anonymous programmes and national surveillance of pregnant women and children,[4] but a study by the group implementing antenatal HIV testing in London has already made it clear that many hospitals' information systems cannot provide data on the proportion of women screened, let alone the proportion offered the test.[13]

Therefore information systems will urgently need to be developed so that the uptake of HIV tests and other antenatal tests such as those for hepatitis B, syphilis, and rubella can be recorded and performance monitored.[8] This is in accordance with other initiatives to improve quality in screening programmes by the National Screening Committee.[14]

The government's year targets for the year 2000 are entirely achievable. Some hospitals in London and Edinburgh have shown that when an offer and recommendation of voluntary HIV testing is made routine as part of standard antenatal care uptake exceeds 80%.[13 15] Some London hospitals have already seen an increase in the proportion of HIV infected women detected.[4] The challenge that remains is to extend this to the rest of the UK, to sustain improvements and to use the lessons learnt to benefit all aspects of screening and care in pregnancy.

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Implementing screening for colorectal cancer

Issues remain about how to investigate those who screen positive

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We now have proof that screening can reduce mortality from colorectal cancer. Three randomised trials have shown that screening by faecal occult blood testing every two years has the potential to reduce mortality by up to 20%.[1–3] With expected compliance rates of around 60%, screening of 50-69 year olds would prevent around 1200 deaths from colorectal cancer each year in the United Kingdom. These estimated benefits are similar to those of three yearly mammography screening in preventing breast cancer mortality, with similar costs of around £40m a year. Thus the UK Screening Committee is about to start two pilot studies examining the feasibility of implementing national faecal occult blood screening. As well as issues concerning the faecal occult blood test itself, there is also no consensus about the best method of investigating those who test positive.

Each pilot site comprises 1 million population, with 20% in the target age range 50-69 years. The pilots will examine a single round of two yearly screening. Thus, faecal occult blood tests will be sent to 100 000 people in year 1 and to the remaining 100 000 in year 2. The test requires participants to take a more active role than with other screening tests. They must sample three consecutive stools and repeat the examination, with dietary restriction, if the result is equivocal (expected in 2% of cases). With a compliance rate of 60% and positivity rate of 2%, 1200 people in each site are expected to test positive each year and require further investigation.[4]

The two methods being considered for this further investigation are total colonoscopy and the combination of double contrast barium enema and flexible sigmoidoscopy. Factors influencing the choice of method include accuracy, patient acceptability, safety, and staffing. Colonoscopy is considered the gold standard because of its high sensitivity for both cancers and adenomas and the potential for immediate polypectomy or biopsy. However, the sensitivities of both total colonoscopy and double contrast barium enema for colorectal cancer are highly operator dependent.

A US study found that when undertaken by non-specialists the sensitivities of both techniques were similar (around 80%),[5] but when performed by experts higher detection rates were achieved with colonoscopy (up to 100% $v \leqslant 90\%$). The sigmoid is difficult to visualise by double contrast barium enema, particularly in the presence of diverticular disease (present in around 40% of this age group)—hence the addition of flexible sigmoidoscopy.[6] The caecum remains a difficult area for both procedures. The US study found that double

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contrast barium enema detected only 75% of 146 caecal cancers and reported that specialist endoscopists regularly achieve caecal intubation rates >90%.[5] In the UK, and probably outside specialist centres in the US, completion rates of 70% are more realistic. Endoscopists cite sensitivities for adenomas <1 cm as low as 44%, while radiologists quote figures as high as 95%.[5] The argument rages on, but there are other issues.

The combination of flexible sigmoidoscopy and double contrast barium enema is much less convenient than total colonoscopy alone. The unrehydrated guaic test, as was used in the randomised trials and is proposed in the UK pilots for the faecal occult blood test, is highly specific with a high positive predictive value for neoplasia (around 50%). For every 10 people who test positive for faecal occult blood 1 will be found to have a cancer, 3 an adenoma >1 cm, 1 a small adenoma, and 5 a negative examination. If total colonoscopy is undertaken, all lesions detected can be biopsied or removed on the same day, and if the caecum is not reached and lesions have not been biopsied double contrast barium enema can be performed on the same day.[7] If double contrast barium enema and flexible sigmoidoscopy are undertaken on the same day, the barium enema cannot precede sigmoidoscopy and polypectomy cannot be performed. In Nottingham, 74% of the cancers (and presumably the large adenomas) were distally located. Therefore of the four important lesions, three should be detectable by flexible sigmoidoscopy alone. However, a significant distal lesion is associated with a greater than 10% chance of having another significant lesion proximally[8 9] and requires a complete colonoscopy.

Thus there are two choices: *(a)* do flexible sigmoidoscopy and barium enema on the same day, undertaking total colonoscopy another day to perform polypectomy in the 50% in whom neoplasia is detected; or *(b)* undertake flexible sigmoidoscopy using a colonoscope, performing total colonoscopy instead of barium enema when distal lesions are found. This means that all patients would need to be prepared to have a sedative if necessary and those found to have proximal neoplasia on barium enema would require a total colonoscopy on another day. Whichever way is selected, a significant proportion of those having flexible sigmoidoscopy and barium enema will need to return to have a total colonoscopy on another day, with all the risks of an extra procedure and bowel preparation.

Complication rates of colonoscopy are higher than those for alternative techniques, with overall mortality around 0.01%.[10] Perforation and bleeding are the major complications of endoscopy, expected in 0.4% and 1.2% respectively of examinations involving polypectomy[10]; complication rates are much lower in diagnostic examinations. A retrospective UK survey found that mortality from double contrast barium enema is around 0.002%.[11] This, of course, excludes the mortality from polypectomy, required in 50% of patients. It should, however, be remembered that the aim of all this is to detect the lesions that led to the positive faecal occult blood result, not to undertake opportunistic screening for small polyps of unknown importance.[12] Paradoxically, the high sensitivity of colonoscopy for small lesions in the right colon may be a disadvantage because the caecum is a high risk area for perforation.

The question then comes down to manpower. Who is going to do these investigations? There are currently insufficient competent endoscopists and long waiting lists for endoscopic investigation of symptomatic patients. The British Society of Gastroenterology audit (J Bowles, personal communication, 1999) has shown much room for improvement in terms of performance and training. Flexible sigmoidoscopy can be undertaken accurately and safely by nurses. An initiative to raise the standards of teaching of these procedures to both medical and non-medical personnel has just begun (R Leicester, Royal College of Surgeons, 1999). Radiographers can perform double contrast barium enema, but radiologists have to interpret the films, and recruitment of radiologists for the breast screening programme has been difficult.

In summary, if safety and staffing issues can be resolved, total colonoscopy is the method of choice in the short term. In the future virtual colonoscopy (as described in Halligan's article on p 1249), possibly in combination with flexible sigmoidoscopy, may provide the required accuracy, safety, and patient acceptability. The examination itself takes less than a minute. Success will depend on developing the technology to reduce the interpretation time and to discriminate stool from bowel wall, obviating the need for bowel preparation. Even further into the future, it might be possible to use magnetic resonance imaging, which would also avoid the radiation exposure. Whatever method is used for investigating screen positives, most lesions will require endoscopic removal. Thus, if screening for colorectal cancer is to become feasible there is a desperate need now to increase recruitment and to train personnel to perform colonoscopy and polypectomy safely and accurately.

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