

## **Title: Variable clinically significant prostate cancer detection rates on Magnetic Resonance Imaging Fusion Prostate Biopsy - Experience from the Pennsylvania Urologic Regional Collaborative**

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### **Introduction**

Magnetic resonance imaging (MRI) fusion biopsy has been shown to outperform systematic biopsy in detecting clinically significant prostate cancer (csPCa). We examined practice variability in detecting csPCa in a large regional quality collaborative.

### **Methods**

The Pennsylvania Urologic Regional Collaborative is a physician-led quality improvement collaborative comprised of 11 urology practices across Pennsylvania and New Jersey. We analyzed 857 first-time MRI fusion biopsy procedures performed at 5 practices between January 2015 and June 2019. Analysis was restricted to practices with a minimum of 30 biopsies. Chi-square and multilevel logistic regression analyzed the association between patient characteristics and csPCa detection (defined as Gleason  $\geq 4+3$  tumor) and the variability in odds of csPCa detection by practice.

### **Results**

Detection rates for csPCa ranged from 14% to 28% across practices ( $p = 0.02$ ); (Table 1). Patient age, family history, race, digital rectal examination findings, prostate specific antigen, prostate volume and Prostate Imaging-Reporting and Data System (PI-RADS) score varied significantly by practice and were all, except family history and race, significantly associated with csPCa (Table 2). PI-RADS score of  $\geq 4$  was associated with increased likelihood of detecting csPCa (OR 2.67, 95% CI 1.48, 4.83,  $p=0.01$ ). After controlling for patient characteristics, the odds of csPCa detection did not vary significantly by practice (intercept variance = 0.042,  $p = 0.26$ ).

### **Conclusion**

Practice variability in csPCa detection rates was predominantly attributable to variability in patient characteristics. This suggests significant differences in practice patterns and patient selection for fusion biopsy. Furthermore, results highlight the importance of pre-biopsy MRI in the diagnosis of csPCa.

**Table 1: Clinically significant prostate cancer detection rates and patient characteristics by practice**

No. patients (%)	Overall	Site A	Site B	Site C	Site D	Site E	p value
	N = 857	N = 42	N = 250	N = 233	N = 119	N = 213	
Clinically significant prostate cancer (csPCa)							
Yes	199 (23.2)	6 (14.3)	64 (25.6)	66 (28.3)	29 (24.4)	34 (16)	0.02
No	658 (76.8)	36 (85.7)	186 (74.4)	167 (71.7)	90 (75.6)	176 (84)	
Age group (years)							
59 or younger	123 (14.4)	8 (19.1)	44 (17.6)	26 (11.2)	19 (16)	26 (11)	0.01
60 – 69	389 (45.4)	16 (38.1)	126 (50.4)	100 (42.9)	61 (51.3)	86 (40.4)	
70 or older	345 (40.3)	18 (42.9)	80 (32)	107 (45.9)	40 (33)	101 (47.4)	
Family History							
No	565 (65.9)	22 (52.4)	150 (60)	166 (71.2)	82 (68.9)	145 (68.1)	0.04
Yes	243 (28.4)	18 (42.9)	83 (33.2)	59 (25.3)	32 (26.9)	51 (23.9)	
Unknown	49 (5.7)	2 (4.8)	17 (6.8)	8 (3.4)	5 (4.2)	17 (8)	
Race							
White	678 (79.1)	33 (78.6)	220 (88)	171 (73.4)	101 (84.9)	153 (71.8)	<0.0001
Black	117 (13.7)	9 (21.4)	25 (10)	44 (18.9)	4 (3.4)	35 (16.4)	
Other*	62 (7.2)	-	5 (2)	18 (7.7)	14 (11.8)	25 (11.7)	
DRE							
Negative	573 (66.9)	35 (83.3)	115 (46)	175 (75.1)	86 (72.3)	162 (76.1)	<0.0001
Positive	109 (12.7)	7 (16.7)	14 (5.6)	39 (16.7)	30 (25.2)	19 (8.9)	
Unknown	175 (20.4)	-	121 (48.4)	19 (8.2)	3 (2.5)	32 (15)	
PSA (ng/ml)							
Less than 4	119 (13.9)	3 (7.1)	43 (17.2)	34 (14.6)	15 (12.6)	24 (11.3)	0.01
4 – 10	532 (62.1)	23 (54.8)	166 (66.4)	141 (60.5)	66 (55.5)	136 (63.9)	
Greater than 10	206 (24)	16 (38.1)	41 (16.4)	58 (24.9)	38 (31.9)	53 (24.9)	
Prostate volume (cc)							
Less than 30	125 (14.6)	2 (4.8)	58 (23.2)	30 (12.9)	13 (10.9)	22 (10.3)	<0.0001
30 – 60	435 (50.8)	21 (50)	138 (55.2)	115 (49.4)	63 (52.9)	98 (46)	
Greater than 60	297 (34.7)	19 (45.2)	54 (21.6)	88 (37.8)	43 (36.1)	93 (43.7)	
PI-RADS ≥ 4							
Yes	542 (63.2)	20 (47.6)	165 (66)	163 (70)	90 (75.6)	104 (48.8)	<0.0001
No	315 (36.8)	22 (52.4)	85 (34)	70 (30)	29 (24.4)	109 (51.2)	

\* Includes Hispanic/Asian/Native American/Unknown

**Table 2: Association of patient characteristics with clinically significant prostate cancer detection<sup>†</sup>**

Risk factor	Crude OR (95% CI)	p value	Adjusted OR (95% CI)	p value
Age group (years)				
59 or younger	1		1	
60 – 69	1.97 (1.07, 3.61)	0.03	2.15 (0.98, 4.72)	0.05
70 or older	3.53 (1.94, 6.43)	<0.0001	4.02 (1.82, 8.88)	0.004
Family History				
No	1		1	
Yes	1.0 (0.71, 1.42)	0.96	1.19 (0.74, 1.91)	0.43
Unknown	0.57 (0.26, 1.23)	0.15	0.68 (0.24, 1.91)	0.41
Race				
White	1		1	
Black	1.4 (0.90, 2.14)	0.14	1.31 (0.71, 2.40)	0.33
Other*	0.9 (0.46, 1.63)	0.65	0.82 (0.33, 2.00)	0.61
DRE				
Negative	1		1	
Positive	2.40 (1.56, 3.69)	<0.0001	2.68 (1.46, 4.90)	0.006
Unknown	1.14 (0.76, 1.70)	0.53	0.99 (0.55, 1.76)	0.95
PSA (ng/ml)				
Less than 4	1		1	
4 – 10	1.97 (1.09, 3.57)	0.03	2.42 (1.14, 5.12)	0.03
Greater than 10	4.51 (2.42, 8.41)	<0.0001	6.98 (3.09, 15.78)	0.0006
Prostate volume (cc)				
Greater than 60	1		1	
30 – 60	2.30 (1.54, 3.44)	<0.0001	3.15 (1.86, 5.34)	0.001
Less than 30	4.60 (2.81, 7.53)	<0.0001	7.93 (4.02, 15.64)	0.0001
PI-RADS ≥ 4				
No	1		1	
Yes	3.00 (2.05, 4.40)	<0.0001	2.67 (1.48, 4.83)	0.01

\* Includes Hispanic/Asian/Native American/Unknown

<sup>†</sup> Practice variance = 0.042, standard error = 0.064, p = 0.26