

Who are we ?

We are one of the largest NHS organizations in the country catering to about 1 million people in the north west of England



Developing a Comprehensive Prostate Imaging Service: Getting It Right & How to Achieve Quality in Public Sector DGHS Hospitals



Dr Shyam Sunder Koteyar, Consultant Radiologist,

Pennine Acute Hospital Trust

- Dr. Yen June Lau, Foundation Doctor
- Dr. Mehran Nasralla, Radiology Registrar
- Mr. Jacob Cherian, Consultant urologist
- Mr. Arun Jain, Consultant Urologist
- Dr. Suraj Amonkar, Consultant Radiologist
- Mr. Andrew Green, MR Lead radiographer

To Deliver a High Quality Prostate Imaging Service by Improving:

01

Quality of Imaging

02

Decreasing Turnaround Time

03

Better Quality Reports

04

Manage the Increasing Demands on Imaging

Aims & objectives

Background & Prostate Imaging Volume in Greater Manchester:

Methodology:

(Click on the title above to reveal the contents)

There has been global increase in awareness and demand for prostate MRI imaging.


Imaging
Imaging Improvements







Scheduling
Scheduling Improvements


Reporting
Reporting Improvements

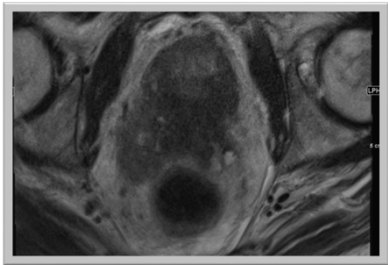


Year	CMFT	SRFT	Bolton
year 2013	~50	~50	~50
year 2014	~50	~50	~50
year 2017	~400	~50	~50

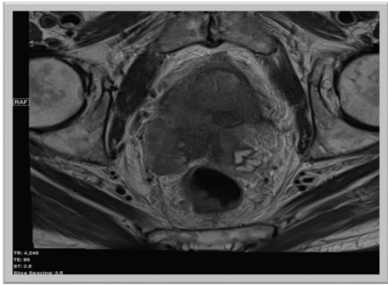
Imaging Improvements

-  Our Trust has 4 hospitals with 4 scanners, from 2 vendors with varied sequences.
-  A task group was set up with all stake holders with multiple meetings (MR radiographers, radiologists, urologists & department managers).
-  Working with various application specialists & vendors, creating longer appointment slots, it was possible to change DWI sequences from 800 to 1400.
-  Accurate ADC sequences were computed using at least 3 b values.
-  Where patients are unable to lie still, BLADE/ PROPELLAR sequences used instead of T2 high res images.

T2 w High Res. Image:

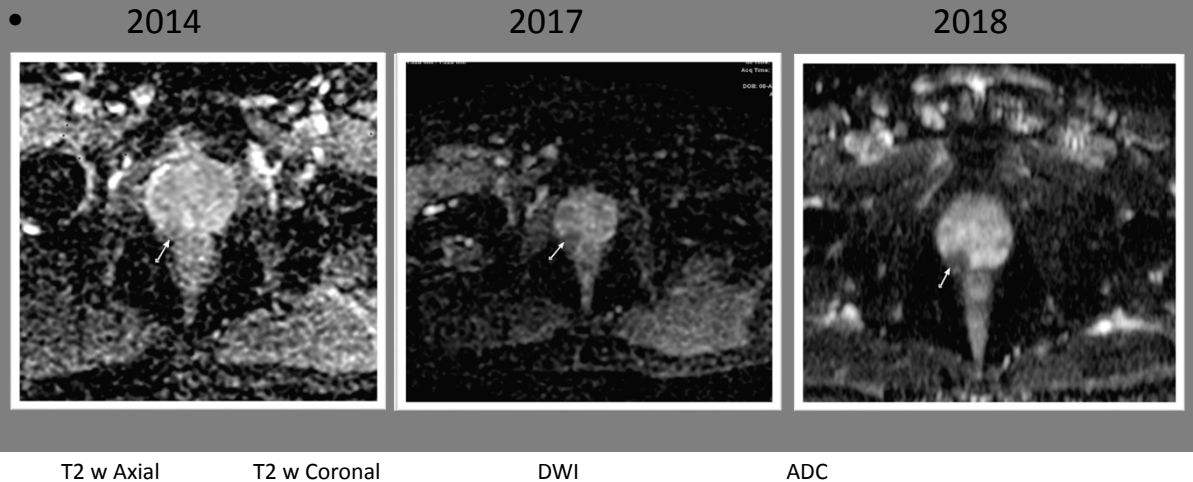


BLADE Sequence image:



Sequential improvement in image quality:

(click or click twice on the sequence label below to reveal the images)



Scheduling Improvements:

Job Plan Optimization Impact:

- R1-R5 are radiologists who report prostate MRIs
- B1- B5 are radiologists are Neuro & MST radiologists
- A Prostate MRI slots
- B in-patient slots
- C other body slots
- D MSK slots.
- Neuro MRI slots

(Click on the title to reveal the contents)

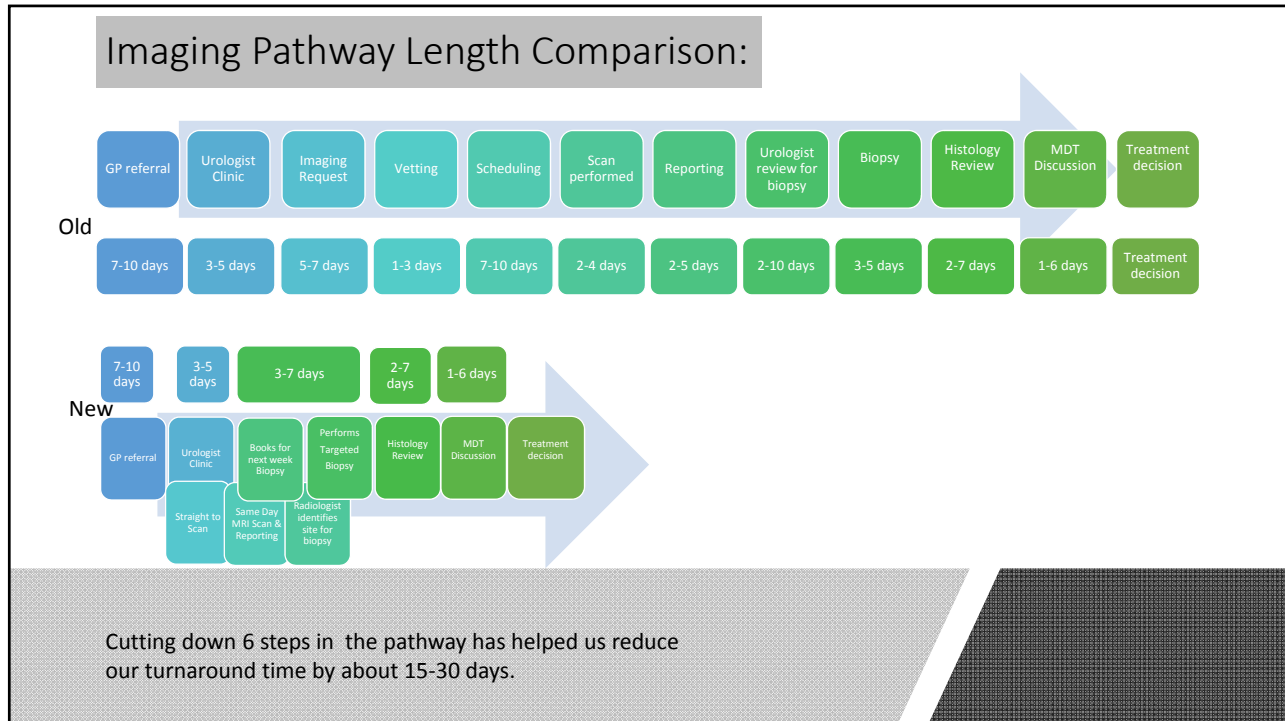
This was the trickiest part of the project, with contradicting demands on radiology of reducing wasted slots and getting same/next day imaging.

After careful analyses of various data, inpatient demands and prostate imaging needs, dedicated slots were created to mirror urology prostate clinics.

A special code for consultant-only-referral was created to accommodate these patients to designed slots.

Aligning reporting and Scheduling to improve productivity:

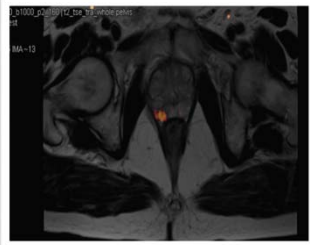
Weekly Rota						MRI appointment Schedule		
		MRI	CT	U5	intervention	Monday	Tuesday	Wednesday
A	Monday	am R1	R3	B1	B3	AAABB	BCCDD	CDEEE
	pm	B1	B3	R1	B4			
S	Tuesday	am R2	R4	B2	ERCP	AAABB	BCCDD	CDEEE
	pm	B2	B4	R2	B5			
t	Wednesday	am R3	R5	B3	B3	AAABB	BCCDD	CDEEE
	pm	B3	B5	R3	B1			
	Thursday	am R4	R1	B4	R4	AAABB	BCCDD	CDEEE
	pm	B4	B1	R4	ERCP			
	Friday	am R5	R2	B5	B3	AAABB	BCCDD	CDEEE
	pm	B5	B2	R5	B4			
	Saturday					AAABB	BCCDD	CDEEE
	Sunday					ABCDE	ABCDE	XXX



Reporting Improvements

- Structured reporting based on PIRADS 2 as opposed to descriptive reporting.
- Fusion imaging using T2 and DWI images, leading to easy targeting of lesions on biopsy.
- Dedicated reporting by subspecialty radiologists with Prostate interests.
- Pictographic / Multimedia reporting with image hyperlinking (to be achived with future pacs refresh.

Fusion (T2 w +DWI) images for biopsy guidance-



2013

MR Prostate

Technique: Axial T1W and T2W whole pelvis. High-resolution axial, sagittal and coronal T2W of the prostate. The naps are slightly suboptimal due to motion artifact.

Findings:

hypointense signal involving the peripheral zone of the left prostatic lobe (series 8, image 19 and series 8, image 15) keeping with prostatic malignancy. There is no extension beyond the prostatic capsule is seen. Heterogeneity of th right peripheral prostatic zone is also noted (series 8, image 18). Normal appearances of the seminal vesicles.

Urinary bladder normal. No lymphadenopathy.

occidental sigmoid diverticular disease. Otherwise unremarkable appearances of the visualised abdominal and pelvic isera.

Normal pelvic and spinal marrow. I not the patient is awaiting a isotope bone scan.

Comment:

ow signal intensity area in the left lobe of prostate in keeping with prostatic malignancy. Slight heterogenous signal oted in the right lobe which is rather non-specific. Provisional staging T2a, N0, Mx.

Current:

Other Therapy:

Volume:

Serial Volume:

PI-RADS 2 Findings: Clinical History : persistently elevated PSA Negative TRUS guided prostate biopsy ORS benign; Abnormality in central zone or anterior lobe

Technique:

Standard MRI sequences without dynamic post gadolinium scan.

Findings:

No previous imaging available for comparison.

The prostate volume is calculated as 5.7 x 4.1 x 5.2 cm corresponding to 83.2 cc and the PSA density is calculated as 0.13.

Within the peripheral zone there is patchy low signal intensity are noted in the midline extending from 3:00 position to 6:00 position and a double position to 10:00 position (series 7, image 12). However there is no corresponding restriction demonstrated on the DWI and ADC sequences. Based on the imaging characteristics, this is categorised as PI-RADS 2.

The central gland shows multiple well-defined nodules. Within the transition zone in the mid gland at 5:00 position (series 7, image 13). Broad and imaging characteristics, this is categorised as PI-RADS 4. Targeted biopsy of this lesion is recommended.

Fusion images have been sent to PACS for easy biopsy guidance.

No regional lymphadenopathy is seen. No extraprostatic involvement is seen. The imaged seminal vesicles appear unremarkable.

The urinary bladder and the rectum also appear unremarkable.

Conclusion:

Although there is heterogeneous low signal intensity seen in the peripheral zone, there is no restriction seen, the peripheral zone is categorised as PI-RADS 2. A 6 mm low signal intensity lesion in the transition zone in the midline on the left side at 5:00 position with corresponding restriction, this is categorised as PI-RADS 4.

Targeted biopsy of this region is recommended

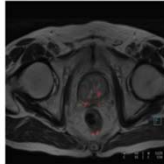
Summary of Measured Findings

Name
S2 Snapshot
S1 Snapshot

Basic Findings

Other Findings

Finding S1 Snapshot:



Improved Reporting Format

Results & Conclusions:

References :

(Click on the title to reveal the contents)

Reporting turnaround time before implementation was 12 step process, with median time of 30- 42 days.

- 1) **Jonathan Kruskal, et al; Quality Initiatives: Lean Approach to Improving Performance and Efficiency in a Radiology Department** <https://pubs.rsna.org/doi/10.1148/rg.322115128>
- 2) **Improved Quality in Imaging of Prostate Cancer (PI-RADS/Pi-RADS)** <https://pubs.rsna.org/doi/10.1148/rg.322115128>
- 3) **ESUR Guidelines for Prostate MRI** <http://www.esur.org/esur-guidelines/prostate-mri>
- 4) **Hirokawa Y, Isoda H, Maetani YS, et al. MRI artifact reduction and time and quality improvement in the upper abdomen with PROPELLER and Prospective Acquisition Correction (PACE) technique. J Clin Imaging Biotechnol 2008;191:1154-1158**