CT Chest imaging under General Anesthesia

Is this Resilience?

August 2017
Thank you!
Background

• Some children need computed tomography (CT) scans to see if they have cancer in their lungs?
• Some children need to have a general anesthetic to get good CT images of their lungs.
Background
Background

• The anesthetic can cause changes in the lungs that affect the images (atelectasis).
  – Need to improve the breathing and do more scans

• The way the anesthesiologist does the breathing can affect the quality of the image
  – Scans are lower quality
Background
Is there a problem?

• Radiology are doing a related quality assurance project
  – 6 months of scans under anesthesia
  – 130 events

• Not reported yet but….  
  • We are not always achieving optimal quality scans
Anaesthetic Ventilation Guidelines for Chest Computed Tomography (CT) Scan

1.1 Purpose
This procedure describes the recommended anaesthetic ventilation management for chest computed tomography (CT) scan.

1.2 Scope
All children having a chest CT scan.

1.3 Method Summary
Anaesthesia is usually induced with an intravenous or inhalational anaesthetic agent (e.g. propofol or sevoflurane).
Following intubation with an endotracheal tube or insertion of a Laryngeal Mask Airway (LMA) a standardised recruitment manoeuvre is used unless contra-indicated.
CT angiogram of the thorax may not require cessation of ventilation or recruitment manoeuvres.

1.4 Definitions and Abbreviations

1.5 Health and Safety Warnings
General safety procedures will be observed.
Low dose radiation scans should be used to minimise exposure to radiation.

1.6 Relative Contra-Indications to Ventilation Recruitment Manoeuvres
Suspected Pulmonary A-V Malformation
Fontan Circulation
High Risk of Pneumothorax (eg. Bullous, Congenital Lobar Emphysema, Rib Fractures etc.)
Recent Haemoptosis

1.7 Equipment and Supplies
Standard hospital equipment and supplies are required.

1.8 Qualifications
Anaesthetists must be fully accredited at RCH

1.9 Anaesthesia Standard Operating Procedures
a. Whenever possible an anaesthetist experienced in chest CT scan should be consulted or available for assistance with these procedures.
b. Anaesthesia is induced with an intravenous or inhalational agent according to the clinical judgement of the anaesthetist.
c. The child's airway is maintained with an endotracheal tube or LMA. A post induction recruitment manoeuvre (PEEP, CPAP or Positive Pressure Ventilation) is recommended to prevent the development of atelectasis.
d. To treat atelectasis, a standardised recruitment manoeuvre, consisting of 10 consecutive slow vital capacity breaths over a PEEP of 5 cmH2O for 1-2 seconds, may be performed.
e. Ventilation with a PEEP of 5 cmH2O is usually continued.
f. Scans are performed in the supine position. Images are taken from the pulmonary apices to the middle of the liver. RARELY the patient may be required to be placed in the PRONE position to enable adequate CT diagnosis when persistent atelectasis occurs.

Suggested Recruitment Manoeuvres:
1. PEEP
2. CPAP
3. Positive Pressure Ventilation

Note. Atelectasis, once established, may be difficult to treat and may require a longer, higher inspiratory pressure and sustained inspiratory breath.
But the protocol has problems...

- Inappropriate options
  - A OR B
- Vague
  - You can do this OR that OR something else
- Less rigorous than international published studies
  - Our protocol: 25cm water pressure
  - Published studies: 40cm water pressure
Work as done

• Online survey of each anesthesiologist’s preferred techniques
• Data from the electronic medical record for each anesthetic matched to the QA sample
Work as done

• Most of us have more specific techniques than those outlined in the protocol
• Most of us are less rigorous than international standards
In a diagram

- Work as done
- Work as Imagined
- Best Practice

Rigor
My questions for you:

- Does anything in this study represent Resilience?
- Is it possible to take this project beyond a traditional QA/QI approach?