Teaching, Learning and Assessment of Medical Imaging Prioritization and Interpretation using Virtual On-Call

	Name	Post	Unit / Department
Principal supervisor	Anil T Ahuja	Professor	Diagnostic Radiology and Organ Imaging, Chinese University of Hong Kong
Co-Supervisors (in alphabetical order)	Gregory E Antonio	Professor	Diagnostic Radiology & Organ Imaging, CUHK
	James F Griffith	Professor	Diagnostic Radiology & Organ Imaging, CUHK
	Gavin Joynt	Professor	Anaesthesia& Intensive Care, CUHK
	Shekar M Kumta	Professor	Orthopedics &Traumatology, CUHK
	Timothy Rainer	Professor	Emergency Medicine, CUHK
	AC Vlantis	Professor	Surgery, CUHK
	KT Wong	Consultant	Diagnostic Radiology & Organ Imaging, Prince of Wales hospital
	Cheuk Man Yu	Professor	Medicine & Therapeutics, CUHK

- In acute medicine, Medical Imaging investigations are often central to disease diagnosis and management. However, these often involve requisition and interpretation by medical personnel not experienced in imaging diagnosis, in particular junior doctors. Our experience has shown this to be a major deficit in students knowledge/ skills and remedial teaching was recommended.
- Junior doctors face major challenges integrating theory learnt as undergraduates with the demands and problems in practice when dealing with acute medicine. This is particularly so dealing with medical imaging in terms of interpretation and resource allocation (how to prioritize different imaging modalities & to integrate investigations with management).
- This combined with poor skills of imaging interpretation would mean an inability to implement one of the main aids in modern medicine (imaging) and perhaps worse, compromise patient care.

We propose a system-level improvement in acute medicine education using an outcomes-based approach, with the aims of:

1. Interns having management skills in requesting and prioritizing medical imaging up to the local established set standard
2. Interns being able to implement a core set of image interpretation skills
3. Students to develop a personalized Digital Portfolio of cases they have undertaken to keep (for future reference) and to develop these throughout their careers

- For this project, a "Virtual On-call" system to supplement the present undergraduate curriculum is to be established so that students can periodically get first-hand real-time experience of managing patients in distress, make critical decisions on prioritizing imaging and interpret imaging investigations.
- Acute cases requiring different skills in imaging interpretation and management will be presented to individual students during an "on-call" session. Students who have successfully completed such cases will be allowed to progress.

- To allow students to keep a record of their work and be able to use their experience in the future, individual "Digital Portfolios" will be developed for archiving cases and notes. The whole record will be available for download to personal computers (or PDAs).
- It is our intention to share the results of this project with the rest of the world and in doing so invite more institutions to participate and thus improve the standard of medical education as a whole.

PROJECTED IMPACT

System-level improvements in teaching and learning:
To produce "Imaging-savvy" interns with improved acute clinical reasoning and thought-processes in line with real-life clinical practice. This will be achieved using the following two systems:

- "Virtual On-call" system that allows students to work through scenarios in acute medicine in real-time, but without the problems of patient non-availability, infection control or other environmental factors
- "Digital Portfolio" for students to record their work and newly acquired knowledge on an individual basis

Plans for dissemination: The system is digital and accessible via the Internet, affording portability and flexibility, and allowing fast and easy dissemination of information.
Impact beyond the unit: The sharing of this system with other institutions will allow it to be implemented elsewhere and thus raise the standard of medical and para-medical education as a whole.
Long term sustainability: The system is to be built on existing technology, therefore ensuring forward compatibility with future technological advances. With the continual rapid development in medical imaging and storage, the system will only become more powerful and efficient.

OUTCOMES ACHIEVED

A. Developed "Virtual On-call" system (months 1-6): Developed an archive of case scenarios linked with images. The cases contain feed back with teaching points at the end which are downloadable on completion of each case.

B. Collecting and processing clinical cases (months 1- 18): Developing the bulk of the clinical cases took approximately 12 months and a total of over 50 teaching cases have been collected.

C. Adapting On-call system for User interface (months 3-15):
Cases are ready for distribution via the internet or wireless transfer to user hardware.

The project was presented as a proffered paper at the 2007 Annual Scientific Meeting of the Royal College of Radiologists and Hong Kong College of Radiologists. This paper won the Best Paper Presentation of the meeting.

D. Developing "Digital Portfolio" system (months 3-18):

- A digital portfolio is being developed for record of student progress.

E. Output preparation and dissemination (months 18-24):

I. The results of the end of teaching examination will be prepared for presentations/ publications
II. The teaching and examination will be made available for use by the Medical Faculty of the CUHK.
III. Other local and overseas institutes will be invited to participate to further expand and improve this project
IV. Project conference/ workshops for other departments and institutions using this system may be organized

A couple of demonstrative cases are presented below as examples:

CASE ONE

The Chinese University of Hong Kong
Department of Diagnostic Radiology and Organ Imaging

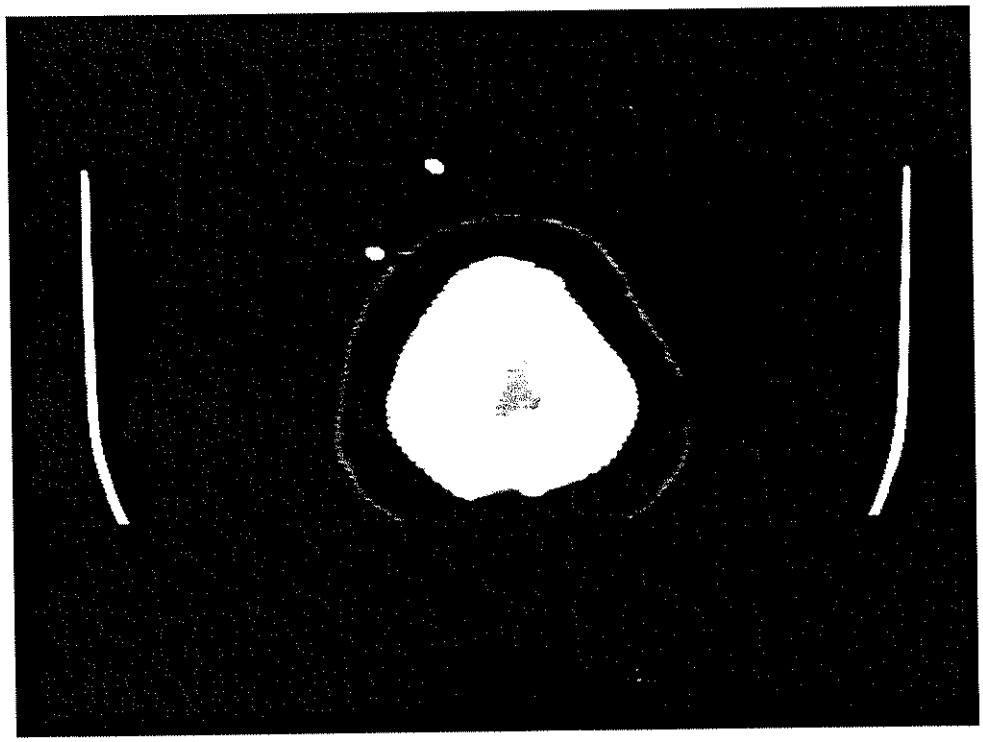
55 y.o. with severe headache

- Sudden onset severe headache
- History of hypertension
- No focal neurological signs

Next you will see a non-contrast CT brain

Record:

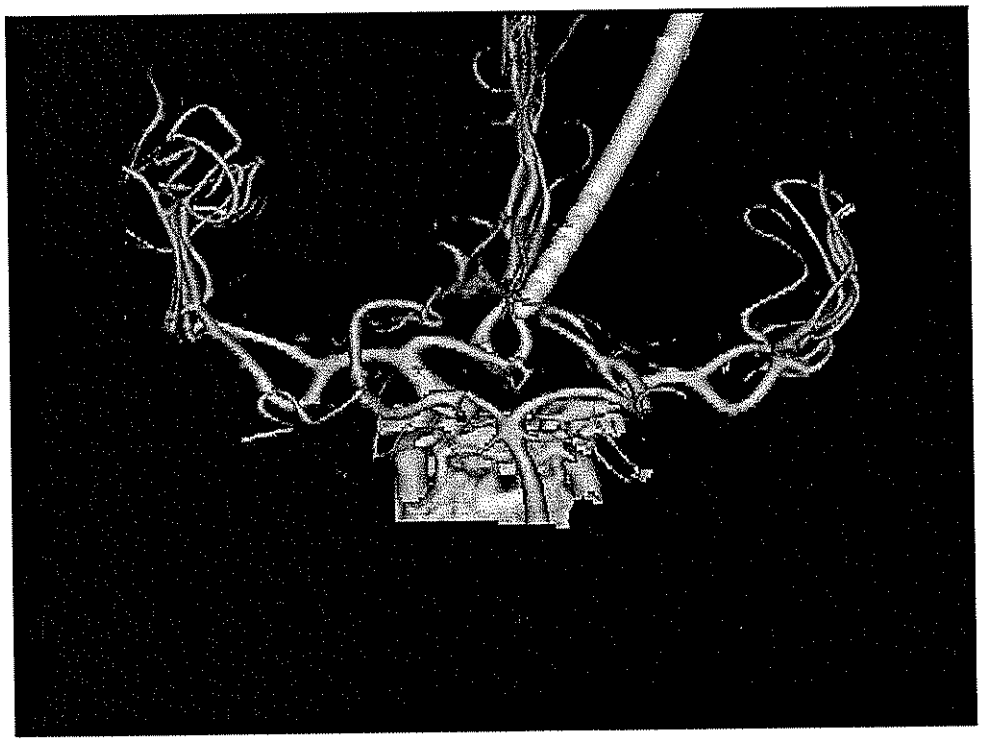
- What you see on this CT
- The causes for this condition



Next you will see a CT angiogram of the Circle of Willis

Record:

- What you see on this CT
- The causes for this condition?



Cerebral arterial aneurysm

- Well-demonstrated with CTA or MRA aside from conventional angiography
- May be cmplicated by rupture (sub-arachnoid haemorrhage)
- Aneursym size related to risk of rupture

CASE TWO

The Chinese University of Hong Kong
Department of Diagnostic Radiology and Organ Imaging

62 y.o. with haemoptysis

- Weight-loss for 5 months
- Smoker for 20 years
- Sudden worsening of dyspnoea

Next you will see a contrast CT Thorax

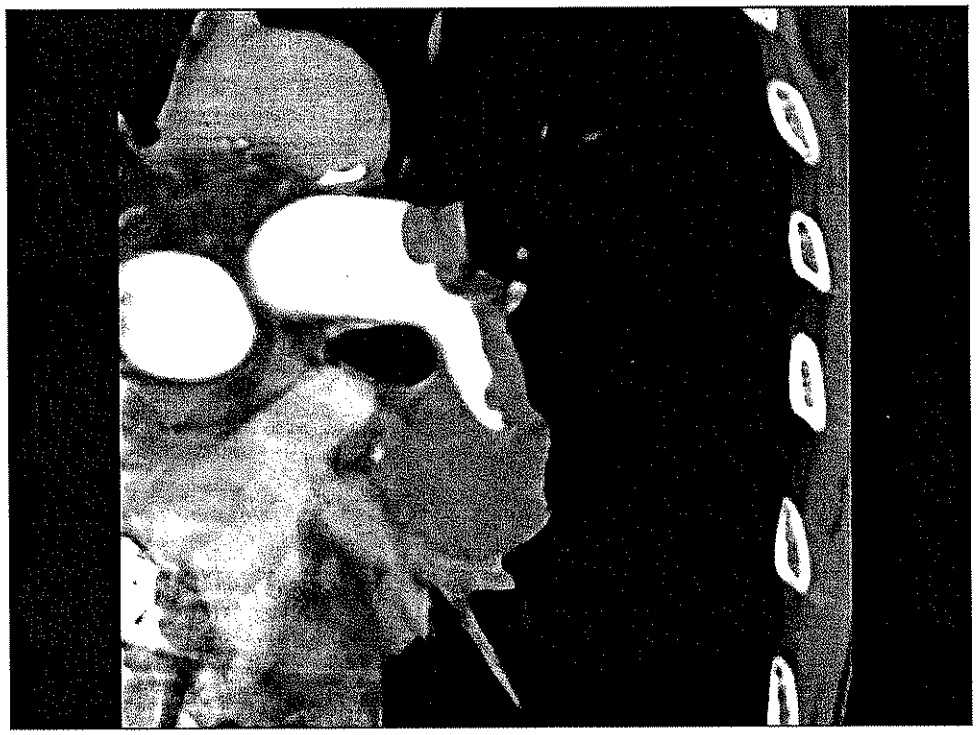
Record:

- What you see on this CT
- The causes for these two conditions

Next you will see a rotational projection of the left hilum

Record:

- What you see on this CT
- The causes for these two conditions



Pulmonary embolism

- Well-demonstrated with pulmonary CTA or conventional angiography as filling defect
- Usually arise from deep venous thrombosis
- This patient also has a left hilar mass which turned out to be bronchogenic carcinoma