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Who's Looking at the Medical Images They Request?

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Abstract

Purpose of Study: Good medical practise suggests that medical imaging requestors should view both the imaging and report. This study aims to determine whether doctors requesting medical imaging viewed both the report and images.

Methods: A retrospective study of 1474 medical imaging requests from a teaching hospital. There were 406 requests for Ultrasound Scans (US) to investigate possible gallstones, 11 US of breast lesions, 53 US for Deep Vein Thrombosis (DVT), 73 MRI brain for Multiple Sclerosis (MS), 132 MRI Knee, 123 MRCPs, 114 CT scans for trauma, 412 CT Brain scans for strokes, 84 CTPA and 65 preoperative chest X-rays. Using the audit trail function of PACS, data on requestors and who viewed the reports and images were collected.

Results: Of the imaging, 93.60% was not viewed for US gallstones, 90.91% of US Breast, 96.23% of US DVT, 52.05% of MRI brain for MS, 70.68% of MRI knee, 90.24% of MRCP, 97.37% of CT scans for trauma, 90.53% of CT Brain scans for strokes, 89.29% of CTPA and 76.92% of preoperative chest X-rays. Of the reports, 95.81% were not viewed for US gallstones, 100% of US Breast, 98.11% of US DVT, 87.67% of MRI brain for MS, 85.71% of MRI knee, 94.31% of MRCP, 99.12% of CT scans for trauma, 96.60% of CT Brain scans for strokes, 95.24% of CTP and 100% of preoperative chest X-rays.

Conclusion: Overall, a significant number of requestors appear not to be viewing the medical imaging or the reports that they have ordered.

Keywords

Medical imaging; Medico-legal; Ethic

Conflict of Interest Disclosures

The authors declare no conflicts of interest.

Introduction

Background

Advancement in radiology has come a long way since the discovery of X-ray by Wilhelm Conrad Roentgen in 1895 [1]. It is no longer viewed as just a scientific curiosity but an integral part of the management of patients. Interpretation of medical imaging is seen as an essential skill of a medical practitioner, and is listed as one of the graduate outcomes by the Australia Medical Council [2]. As a result, it is included in the curriculum of all medical schools in Australia and is often tested in various medical examinations. Since the inception of radiology as a specialty in the 1900s [3], medical practitioners have come to rely on the expertise of specialists in medical imaging for the interpretation and reporting of various medical imaging modalities. Despite this, it is still recommended by some that those who request medical imaging should view the images themselves. This is common practice for some craft groups when planning for intervention. There may also be medicolegal implications associated with viewing of both the images and the report.

Objectives

The aim of this study was to determine whether doctors requesting medical imaging viewed both the images and the report.

Methods

Study design

This was a retrospective observational study.

Settings

The study was performed in a tertiary level teaching hospital in Australia. The study was performed in a tertiary level teaching hospital in Australia.

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Participants

Nine different imaging modalities were included in this study-Ultrasound (US) for Gallstones, US of Breast, US for Deep Vein Thrombosis (DVT), Magnetic Resonance Imaging (MRI) Brain for Multiple Sclerosis (MS), MRI Knee, Magnetic Resonance Cholangiopancreatography (MRCP, Computed Tomography (CT) scans for Trauma, CT Brain scans for strokes, CT Pulmonary Angiography (CTPA) and Pre-Operative Chest X-rays (Pre-Op X-Ray).

Variables

The primary outcome of this study is whether the imaging requestor views the imaging and the report.

Data source

Data was extracted from the Royal Hobart Hospital (RHH) Picture Archiving and Communication System (PACS) from 2015-2017. From the database, a total of 1474 medical images were identified. With the use of the audit trail function of PACS, using unique log on credentials, data on requestors, and who viewed the reports, as well as images, were collected. Radiologists were excluded from the analysis as while they are not the image requestors, they are being captured by the system as well.

Results

Participants

There was a total of 406 US for Gallstones, 11 US of Breast, 53 US for DVT, 73 MRI MS, 132 MRI Knee, 123 MRCP, 114 CT Trauma, 412 CT Brain Strokes, 84 CTPA, and 65 Pre-Op X-ray reviewed.

Descriptive data

The descriptive data of patient's basic information-mean age and gender is shown in Table 1.

Outcome data

The primary outcome-number and percentage of images and reports viewed by the requestors are shown in Table 2.

Discussion

Key results

The aim of this study was to identify if the imaging requestors had looked at the imaging and reports. Overall, there appears to be a significant number of requesting doctors who had not viewed the medical imaging nor the reports that they requested.

Limitations

The audit trail data recorded on the PACS relies on individuals logging into the systems using unique identifiers. One of the major limitations of this study is that we were not able to determine if the images or report were viewed under someone else's log in details. In addition, we have not reviewed the outcome of individual patients who were imaged, hence we are unable to correlate if the outcome and quality of patient care was related to how the physician handles the imaging test results. It will also be beneficial to this study if qualitative responses were collected from the physician regarding why the images and reports are not viewed.

In this study, we chose medical imaging modalities that we felt were most likely to show a lack of viewing of either the images or the report. Therefore, we did not choose every image performed within our medical imaging department over the study period.

Interpretation

To our knowledge, this is the first publication to draw attention to this problem. The senior author is aware of an unpublished study performed in the United Kingdom where pre-operative chest X-rays were placed in sealed envelopes. On discharge of the patient from hospital, the envelops were returned to the medical imaging department and surprisingly, the majority of the envelops remained sealed, indicating that it was physically not possible for anyone to have viewed the medical imaging prior to discharge. Many hospitals now have a digital platform to store and view medical imaging, henceforth this historical study is not replicable. However, many picture archiving systems have an auditing function to record within them who has viewed the images or report. As mentioned in our limitations, one of the major limitations of this study is that by relying on the auditing function, we were unable to discern if the images or reports were viewed under someone else's log in details. Be that as it may, the lack of physicians who viewed the results and images is concerning as absence of follow-ups with test results are considered medical negligence, and may result in medicolegal implications, and complaints [4]. This is also coherent with the Medical Board of Australia's Good Medical Practice which describes providing good patient care as including arranging investigations with appropriate management plans [5]. The low numbers of doctors reviewing requested imaging and reports could be attributed to the request not being a requirement to overall patient management but rather the

Parameters	US Gallstones	US Breast	US DVT	MRI MS	MRI Knee	MRCP	CT Trauma	CT Stroke	CTPA	Pre-Op X-ray
	(n=406)	(n=11)	(n=53)	(n=73)	(n=132)	(n=123)	(n=114)	(n=412)	(n=84)	(n=65)
Female, n (%)	205 (50·49)	11 (100·00)	36 (67·92)	53 (72·60)	55 (41·67)	69 (56·10)	40 (35·09)	180 (43·69)	36 (42·86)	30 (46·15)
Mean age, year	44·1	44·5	52·2	47·1	36·6	60·2	55·4	72·3	61·0	57·4

Table 1: Baseline characteristic of patients

Modalities	Number, n	Number of images viewed, n (%)	Number of reports viewed, n (%)
US Gallstones	406	26 (6·40)	18 (4·43)
US Breast	11	1 (9·09)	0 (0·00)
US DVT	53	2 (3·77)	1 (1·89)
MRI MS	73	35 (4·.95)	9 (12·33)
MRI Knee	132	38 (28·79)	18 (13·64)
MRCP	123	12 (9·76)	7 (5·69)
CT Trauma	114	3 (2·63)	1 (0·88)
CT Stroke	412	39 (9·47)	14 (3·40)
CTPA	84	9 (10·71)	4 (4·76)
Pre-Op X-ray	65	15 (23·08)	0 (0·00)

Table 2: Primary outcome-number of images and reports viewed by the requestors

investigation being requested in accordance to protocol or on senior advice thus reducing the necessity to follow up with every test they order. As a result, doctors have become over reliant on radiologists in the process of interpreting images, rendering a trend where physicians do not concern themselves with the imaging interpretation process. The senior author is also aware of non-specialist medical examinations where candidates are expected to interpret complex medical imaging. Justification for this line of examination by senior examiners is that medical practitioner should be able to interpret not only the formal medical imaging report but also the actual medical images. Given the much specialised nature of radiology practise, this seems unreasonable and fraught with danger when anything other than very common simple images require interpretation by junior doctors. This is further supplemented by the fact that even for a trained radiologist, the process of interpreting a medical imaging is complex and the level of error for clinically significant or major error is approximately 2-20%. This study suggests that many non-specialists are not viewing the images they request as well [6].

In addition, the senior author is aware of coroners' cases where this approach to investigating whether a medical practitioner had viewed the medical imaging or the report has resulted in criticism of a medical practitioner as the audit trail suggest that it were unlikely to have viewed the images or report despite the medical practitioner reporting to the coroner that they had.

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