Comparison of participation rates between males and females in faecal immunochemical test colorectal cancer screening: A review



and meta-analysis

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Introduction:

Colorectal cancer is the third most common cancer in men and the second in women worldwide (Globocan, 2008). There is higher incidence (20.3) vs. 14.6 per 100,000) and mortality (9.6 vs. 7.0 per 100,000) in men than women worldwide. In Ireland, as in other developed countries, the number of new cases is expected to grow substantially in coming years (NCRI, 2008), in large part due to demographic changes. Colorectal cancer can be prevented through screening and treated effectively, or cured, if caught early. Screening options include invasive (e.g. colonoscopy) and non-invasive tests (e.g. faecal immunochemical test (FIT)). Internationally, FIT is increasingly being recommended as the preferred initial screening modality. Some studies and screening programmes have reported lower screening uptake among men, but it is unclear whether this holds for FIT.

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Methods:

This systematic review and meta-analysis aimed to determine if uptake of FIT-based colorectal cancer screening is lower among men than women.

Results:

Eighteen studies met the eligibility criteria: 4 from Italy, 4 from Australia, 2 from the Netherlands, 2 from the USA, and one each from Spain, Scotland, Uruguay, Taiwan, Korea and Israel. Of these, 2 studies were RCTs, 9 were from population-based programmes, 5 were cohort studies and 2 were cross-sectional studies. Study characteristics and findings are summarised in Tables 1 and 2.

We searched PubMed and Embase for peer-reviewed papers published in English during 2000-2012, from randomised controlled trials (RCTs), cohort studies, cross sectional studies or population-based screening programmes using FIT-based screening. For inclusion, studies had to report numbers invited and numbers screened by gender. 246 potentially eligible papers were identified. Two reviewers independently screened titles and abstracts, obtained and reviewed full-text articles, and performed data abstraction. A meta-analysis using a random effects model was performed, calculating odds ratios for male uptake of FIT.

Figure 1. Meta analysis comparing male and female compliance in FIT-based colorectal cancer screening

								No invited	Ovorall		
				No. of				to complete	uptake	Male Female Odds Ratio	(
	Study & Year	Study design	Age range	samples	Test type	Invitation strategy	Reminder	FIT	n (%)	Study or Subgroup Events Total Events Total Weight M-H, Random, 95% CI Year	M-H ,
	Cole et al, 2002	Cohort study	50-74	3 samples	Flexsure OBT	recommendations)	6 week reminder	2400	(35.7%)	Cole et al, 2002 375 1094 482 1306 5.7% 0.89 [0.75, 1.05] 2002	
	Cole et al, 2003	Cohort study	50-69	3/2 samples	FlexSure OBT / InSure	Letter of invitation (no recommendation)	6 week reminder	1212	425 (35%)	Cole et al, 2003 196 592 229 620 4.8% 0.85 [0.67, 1.07] 2003	
			50.74		00.0	Letter of invitation (Mayor			1631	Crotta et al 2004 710 1403 921 1558 6.0% 0.71 [0.61, 0.82] 2004	
	Crotta et al, 2004	Population based study	50-74	1 sample	OC Sensor, Japan	recommendation)	2 month reminder	2961	(55.1%) 785	Bampton et al, 2005 366 765 419 876 5.4% 1.00 [0.82, 1.21] 2005	
	Bampton et al, 2005	Cohort study	No age range	1 sample	Inform OBT	Letter of invitation	No reminder	1641	(47.8%)	Fenochi et al 2006 3282 3663 7291 8071 6.2% 0.92 [0.81, 1.05] 2006	
						through Primary Care			10537	Chen et al, 2007 9522 21502 13150 35466 7.0% 1.35 [1.30, 1.40] 2007	
	Fenochi et al, 2006	Cross sectional study	50+	1 sample	OC Hemodia	Centres and Cancer Centre	e No reminder	11734	(89.8%) 22672	Fraser et al, 2007 333 673 225 451 4.8% 0.98 [0.77, 1.25] 2007	
	Chen et al, 2007	Population based study	50+	not stated	Not stated	Not stated	Not stated	56968	(39.8%)	van Rossum et al, 2008 2820 5037 3337 5285 6.7% 0.74 [0.69, 0.80] 2008	
	Fraser et al, 2007	Population based study	50-69	1 sample	Test tubes	None	None	1124	558 (49.6%)	Parente et al, 2009 18314 37838 20379 37950 7.0% 0.81 [0.79, 0.83] 2009	
			50 75		00.0	Letter of invitation (no		40000	6157	Levy et al, 2010 106 131 129 166 1.9% 1.22 [0.69, 2.15] 2010	
Va	n Rossum et al, 2008		50-75	1 sample	OC Sensor	invitation (no	2 week reminder	10322	(59.6%) 38693	Birkenfeld et al, 2011 1507 2451 2376 3013 6.3% 0.43 [0.38, 0.48] 2011	٦
	Parente et al, 2009	Population based study	50-69	1 sample	HM-Jack	recommendation)	No reminders	78083	(49.6%)	Gregory et al, 2011 86 181 106 194 3.0% 0.75 [0.50, 1.13] 2011	
	Levy et al, 2010	Population based study	50-64	1 sample	Clearnew ULTRA FOB	Advanced notification invitation	Not stated	297	235 (79.1%)	Park et al, 2011 535508 2150635 675654 2474922 7.0% 0.88 [0.88, 0.89] 2011	
	Pirkopfold at al. 2011	DOT	50.74	2 complex		Not stated	Not stated	5464	3883	Ferrari et al, 2012 7980 20311 9461 21934 6.9% 0.85 [0.82, 0.89] 2012	
	Sirkeilleiu et al, 2011	KUT	50-74	5 Samples	OC-MICKO	Advanced notification	NUL SLALEU	0404	192	Senore et al, 2012 2719 17223 4562 20468 6.9% 0.65 [0.62, 0.69] 2012	
	Gregory et al, 2011	Cross sectional study	50-74	1 sample	InSure	invitation	6 week reminder	375	(51.2%)	Klushman et al, 2012 29 50 116 150 1.5% 0.40 [0.21, 0.80] 2012	
	Park et al, 2011	Population based study	50+	not stated	Not stated	Not stated	Not stated	5739337	905077 (17.2%)	Hol et al, 2012 472 2221 620 2186 6.1% 0.68 [0.59, 0.78] 2012	
	Ferrari et al. 2012	Population based study	50-69	not stated	Test tube	Invitation with test (GP recommendation)	Not stated	42.245	17441 (41,3%)	Quintero et al, 2012 4145 12156 4944 14443 6.9% 0.99 [0.94, 1.05] 2012	
			Turin 58-69	not otatou		Invitation letter (GP		,	7271		
	Senore et al, 2012	Cohort study	Verona 60-69	1 sample	OC Sensor	recommendation)	No reminder	37619	(19.3%) 145	Total (95% Cl)22779262629059100.0%0.82 [0.75, 0.90]	
ł	Klushman et al, 2012	Cohort study	50+	1 sample	INSure	practice	No reminder	200	(72.5%)	Total events 588470 744401	
	Hol L et al, 2012	Population based study	50-74	1 sample	OC Sensor	Advanced notification invitation	6 week reminder	4407	1092 (24.8%)	Heterogeneity: Tau ² = 0.03; Chi ² = 958.12, df = 17 (P < 0.00001); l ² = 98%	
	Quintoro et al. 2012	DOT	50.00		OC Sensor	Advanced notification	3 and 6 month	00500	9089	Test for overall effect: Z = 4.20 (P < 0.0001) Higher female con	mpliar
		General find	dinge	r sample	OC Sensor	Invitation	reminuers	20099	(34.2%)		
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			No. of				No. invited to complete	Overall uptake		Mal	e	Fema	ale		Odds Ratio	Odds Ratio
Study & Year	Study design	Age range	samples	Test type	Invitation strategy	Reminder	FIT	n (%) 857	Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% CI Year	M-H, Random, 95% Cl
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Cole et al, 2003	Cohort study	50-69	3/2 samples	FlexSure OBT / InSure	Letter of invitation (no recommendation)	6 week reminder	1212	425 (35%)	Cole et al, 2003	196	592	229	620	4.8%	0.85 [0.67, 1.07] 2003	
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		0011	i sampic		rooonmondationy		2001	785	Bampton et al, 2005	366	765	419	876	5.4%	1.00 [0.82, 1.21] 2005	+
Bampton et al, 2005	Cohort study	No age range	1 sample	Inform OBT	Letter of invitation Volunteers recruited	No reminder	1641	(47.8%)	Fenochi et al 2006	3282	3663	7291	8071	6.2%	0.92 [0.81, 1.05] 2006	
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Fenochi et al, 2006	Cross sectional study	50+	1 sample	OC Hemodia	Centres and Cancer Centre	No reminder	11734	(89.8%) 22672	Fraser et al, 2007	333	673	225	451	4.8%	0.98 [0.77, 1.25] 2007	
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Dirkonfold at al. 2011	DCT	50 74			Not stated	Not stated	5464	3883	Ferrari et al, 2012	7980	20311	9461	21934	6.9%	0.85 [0.82, 0.89] 2012	
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Quintero et al, 2012	RCT	50-69	1 sample	OC Sensor	invitation	reminders	26599	(34.2%)								Figher remaie compliance Higher male compliance
Table 2: G	eneral find	dings														
Sampl	ina		12 st sampl	udies used es. 3 studie	1 sample FIT, s did not state	while 3 stu the numb	udies us er of sar	ed 3 mples	Conclusi	ions						References GLOBOCAN 2008 (IARC), Section of Cancer Information 19/17

Table 1: Study characteristics

While screening based on FIT has been shown to result in higher overall compliance than screening based on FOBT (Vart et al, 2012), this metaanalysis suggests that FIT uptake is significantly lower among men than women. Further investigation is required to better understand what influences screening uptake and test acceptability in men and women. In addition, national screening programmes should plan and design programmes with a greater focus on gender equity in uptake.



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NCRI (2008) Cancer Projections 2005-2035. Cork: National Cancer Registry Ireland

Cole SR et al, J. Med Screening. 2002; 9:147-152.

required to complete the test 5 studies used a single letter of invitation, 4 studies used a recommended letter of invitation, 4 used otification letters of invitation. Two invited ring routine primary care practice visits. Two not indicate the method of invitation. ance ranged from 19.3% (cohort study) to 3% (large cross sectional study).

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Meta analysis	Of the 18 stu among men;
Male female compliance	Compliance in compliance
Compliance	Overall complia 89.8
Invitation strategies	GP or other advance not participants dur studies dic

men ranged from 15.8% to 89.6%, while in women ranged from 22.3% to 90.3%

udies, 9 had significantly lower uptake eight showed no significant difference; tudy had significantly lower uptake in n combined in a meta-analysis, uptake ntly lower in men (OR 0.82, 95%CI 0.75-0.90, p<0.0001) (Figure 1)

Cole SR et al, J Med Screening. 2003; 10: 117-122 Crotta S et al, Eur J Gastroenterol Hepatol. 2004; 16 (1): 33-37 Bampton P.A et al, Gut. 2005; 54: 803-806 Fenochi E et al, Eur J Cancer Prev. 2006; 15: 384-390 Chen LS et al, J Med Screen. 2007; 14: 191-199 Fraser FG et al, Gut. 2007; 56: 1415-1418 van Rossum LG et al, Gastroenterology. 2008; 135:82-90 Levy BT et al, J Prim Care & Comm Health. 2010; 1: 43 - 49 Birkenfeld S et al, J Med Screen. 2011; 18: 135-141 Gregory TA et al, BMC Public Health. 2011; 11: 38 Park JM et al, Asian Pacific J Can Prev. 2011; 12: 3489- 3493 Ferrari BM et al, J Prev Med Hyg. 2012; 53: 37-43 Senore C et al, Gut. 2013; 62: 735-740 Klushman BC et al, Preventing Chronic Disease 2012; 9:1-7 Hol L et al, Int J Cancer. 2012; 130:2096-2102 Quintero E et al, New Eng J Med. 2012; 366: 697-706 Vart G et al, Prev Med. 2012; 55: 87-92

e National Cancer Registry is funded by the Department of Health Clarke is funded by an Irish Cancer Society Research Scholarship Grant



