

Supplementary Material

A prospective analysis of the accuracy of anal self- and companion exams among sexual minority men and transgender women: The Prevent Anal Cancer Palpation Study

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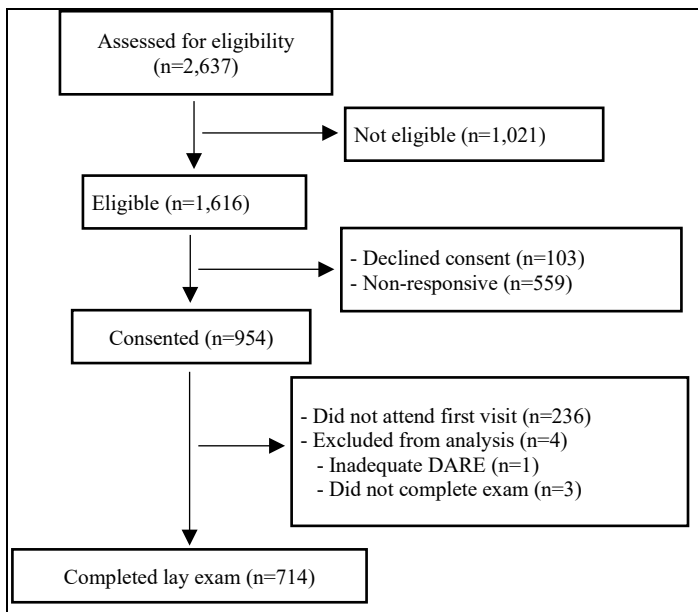
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Supplementary Table 1. Characteristics of individuals conducting lay anal examinations and concordance with clinician examinations by city in Chicago, Illinois and Houston, Texas, USA 2020–2022

	Chicago		Concordance (95% CI)		Houston		Concordance (95% CI)	
Overall	370/370 (100.0%)		0.76	(0.72 to 0.81)	344/344 (100.0%)		0.70	(0.65 to 0.75)
Age, years	37 (30-51)				46 (35-56)			
Age, years								
25-34	162/370 (43.8%)		0.78	(0.72 to 0.85)	90/344 (26.2%)		0.79	(0.70 to 0.87)
35-44	92/370 (24.9%)		0.79	(0.71 to 0.88)	69/344 (20.1%)		0.61	(0.49 to 0.72)
45-54	54/370 (14.6%)		0.74	(0.62 to 0.86)	91/344 (26.5%)		0.73	(0.63 to 0.82)
55-81	62/370 (16.8%)		0.68	(0.56 to 0.79)	94/344 (27.3%)		0.66	(0.56 to 0.76)
Waist circumference, cm								
≤102	262/370 (70.8%)		0.81	(0.76 to 0.85)	211/338 (62.4%)		0.69	(0.63 to 0.75)
>102	108/370 (29.2%)		0.66	(0.57 to 0.75)	127/338 (37.6%)		0.71	(0.63 to 0.79)
Sex at Birth								
Male	368/370 (99.5%)		0.76	(0.72 to 0.81)	335/344 (97.4%)		0.70	(0.65 to 0.75)
Female	2/370 (0.5%)		0.50	(0 to 1)	9/344 (2.6%)		0.67	(0.30 to 0.93)
Gender identity								
Man	344/369 (93.2%)		0.76	(0.71 to 0.80)	327/344 (95.1%)		0.69	(0.64 to 0.74)
Non-binary	16/369 (4.3%)		0.88	(0.71 to 1.00)	2/344 (0.6%)		1.0	n/a
Transgender woman	5/369 (1.4%)		0.80	(0.45 to 1.00)	6/344 (1.7%)		0.83	(0.54 to 1.00)
Transgender man	1/369 (0.3%)		1.0	n/a	8/344 (2.3%)		0.75	(0.45 to 1.00)
Woman or other	3/369 (0.8%)		0.67	(0.13 to 1.00)	1/344 (0.3%)		1.0	n/a
Race/ethnicity								
White, non-Hispanic	149/370 (40.3%)		0.75	(0.68 to 0.82)	185/340 (54.4%)		0.70	(0.63 to 0.76)
Black, non-Hispanic	120/370 (32.4%)		0.79	(0.72 to 0.86)	46/340 (13.5%)		0.80	(0.69 to 0.92)
Hispanic	76/370 (20.5%)		0.72	(0.62 to 0.82)	87/340 (25.6%)		0.66	(0.56 to 0.76)
Asian, non-Hispanic	16/370 (4.3%)		0.88	(0.71 to 1.00)	16/340 (4.7%)		0.75	(0.54 to 0.96)
Other, non-Hispanic†	9/370 (2.4%)		0.78	(0.51 to 1.00)	6/340 (1.8%)		0.50	(0.10 to 0.90)
Sexual orientation								
Gay	296/370 (80.0%)		0.75	(0.70 to 0.80)	305/343 (88.9%)		0.68	(0.63 to 0.73)
Bisexual	40/370 (10.8%)		0.83	(0.71 to 0.94)	27/343 (7.9%)		0.81	(0.67 to 0.96)
Queer	28/370 (8.0%)		0.75	(0.59 to 0.91)	7/343 (2.0%)		1.0	n/a
Heterosexual, lesbian, I don't know or other	6/370 (1.6%)		0.83	(0.54 to 1.00)	4/343 (1.2%)		1.0	n/a
HIV status, self-report								
Negative	272/362 (65.1%)		0.78	(0.73 to 0.83)	172/341 (50.4%)		0.72	(0.65 to 0.79)
Positive	90/362 (24.9%)		0.72	(0.63 to 0.81)	169/341 (49.6%)		0.68	(0.61 to 0.75)
Dexterity-related medical condition*								
No	258/351 (73.5%)		0.77	(0.72 to 0.82)	215/341 (63.1%)		0.72	(0.66 to 0.78)
Yes	93/351 (26.5%)		0.72	(0.62 to 0.81)	126/341 (37.0%)		0.66	(0.58 to 0.74)
Lay anal examination type								
Anal self-examination	352/370 (95.1%)		0.76	(0.71 to 0.80)	306/344 (89.0%)		0.70	(0.65 to 0.75)
Anal companion examination	18/370 (4.9%)		0.89	(0.74 to 1.00)	38/344 (11.1%)		0.68	(0.54 to 0.83)
Trainer type								
Clinician	84/370 (22.7%)		0.86	(0.78 to 0.93)	2/344 (0.6%)		0.50	(0.00 to 1.00)
Non-clinician	286/370 (77.3%)		0.73	(0.68 to 0.79)	342/344 (99.4%)		0.70	(0.65 to 0.75)
Clinician type								
Medical doctor	301/370 (81.4%)		0.78	(0.74 to 0.83)	0/344		0.0	n/a
Advanced practice provider	69/370 (18.7%)		0.67	(0.56 to 0.78)	344/344 (100.0%)		0.70	(0.65 to 0.75)
Recruitment source								
Social media	236/367 (64.3%)		0.76	(0.70 to 0.81)	68/344 (19.8%)		0.71	(0.60 to 0.81)
Clinics	22/367 (6.0%)		0.73	(0.54 to 0.91)	147/344 (42.7%)		0.69	(0.61 to 0.76)
Friends	44/367 (12.0%)		0.77	(0.65 to 0.90)	84/344 (24.4%)		0.71	(0.62 to 0.81)
Flyers/advertisement	61/367 (16.6%)		0.77	(0.67 to 0.88)	38/344 (11.1%)		0.68	(0.54 to 0.83)
Other	4/367 (1.1%)		0.75	(0.33 to 1.00)	7/344 (2.0%)		0.86	(0.60 to 1.00)
Lay anal examination results								
True negative	198/370 (53.5%)		n/a		178/344 (51.7%)		n/a	
True positive	84/370 (22.7%)		n/a		63/344 (18.3%)		n/a	
False negative	39/370 (10.5%)		n/a		60/344 (17.4%)		n/a	
False positive	49/370 (13.2%)		n/a		43/344 (12.5%)		n/a	
Preferred anal sex position								
Insertive	91/356 (25.6%)		0.77	(0.68 to 0.86)	72/337 (21.4%)		0.69	(0.59 to 0.80)
Versatile	137/356 (38.5%)		0.74	(0.67 to 0.82)	144/337 (42.7%)		0.73	(0.66 to 0.80)
Receptive	127/356 (35.7%)		0.75	(0.67 to 0.82)	118/337 (35.0%)		0.66	(0.58 to 0.75)
Never had anal sex	1/356 (0.3%)		1.0	n/a	3/337 (0.9%)		1.0	n/a
Difficulty with ASE/ACE								
Easy or Very Easy	330/367 (89.9%)		0.77	(0.73 to 0.82)	310/341 (90.9%)		0.71	(0.66 to 0.76)
Hard or Very Hard	37/367 (10.1%)		0.65	(0.49 to 0.80)	31/341 (9.1%)		0.58	(0.41 to 0.75)
Pain with ASE/ACE								
None	359/367 (97.8%)		0.76	(0.71 to 0.80)	322/343 (93.9%)		0.69	(0.64 to 0.74)
A little	6/367 (1.6%)		0.83	(0.54 to 1.00)	17/343 (5.0%)		0.76	(0.56 to 0.97)
A lot	1/367 (0.3%)		1.0	n/a	1/343 (0.3%)		1.0	n/a

I don't know	1/367 (0.3%)	1.0	n/a	3/343 (0.9%)	1.0	n/a
Ever checked anus for disease						
No or I don't know	196/369 (53.1%)	0.74	(0.68 to 0.80)	189/344 (54.9%)	0.69	(0.62 to 0.75)
Yes	173/369 (46.9%)	0.79	(0.73 to 0.85)	155/344 (45.1%)	0.72	(0.65 to 0.79)
Worry about getting anal cancer						
None	219/367 (59.7%)	0.76	(0.70 to 0.81)	202/343 (58.9%)	0.72	(0.66 to 0.78)
A little	101/367 (27.5%)	0.75	(0.67 to 0.84)	103/343 (30.0%)	0.65	(0.56 to 0.74)
Some	35/367 (9.5%)	0.89	(0.78 to 0.99)	33/343 (9.6%)	0.76	(0.61 to 0.90)
Quite a lot	12/367 (3.3%)	0.50	(0.22 to 0.78)	5/343 (1.5%)	0.60	(0.22 to 1.00)
Plans to do ASE/ACE in the future						
Strongly agree	257/366 (70.2%)	0.78	(0.73 to 0.83)	251/343 (73.2%)	0.70	(0.64 to 0.76)
Agree	99/366 (27.1%)	0.71	(0.62 to 0.80)	85/343 (24.8%)	0.71	(0.61 to 0.80)
Disagree	1/366 (0.3%)	1.0	n/a	2/343 (0.6%)	1.0	n/a
Strongly Disagree	2/366 (0.6%)	0.0	n/a	0/343	0.0	n/a
I don't know	7/366 (1.9%)	1.0	n/a	5/343 (1.5%)	0.40	(0.00 to 0.83)
Would see a doctor for a persistent anal problem						
Strongly agree	245/368 (66.6%)	0.76	(0.71 to 0.82)	236/343 (68.8%)	0.70	(0.65 to 0.76)
Agree	96/368 (26.1%)	0.82	(0.75 to 0.90)	87/343 (25.4%)	0.69	(0.59 to 0.79)
Disagree	5/368 (1.4%)	0.60	(0.17 to 1.00)	7/343 (2.0%)	0.71	(0.38 to 1.00)
Strongly Disagree	3/368 (0.8%)	0.33	(0.00 to 0.87)	0/343	0.0	n/a
I don't know	19/368 (5.2%)	0.53	(0.30 to 0.75)	13/343 (3.8%)	0.69	(0.44 to 0.94)
Preference for ASE/ACE or doctor-provided exam^s						
ASE or ACE	121/364 (33.2%)	0.80	(0.73 to 0.87)	123/341 (36.1%)	0.70	(0.62 to 0.78)
Doctor-provided exam	243/364 (66.8%)	0.74	(0.68 to 0.79)	218/341 (63.9%)	0.71	(0.65 to 0.77)

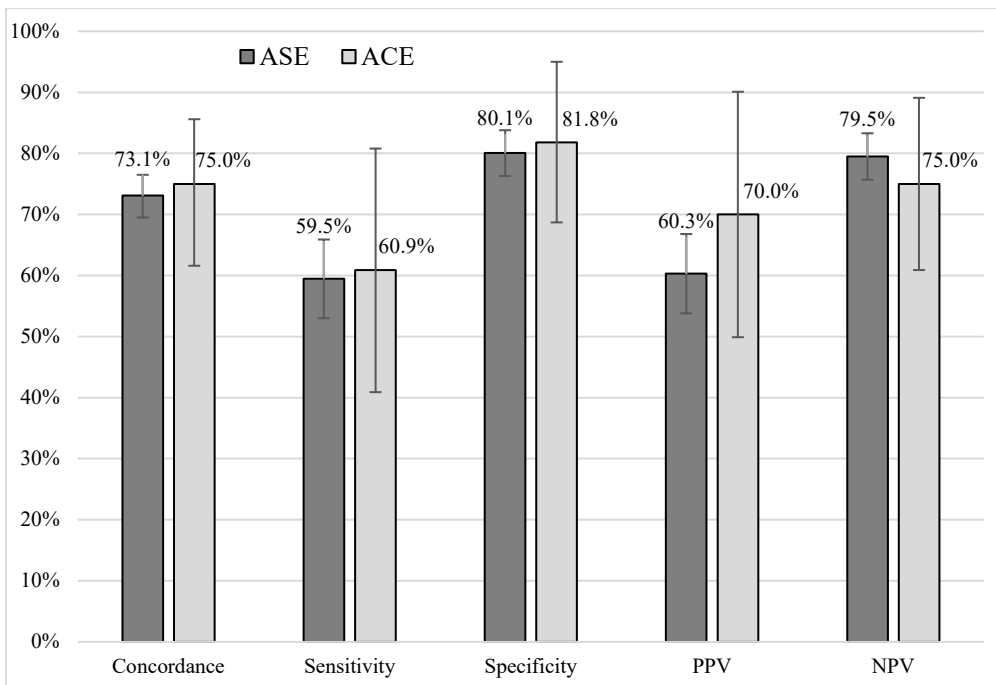
Data are n (%) or median (interquartile range). † Other includes Native American or Alaskan Native, Hawaiian or Pacific Islander, other, and I don't know. * Conditions were arthritis, carpal tunnel syndrome, cerebral palsy, diabetes, fibromyalgia, chronic lower back pain, motor neuron diseases, multiple sclerosis, obesity, spina bifida, spinal cord injury, stroke, and other (neuropathy, lower back nerve compression, tremors in hand, McArdle disease, autism, scoliosis, knee pain, scapular dyskinesis, transverse myelitis, osteoporosis, thoracic outlet syndrome, cervicalgia, causalgia and herniated disc). Abbreviations: ASE/ACE, anal self-examination, or anal companion examination; n/a, not applicable.



Supplementary Figure 1. Study flow.

Supplementary Table 2. Primary lesion characteristics for 245 individuals by gender identity in Chicago, Illinois and Houston, Texas, USA 2020-2022								
	Gender identity (# of participants)*							
	Man (n=236)		Non-binary (n=2)		Transgender woman (n=3)		Transgender Man (n=4)	
	Anatomic site (# of participants)†							
	Perianus (n=183)	Anal canal (n=90)	Perianus (n=1)	Anal canal (n=2)	Perianus (n=3)	Anal canal (n=1)	Perianus (n=3)	Anal canal (n=1)
Clinician-detected lesions								
Lesion size, mm, IQR	3, 2-4	3, 2-3	6, 6-6	3, 3-3	3, 1-10	3, n/a	4, 3-6	2, n/a
Lesion type								
Haemorrhoids	53/183 (29.0%)	43/90 (47.8%)						1/1 (100.0%)
Skin fold/flaps/tags	87/183 (47.5%)	6/90 (6.7%)					3/3 (100.0%)	
Scar	11/183 (6.0%)	13/90 (14.4%)		1/2 (50.0%)	1/3 (33%)			
Condyloma	12/183 (6.6%)	8/90 (8.9%)	1/1 (100.0%)	1/2 (50.0%)	1/3 (33%)			
Suspicious lump or thickening	2/183 (1.1%)	2/90 (1.1%)				1/1 (100.0%)		
Papule	9/183 (4.9%)	6/90 (6.7%)						
Anal fissure	n/a	1/90 (1.1%)						
Other	4/183 (2.2)	0/90			1/3 (33%)			
Perianal lichenification	1/183 (0.6)	n/a						
Perianal psoriasis	1/183 (0.6)	n/a						
Cyst	1/183 (0.6)	n/a						
HCP referred participant								
No	161/183(88.0%)	62/90 (68.9%)		1/2 (50.0%)	2/3 (66.7%)	0/1	3/3 (100.0%)	1/1 (100.0%)
Yes	22/183 (12.0%)	28/90 (31.1%)		1/2 (50.0%)	1/3 (33.3%)	1/1 (100.0%)		0

Note. Data are median, IQR and n and (%). * No lesions were detected in individuals identifying as Woman or Other. †Number of lesions at each anatomic site does not equal total number of participants with lesions due to lesions at both anatomic sites in some individuals. Abbreviations: IQR, interquartile range; n/a, not applicable; HCP, health care provider; ASE, anal self-exam; ACE, anal companion exam.



Supplementary Figure 2. Agreement and accuracy for lay anal examinations compared with clinician examinations by examination type in Chicago, Illinois and Houston, Texas, USA 2020-2022. ASE=anal self-examination, ACE=anal companion examination, PPV=positive predictive value, NPV=negative predictive value.

Supplementary Table 3. Stratified sensitivity estimates for lay anal examinations compared with clinician examinations in Chicago, Illinois and Houston, Texas, USA 2020-2022

Stratification variable	Sensitivity (95% CI)	
Age, years		
<45	64.7	(56.1-73.3)
≥45	54.8	(46.1-63.5)
Waist circumference, cm		
≤102	60.4	(52.9-67.9)
>102	58.0	(47.3-68.8)
HIV status, self-report		
Negative	62.5	(54.4-70.6)
Positive	56.2	(46.7-65.7)
Dexterity-related medical condition		
No	61.4	(53.7-69.2)
Yes	56.5	(45.9-67.0)
Preferred anal sex position		
Insertive	52.9	(39.2-66.6)
Versatile	62.4	(52.5-72.2)
Receptive	60.0	(50.2-69.9)
Never had anal sex	100.0	n/a
Trainer type		
Clinician	70.4	(53.2-87.6)
Non-Clinician	58.3	(51.7-64.8)
Lesion size (n=245)		
<5 mm	58.4	(51.5-65.3)
≥5 mm	64.6	(51.1-78.1)
Referral for any lesion (n=245)		
No	58.8	(52.0-65.6)
Yes	63.0	(49.1-77.0)
Referral for anal canal lesion (n=94)		
No	59.5	(53.0-66.1)
Yes	60.0	(42.5-77.5)
Referral for perianal lesion (n=190)		
No	57.9	(51.4-64.4)
Yes	75.0	(57.7-92.3)

Note. Numbers are percent.

Supplementary Table 4. Factors associated with concordance between anal self-examinations and clinician examinations in Chicago, Illinois and Houston, Texas, USA 2020-2022, bivariate and multivariable analyses

Characteristic	PR (95% CI)	aPR* (95% CI)
Age, years		
25-34	1.0	1.0
35-44	0.91 (0.81-1.03)	0.92 (0.81-1.04)
45-54	0.92 (0.81-1.04)	0.94 (0.83-1.06)
55-81	0.83 (0.73-0.95)	0.85 (0.74-0.97)
Waist, cm		
≤ 102	1.0	
> 102	0.92 (0.83-1.02)	-
Sexual orientation		
Gay	1.0	
Bisexual	1.15 (1.01-1.31)	-
Queer	1.11 (0.93-1.33)	-
Heterosexual, lesbian, don't know or other	1.26 (1.02-1.56)	-
HIV status, self-report		
Negative	1.0	-
Positive	0.92 (0.83-1.02)	-
Difficulty with ASE/ACE		
Hard or Very Hard	1.0	
Easy or Very Easy	1.20 (0.99-1.46)	-
Trainer type		
Clinician	1.0	1.0
Non-clinician	0.84 (0.76-0.93)	0.86 (0.77-0.97)
Clinician type		
Medical doctor	1.0	
Advanced practice provider	0.89 (0.81-0.98)	-
Worried about getting anal cancer		
None	1.0	1.0
A little	0.95 (0.85-1.06)	0.97 (0.86-1.08)
Some	1.13 (1.00-1.28)	1.14 (1.01-1.29)
Quite a lot	0.63 (0.37-1.09)	0.63 (0.37-1.06)

Note. Confidence intervals in bold do not include unity. * Variables remaining in model are adjusted for each other and city. Abbreviations: PR, prevalence ratio; aPR, adjusted prevalence ratio; ASE/ACE, anal self-examination, or anal companion examination.