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NHS Bowel Cancer Screening Programme

A faecal immunochemical test for haemoglobin (FIT) markedly increased participation in a colorectal cancer screening pilot in England

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Background: The NHS Bowel Cancer Screening Programme (BCSP) in England has used a guaiac-based faecal occult blood test (gFOBt) since its inception in 2006. In April 2014, the BCSP commenced a six-month FIT Pilot study to assess the implications of adopting FIT in England. Interim uptake and clinical observations are reported here; the financial and organisational aspects of the pilot will be reported in due course.

Methods: Two of the five regional BCSP Hubs and associated Screening Centres participated in the pilot study. One in 28 people invited for screening was offered a quantitative FIT rather than gFOBt. 30,000 FIT invitations provided adequate power for statistical analysis of uptake compared with the gFOBt programme. Figure 1 illustrates (a) the gFOBt sample collection card used by BCSP (hema-screen, Immunostics Inc., USA) and (b) the FIT sample collection tube (OC-AUTO sampling bottle 3 for use with the OC-SENSOR DIANA analyser, Eiken Chemical Co. Ltd., Japan) and packaging used in the FIT Pilot. Each gFOBt requires two samples from three separate stools and up to three gFOBt kits may be required to reach a definitive result; one sample is required for FIT. The FIT cut-off for positivity was 20 µg haemoglobin [Hb]/g faeces (100 ng Hb/mL buffer).

(a) (b)

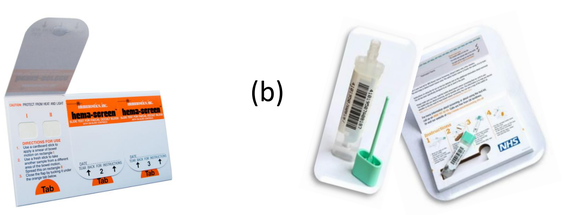


Figure 1: (a) gFOBt collection card and (b) FIT sample collection tube and packaging

Interim results are presented for screening invitations issued between 15 April 2015 and 15 October 2015. Colonoscopy outcomes are those reported by early January 2015. The definitions used are provided in Table 1.

Table 1: Definitions used in the FIT Pilot

Measure	Definition
Uptake:	The proportion of *subjects sent a kit* that was adequately screened (usual BCSP definition is the proportion of *invitees* that is adequately screened).
Positivity:	The proportion of subjects adequately screened that had a definitive positive result.
Adequately screened:	Achieving a definitive screening test result of positive (abnormal) or negative (normal) with 18 weeks.
IMD (Index of Multiple Deprivation):	Derived using the English Indices of Deprivation 2010, which measure relative levels of deprivation in small areas of England (Lower layer Super Output Areas) and according to subjects' postcodes.

Table 2: FIT and gFOBt invitations counts and uptake

	FIT			gFOBt			Uptake difference
	Invitations		Uptake	Invitations		Uptake	FIT vs. gFOBT
	n	(%)	(%)	n	(%)	(%)	Odds Ratio (95% CI)
All	39,460	-	67.6	1,067,120	-	60.1	1.38 (1.35,1.41)
Females	20,238	(51.3)	69.6	545,510	(51.1)	63.2	1.33 (1.29,1.37)
Males	19,222	(48.7)	65.5	521,610	(48.9)	57.0	1.43 (1.39,1.48)
Age-groups							
59-64	16,658	(42.2)	63.9	446,812	(41.9)	54.4	1.48 (1.44,1.53)
65-69	13,410	(34.0)	70.8	364,987	(34.2)	65.1	1.30 (1.25,1.35)
70-75	9,392	(23.8)	69.6	255,321	(23.9)	63.2	1.33 (1.28,1.39)
Deprivation							
IMD[1] 1	7,923	(20.1)	74.5	213,621	(20.0)	67.7	1.40 (1.33,1.48)
IMD 2	8,021	(20.3)	71.6	213,310	(20.0)	65.3	1.32 (1.26,1.39)
IMD 3	7,905	(20.0)	69.9	213,446	(20.0)	62.8	1.39 (1.32,1.46)
IMD 4	7,874	(20.0)	66.1	213,320	(20.0)	57.7	1.43 (1.37,1.50)
IMD 5	7,511	(19.0)	55.1	206,896	(19.4)	46.9	1.39 (1.33,1.46)
IMD n/k[2]	226	(0.6)	-	6,527	(0.6)	-	
Episode							
First[3]	6,258	(15.9)	61.5	168,090	(15.8)	50.2	1.58 (1.50,1.66)
Prevalent[4]	11,485	(29.1)	26.6	306,783	(28.7)	14.5	2.13 (2.04,2.22)
Incident[5]	21,723	(55.0)	91.1	592,247	(55.5)	86.6	1.57 (1.50,1.65)

[1] IMD = Index of Multiple Deprivation; [2] n/k = not known; [3] First episode = participation on first invitation; [4] Prevalent episode = previous non-responder; [5] Incident episode = previous participation

Results: 39,460 subjects were sent a FIT and 1,067,120 a gFOBt during the pilot period (Table 2). Uptake of FIT was significantly higher than for gFOBt (67.6% vs. 60.1%). The increase in uptake was significantly greater for previous non-responders (FIT 26.6% vs. gFOBt 14.5%), compared with subjects invited for the first time (61.5% vs. 50.2%) and those who had participated previously (91.1% vs. 86.6%) (Figure 2). The increase in uptake was higher in males (FIT 65.5% vs. gFOBt 57.0%) than females (69.6 % vs. 63.2) (Figure 3) and was apparent for all quintiles of deprivation (Figure 4). Of particular note is the increase in uptake with FIT compared with gFOBt in the most deprived and traditionally 'hard-to-reach' quintile (55.1% vs. 46.9%). The interval between sending a kit and achieving a definitive screening test result was shorter with FIT (Figure 5).

Figure 2: FIT and gFOBt uptake by screening history

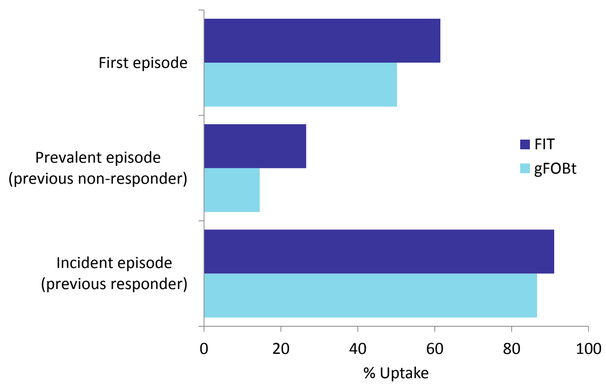


Figure 3: FIT and gFOBt uptake by age and sex

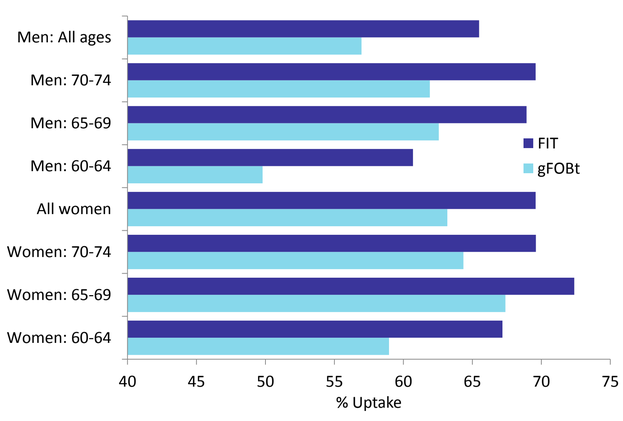
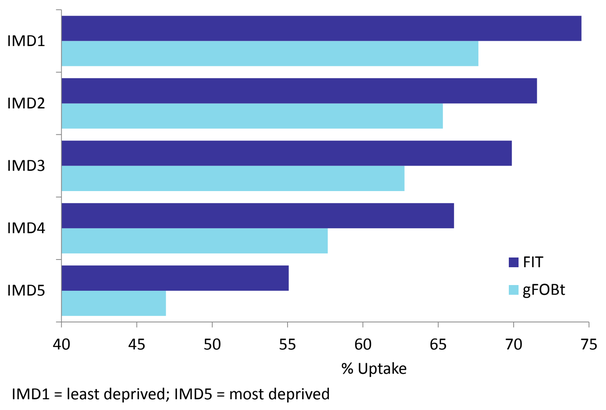
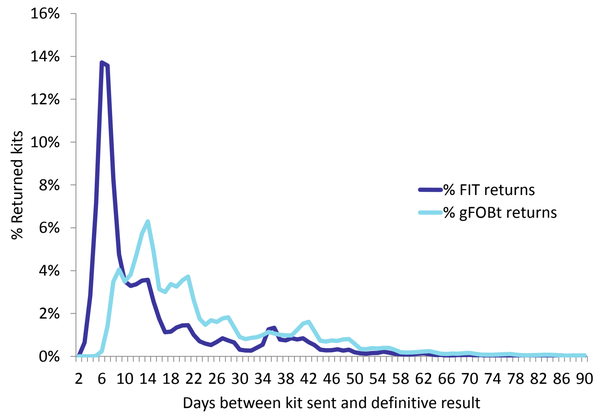


Figure 4: FIT and gFOBt uptake by IMD



IMD1 = least deprived; IMD5 = most deprived

Figure 5: Days to return test kits



At a cut-off of 20 µg Hb/g faeces, overall FIT positivity was 7.8%; gFOBt positivity was 1.7%. Significantly more colorectal cancers (CRC) and advanced adenomas were detected with FIT and the PPV for all neoplasms was significantly higher with FIT (Table 3). At a cut-off of 150 µg Hb/g faeces (750 ng Hb/mL buffer), which yielded a positivity for FIT (1.8%) similar to gFOBt, FIT detected more advanced adenomas and all neoplasia and had a higher PPV for advanced adenomas and all neoplasms.

Table 3: Positivity and disease detection (FIT cut-off 20 µg Hb/ g faeces)

	FIT	gFOBt	Odds Ratio (95% CI)
Positivity (%)	7.85	1.72	4.87 (4.64,5.12)
Detection of cancer (%)	0.22	0.10	2.25 (1.72,2.94)
Detection of AA[1] (%)	1.56	0.30	5.22 (4.69,5.80)
Detection of all neoplasms(%)	3.46	0.66	5.43 (5.05,5.83)
PPV[2] for all neoplasms (%)	54.68	50.48	1.18 (1.07,1.31)

[1] AA = Advanced adenoma (intermediate- and high-risk adenoma[Ref]); [2] PPV = Positive Predictive Value

Conclusions: Uptake of screening with FIT was significantly greater than for gFOBt. There are several factors that might have encouraged participation:

- the design and ease-of-use of the FIT sample collection tube,
- only one faecal sample was required,
- FIT Pilot mail packaging.

Further work is required to investigate uptake of FIT in more ethnically diverse and deprived populations.

FIT provides an opportunity to adjust the faecal Hb concentration cut-off for positivity to balance disease detection targets and the burden on colonoscopy resources. Further analysis will determine how the faecal Hb concentration measured by FIT could be incorporated into a multivariate risk score for CRC.

Ref: Cairns SR *et al*. Gut 2010;59(5):666-89

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