Purpose

MRI is a critical tool in the diagnosis and staging of prostate cancer, but its availability can be limited by resource and workflow constraints.

We assessed the impact of a multi-faceted Continuous Quality Improvement (CQI) initiative designed to improve patient access to, and availability of, multiparametric prostate MRI (mpMRI).

Methods

The CQI initiative was implemented at a tertiary-care academic medical center which performs 70,000 MRI exams annually.

The CQI program involved:

- re-design of the prostate 3T MRI value chain;
- transition of the PI-RADS v2 compliant mpMRI protocol from scanning with an endorectal coil to scanning without;
- and re-structuring of exam/resource scheduling.

New process metrics were developed and implemented to inform and support the CQI program.

Methods

The CQI period, from April 2016 -March 2018, was divided into four consecutive 6-month intervals:

1. Observation period: baseline 3 mpMRI slots per day (endorectal technique);
2. Phase 1: 5 mpMRI slots per day; a metric for MRI exam access, the number of days to the 3rd - next available exam, was measured starting at the end of Phase 1;
3. Phase 2: 7 mpMRI slots per day; purchase of a commercially available MR software package for small field-of-view diffusion weighted imaging; introduction of a new MRI scanning protocol without an endorectal coil (maintaining PI-RADS v2 compliance);
4. Phase 3: 10 mpMRI slots per day (without endorectal coil); expanded access to three 3T MRI scanners on weekdays and weekends, including evenings.

Methods – Outcomes

Primary outcome measures:

a. access to mpMRI (defined as 3rd -next available appointment, measured beginning March 2017);

b. availability of mpMRI (defined as percentage of weekly outpatient MRI operating hours from 0800-2000 hours during which mpMRI was offered).

Secondary outcome measures:

c. mpMRI exam volume;

d. mean mpMRI in-room exam time;

e. mean time spent per day by a radiologist for endorectal coil placement;

f. number of mpMRI exams flagged for CQI review.

Statistical process control (SPC) analysis was used for a. and chi-squared test of proportions for f. outcome measures.

Results – Primary Outcomes

During the CQI period:

a. mpMRI access improved significantly

- days to the 3rd-next available appointment decreased from 21 days in March 2017 to <1 day (same day availability) in March 2018 ($p<0.0001$, SPC);

b. weekly mpMRI availability improved in each CQI phase

- 14% (12/84 hrs) in the Observation period,
- 24% (20/84 hrs) in Phase 1,
- 33% (28/84 hrs) in Phase 2,
- and 100% (84/84 hours) in Phase 3

Results – Primary Outcomes

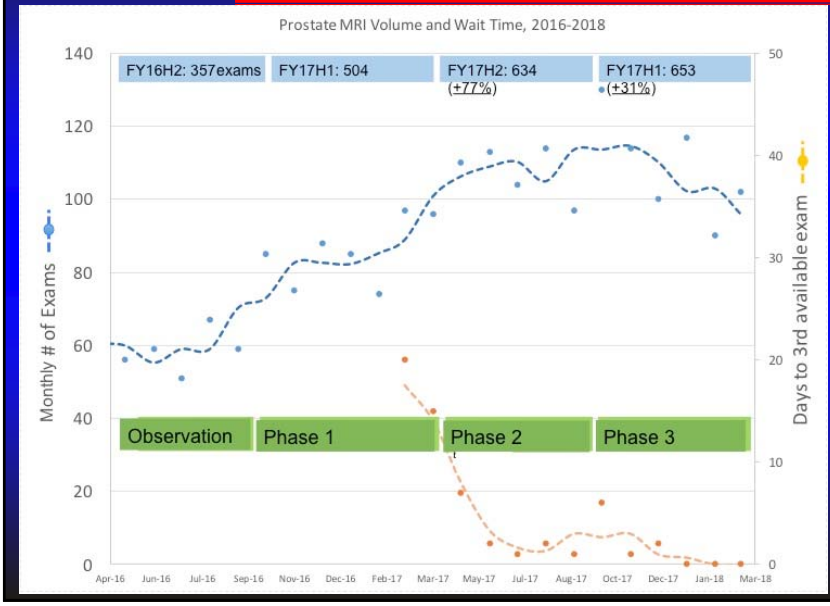


Figure. Monthly prostate MRI exam volume and wait time at a tertiary-care academic medical center in the northeastern United States, April 2016 – March 2018. Monthly prostate MRI exam volume (blue) is plotted on the left hand axis; wait time (orange) is plotted on the right hand axis. Dashed lines represent rolling 3-month averages.

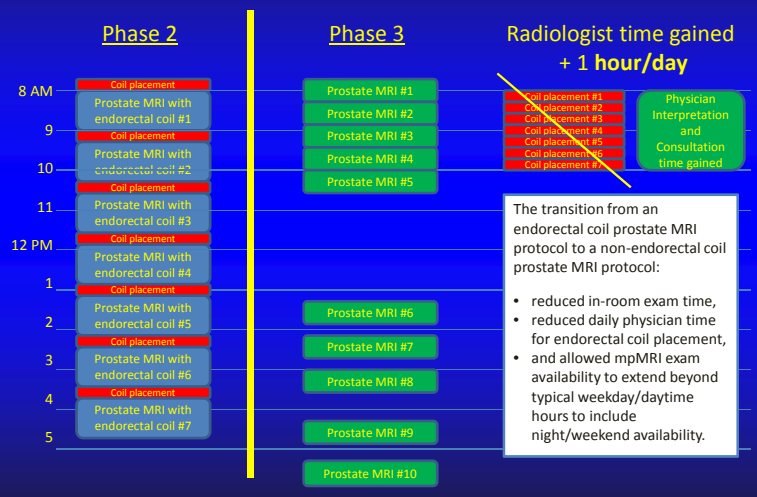
6-month exam volume increased consecutively (blue boxes).

Wait time decreased from 20 days at the start of measurement in March 2017 to <1 day in March 2018.

Results – Secondary Outcomes

	Patient access to mpMRI (median, 3rd available exam)	mpMRI Exam availability (% of weekly hours of operation)	mpMRI exam volume	Mean monthly mpMRI volume	Mean mpMRI in-room time	Mean time for coil placement	mpMRI for CQI review
Observation	n/a	14	357	60	75	41	n/a
Phase 1	21	24	504	84	83	68	12
Phase 2	2	28	634	106	64	61	15
Phase 3	0.5	100	653	109	41	0	23
	days		exams	exams	minutes	minutes	exams

Results – Secondary Outcomes



Conclusions

- A comprehensive CQI initiative resulted in improved access to and availability of mpMRI for patients.
- Optimizing the mpMRI value chain achieved:
  - same day availability,
  - nearly doubled mpMRI volume,
  - and maintained exam quality.
- Patient access to a critical resource in prostate cancer care was expanded, an important development given increasing demand for this exam.