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Optimizing patient care in radiology through team-working: A case study from the United Kingdom

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ABSTRACT

Objectives: To investigate how changes in service delivery within the radiology department of an acute district general hospital optimized imaging services for patients and referrers through a strong emphasis on team-working.
Methods: Data related to service delivery was collected for three consecutive years and interrogated by imaging modality and reporting practitioner (radiologist, reporting radiographer, sonographer) to explore how workload had changed over the cycle.
Results: Departmental activity demonstrated consistent increases, both overall (13.3%) and for most modalities (MRI 43.7%, CT 22.8%) for the study period (March 2010–March 2013). Overall trend suggested significantly shorter waiting times (CT 0.7 weeks, MRI 1.3 weeks, non-obstetric ultrasound one week; all modalities $p = 0.001$). Some modality variation in reporting times was apparent, with CT ($p = 0.06$) and MRI ($p = 0.01$) decreasing but there was an increase in X-ray reporting times ($p = 0.001$). Reporting radiographers and sonographers reported the majority of X-ray and non-obstetric ultrasound interpretations (59% and 52%, respectively). A radiographer-led neonatal reporting service was implemented and the urology patient pathway redesigned. Effective team-working produced savings of three full-time consultant radiologist posts.
Conclusion: Radiologists and radiographers, working together, can deliver an effective service. Innovation, staff development and redesign of patient pathways, have produced significant improvements.

Introduction

Person-centred care, an aging population, government targets and new technology have resulted in an unprecedented growth in imaging workload.[1–4] In response to these rising demands an increasing number of radiographers who have completed a relevant postgraduate qualification now undertake clinical reporting.[5–7] The current political and economic climate in the United Kingdom has resulted in renewed focus being placed on the efficient use of NHS resources in the drive to deliver savings while improving patient care and outcomes.[8] Team-working has been highlighted in a recent joint publication by the Royal College of Radiologists and the College of Radiographers as fundamental and essential to ensure that modern radiology services meet current and future demand in an effective, efficient and patient focused manner.[9]

The introduction of radiographer reporting and implementation of the four tiered job structure, from assistant practitioners to consultant radiographers, has aided radiology departments to meet these ever increasing demands in a patient focused and efficient manner through the appropriate use of skill mix.[10] Radiographer practice and their contribution to patient care are often driven by local service demands, with many varied and excellent examples occurring across the United Kingdom.[11–13] Presented here, as a case study, is the model of service delivery implemented in the radiology department of an acute district general hospital.

The Homerton University Hospital serves a diverse population of 246,000, with 51,500 in-patient, 272,300 out-patient, and 119,800 emergency attendances and 13,990 neonatal intensive care bed days in 2012/13.[14] Radiology provides general X-ray, ultrasound (US), fluoroscopy, computed tomography (CT), magnetic resonance imaging (MRI) and mammography services to hospital and community patients with a combined workforce of 91 full time equivalent (FTE) staff.

The aim of this study was to explore the role that multidisciplinary team working can have on patient care; how service

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delivery responds to increasing demands, trends in waiting and report turnaround times, to identify novel examples of best practice, while ensuring that a safe service is provided.

Methods

The structure and characteristics of the department were outlined. Departmental staff numbers and profile (profession and grade) was determined through workforce analysis. Significant landmark events; installation of new equipment, patient pathway redesigns and introduction of novel services, were highlighted at service review conducted at the end of the audit cycle. Key measures of department performance were identified and agreed at the commencement of the audit cycle, with changes implemented in response to clinician and patient need.

Monthly departmental activity data was collated from the radiology information system for three consecutive years (April 2010–March 2013) from regular service evaluation reports generated by the Information Management department. Data was collected using Microsoft Excel 2013 (Microsoft Corporation), with pivot tables used to perform the analysis. Data was stratified by modality, referral source and examination type (X-ray and ultrasound) using the filter functions. Statistical analysis performed using SPSS (IBM version 19).

Waiting time for radiology investigations was highlighted as an important indicator, both for the delivery of a patient focused service and to ensure compliance with national standards.[15,16] Waiting times for modalities not providing a walk in service (CT, MRI, US) were calculated in weeks, taken from the date of examination request to completion date. Report turn-around time, calculated in hours from examination completion time to the provisional of a final report, has been emphasized as a key factor in radiology performance, from the perspective of patients[17] and referring clinicians.[9] Stratified by imaging modality (and examination where appropriate), average RTAT was determined using Microsoft Excel. Multidisciplinary team-working was been suggested as one method to provide prompt and accurate diagnoses in the context of increasing radiology workloads.[9] To assess the contribution of each professional group to department activity, the proportion of examinations performed and/or interpreted by different professional groups was determined using Microsoft Excel by filtering the data by reporting practitioner. To examine for trends in the waiting time and RTAT data, one-way multivariate analysis of variance (MANOVA) was performed. Results with $p < 0.05$ were deemed significant.

Ultrasound and plain imaging cases from the monthly radiology discrepancy meeting were analysed for reporting practitioner, type of discrepancy and discrepancy grade and examined with chi-squared or Fisher's exact test as appropriate.

Local Research & Development indicated that NHS ethical approval was not required for this service evaluation. The project was registered with the local Clinical Audit department in line with good practice and local requirements.

Table 2
Proportion of reports produced by reporting radiographers and sonographers.

Modality	% Total RR/Son		
	2010–11	2011–12	2012–13
CT	<1	<1	<1
MRI	<1	<1	<1
US	52	51	52
X-ray	49	58	59

CT = computed tomography, MRI = magnetic resonance imaging, US = non-obstetric ultrasound, RR = reporting radiographer, Son = sonographer.

Results

Activity

Departmental activity demonstrated consecutive year on year increases (117,520–133,149 examinations) over the study period, most pronounced in the cross-sectional areas with MRI and CT producing the largest percentage increase in workload (Table 1).

Workload by professional group

The proportion of examinations performed/interpreted by each professional group were identified (Table 2). The radiology department employs advanced radiographer practitioners who provide definitive reports[9] for CT head and MRI lumbar spine examinations. However, the vast majority (>99%) of these examinations were interpreted by radiologists. Sonographers and a consultant musculoskeletal (MSK) physiotherapist reported just over half of all non-obstetric ultrasound examinations for each of the three years. There was a steady increase in the proportion of X-ray examinations interpreted by reporting radiographers, increasing from 49% in year 1 to 59% in year 3. Analysis of X-ray examination type revealed that this rise was driven largely by an increase in the number of chest and abdominal X-rays interpreted by reporting radiographers, especially in-patient examinations (Figs. 1 and 2).

Waiting times

Data analysis on modality waiting times and report turnaround times was conducted with one-way multivariate analysis of variance (MANOVA). The waiting time data for all modalities (CT, MRI, US) show a highly significant ($p = 0.0001$) reduction. The majority of the improvement occurs between years 1 and 2 and although

Table 1
Annual departmental activity stratified by modality.

Modality	2010–11	2011–12	2012–13	% Change 10–11/11–12	% Change 11–12/12–13	% Change 10–11/12–13
CT	11636	12631	14289	8.6	13.1	22.8
DEXA	384	344	382	−10.4	11.0	−0.5
Fluoroscopy	1228	1043	936	−15.1	−10.2	−23.8
Interventional	730	434	745	−40.5	71.7	2.1
MRI	5814	6456	8357	11.0	29.4	43.7
Mammography	1339	1460	1403	9.0	−3.9	4.8
Non-obstetric US	23057	26199	27642	13.6	5.5	19.9
Nuclear medicine	542	502	453	−7.4	−9.9	−16.5
Intravenous Urogram	237	91	3	−61.6	−96.7	−98.7
X-ray	72546	74802	78843	3.1	5.4	8.7
Grand Total	**117520**	**123974**	**133149**	**5.5**	**7.4**	**13.3**

CT = computed tomography, DEXA = dual energy X-ray absorptiometry, MRI = magnetic resonance imaging, US = ultrasound.