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Integrating the Radiology Information System with Computerised Provider Order Entry: The impact on repeat medical imaging investigations

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Research Methods
Development

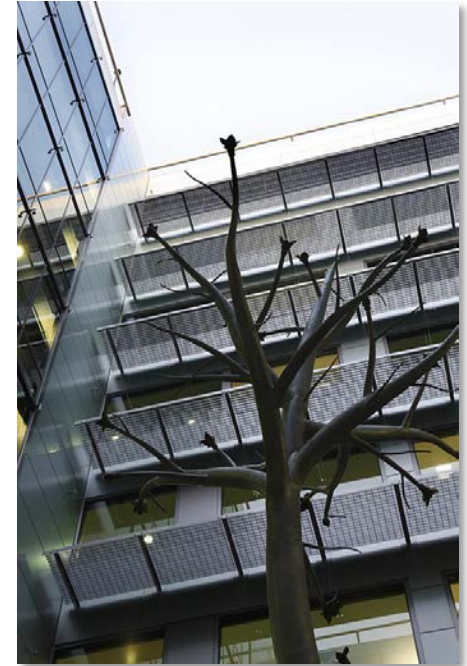
The role of medical imaging

- Contribute to the examination, diagnosis, monitoring/documentation and treatment of patients.
- Potential safety implications of exposure of patients to carcinogenic ionising radiation
- CT procedures are among the largest source of medically-related exposures to ionising radiation
- Repeat imaging requests represents 9.2% of all imaging requests (Lee et al. Radiology, 2007)
- Potential for unintentional (inappropriate) repeat imaging requests (Kamat et al. Emer Med Journal, 2015)



Aim

To assess the impact of implementing an integrated Computerised Provider Order Entry/Radiology Information System/Picture Archiving and Communication System on the number of x-ray and computer tomography procedures (including repeat imaging requests) for inpatients at a large Sydney hospital



Setting

- Medical imaging department located within an 855-bed Sydney teaching hospital
- Existing Cerner PowerChart (Version 2004.01) and in-house imaging results reporting system (HOSREP)
- Neither system were integrated with each other
- GE Healthcare Centricity Radiology Information System (RIS) introduced in 2009 to replace HOSREP.
- New RIS fully integrated into Cerner PowerChart
- New RIS also included PACS functionality allowing films to be captured, stored and communication electronically.



Analysis

- The mean number of imaging procedures per patient were calculated by dividing the number of procedures by the number of patients.
- Repeat procedures were defined as those procedures when an identical procedure code was ordered for the same patient.
- Inferential statistics utilised univariate ANOVA methods and 95% Confidence Intervals (CIs) for the differences in rates between time-periods used Dunnett's C correction for multiple comparisons.
- SPSS version 22
- Seasonally matched comparisons

Study period	Calendar period
Pre-	Jan-Jul 2009
Post-	Jan-Jul 2010
Follow-up	Jan-Jul 2011

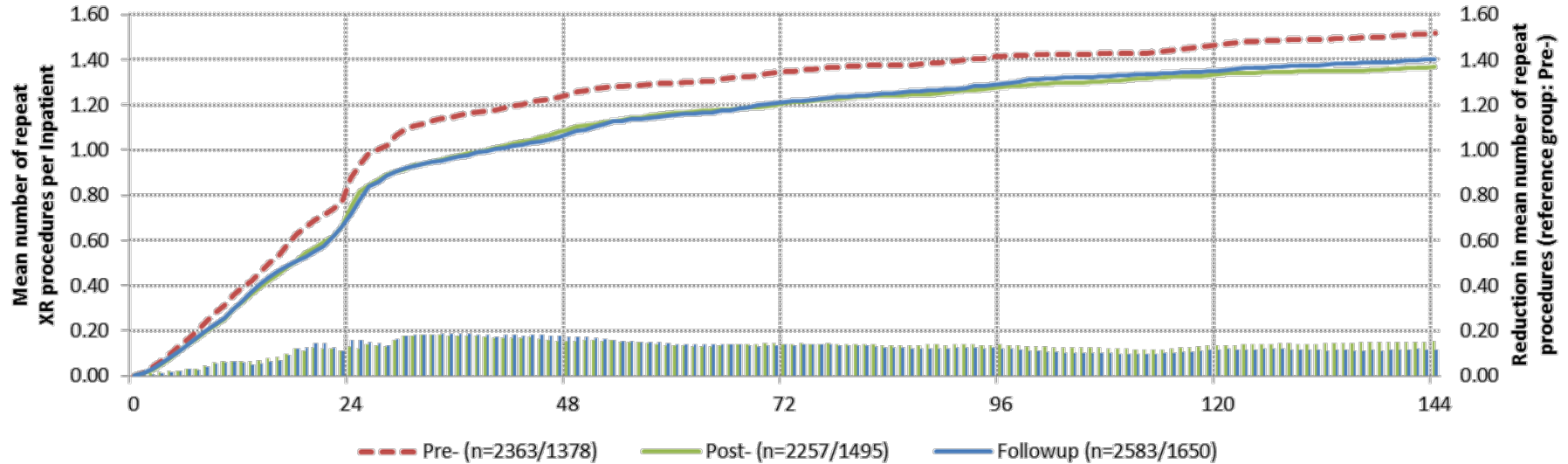
Results

Mean rate of procedures per inpatient (No. of procedures / No. of inpatients)				
	Pre-		Post-	Follow-up
XR	3.02 (4161/1378)		2.55 (3807/1495)	2.58 (4254/1650)
Mean change (reference group: Pre-) (95% CIs)			-0.47 (-0.78, -0.17)	-0.44 (-0.75, -0.13)

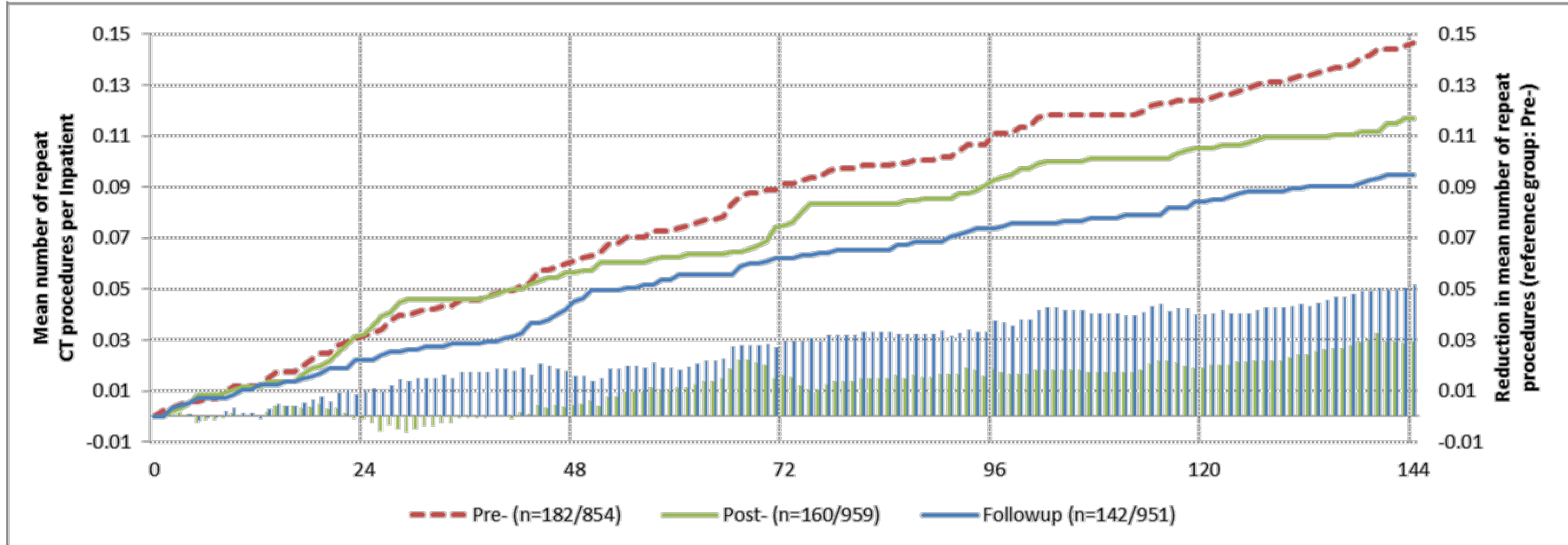
Results

Mean rate of procedures per inpatient (No. of procedures / No. of inpatients)					
	Pre-		Post-		Follow-up
CT	1.38 (1175/854)		1.31 (1255/959)		1.30 (1239/951)
Mean change (reference group: Pre-) (95% CIs)			-0.07 (-0.15, 0.02)		-0.07 (-0.16, 0.01)

Results



Results



Key findings



- Decrease in imaging procedure requests following the implementation of new RIS/PACS integrated with CPOE
- Average of 0.46 fewer x-rays and 0.07 CT procedures
- There was also a lower rate of repeat procedures – 0.13 fewer repeat x-ray procedures in 24h
- This was mainly driven by a drop in the number of x-ray procedures.

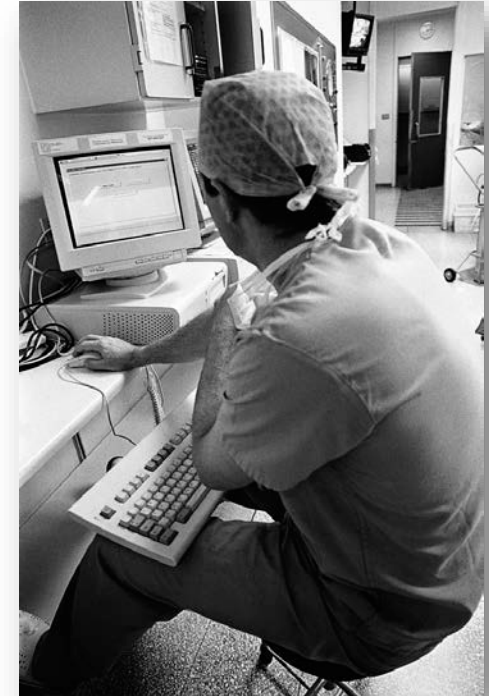
Limitations



- Observational study which utilises a dataset with information about patients with at least one imaging procedure
- Changes in imaging request rates were not compared with a control hospital.

Implications

- Enhanced clinical access to patient information including about what and when images previously requested
- Access to electronic images eliminates problems associated with misplaced and lost films
- Potential for electronic decision support at point of care as an aid to quality evidence-based decision making





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Thank You

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