

Supplementary Information

Two-decade prefecture-wide trends in prostate biopsy volume and cancer detection
alongside institutional adoption of pre-biopsy MRI in Yamanashi, Japan

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Supplementary Table S1. Annual prefecture-wide prostate biopsy volume and cancer detection in Yamanashi Prefecture

Fiscal year	Biopsy procedures, n	Cancer-positive, n	Cancer-negative, n	Cancer detection rate, %	Participating institutions, n	Biopsy-performing institutions, n
2004	1270	500	770	39.4	14	
2005	1231	472	759	38.3	16	
2006	1062	408	654	38.4	13	
2007	881	388	493	44.0	9	
2008	874	368	506	42.1	11	
2009	1227	549	678	44.7	13	
2010	1110	508	602	45.8	13	
2011	1116	530	586	47.5	13	
2012	1139	548	591	48.1	13	
2013	1048	505	543	48.2	13	
2014	964	488	476	50.6	13	
2015	948	489	459	51.6	13	10
2016	887	459	428	51.7	17	10
2017	825	461	364	55.9	18	11
2018	737	458	279	62.1	19	10
2019	831	538	293	64.7	19	10
2020	737	491	246	66.6	19	10
2021	825	523	302	63.4	19	9

2022	922	604	318	65.5	19	8
2023	775	534	241	68.9	21	7
2024	783	544	239	69.5	22	8

A fiscal year was defined as April of the indicated year through March of the following year. Blank entries for biopsy-performing institutions indicate that the value was not consistently documented and should not be interpreted as zero.

Supplementary Table S2. Annual institutional MRI utilization and prostate cancer detection at the University of Yamanashi Hospital

Fiscal year	Biopsy procedures, n	Overall PCa, n	Overall PCa, %	csPCa, n	csPCa, %	Grade Group 1, n	Grade Group 1, %	Pre-biopsy MRI, n	Pre-biopsy MRI, %	Policy period
2011	211	93	44.1	81	38.4	12	5.7			Not analyzed
2012	254	109	42.9	94	37.0	15	5.9	26	10.2	Pre
2013	254	124	48.8	111	43.7	13	5.1	43	16.9	Pre
2014	207	120	58.0	101	48.8	19	9.2	46	22.2	Pre
2015	213	118	55.4	107	50.2	11	5.2	78	36.6	Pre
2016	240	128	53.3	112	46.7	16	6.7	77	32.1	Pre
2017	232	141	60.8	117	50.4	24	10.3	93	40.1	Transition
2018	198	124	62.6	111	56.1	13	6.6	177	89.4	Post
2019	178	135	75.8	124	69.7	11	6.2	174	97.8	Post
2020	158	125	79.1	120	75.9	5	3.2	148	93.7	Post
2021	181	130	71.8	122	67.4	8	4.4	173	95.6	Post
2022	224	170	75.9	158	70.5	12	5.4	213	95.1	Post
2023	203	164	80.8	151	74.4	13	6.4	196	96.6	Post
2024	176	122	69.3	117	66.5	5	2.8	172	97.7	Post

PCa, prostate cancer; csPCa, clinically significant prostate cancer; MRI, magnetic resonance imaging. csPCa was defined as International Society of Urological Pathology Grade Group 2 or higher. Fiscal year 2011 was excluded from MRI analyses because MRI information was incomplete. The MRI-in-principle policy began in January 2018; fiscal year 2017 was treated as a transition year.

Supplementary Table S3. Sensitivity analyses.

<i>a. Alternative models for the prefecture-wide annual biopsy-volume trend</i>							
Model	Effect	Estimate	95% CI	P value	Dispersion	AIC	Interpretation
Primary linear regression	Change per fiscal year	−21.1	−29.5 to −12.8	<0.001			Primary analysis
Poisson regression	Rate ratio per fiscal year	0.9782	0.9760–0.9804	<0.001	12.028	420.024	Sensitivity analysis
Negative binomial regression	Rate ratio per fiscal year	0.9782	0.9709–0.9856	<0.001		259.471	Sensitivity analysis

Supplementary Table S3. Sensitivity analyses (continued).

<i>b. Sensitivity analysis treating FY2017 as part of the pre-policy period</i>							
Outcome	Effect	OR	95% CI	P value	Model	Transition-year handling	Comment
Pre-biopsy MRI utilization	Post-policy versus pre-policy	9.908	4.797–20.462	<0.001	Grouped quasibinomial regression	FY2017 classified as pre-policy	Exploratory sensitivity analysis
Overall PCa detection	Post-policy versus pre-policy	1.397	0.764–2.555	0.245	Grouped quasibinomial regression	FY2017 classified as pre-policy	Exploratory sensitivity analysis
csPCa detection	Post-policy versus pre-policy	1.542	0.914–2.602	0.095	Grouped quasibinomial regression	FY2017 classified as pre-policy	Exploratory sensitivity analysis
Grade Group 1 detection	Post-policy versus pre-policy	0.609	0.260–1.426	0.223	Grouped quasibinomial regression	FY2017 classified as pre-policy	Exploratory sensitivity analysis

Supplementary Table S3. Sensitivity analyses (continued).

<i>c. Exploratory segmented regression (continued)</i>							
Outcome	Term	OR	95% CI	P value	Model	Transition-year handling	Interpretation
Pre-biopsy MRI utilization	Post-policy level change	9.398	3.563–24.786	<0.001	Grouped quasibinomial segmented regression	FY2017 excluded	Level change
Pre-biopsy MRI utilization	Post-policy slope change	0.840	0.632–1.117	0.196	Grouped quasibinomial segmented regression	FY2017 excluded	Change in post-policy annual slope
Overall PCa detection	Post-policy level change	1.416	0.604–3.315	0.374	Grouped quasibinomial segmented regression	FY2017 excluded	Level change
Overall PCa detection	Post-policy slope change	0.949	0.769–1.171	0.583	Grouped quasibinomial segmented regression	FY2017 excluded	Change in post-policy annual slope
csPCa detection	Post-policy level change	1.429	0.666–3.069	0.313	Grouped quasibinomial segmented regression	FY2017 excluded	Level change
csPCa detection	Post-policy slope change	0.963	0.797–1.163	0.655	Grouped quasibinomial segmented regression	FY2017 excluded	Change in post-policy annual slope
Grade Group 1 detection	Post-policy level change	0.838	0.313–2.247	0.691	Grouped quasibinomial segmented regression	FY2017 excluded	Level change
Grade Group 1 detection	Post-policy slope change	0.913	0.713–1.169	0.420	Grouped quasibinomial segmented regression	FY2017 excluded	Change in post-policy annual slope

AIC, Akaike information criterion; CI, confidence interval; FY, fiscal year; MRI, magnetic resonance imaging; OR, odds ratio; PCa, prostate cancer; csPCa, clinically significant prostate cancer. Panels b and c used grouped quasibinomial regression to account for overdispersion. Panel

b treated FY2017 as part of the pre-policy period, whereas panel c excluded FY2017. In panel c, level-change estimates represent post-policy level differences and slope-change estimates represent changes in the annual slope after FY2018. All confidence intervals are 95% confidence intervals, and all P values are two-sided.