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## Adaptive Tutorials versus Web-Based Resources in Radiology: A Mixed Methods Analysis of Efficacy and Engagement in Senior Medical Students

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## Background

*"Radiology provides one of the best mechanisms to learn anatomy and the pathology of diseases in living patients, rather than from cadavers and operative specimens. To a lesser extent it can also be used to teach physiology"*

Subramaniam, et al 2007 [1]

### Main Issues

- Variability in teaching time allotted to radiology and content delivered.
- Junior doctors feeling underprepared in the clinical environment supported by:
  - Limited ability to correctly interpret basic x-rays.
  - Overutilisation of diagnostic imaging.
  - Suboptimal knowledge of radiation doses and protection with many common investigations.

1. Subramaniam R.M, Kim C, Scally P. Medical student radiology teaching in Australia and New Zealand. *Australas Radiol* 2007; 51: 358 – 361



## Background

### Methods of Delivery of Radiology Education

- As part of Problem Based Learning (PBL) sessions
- Lectures
- Workshops
- Self-study
  - Text books
  - Peer-reviewed journal articles
  - Web-based resources
  - E-learning modules



## Adaptive Tutorials Sample Scenario

### My chest hurts!



A 65 year-old man presents to ED with progressively worsening dyspnoea and chest pain radiating to the back. This has occurred over the past few months, though now 'he can't take it any more'. He also describes weight loss but attributes this to 'dieting'.

This is on a background of hypertension, diabetes, heavy alcohol intake and smoking.

He is afebrile, with no clinical evidence of cardiac failure.

He has had a recent admission for pneumonia though his inflammatory markers are normal. His ECG is unchanged from 5 years prior and the initial troponin level is normal.

**What do you see on his mobile chest x-ray?**

- Pulmonary oedema
- Pleural effusion
- Mediastinal mass
- Pneumonia

**From your findings, what would you do?**

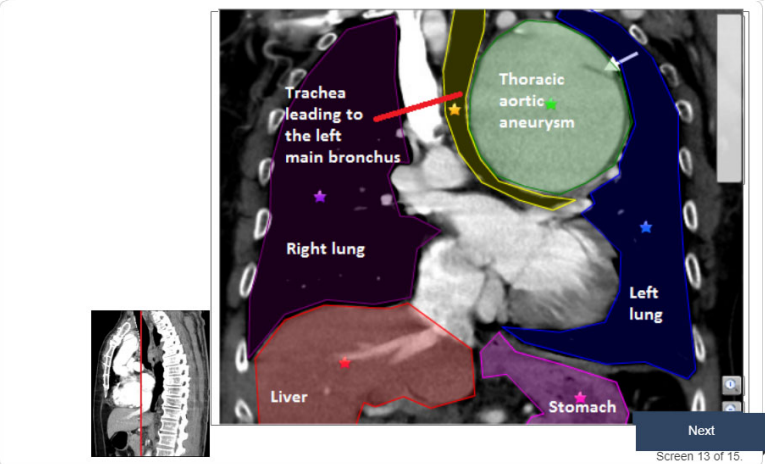
- High resolution CT chest
- CT chest with IV contrast
- CT pulmonary angiogram (CTPA)
- V/Q scan

Screen 12 of 15.

Next



# Adaptive Tutorials Sample Scenario

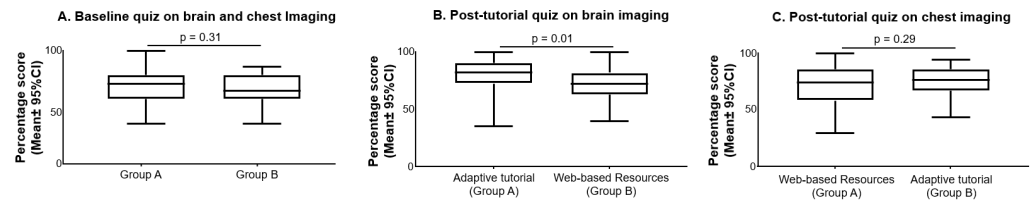


# Method

- Randomised mixed methods trial comparing Adaptive Tutorials versus Peer-reviewed Web-based Resources.
- Phase 3 (Year 5 and Year 6) UNSW medical students recruited by broadcast email.

Topic	Group A	Group B	Timeline (Days)
	Baseline Quiz		0-7
CT of the Head	Adaptive Tutorials	Web-Based Resources	8-14
	Web-based Quiz		15-21
CT of the Chest	Web-based Resources	Adaptive Tutorials	22-28
	Web-based Quiz and Online Questionnaire		29-34

## Quiz Results

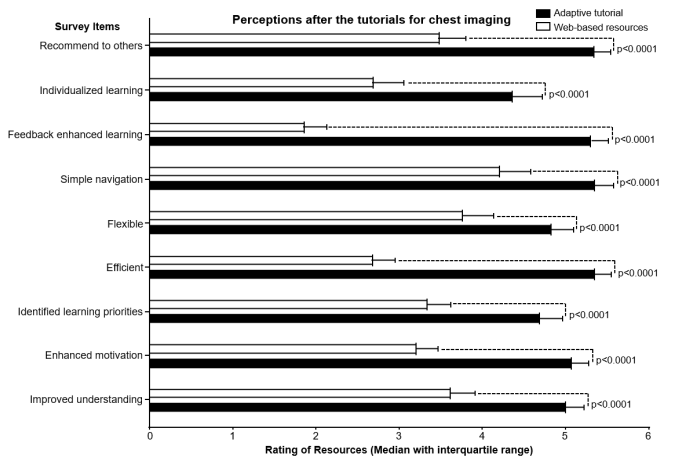


**Baseline Quiz**  
 • 81 participants – 43 5<sup>th</sup> year and 38 6<sup>th</sup> year students.

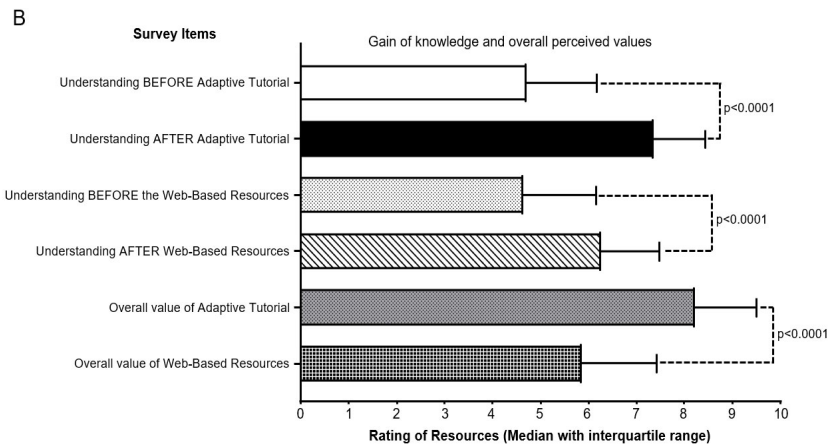
**Phase 1 Brain Quiz**  
 • Group A (34 students)  
 • Group B (37 students)

**Phase 2 - Chest Quiz**  
 • Group A (34 students)  
 • Group B (29 students)

## Perceptions of Each Educational Resource

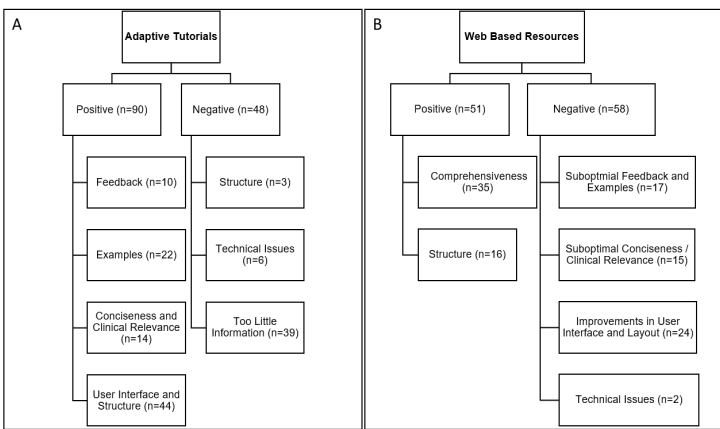


# Perceptions of Each Educational Resource



# Major Themes in Open-Ended Feedback

Flow Charts of the Major Questionnaire Themes



## Conclusions

- Adaptive tutorials have benefits for learning radiology compared with web-based resources
- Interactivity and feedback are key to the efficacy of adaptive tutorials



## Future Directions

- Evaluation of longer-term retention of concepts - longitudinal study.
- Evaluation of adaptive tutorials for junior doctors.
- Comparison of 2D versus 3D images in radiology education modules.

