Risk scoring incorporating FIT in triage of symptomatic patients

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Possible conflicts of interest

- None
Background

Symptoms are poor predictors of underlying pathology.

1/6 of patients with symptoms have significant colorectal disease (cancer, advanced adenoma, IBD).

2/6 have less serious pathology (diverticular disease, haemorrhoids, hyperplastic or small polyps).

3/6 have no pathology detected at colonoscopy.
Use of FIT in symptomatic patients

• Previous studies have shown that the Faecal Immunochemical Test for haemoglobin (FIT) performs well as a rule out test for significant colorectal disease, using low cut-off concentrations.


1.1 ....quantitative faecal immunochemical tests are recommended for adoption in primary care to guide referral for suspected colorectal cancer...........

1.2 Results should be reported using a threshold of 10 µg Hb/g faeces
Can prediction be improved further with risk scoring?
Approaches to date

- High sensitivity for colorectal cancer (0.90-0.98).
- Area under the ROC curve > 0.85.
- Better discrimination when compared with referral guidelines such as NICE and SIGN.
- Only 4/15 models included a positive test for the presence of occult blood in faeces as a risk factor.

- 15 risk models
  - 9 in primary care
  - 6 in secondary care
• AUC in validation cohort 0.92 (95% CI 0.90 – 0.94).

• Highly accurate prediction model for colorectal cancer.

The FAST score

- The Faecal Hb, Age and Sex Test score

FIT $\geq$ 200 µg Hb/g
FIT (20-199) µg Hb/g
FIT (1-19) µg Hb/g
Sex (male)
Age (years)

Derivation cohort: COLONPREDICT, n = 1,572
3 external validation cohorts (2 Scotland, 1 Spain), n = 3,976
  - AUC 0.92 (95% CI 0.89 – 0.94)

Cubiella J, et al., Int J Cancer. 2017

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Further work on use of FIT in symptomatic patients

• Since December 2015, FIT introduced as part of the referral process in one Health Board in Scotland (NHS Tayside) - 2/3 referrals now accompanied by FIT.

• 1st year of data: 1,379 patients with FIT underwent colonoscopy:
  – 54.4% ≥ 10 µg Hb/g faeces
  – 5.2% > 400 µg Hb/g faeces

• 277 cases of significant bowel disease (SBD)
  • colorectal cancer (86) + high risk adenoma (123) + IBD (68).

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Clinical outcomes

- Cancer
  - > 400 µg Hb/g faeces: 30%
  - 10-399 µg Hb/g faeces: 20%
  - < 10 µg Hb/g faeces: 5%

- High-risk adenoma
  - > 400 µg Hb/g faeces: 20%
  - 10-399 µg Hb/g faeces: 15%
  - < 10 µg Hb/g faeces: 5%

- IBD
  - > 400 µg Hb/g faeces: 10%
  - 10-399 µg Hb/g faeces: 5%
  - < 10 µg Hb/g faeces: 2%

- Other*
  - > 400 µg Hb/g faeces: 10%
  - 10-399 µg Hb/g faeces: 40%
  - < 10 µg Hb/g faeces: 50%

- No pathology
  - > 400 µg Hb/g faeces: 5%
  - 10-399 µg Hb/g faeces: 30%
  - < 10 µg Hb/g faeces: 65%

20% patients with serious colorectal disease
43% patients with less serious colorectal disease
37% patients with no abnormality detected
Application of FAST score algorithm

**Faecal Hb score:**
- 0 µg Hb/g faeces scores 0
- 1-19 µg Hb/g faeces scores 0.684
- 20-199 µg Hb/g faeces scores 2.824
- ≥200 µg Hb/g faeces scores 4.184

**Age score:**
- Age in years * 0.031

**Gender score:**
- Women score 0
- Men score 0.479

- Thresholds for the b-coefficient of the FAST Score with 90 and 99% sensitivity for colorectal cancer were 4.50 and 2.12, respectively.

- In our latest cohort, 79.2% patients had FAST score ≥ 2.12
## Application of FAST score

<table>
<thead>
<tr>
<th></th>
<th>Actual numbers</th>
<th>If applying FAST score with threshold ≥2.12</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of colonoscopies</td>
<td>1,392</td>
<td>1,107</td>
</tr>
<tr>
<td>No. colorectal cancers (CRC)</td>
<td>86</td>
<td>85</td>
</tr>
<tr>
<td>% with CRC</td>
<td>6.2</td>
<td>7.7</td>
</tr>
<tr>
<td>No. of significant bowel disease (SBD)</td>
<td>277</td>
<td>269</td>
</tr>
<tr>
<td>% with SBD</td>
<td>19.9</td>
<td>24.3</td>
</tr>
</tbody>
</table>

Applying FAST score would give:

- ↓ 20.5% colonoscopies
- ↓ 1.2% CRC
- ↓ 2.9% total SBD

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Eight cases of SBD with low FAST score

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Faecal Hb</th>
<th>Age (years)</th>
<th>Sex</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRC*</td>
<td>Undetectable</td>
<td>54</td>
<td>F</td>
</tr>
<tr>
<td>High risk adenoma†</td>
<td>Undetectable</td>
<td>41</td>
<td>M</td>
</tr>
<tr>
<td>High risk adenoma†</td>
<td>Undetectable</td>
<td>62</td>
<td>F</td>
</tr>
<tr>
<td>High risk adenoma†</td>
<td>Undetectable</td>
<td>68</td>
<td>F</td>
</tr>
<tr>
<td>IBD*</td>
<td>Undetectable</td>
<td>36</td>
<td>F</td>
</tr>
<tr>
<td>IBD</td>
<td>Undetectable</td>
<td>22</td>
<td>M</td>
</tr>
<tr>
<td>IBD*</td>
<td>Undetectable</td>
<td>52</td>
<td>F</td>
</tr>
<tr>
<td>IBD*</td>
<td>Undetectable</td>
<td>44</td>
<td>M</td>
</tr>
</tbody>
</table>

* these four patients were referred to clinic and then on to colonoscopy.

Neither f-Hb nor the FAST Score are perfect investigations!
Robust safety-netting using clinical judgement and other data is required.

†defined as ≥ 3 or any ≥ 1 cm
Can we improve this further?

• Patients who had completed FIT and were attending for colonoscopy completed questionnaire with items for:
  – Symptoms,
  – Medication,
  – Family history,
  – Diet,
  – Smoking,
  – Alcohol,
  – Physical activity + hours spent sitting, and
  – BMI and waist circumference.
  – Full blood count also collected
Next steps

• Modelling of questionnaire data

• Creation of online tool for GPs?

• Prospective study on use of the FAST score