve medical care on several fronts. Dynamic clinical data monitoring allows real time interpretation of multiple physiologic parameters to improve patient management and outcomes, for example by detecting early signs of sepsis or reducing ventilator-induced lung injury. Data-mining of large open source patient databases such as MIMIC and PCORNET can be used to refine drug doses - generating age, gender, and race-specific dosing recommendations rather than using the same simple per kg calculations for all patients. Large databases can be searched for propensity-matched cases, allowing for pseudo-RCT research, at a fraction of the cost of conducting prospective trials. Useful epidemiological data can be derived from monitoring internet search and social media, the prototypical example being Google flu trends. True artificial intelligence is beginning to emerge as a powerful clinical tool that can be utilised to optimise outcomes. Despite the great promise that big data offers, caveats remain. Many "big data" sets are not primarily collected for research purposes, and may be less representative than the "n=all" that is often assumed. Repeated hypothesis testing on large datasets increases the risk of false positive results. The advent of big data does not change the fundamental truth that correlation and causation are different entities. Finally, privacy concerns exist, even when data sets are de-identified. Nevertheless, big data offers the promise of new research opportunities and the potential for improved patient care.

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