



Optimising Paediatric ventilation

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Study outline

To establish the evidence for lung recruitment in critically ill paediatrics in a tertiary Paediatric Intensive Care Unit

- RCT, n=60

'Lung recruitment post endotracheal suctioning in mechanically ventilated paediatrics'



Study outline

- Cochrane Reviews X 2

'Lung recruitment to reduce respiratory morbidity in mechanically ventilated paediatrics '

'Lung recruitment to reduce respiratory morbidity in mechanically ventilated neonates'



Rationale

Lung recruitment has been established in adult populations to restore end expiratory lung volume, maintain oxygenation and reduce the incidence of Ventilator Associated Lung Injury (VALI) in mechanically ventilated patients

Rationale

- VALI results from positive pressure ventilation
 - VALI is an iatrogenic injury that is largely unavoidable
 - Lung protective ventilation strategies have reduced the incidence of VALI but it continues to rate at ~30% of intubated and ventilated children
 - Vt at 6-8mls/kg
 - Low FiO₂
 - ±lung recruitment
 - VALI increases the length of ventilation and length of PICU stay
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Our study

- Intubated children that have an arterial line in situ
 - Crossover design
 - a. Double baseline Positive End Expiratory Pressure (PEEP) manoeuvre for 2 minutes post endotracheal suction
 - b. Incremental increase and decrease in (PEEP) up to 18cmH₂O
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- First suction is the 'control' group
 - Two hour washout period
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- Randomize so either 'Double PEEP' group or 'Incremental PEEP' group
 - Two hour washout period
 - Either 'Double PEEP' or 'Incremental PEEP'
 - Two hour measurement period
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Measurements

Physiological measurements

- heart rate & rhythm
- blood pressure via arterial line

Oxygenation

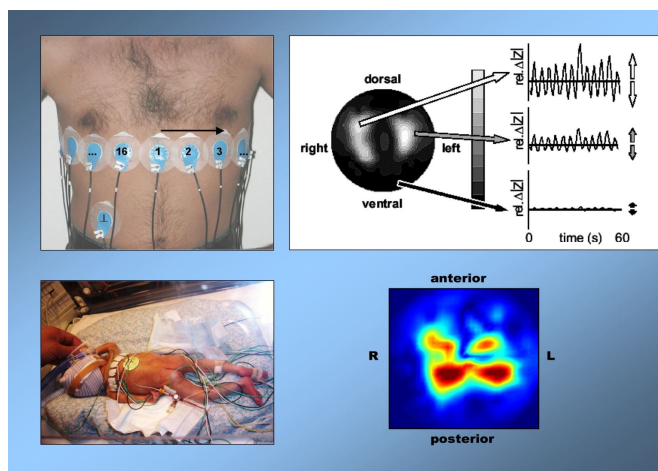
- saturation
- regular blood gases

USCOM

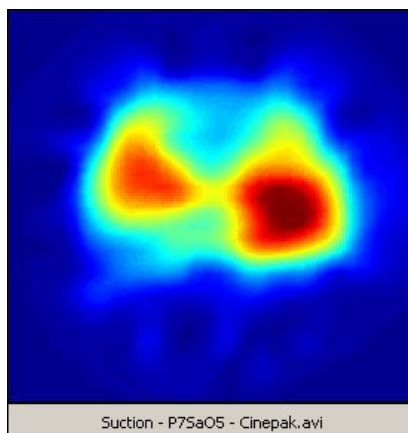
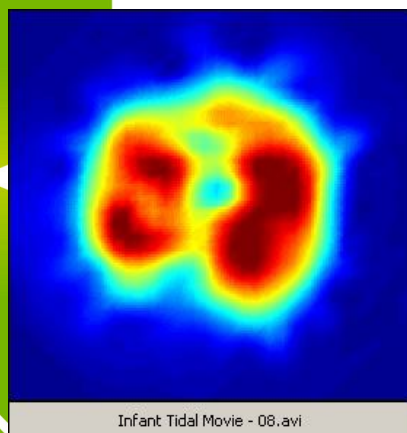
- non-invasive cardiac output measurement

Electrical Impedance Tomography

Electrical Impedance Tomography

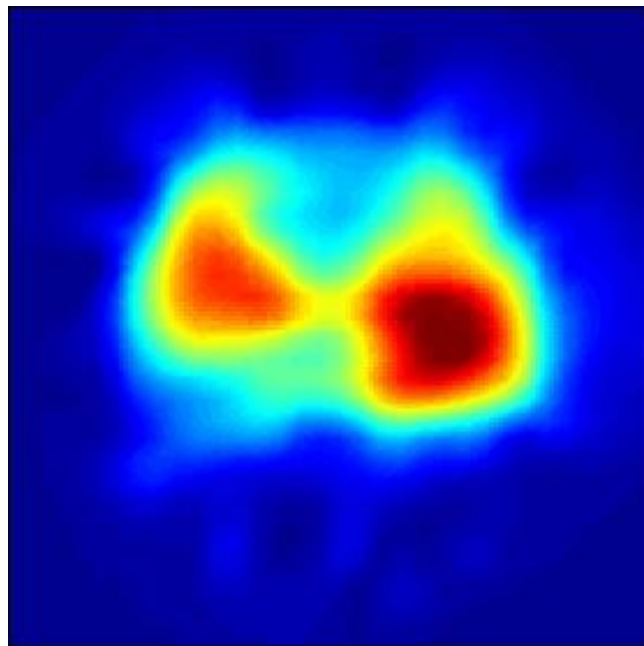


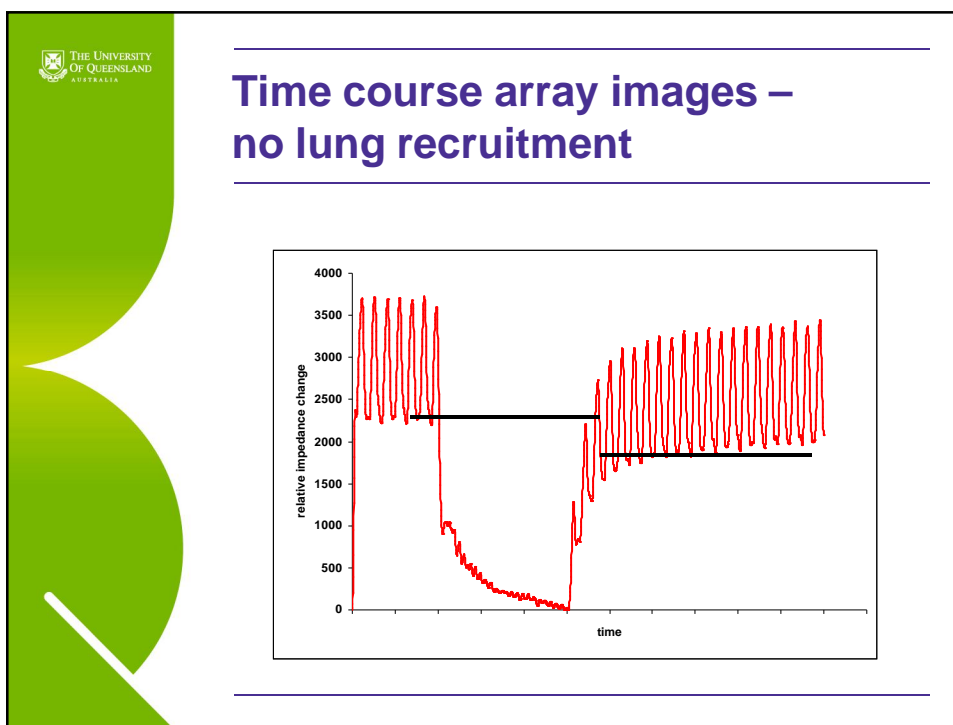
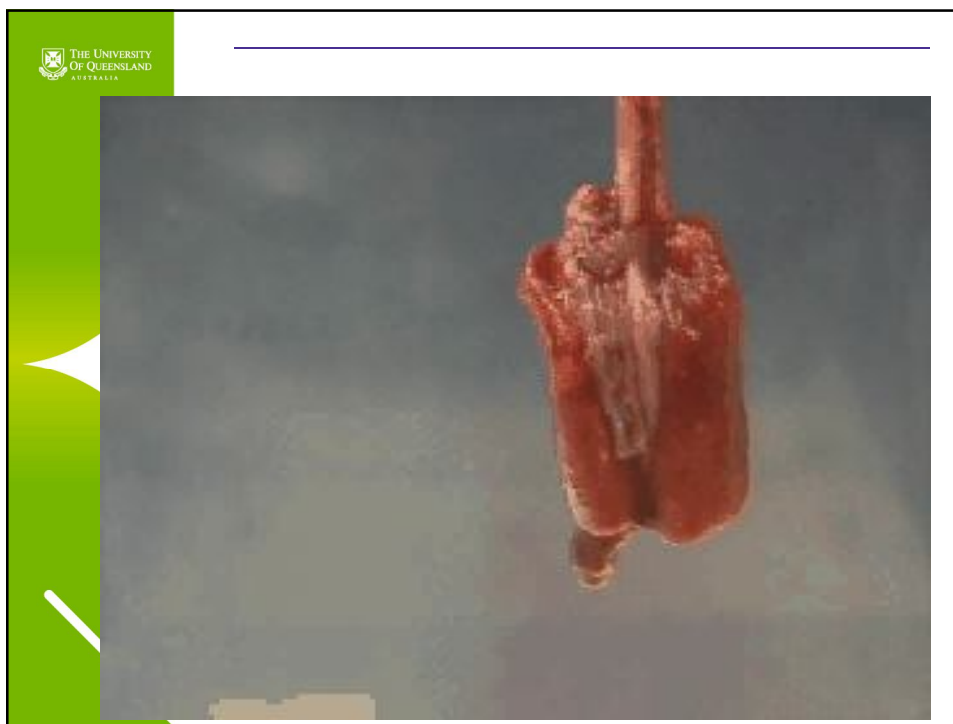
EIT images



Electrical Impedance Tomography

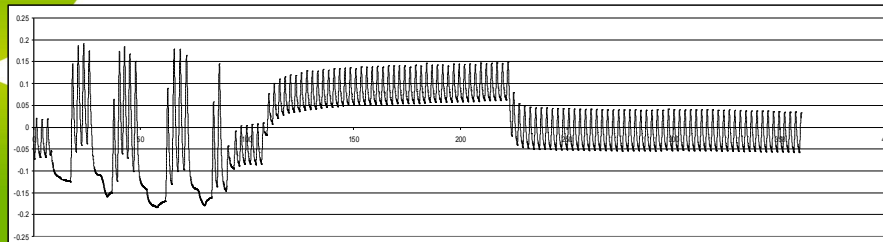
- Electrical current passed through the 16 electrodes around chest wall providing us with a cross sectional image of the thorax
- Every pixel represents tidal volume change
- Map generated as a result of the variability in electrical impedance between tissue, air and fluid
- Measures the impedance to the electrical signal caused by biological tissue
- Calculate - this is represented by colour scale



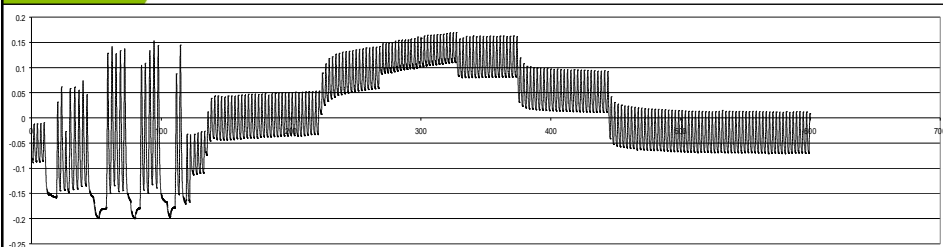


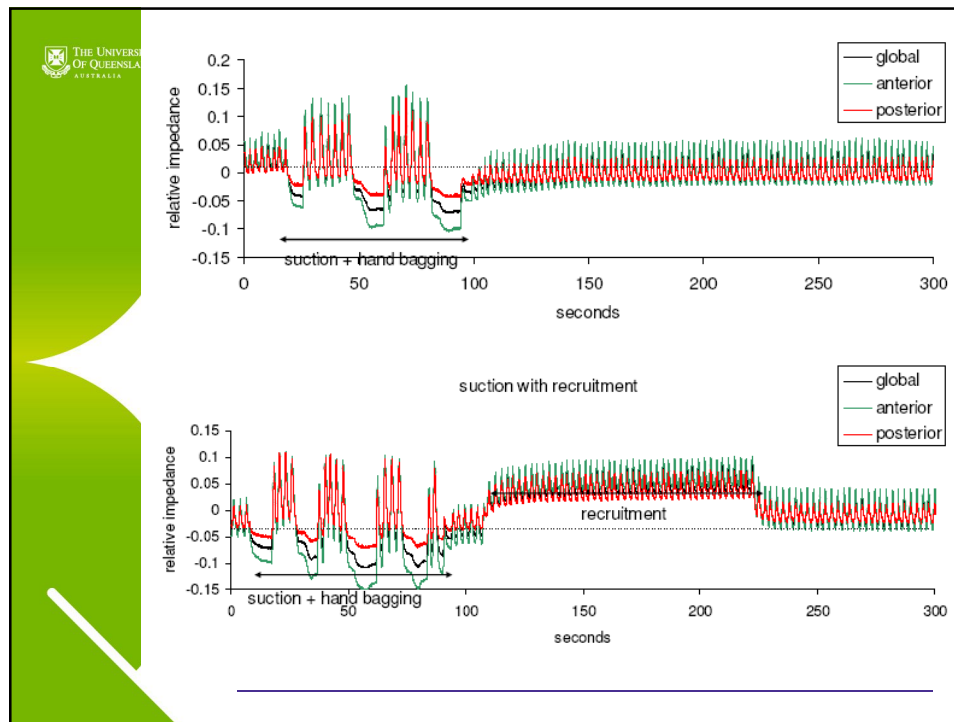


Time coarse array images – double PEEP manouvre



Time coarse array – Incremental PEEP manouvre





Current status

- RCT at 94% complete
- Data analysis in progress
- Two papers published

Jauncey-Cooke J, Bogossian F, East C. Lung Recruitment-A Guide for Clinicians. *Australian Critical Care*, 22(4). 2009:155-162

Jauncey-Cooke J, Bogossian F, East C. Lung Protective Ventilation Strategies in Paediatrics – A Review. *Australian Critical Care*, 23(2). 2010:81-88.

Current Status cont...

- Cochrane protocol accepted for publication – Lung recruitment to reduce respiratory morbidity in mechanically ventilated paediatrics
 - Title registration accepted for neonatal review – protocol almost complete
 - Paediatric review almost complete
 - Determining Post-doctoral opportunities...
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Challenges...

- Slower than anticipated recruitment into the study
 - Difficulty with consent – parents in crisis
 - Motivation – data collection takes approximately 8 hours
 - Family demands
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Conclusion

- Contributing in a small way to improving outcomes for critically ill children
 - Contribute to the body of knowledge that nursing contributes to society
 - Personal extraordinary journey
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Any questions?
