



Improved Detection of Clinically Significant Prostate Cancer Using a Structured Prostate Imaging – Reporting Data System (PI-RADS) Template

Abstract #17-130

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Disclaimer

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Background

- Prostate cancer is the most common solid tumor malignancy in males, with approximately 180,000 new cases reported in 2016 (1).
- Prostate MRI plays an increasingly important role in detecting clinically significant prostate cancer (2).
- Structured templates are recommended by the American College of Radiology to promote use of practice guidelines (3).
- Prior to July 2016, prostate MRIs at our institution were reported using a generic template.
- Problems with using the generic template included:
 - Inconsistent use of PI-RADS lexicon
 - Confusion among urologists reading the reports
 - Variability among interpreting radiologists
 - Low accuracy

Purpose

To explore the effect of using a structured PI-RADS reporting template on radiologists' adherence to PI-RADS and on the accuracy of prostate MRI for detecting clinically significant prostate cancer

Methods

- In July 2016, a structured reporting template based on drop down menus incorporating PIRADS v2 lexicon was instituted
- Patients who had a prostate MRI followed by MRI-US fusion targeted and systematic biopsies pre-and post-template change from October 2015 through December 2016 were retrospectively reviewed
- Lesion and patient characteristics were extracted from MRI reports and patients' charts
- Adherence of the MRI report to PI-RADS classification decision rules was recorded and compared before and after the institution of the standardized template using Fisher's exact test

Methods

- Using a threshold of PI-RADS 4 for positivity, we tested the sensitivity, specificity, and accuracy of MRI to detect clinically significant prostate cancer (Gleason score >7)
- Histopathology of the combined targeted and non-targeted biopsy cores served as the reference standard
- Sensitivity, specificity, and accuracy were compared before and after instituting the standardized PI-RADS template
- No other change/intervention was undertaken during the studied period aside from template change
- MRIs were interpreted by one of six radiologists with at least 2 years experience in interpreting prostate MRIs

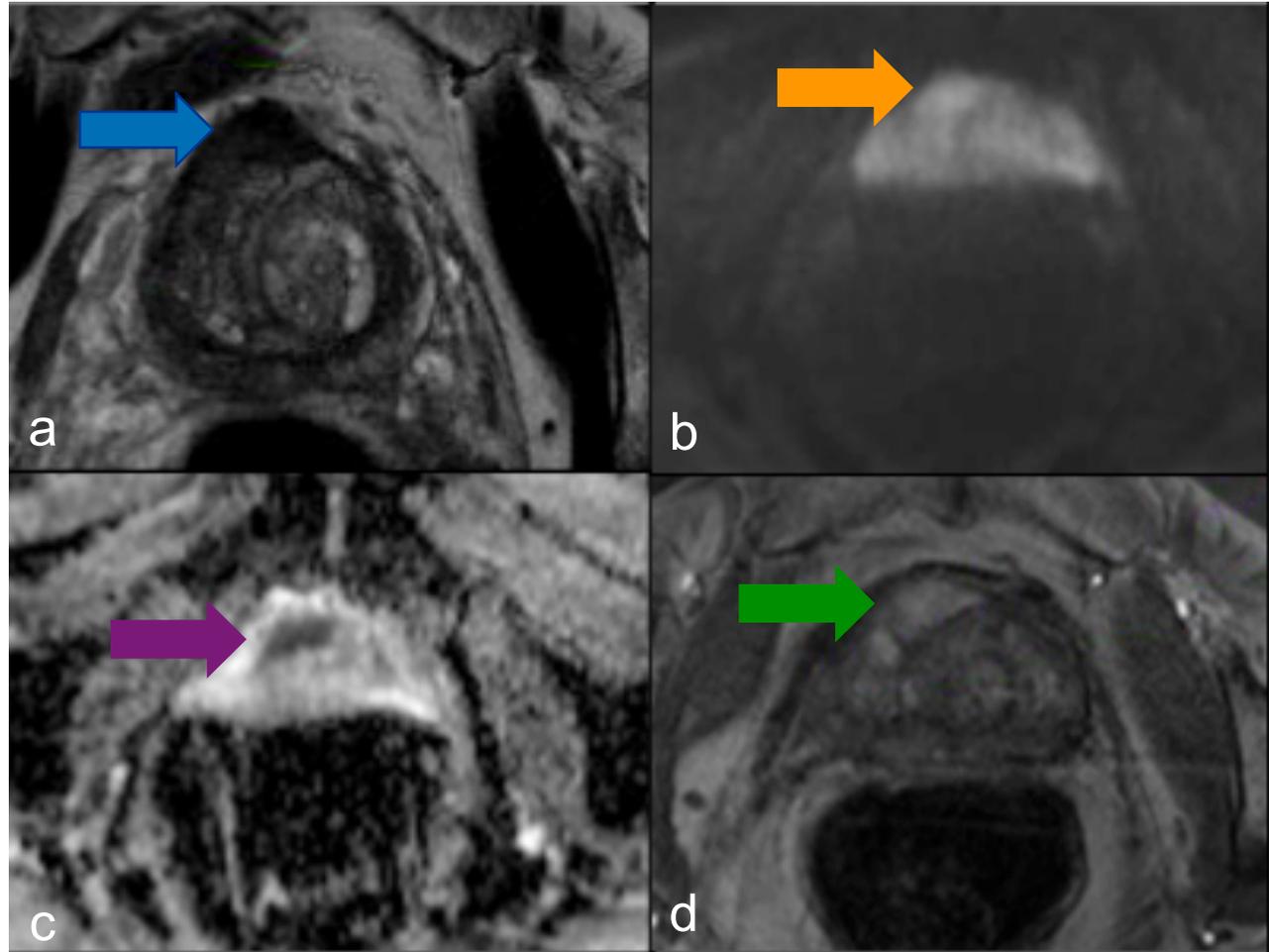
PIRADS v2 Template

- **Clinical information:** patient age, presenting symptoms, PSA, prior biopsy with Gleason score if available
- **Technique:** contrast with volume, MRI field strength, endorectal coil (yes or no)
- **Findings:**
 - Prostate gland: size/volume, presence of post-biopsy hemorrhage, intravesicular protrusion
 - Individual lesion: PIRADS v2 assessment, T2-weighted, diffusion-weighted/ADC, and dynamic contrast enhancement properties, size, location, zone, extra-prostatic extension
 - Additional findings: invasion of seminal vesicles, lymph nodes, osseous structures
- **Impression:**
 - Summary of individual lesions with respective PIRADS categories
 - Relevant additional findings



Example – MRI Prostate with Biopsy Proven Prostate CA (Gleason 7)

Axial images through the prostate gland show a **T2 hypointense lesion** in the right anterior midgland/base transition zone (a) which demonstrates **restricted diffusion** with associated **low signal on ADC** (b,c), and **early enhancement** on dynamic post-contrast images (d)



Example - Associated MRI prostate report **BEFORE** template change

“...Findings: ...

There is a 2.0 x 0.9 cm low T2 signal nodule in the right paracentral anterior mid gland/base, inseparable from anterior fibromuscular stroma (7:13) with restricted diffusion (8:98, 10:13), low signal on a DC (9:14), with early postcontrast enhancement (15:9), suspicious for high-grade neoplasm.

...

IMPRESSION:

Low signal nodule of right anterior gland with restricted diffusion and early enhancement is suspicious for high-grade (> Gleason 6) intraprostatic neoplasm.

Focal bulge of anterior capsule may represent mild extracapsular extension of tumor.

PIRADS 4- High probability (clinically significant cancer is likely to be present)”

Example - Associate MRI prostate report **AFTER** template change

...LESION: 1

PI-RADS Assessment Category: 5, Very high (clinically significant cancer highly likely)

T2-weighted images: 5 (Lenticular or noncircumscribed, homogenous moderately hypointense ; ≥ 1.5 cm or definite invasion/EPE)

Diffusion-weighted images: 5 (focal marked decreased ADC and marked increased ultra high b-value signal; >1.5 cm)

Size: 20 x 9 mm (AP x transverse) as measured on image 13 of series 7 (T2-weighted image)

Side: Midline

Location within transverse plane: Anterior

Level of prostate: Base-to-midgland

Zone: Transition zone

Extra-prostatic extension: Broad based abutment with overlying capsular irregularity

Example - Associate MRI prostate report **AFTER** template change cont'd

IMPRESSION:

20 x 9 mm right anterior base-to-midgland transition zone lesion with overlying capsular irregularity. PI-RADS 5, very high (clinically significant cancer highly likely).

No evidence of seminal vesicle invasion or pathologic pelvic lymphadenopathy.

Results

- 177 lesions in 112 patients (average age 65, average PSA: 6.4 ng/mL) were included in the analysis
- 151 lesions were reported before instituting the PI-RADS standard template and 26 lesions were reported after template change
- Adherence to PI-RADS was significantly higher after template change (34.5% pre- and 75% post template change, p-value <0.0001)

	Performance of Prostate MRI Before Changing to PIRADS v2 Template	Performance of Prostate MRI After Changing to PIRADS v2 Template
Sensitivity	60%	100%
Specificity	56%	72%
Accuracy	58%	81%

Limitations

- Small sample size post template change
- Possibility of improved proficiency of the interpreting radiologists over time, unrelated to the template change
- Possibility of improved lesion marking and prostate segmentation over time
- Possibility of improved biopsy technique by the urologist over time
- Retrospective analysis

Conclusion

Based on these results a standardized PI-RADS MRI reporting template may improve radiologists' adherence to PI-RADS as well as possibly the sensitivity, specificity, and accuracy of prostate MRI for detecting clinically significant prostate cancer

References

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