



## Meeting Summary: Expert Convening on Advancing Diagnostic Excellence in Prostate Cancer – Prostate MR Image Quality

October 26, 2024 | 7:30am- 11:00am

American Urological Association | 1000 Corporate Blvd, Linthicum, MD 21090

**Meeting Objective:** To build towards diagnostic excellence in prostate cancer through the exchange of ongoing quality work on prostate cancer screening, imaging, and biopsy.

### Advancing Diagnostic Excellence in Prostate Cancer – Dr. Matthew Nielsen

#### Prostate Cancer Disparities in Black Men:

- Black men experience higher prostate cancer incidence and mortality compared to White men. Black men are 1.8x more likely to be diagnosed with, and 2.1x more likely to die from, prostate cancer when compared to their White counterparts.<sup>1</sup>
- Between 2007 and 2014, the incidence rate of prostate cancer dropped by 40%; however, between 2014 and 2019, the incidence has risen ~3% per year, driven in part by a 4.5% per year increase in the incidence of advanced stage prostate cancer.<sup>1</sup>

#### Improving Care throughout Diagnostic Continuum:

- National-level impact could be achieved through cross-specialty quality improvement (QI) initiatives across the diagnostic continuum (e.g., PSA screening, magnetic resonance imaging [MRI], biopsy, active surveillance, and treatment).
- PSA screening and prostate cancer management should be tailored to the patient (e.g., via screening intervals, thresholds for action, MRI use, and active surveillance).
- MRI can be a valuable tool to help risk-stratify who should undergo a biopsy while averting biopsy in others. Prostate MRI can improve detection of prostate cancer requiring treatment while reducing detection of low-risk prostate cancer (overdiagnosis). This requires a reliable, high-quality MR image.

#### Diagnostic Excellence:

- Diagnostic excellence is *“an optimal process to attain an accurate and precise explanation about a patient’s condition. An optimal process would be timely, cost-effective, convenient, and understandable to the patient. An accurate and precise diagnosis gains clinical value insofar as it leads to better choices in treatment”*<sup>ii</sup>
- *“The diagnostic process requires collaboration... [and] hinges on successful intra- and inter[\*]-professional collaboration among health care professionals, including primary care clinicians... physicians in various specialties”* \*and professionals attached to each step of the diagnostic process (techs, nurses, APPs, etc.).

### Prostate MRI in Michigan Urological Surgery Improvement Collaborative (MUSIC) – Drs. Kevin Ginsburg & Tudor Borza

#### MUSIC Overview:

- Founded over 10 years ago, MUSIC is a community-driven initiative focused on improving patient care through data, best practices, education, and innovation.



- Supported by Blue Cross and Blue Shield of Michigan, MUSIC includes 260+ urologists across 46 practices, 15 patient advocates and 16 coordinating center staff.
- The MUSIC registry has over 136,000 cases.
- MUSIC has three primary programs including MUSIC Prostate (focused on prostate cancer care).

#### **Prostate MRI Quality Assurance Program:**

- The program was implemented in 2017.
- In 2024, over 50% of the 10,000-15,000 biopsies performed by MUSIC practices are informed by MRI.

#### **Variation in Detection of Clinically Significant Prostate Cancer:**

- For prostate cancer, radiologists use a scoring system, PI-RADS (Prostate Imaging Reporting and Data System), to indicate the likelihood of clinically significant cancer in a lesion (a score of 1 indicates very low likelihood, while a score of 5 indicates a very high likelihood).
- MUSIC data show significant variation in the detection of clinically significant prostate cancer (csPCa), by radiologists and by urologists.
- To address variation in detection of csPCa, MUSIC conducted a multi-disciplinary review of discordant cases (e.g., PI-RADS 5 lesions with negative biopsies or negative MRIs with positive biopsies). MRI fusion biopsy scorecards were developed and shared with each practice, and radiologists held MRI reading workshops for urologists.
  - Despite these efforts, some issues remained.
    - Amongst men undergoing MRI-fusion targeted biopsy with a suspicious MRI (PI-RADS 3, 4, and 5), csPCa detection rate varies at the provider level, both for individual radiologists interpreting the MRI, and by urologists performing the fusion biopsy.
    - When individual radiologist and urologist csPCa detection rates were analyzed by PI-RADS score, MUSIC found that amongst men with PI-RADS 5 lesions, radiologists' interpretation contributed more to variation in csPCa detection rate (i.e., MRI overread > biopsy error), while amongst men with PI-RADS 3 and 4 lesions, biopsy performance by a urologist likely contributed more to variation in csPCa detection.
  - QI initiatives need to be tailored to target each group (radiologists and urologists) according to their specific areas of impact.

#### **Variation in Diagnostic Practices:**

- There is significant variation in prostate cancer diagnostic practices, including the number of MRI scans read by radiologists and the number of biopsies performed by urologists.
  - Urologists expressed concerns about variability in prostate MRI interpretation by radiologists and the varying levels of experience amongst radiologists in conducting and reading prostate MRIs.
  - In addition, urologists feel that many radiologists in community settings are not reporting according to PI-RADS specifications. Most of the publications on PI-RADS usage are heavily based on data from academic medical centers.
- Many radiologists and urologists conduct few prostate MRI readings and targeted biopsies, respectively.
  - Using MUSIC data, the median number of prostate MRI reads was 7 for radiologists (n=113) and 11 targeted biopsies for urologists (n=85) over a 4-year period.



- From a radiologist's perspective, this is a very low number of prostate MRI readings to be proficient at reading them. As a reference, in order to obtain the American College of Radiology (ACR) Prostate Cancer MRI Center Designation, radiologists must interpret and report 150 exams, and MRI techs must have supervised experience in 50 exams, over 36 months.

### MUSIC Scorecards

- Practices that participate in MUSIC are provided scorecards that compare their practice-level performance to the performance of all MUSIC practices.
- The scorecards below (provided courtesy of MUSIC) are examples of the MRI and fusion biopsy scorecards that MUSIC practices receive.



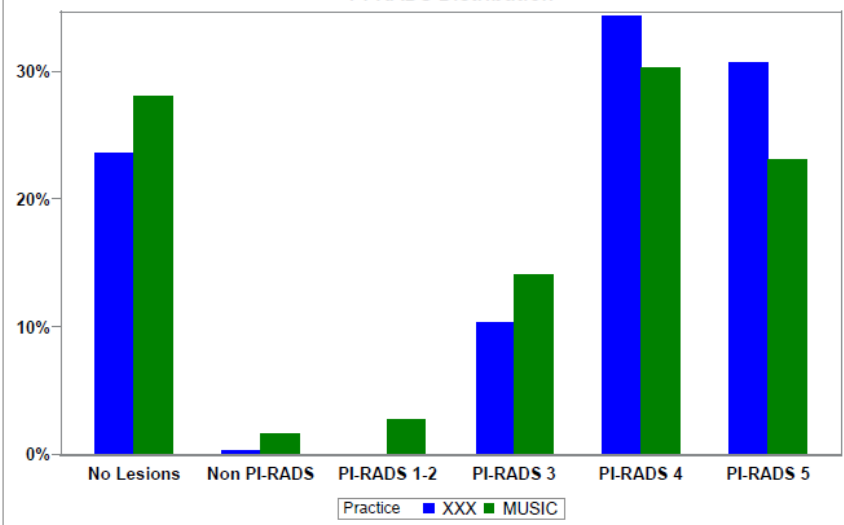
### MUSIC MRI Scorecard

Practice XXX - Data from 6/1/2016 to 5/1/2019

#### MRI Prostate/Pelvis

MRI Technical Specs	Practice XXX	MUSIC	Indications for MRI	Practice XXX	MUSIC
# MRIs Ordered	378	5517	Before First Biopsy	4.0%	9.3%
MRI Type			After Negative Biopsy	8.5%	14.4%
3 Tesla	99.2%	68.0%	Premalignant Findings on Prior Biopsy	2.1%	3.0%
1.5 Tesla			Prostate Cancer	85.2%	72.9%
+ Endorectal Coil	0%	0.1%	Surveillance: entrance	24.9%	16.3%
- Endorectal Coil	0%	2.1%	Surveillance: ongoing	19.0%	25.6%
Other	0.8%	29.7%	Staging/Pre-trt Planning	43.7%	34.5%
PI-RADS	99.7%	97.7%	Rising PSA after Trt	0.0%	1.9%
			Other	0.0%	2.0%

PI-RADS Distribution





**MUSIC Fusion Biopsy Scorecard**

Practice XXX - Data from 8/1/2017 - 9/9/2019

Metric	Benchmark	Practice XXX	Rest of MUSIC		
<b>Patient Level Cancer Detection Rates (CDR), N = 162</b>					
Overall CDR	>55%	77%	●	70%	●
Standard Biopsy CDR	>50%	65%	●	60%	●
Targeted Biopsy CDR	>45%	58%	●	56%	●
Targeted Biopsy High Grade* CDR	>35%	31%	●	37%	●
<b>Lesion Level High Grade Cancer Detection Rates (CDR), N = 178</b>					
PI-RADS 3 High Grade CDR (N=30)	10-25%	13%	●	14%	●
PI-RADS 4 High Grade CDR (N=107)	25-60%	25%	●	30%	●
PI-RADS 5 High Grade CDR (N=41)	70-95%	44%	●	59%	●
<b>Patient Level Upgrading, N = 162</b>					
Upgrading by Standard Biopsy	<15%	23%	●	21%	●
Upgrading by Targeted Biopsy	>15%	27%	●	20%	●
Upgrading to High Grade by Standard Biopsy	<15%	9%	●	9%	●
Upgrading to High Grade by Targeted Biopsy	>20%	17%	●	11%	●

\*High Grade: Gleason>=7

## ACR Learning Network & ACR Initiatives on Prostate MRI Quality – Drs. David Larson and Andrei S. Purysko

### Prostate MRI Utilization:

- The percentage of men undergoing prostate MRI before biopsy has increased from 0.5% in 2007 to 35.5% in 2022 and continues to grow.
  - There has been a significant increase in prostate MRI volumes, but many radiologists lack formal training in prostate imaging and the correct use of protocols.
- Utilization is higher in urban areas versus rural areas, highlighting a gap in access in rural settings.
- PI-RADS is a critical development in prostate MRI, providing technical parameters for imaging and a scoring system for image interpretation. The development of PI-RADS was a major contributor in the increase of prostate MRI utilization.

### Benefits of Prostate MRI:

- When used prior to biopsy, prostate MRI leads to:
  - Increased or maintained detection of clinically significant cancers.



- Decreased overdiagnosis and overtreatment of insignificant cancers.
- Reduction in unnecessary biopsies (by 25-50%).
- Lower healthcare costs.
- However, data are predominantly from high-volume academic centers, while data from community centers are lacking.

#### **Impact of Poor MRI Quality:**

- Over a third of prostate MRI exams have insufficient image quality, which:
  - Decreases the ability to detect significant cancers.
  - Increases the number of equivocal results.
  - Leads to more unnecessary biopsies.
- Poor image quality can impact the entire diagnostic process, from MR-informed biopsy to biopsy interpretation to treatment decisions.

#### **Prostate MRI Quality Improvement Collaborative:**

- This initiative, Part of the ACR Learning Network, involves teams working together to solve common problems using a structured improvement process.
- The program includes didactic sessions in improvement sciences and engagement of frontline staff (especially radiology techs who perform the exam) in the QI process.
- Teams learn about the Prostate Imaging Quality (PI-QUAL) system and how to implement it in practice.
- The program focuses on four key pillars for improving prostate MRI quality:
  - Preparation: Effective, timely, and clear patient preparation.
  - Protocol: PI-RADS-compliant, standardized, and optimized prostate MRI protocols.
  - Personnel: Communication, engagement, and training for the staff involved in scheduling, performing and interpreting prostate MRI.
  - Process for auditing images: Efficient and reliable auditing process and feedback system.
- Of the groups that have participated in the program, three cohorts saw increases in the number of exams that meet quality criteria according to PI-QUAL systems.
  - Dramatic increases in efficiency through this program have also led to increased revenue and improved access to imaging by opening more appointment slots. Additionally, the program has been a positive experience for frontline staff, which benefits staff recruitment and retention (techs are learning new skills and working on improving work in other areas).

#### **ACR Prostate Cancer MRI Center Designation:**

- Requirements for the program include:
  - Achievement of ACR MR Accreditation in the body module.
  - Use of PI-RADS technical standards and scoring system for imaging acquisition and reporting.
  - Coordination of prostate biopsies (any technique).
  - Radiology/pathology follow-up.
  - Qualifications for personnel: radiologists must complete 150 exams in 36 months, MRI techs must complete 50 exams.
    - ACR Prostate MR training (see below) can help low volume centers reach the required exam levels.
  - Cost: \$400 for 3 years of accreditation.
- Currently, 53 imaging facilities have the designation (44% hospital-based and 56% outpatient).



- 13 of 14 centers that initially did not qualify, achieved the designation by addressing identified deficiencies with the ACR support.
- Urologists can consider referring to imaging centers with the ACR Prostate Cancer MRI designation, which demonstrates that radiology centers meet ACR's quality standards for prostate MRI. If there isn't a designated site near them, urologists should, at minimum, refer to a center with an MRI accreditation (there are over 7,000 sites in the U.S.). The ACR is one of the entities that offer [MRI accreditation](#).

#### ACR Prostate MRI Training:

- [Primer for using PI-RADS v2.1 for Prostate MRI](#) (free registration)
- [Prostate MR](#) (2 day in-person course, lectures and faculty interaction, opportunity to review over 200 cases with rad-path correlation)
- [Prostate MR Virtual Course – Case Review](#) (online case review – 20 cases with rad-path correlation, recorded lectures)
- ACR membership is not required, and the training options are open to non-radiologists.

### Optimizing MRI and Biopsy Quality – Dr. Ismail Baris Turkbey

#### Critical Quality Control Steps for MRI Guided Localized Prostate Cancer Management:

- The positive predictive value (PPV) of PI-RADS for the detection of high-grade prostate cancer varies widely across imaging centers.<sup>iii</sup>A good quality prostate MRI can be impacted by a number of factors:
  - Interpretation (adherence to PI-RADS)
  - Use of bowel enemas, antispasmodics, rectal tubes, and endorectal coils.
    - It is essential to inform patients about the correct preparation steps and the consequences of improper prep.
  - Protocol optimization.
- PI-QUAL is an assessment tool to determine the quality of the MR image and should be used to guide clinical decisions about whether a repeat scan is necessary.
  - PI-QUAL 1: Inadequate scan, should be repeated.
  - PI-QUAL 2: Acceptable scan, consider repeat scan.
  - PI-QUAL 3: Optimal scan, of highest diagnostic quality.
  - To promote uptake, urologists can ask their radiologists to include both PI-RADS and PI-QUAL scores in their reports to provide a comprehensive view of the MRI. PI-RADS uptake by radiologists was driven by urologists requesting that it be incorporated into their reports.

#### Artificial Intelligence (AI) for Quality Evaluation and Enhancement:

- AI algorithms could help technicians identify poor-quality scans in real-time, pinpointing specific issues.
- The AI models developed by National Cancer Institute (NCI) are available to Clinical Cancer Research (CCR) investigators via the [Artificial Intelligence Resource \(AIR\)](#). AI-based solutions are being used to reconstruct images at higher quality and enhance image resolution.
- A new study from the NCI found that when you compare an MRI from an external facility and an MRI conducted at the NCI, the gap in diagnostic quality proportion between the two is approximately 30-40%. By using AI-based solutions to salvage the image, the gap in quality dropped to a 10-15% difference in diagnostic quality.<sup>iv</sup>



## From PubMed to Practice – The North Carolina Experience – Drs. Ray Tan & Zach Feuer

### UNC Rapid Access Program:

- As a large state hospital, UNC receives a large number of patients with abnormal PSA levels. The timeframe from referral to prostate biopsy and pathology review was 4-6 months.
- When reviewing the process, they broke the process down to three main steps: initial visit, prostate MRI, and biopsy.
- To reduce the referral visit wait time, UNC dedicated Rapid Access staff to improve scheduling, introduced telehealth for initial visits and MRI reviews, and worked on obtaining outside hospital MRIs in parallel with other steps.
- A standardized biopsy decision algorithm was implemented, where PI-RADS 3-5 cases received MRI fusion biopsies, while PI-RADS 1-2 cases were evaluated for biopsy based on additional factors (PSA density > 0.15, Black ancestry, and patient preference).
- Results:
  - Referral-to-biopsy time was reduced by 70%, now averaging 58 days.
  - Biopsies were performed in 38% of men seen through rapid access, with 39% of these detecting clinically significant prostate cancer.
  - For men with PI-RADS 3 and PSA density <0.15, and those with negative MRI and PSA density <0.15, clinically significant cancer detection rate was <10%.

### Primary Care Insights:

- Conversations with UNC primary care providers (PCPs) revealed that PCPs have started ordering MRIs preemptively because they noticed urologists ordering MRIs for patients with elevated PSA levels. There is a need for the AUA and ACR to engage with the American College of Physicians (ACP) and the American Academy of Family Physicians (AAFP) to provide guidance on the appropriate ordering of MRIs by PCPs in the context of elevated PSA.

## Next Steps

### Potential Next Steps and Work Products:

- Develop materials for urologists (written, webinars, and/or podcasts) that raise awareness/educate on:
  - Advocating for appropriate PI-RADS and PI-QUAL reporting (e.g. developing a Quality Improvement Issue Brief (QIIB) on this topic or including this information in the next AUA *Early Detection of Prostate Cancer* guideline update).
  - Identifying high-quality MRI centers for patient referral.
  - Identifying imaging facilities to apply for Prostate Cancer MRI center designation and participating in the ACR Learning Network.
  - Collecting center-specific data on PI-QUAL scores to inform referral choices.
  - Integrating prostate MRI into clinical algorithms (similar to UNC Rapid Access Program).
  - Educating patients on preparation for prostate MRI.
  - Reducing variation in detection of csPCa, both by radiologists and by urologists.



- Develop a Joint Statement or Quality Improvement Issue Brief to raise awareness about PI-QUAL, MRI accreditation standards, and the ACR Learning Network, as many AUA members may be unaware of these topics.
- Determine next steps that focus on fusion biopsy.
- Outline a 5-year plan for AUA/ACR collaboration on prostate MRI quality and prostate biopsy.
- Strategize if/how to include other relevant specialties (e.g., primary care, pathology).
- Collect additional data to identify the number of practitioners performing low-volume prostate MRIs, potentially targeting areas for improvement or additional support.

## Meeting Attendees

- **Andrei Purysko, MD:** Section Head, Abdominal Imaging and Associate Professor of Radiology, Cleveland Clinic; Physician Leader, ACR Learning Network Prostate MR Image Quality Improvement Collaborative
- **Angela Tong, MD:** Clinical Assistant Professor and Director, Prostate Imaging, NYU Langone Health
- **David B. Larson, MD, MBA, FACR:** Professor and Executive Vice Chair, Department of Radiology, Stanford University School of Medicine; Chair, Commission on Quality and Safety, American College of Radiology
- **Emily Calvert, MSN, RN, CPHQ:** Project Manager, Quality & Measurement, American Urological Association
- **Ersan Altun, MD:** Medical Director of MRI, Professor of Clinical Radiology, Abdominal Imaging, University of North Carolina Chapel Hill
- **Gregory Aufferberg, MD, MS:** Urologic Oncologist, Urology of St. Louis; Chair, Quality Improvement & Patient Safety Committee, American Urological Association
- **Hung-Jui (Ray) Tan, MD, MSHPM, FACS:** Director, Urologic Oncology, University of North Carolina Chapel Hill; Chair-elect, Data Committee, American Urological Association
- **Ismail Baris Turkbey, MD, FSAR:** Senior Clinician, Molecular Imaging Branch, National Cancer Institute
- **Karen Johnson, PhD:** Director, Quality & Measurement, American Urological Association
- **Keonna Confesor, MS:** Project Coordinator, Quality & Measurement, American Urological Association
- **Kevin Ginsburg, MD, MS:** Assistant Professor, Urology, Wayne State University School of Medicine; Co-director, MUSIC Prostate Program
- **Matthew Nielsen, MD, MS, FACS:** Chair, Department of Urology, University of North Carolina Chapel Hill; Chair, Science and Quality Council, American Urological Association
- **Mythreyi Chatfield, PhD:** Executive Vice President, Quality & Safety, American College of Radiology
- **Tudor Borza, MD, MS:** Assistant Professor, Urology, University of Michigan; Co-director, MUSIC Prostate Program; Member, Quality Improvement & Patient Safety Committee, American Urological Association
- **Zach Feuer, MD:** Clinical Fellow, Society of Urologic Oncology, University of North Carolina Chapel Hill

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<sup>iii</sup> Westphalen AC, McCulloch CE, Anaokar JM, Arora S, Barashi NS, Barentsz JO, Bathala TK, Bittencourt LK, Booker MT, Braxton VG, Carroll PR, Casalino DD, Chang SD, Coakley FV, Dhatt R, Eberhardt SC, Foster BR, Froemming AT, Fütterer JJ, Ganeshan DM, Gertner MR, Mankowski Gettle L, Ghai S, Gupta RT, Hahn ME, Houshyar R, Kim C, Kim CK, Lall C, Margolis DJA, McRae SE, Oto A, Parsons RB, Patel NU, Pinto PA, Polascik TJ, Spilseth B, Starcevich JB, Tammisetti VS, Taneja SS, Turkbey B, Verma S, Ward JF, Warlick CA, Weinberger AR, Yu J, Zagoria RJ, Rosenkrantz AB. Variability of the Positive Predictive Value of PI-RADS for Prostate MRI across 26 Centers: Experience of the Society of Abdominal Radiology Prostate Cancer Disease-focused Panel. *Radiology*. 2020 Jul;296(1):76-84. doi: 10.1148/radiol.2020190646. Epub 2020 Apr 21. PMID: 32315265; PMCID: PMC7373346.

<sup>iv</sup> Yilmaz EC, Harmon SA, Law YM, Huang EP, Belue MJ, Lin Y, Gelikman DG, Ozyoruk KB, Yang D, Xu Z, Tetreault J, Xu D, Hazen LA, Garcia C, Lay NS, Eclarinal P, Toubaji A, Merino MJ, Wood BJ, Gurram S, Choyke PL, Pinto PA, Turkbey B. External Validation of a Previously Developed Deep Learning-based Prostate Lesion Detection Algorithm on Paired External and In-House Biparametric MRI Scans. *Radiol Imaging Cancer*. 2024 Nov;6(6):e240050. doi: 10.1148/rycan.240050. PMID: 39400232.