The impact of illustrations on public understanding of the aim of cancer screening

Hannah Brotherstone, Anne Miles, Kathryn A. Robb, Wendy Atkin, Jane Wardle

Abstract

Objective: To study the effectiveness of visual illustrations in improving people’s understanding of the preventive aim of flexible sigmoidoscopy (FS) screening.

Methods: Three-hundred and eighteen people aged 60–64 were offered an appointment to attend FS screening and randomly allocated to receive either written information alone or written information plus illustrations. The illustrations showed the adenoma–carcinoma sequence and how it can be interrupted by removing polyps found during FS. Telephone interviews were conducted with a randomly selected sub-set of people prior to their screening appointment to assess their knowledge and understanding of the test (n = 65). The interviews were tape-recorded, transcribed and content analysed by researchers blind to the condition people had been allocated to.

Results: In the written information only group, 57% understood that the test was looking for polyps rather than just cancer, whilst in the group who received written information and illustrations, 84% understood this. Logistic regression analyses confirmed that addition of illustrations resulted in significantly better understanding (OR = 3.75; CI: 1.16–12.09; p = 0.027), and this remained significant controlling for age, gender and Townsend scores (an area-based measure of deprivation) (OR = 10.85; CI: 1.72–68.43; p = 0.01).

Conclusion: Illustrations improved understanding of the preventive aim of FS screening.

Practice implications: Pictorial illustrations could be used to facilitate patient understanding of screening.

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Keywords: Screening; Colorectal; Illustrations; Comprehension; Recall; Patient education; Pictures

1. Introduction

Informed decision-making about cancer screening requires people to understand its potential costs and benefits. Recent evidence indicates that the public overestimate the benefits of screening and are largely unaware of its shortcomings or potential for adverse effects [1,2]. As a result, efforts to promote informed decision-making have concentrated on providing information to clarify the limitations of screening [3,4]. However, there are positive aspects of screening that need to be conveyed; one of which is that some types of cancer screening (e.g. cervical screening) do more than identify cancer early; they can actually prevent it by detecting and removing pre-cancerous lesions.

The limited evidence available indicates that the concept of a pre-cancerous lesion is poorly understood. Knowledge of pre-cancerous states for oral and cervical cancers is poor [5–7], and the terms ‘pre-cancer’ and ‘cancer’ are often assumed to be synonymous. Although cervical screening is well-established in Britain, a survey of first time attenders at a colposcopy clinic for the treatment of cervical abnormalities found that 10% of women thought an abnormal smear meant early-stage cancer [7].

Like cervical screening, flexible sigmoidoscopy (FS) screening has the potential to prevent cancer by detecting...
and removing the pre-cancerous lesions (adenomatous polyps), and thereby interrupting the adenoma–carcinoma sequence [8]. Few people are likely to be aware that colorectal cancer can be prevented through screening because knowledge of this type of cancer is poor [9,10]. This is important in the UK, because colorectal cancer screening will be offered as part of the nationwide screening program from 2006, and effective ways of informing all sectors of the community about screening need to be developed.

Written leaflets are often used to convey the benefits and harms of screening, but they have limitations. People may not be attracted to written materials, some will find the content difficult to understand either because of the use of technical language in the document or their own literacy level, and the material may be hard to remember. Surprisingly, simplifying written information has been found to be more beneficial to good readers than poor readers [11]. One possible alternative approach is to use illustrations to supplement the text. Research into the value of illustrations in enhancing health communications has been scant, but a recent review [12] concluded that visual displays of information alongside text can make a useful contribution. Illustrations make written information more attractive [13,14], and increase the likelihood that the text will be read [15], understood [14] and remembered [15,16]. Illustrations may be particularly beneficial for people with low levels of literacy who are both least knowledgeable about cancer [17] and least likely to benefit from written information. There is also evidence that illustrations improve comprehension more among people with lower literacy or fewer years of education [14,18].

We hypothesized that visual illustrations of the development of adenomas and their removal during FS screening would clarify written information and help people understand that FS is intended to prevent colorectal cancer. The present study compared people’s understanding of the preventive aim of FS screening following written material alone or written material accompanied with illustrations.

2. Methods

2.1. Participants and procedures

Three-hundred and eighteen people, aged 60–64, registered at GP practices in Harrow (London, UK), and eligible for screening (e.g. had not had an endoscopic bowel investigation in the last 2 years) were invited to participate in an ongoing feasibility study into population-based FS screening, and were sent a timed, dated screening appointment. They were randomized either to be sent a written leaflet alone (n = 151) or a written leaflet along with a set of illustrations showing the development of cancer from polyps and removal of polyps during flexible sigmoidoscopy (n = 167). The illustrations are shown in Fig. 1 and the written information leaflet in Appendix A.

The leaflet was based on materials that had been extensively piloted and were used in the UK FS Trial [19]. It contained comprehensive information about FS screening including risk factors for bowel (colorectal) cancer, how screening works, what the test involves, what happens if pre-cancers are found, whether there are risks associated with having the test, and the reliability of the test. The leaflet also explained that bowel cancer developed from benign polyps, and that the screening tests aimed to detect and remove polyps and therefore prevent the development of cancer. The illustrations represented the polyp–cancer process and the removal of polyps. The text accompanying the illustrations also repeated the name used for the test (Flexi-Scope) and the fact that a nurse would be conducting the procedure. The link between colorectal cancer development and increasing age was also emphasized because the illustrations showed polyps developing in a 50–60 year old.

We predicted that people sent the illustrations would have a better understanding of the preventive aim of FS screening, be more likely to remember the name of the test and that it would be carried out by a nurse, and be more likely to mention older age as a risk factor. No specific predictions were made about whether the illustrations would improve knowledge of the material contained only in the written leaflet. Data on attendance at screening were collected from the screening centre, but the study was not designed or powered to examine screening attendance and the primary outcome was awareness of the preventive aim of FS screening.

A sample of 123 of the 318 people to whom the information was sent were selected at random for a telephone interview within two to four weeks of the information materials being sent out. The interviewer explained that because FS screening was new to Britain, we wanted to understand what people thought about it, and what they thought of the information materials that they had been sent. Respondents were asked if they were willing to be interviewed and permission was sought to record the interview with assurances that the information collected would be confidential.

2.2. The interview

The interviewer asked first if the respondent had received any information about bowel screening and whether they remembered anything about it. This was followed by eight questions, five of which related to the screening procedure (do you remember what the test is looking for, how long the test takes, how often people need to have the test, who performs the test, and the name of the test). Three questions were about bowel cancer (whether it is common, and whether age and gender are associated with increased likelihood of getting the disease).

The interviews were recorded and transcribed, and coded by two independent raters who were blind to condition (leaflet only or leaflet and illustrations). The raters began by
examining five transcripts to gauge the range of response options to the question about the aim of the test. The following classification of responses was agreed: (a) did not know (had no understanding of the aim of the test), (b) to find cancer, (c) to find cancer with mention of early detection or removal of something (unspecified), but no indication of understanding that pre-cancers were being detected or removed, (d) to look for or remove polyps or lumps, and (e) to remove polyps or lumps to prevent cancer or mention that polyps can be benign and develop into cancer. Some examples are given in Table 1.

Responses were classified into two broad groups: response categories (a)–(c) were grouped as showing poor understanding of the preventive aims of the test and groups (d) and (e) were grouped as showing good understanding. Logistic regression was used to see whether the illustrations enhanced understanding of the preventive aim of FS screening.

Table 1

<table>
<thead>
<tr>
<th>Examples of responses participants gave in answer to the question ‘what is the test looking for?’</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not know</td>
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Cancer

“Probably cancer or something like that”
“Whether there’s any infection in the bowels or any cancer or anything happening at the moment.”
“I say that you want to see if there is any kind of cancer or something in the bowel or something.”

Cancer plus removal of something (unspecified)

“it was about bowels and you want to put endoscope in them you know and if you find something you gonna remove it yeah and it’s about cancer, bowel cancer (it’s looking for) a fissular something going on inside... I don’t know what they are”

Looking for/removing polyps/lumps

“you have the endoscope...with a view to seeing polyps”
“looking for polyps, benign or lethal”

Cancer prevention explicitly mentioned e.g. polyps can turn into cancer

“...if you find a polyp you remove it. If there’s none, great. If there are any it could eventually end up cancerous in about 20 years time.”
“‘It’s looking for cancer polyps or things that might or might not be cancerous or might become cancerous.”
varies with gender and socioeconomic status [10], and ability to recall information declines with age, these three variables were entered as covariates in the analyses. Medical record data were available on gender, postcode, and age. Postcodes were used to generate Townsend scores which are area-based measures of socio-economic deprivation [20].

3. Results

Of the 123 people who had been randomly selected for interview, 25 could not be contacted after several attempts, 16 telephone numbers were incorrect and we were unable to obtain a correct number, two respondents had communication difficulties (one because of poor English and one because of Parkinson’s disease), four were on holiday during the interview period, and three of the interviews were terminated prematurely because of external interruptions. Only eight people declined to be interviewed. Sixty-five interviews were therefore completed and recorded, 35 with participants who were sent the written information only and 30 with those who had been sent illustrations as well. Comparisons between people who were interviewed (n = 65) and those who were not (n = 58) showed no significant differences in age, gender or Townsend scores.

Accurate understanding of the aims of FS screening was lower among more socio-economically deprived groups (OR = 0.63; CI: 0.48–0.82; p < 0.001) but did not vary by age or gender. In the written information group, 57% had good understanding of the aims of the test, whilst in the group who were sent written information and illustrations, 84% had good understanding (Table 2). Logistic regression analysis confirmed that addition of the illustrations resulted in significantly better understanding (OR = 3.75; CI: 1.16–12.09; p = 0.027), and this remained significant controlling for age, gender and Townsend scores (OR = 10.85; CI: 1.72–68.43; p = 0.011). Looking specifically at responses indicating the best understanding of the aims of sigmoidoscopy (responses coded as category ‘e’), 37% of people who were sent the illustrations gave responses in this category compared with 20% of those who were sent the written materials alone. However using this more stringent measure of understanding as the dependent variable, receipt of the illustrations did not predict understanding when entered alone (OR = 2.31; CI: 0.76–7.04; p = 0.14) or along with age, gender and Townsend scores (OR = 1.67; CI: 0.51–5.51; p = 0.39).

People who were sent the illustrations were no more likely to remember the name of the test (42% in the written group, 44% in the picture group), the fact that it would be carried out by a nurse (59% in the written group, 79% in the picture group—although this approached significance: p = 0.11) or that cancer risk increases with age (76% in the written group, 82% in the picture group).

Although the study was not powered to examine attendance, we examined it to see if there were differences among the full sample of 318 people randomized to be sent written information alone or written information plus illustrations. Attendance was not significantly higher among those who were sent the illustrations (68.3% vs. 67.5%). In the interview sample (n = 65), people with good understanding of the aims of the test had slightly higher attendance rates than people with poor understanding (77.8% vs. 70%), but this difference was not statistically significant.

4. Discussion and conclusion

4.1. Discussion

Our results show that simple visual information is effective in increasing people’s understanding of the preventive aim of colorectal cancer screening using flexible sigmoidoscopy (FS). People who were sent the illustrations were significantly more likely to understand that the aim of FS screening was to detect polyps and prevent cancer rather than just to detect cancer. There was no evidence of enhanced recall of information provided in the text that accompanied the illustrations such as the name of the procedure and the fact that a nurse would be carrying it out. There was also no evidence that providing illustrations encouraged reading and retention of the information contained only in the written material sent along with the illustrations. The results of our study therefore suggest that only the meaning contained within the illustrations (that of polyp growth and removal) has a recall advantage.

<table>
<thead>
<tr>
<th>Perceived aim of FS screening</th>
<th>Text only</th>
<th>Text and pictures</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Do not know</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>(b) Cancer detection</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>(c) Cancer detection with mention of early detection or removal of something (unspecified)</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>(d) Detection of polyps or lumps</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>(e) Cancer prevention explicitly mentioned e.g. polyps can turn into cancer</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>Good understanding (d) + (e)</td>
<td>20</td>
<td>25</td>
</tr>
</tbody>
</table>
Superior memory for illustrations over words has been attributed to their distinctive visual-sensory features which allows them to be encoded within memory in a unique way [21]. Illustrations are remembered better using both free recall and recognition [22,23] although a review concluded that the benefit of illustrations is particularly apparent in delayed compared with immediate recall [24]. Our results are therefore consistent with these findings. However, whilst recall refers to simple retrieval from memory of words or picture elements, of particular concern to health professionals is the extent that illustrations encourage people to read and comprehend the information presented. In their review, Houts et al. [12] argue that respondents have to explain or do something with the information they are presented with in order to demonstrate understanding as opposed to simple recall. Just repeating facts or words contained within health information would constitute recall rather than comprehension.

A number of the questions we used came under the category of recall rather than comprehension, for example remembering that it is a ‘nurse’ who carries out the procedure, that you only need to have the screening test ‘once’ and that the test is called the ‘Flexi-Scope’. With the question about the aims of the test, it is less clear which responses might count as recall and which as comprehension. Arguably, the only answer that demonstrates understanding is ‘the test aims to prevent cancer by detecting and removing polyps’ (category ‘e’). Stating that the test is looking for polyps/growths may be achieved by recalling a picture element (e.g. a picture of a polyp) without any interpretation on the part of the individual. Thirty-seven percent of people with illustrations stated that the aim of the test was cancer prevention compared to 20% of people who had received written information alone. Although the sample size was too small for the difference to reach conventional levels of significance, this suggest that comprehension and not just recall was enhanced by providing illustrations, although a larger sample size would be needed to confirm this. However, if we take a more lenient definition of understanding the preventive aim (categories ‘d’ or ‘e’), then the effect is significant.

Communicating the preventive aim of screening is an important element in ensuring fully-informed decision-making. It also has the potential to increase screening uptake and reduce the distress associated with an abnormal screening result. Previous research has shown that fear of a cancer diagnosis or fatalistic beliefs that cancer cannot be prevented or cured, act as significant deterrents to adherence to colorectal screening [25,26]. Communicating the preventive aim of colorectal cancer screening could help to reduce avoidance of screening that is motivated by fear of having cancer diagnosed, particularly in underserved groups among whom cancer fear and fatalistic beliefs are disproportionately high [26]. The present study showed no effect of illustrations on attendance, but the sample size was too small to properly assess the relationship between understanding of the preventive aims of the test and attendance and this had never been a primary goal. Nevertheless, there was evidence to suggest uptake may be higher among people who correctly understood the preventive aim of FS screening and this relationship should be explored in future research.

Education about the preventive value of some types of cancer screening may also help reduce the adverse psychological effects associated with having pre-cancers detected. Distress is likely to be higher if people (incorrectly) believe they have cancer than if they understand that pre-cancerous abnormalities have been found. The present results take a step towards identifying the value of illustrations in promoting understanding of screening. This needs to be followed up with research into the psychological impact of providing this additional information.

The findings of the present study are limited to promoting understanding of FS screening. Further work needs to be done to show whether similar benefits are found for screening tests that aim to prevent other chronic diseases, such as cervical cancer screening and tests for high cholesterol and blood pressure. In addition, the positive results demonstrated here may be limited to the particular format of the illustrations. Pictures have the potential to put people off if they appear too technical or distasteful.

4.2. Conclusion

People who received illustrations accompanying written information showed better understanding of the aims of FS screening. They were more likely to say the test was looking for polyps than that the test was just looking for cancer compared with people who received written information alone.

4.3. Practice Implications

Illustrations should be used to facilitate patient understanding of the preventive value of FS screening.
Appendix A

Am I at risk of bowel cancer?

- One in 20 people develop bowel cancer in their lifetime and half of them die from it.
- If you are 60 or over you are most at risk of bowel cancer.
- Both men and women are at risk.
- Bowel cancer often has no symptoms until the later stages, when it is hard to treat.
- Most people who get bowel cancer do not have a family history of the disease.
- By going for the Flexi-Scope Test you will be taking an opportunity to reduce your risk.

I feel well, why have the test?

- The Flexi-Scope Test examines the bowel for polyps. Polyps are small lumps that grow in the bowel.
- About one in three people have polyps.
- You cannot tell if you have polyps because they have no symptoms.
- Polyps are harmless in most cases but sometimes they can grow and turn into cancer.
- The Flexi-Scope Test painlessly removes the polyps so they cannot turn into cancer.
- The test takes 5 minutes.

Who will carry out my test?

An experienced nurse will carry out your test.

What does the test involve?

- Before your test you will be sent an enema to clear out your bowel. The modern enema is small, simple and very easy to use. You can use it an hour or so before leaving home for the test.
- During the test the nurse inserts a thin flexible viewing tube (the Flexi-Scope) into your back passage to look for polyps. The nurse will look at the lower part of the your bowel where most polyps are found.

New screening test at St. Marks

- The Flexi-Scope Test is a new test available for healthy people that can prevent bowel cancer.
- A nationwide bowel cancer screening programme for men and women will be launched in the near future.
- Screening programmes save lives. Every year, lives are saved because people attend breast screening.
References


