Cancer screening is an important element of any national strategy to improve early cancer diagnosis. The NAEDI initiative (Department of Health NAEDI Newsletter, 2009) emphasises a multi-faceted approach; there is a need to raise awareness of cancer symptoms and make health services better equipped to respond to symptoms. In parallel, effective and efficient cancer screening programmes based on sound evidence are needed. Indeed, cancer screening can effectively complement awareness and early diagnosis initiatives; a screening programme can, for example, raise awareness in the community of particular cancers and their associated symptoms.

Uptake (i.e. the proportion of screening invitees in a given year for whom a screening test result is recorded) is the most important factor in determining the success of a screening programme (Barratt et al, 2002; Parkin et al, 2008). The United Kingdom has, over recent decades, taken an organised, population-wide approach to screening; although the exact contribution of cancer screening to an observed reduction in mortality in the population can be difficult to quantify, modelling exercises suggest that cancer screening activity over recent decades has made a significant difference (Blanks et al, 2000; Raffle et al, 2003; Taylor et al, 2004; van der Aa et al, 2008). However, mortality reductions are brought about by many contributory factors and therefore combined approaches that include earlier presentation, more timely diagnosis and improved treatments are considered to hold the greatest promise of improved cancer outcomes (Department of Health NHS Cancer Plan, 2000).

Experience in the United Kingdom suggests that achieving and maintaining uptake in cancer screening requires ongoing effort; coverage (i.e. the proportion of resident and eligible individuals who have had a test with a recorded result in a screening round) can decline from one round of screening to the next, and the causes of this drop-off are often difficult to identify (Weller et al, 2007; Lancuck et al, 2008). A number of systematic reviews have examined the evidence supporting various approaches to cancer screening uptake (Jepson et al, 2000; Bonfill et al, 2001; Forbes et al, 2002). The findings typically vary according to factors such as cancer site, type of test and target population. However, organised recruitment strategies (the approach typically taken in the United Kingdom, which involves systematic recruitment and follow-up, the provision of scheduled appointments for screening), and personalised invitation approaches (for example, from a general practitioner) seem to show consistent benefits over opportunistic approaches to screening. Reducing structural barriers to accessing services (e.g. location, timing of appointments, childcare facilities) can also increase uptake (Baron et al, 2008).

It is timely, in this BJC issue, to examine the main predictors of uptake for the United Kingdom’s three established cancer screening programmes (breast, cervical and colorectal screening), along with the evidence supporting strategies to improve uptake in each of these programmes.

CERVICAL SCREENING

Variations in uptake

Recently, declining rates in cervical screening, particularly in younger women, have prompted renewed interest in the issue of adequate, population-wide coverage (Lancuck et al, 2008). Women from ethnic minorities and deprived sub-groups in the population have shown consistently lower uptake over decades of screening in countries worldwide (Webb et al, 2004; Moser et al, 2009) – particularly among groups born outside their host country (Downs et al, 2008). Health literacy is also an important determinant; the messages in cervical cancer screening recruitment materials are relatively complex, and strategies targeting invitees with limited...
health literacy require careful design and, ideally, flexibility in recruitment procedures (Giordano et al, 2008).

Strategies to improve uptake

While setting recruitment targets in UK primary care can lead to improved uptake, even in deprived populations (Baker and Middleton, 2003), interventions of proven sustainable benefit are typically multi-faceted, and result from efforts to make the approaches to target groups socially and culturally appropriate (Dietrich et al, 2006; Tu et al, 2006). The media has an important role to play in cervical screening through, for example, programme story-lines where a character has cancer (Meissner et al, 2004) in the United Kingdom this can produce profound short-term effects, although evidence for effectiveness in bringing about sustained increases is variable (Howe et al, 2002).

On-going effort, particularly targeting ethnic sub-groups, seems justified in the United Kingdom, although an ‘off-the-shelf’ strategy remains elusive. Ideally, detailed socio-demographic and ethnic information should be available at local levels, to tailor strategies with local effect. The advent of HPV vaccination introduces a new dynamic into cervical screening uptake, and this will require further refinement of messages promoting uptake of screening over the next several years.

BREAST SCREENING

Variations in uptake

Socio-economic status is a powerful driver of uptake in breast screening, as shown in the recent National Statistics Omnibus Survey (Moser et al, 2009). Importantly, deprived populations seem to have later stage presentation in breast cancer-compounding the potential effects of inequalities of breast screening uptake (Cuthbertson et al, 2009). There is compelling evidence that certain ethnic sub-groups in the United Kingdom have lower participation rates than the general population (Szczepura et al, 2008).

Strategies to improve uptake

In common with other forms of screening, individuals vary in their response to a breast screening invitation; factors such as perceived risk of cancer and perceived ability to undertake the test are important, and interventions should ideally incorporate theoretical psychological models (Champion et al, 2007). Endorsement of breast screening from primary care seems to have a consistent, albeit modest, effect on recruitment (Bankhead et al, 2001). Research on targeting low-uptake groups has typically used customised approaches and, on balance, shows a beneficial effect – for example, strategies such as tailored telephone counselling seem to improve uptake (Luckmann et al, 2003). We should, however, be cautious about attempting more intense recruitment strategies across different regions of the United Kingdom – again, there is no one strategy with proven benefit in different contexts. While strategies such as phone calls and home visits can produce modest increases in breast cancer screening uptake, these efforts are labour intensive and may not be cost-effective on a population-wide scale in the United Kingdom (Kearins et al, 2009).

COLORECTAL SCREENING

Variations in uptake

Colorectal screening, using the FOBT, is now being ‘rolled out’ in all four countries of the United Kingdom. There is already compelling evidence that certain ethnic sub-groups in the United Kingdom have lower participation rates of colorectal screening than the general population – this applies to screening using both FOBT and flexible sigmoidoscopy (Robb et al, 2008; Szczepura et al, 2008). The reasons for these differences are complex, underpinned by a range of health beliefs and cultural attitudes; in some ethnic sub-groups participation in screening is at odds with cultural norms, and issues such as perceived lack of self-efficacy, cultural misunderstandings, barriers relating to spiritual beliefs and fear of cancer are all significant. Further, profound differences in uptake rates between socio-economic groups have emerged in countries adopting screening (Weller et al, 2007; Deutekom et al, 2009).

Colorectal screening is targeted at both males and females, and there is some evidence that males and younger age groups have lower uptake rates of FOBT screening (Weller et al, 2007; Porner et al, 2009). However, the evidence is less clear for endoscopic procedures such as colonoscopy or flexible sigmoidoscopy (UK Flexible Sigmoidoscopy Screening Trial, 2002; Meissner et al, 2006). Men appear to have higher rates of participation, although there are exceptions, such as a recent population-based trial of flexible sigmoidoscopy screening from Norway (Hoff et al, 2009).

Again, literacy is a critical determinant of participation in colorectal cancer screening. A great deal of effort has been devoted to producing information and materials for the bowel cancer screening programmes, which are comprehensive, informative and balanced – yet we know that health literacy varies a great deal in the population (von Wagner et al, 2009b), and many invitees will have limited comprehension of recruitment materials.

Strategies to improve uptake

Again, interventions of proven benefit targeting deprived and ethnic sub-groups are typically multi-faceted, and result from efforts to make the approaches to target groups socially and culturally appropriate (Tu et al, 2006). The type of test used is also important. On the whole, tests that are simpler and which minimise factors such as cost, inconvenience and distaste (e.g. from handling faeces in faecal occult blood testing), are associated with greater uptake (Federici et al, 2005). Endorsement of cancer screening from primary care can improve uptake although, again, the effect is quite modest (Federici et al, 2006); evidence from the United States suggests that engagement of wider primary care teams is particularly promising (Hudson et al, 2007; Klabunde et al, 2007). Low primary care use has been associated with a lack of CRC screening among both women and men (Fenton et al, 2009).

As the current programme is implemented screening providers need to avoid the possibility of patterns of low uptake in ethnic and deprived groups becoming entrenched. We have the opportunity with a new programme to trial new, tailored and culturally appropriate approaches to these groups, and there is currently a great deal of research activity and innovation in this area. It is less clear whether specific effort should be directed at males as the differences in uptake are not large and appear to be less consistent in different regions of the United Kingdom. Nevertheless, methods of approach, which accommodate male perspectives and attitudes towards preventive health services, should be considered – these may differ considerably from those of women (Cullati et al, 2009), and require specific strategies to overcome gender-specific barriers to screening uptake.

The timing of invitations may also be worth considering – although it would require a substantial re-arrangement of current recruitment processes in the bowel screening programmes. It seems timing can have a positive effect, if invitations coincide with annual milestones such as birthdays and festivals (Hoff and Brethauer, 2008). We so far have limited evidence supporting the use of web-based resources in promoting CRC screening in the United Kingdom, although US evidence suggests these approaches...
show promise, particularly, if they have a strong interactive component (Ruffin et al, 2007).

SUMMARY

While other factors are important, ethnicity, social deprivation and gender are the major determinants of cancer screening uptake in United Kingdom cancer screening programmes – their effect on uptake is summarised in Table 1. Strategies to improve cancer screening uptake vary according to context, type of test and target group – a summary of evidence is shown in Table 2. There is a strong programme of research into cancer screening uptake in the United Kingdom, and new evidence is emerging; in this British Journal of Cancer supplement von Wagner et al (2009a) describe socio-economic patterns of uptake for FOBT screening in London. This adds to a growing body of literature showing that we need to invest extra efforts in reducing inequalities in cancer screening uptake. Further Elbort et al (2009) provide an interesting model for improving uptake – carefully tailored to local context in their region of London, and involving multi-faceted approaches. Increasingly, these are the kinds of approaches we will need to improve uptake in an equitable way.

Ideally, the achievement of adequate uptake rates in cancer screening should be accompanied by informed uptake – that is, invitees should make informed choices and be aware of all the risks and benefits of participation (Jepson et al, 2005). It is a difficult concept to measure, and involves more than provision of information – it includes a need to check understanding and to explore decision making processes (Jepson et al, 2007; Woodrow et al, 2008). Increasingly, individuals invited to screening are encouraged to access and use more information to reach decisions over participation (Welch, 2004).

CONCLUSIONS

The reduction in health inequalities is a major feature of the Cancer Reform Strategy. Yet uptake of cancer screening is not uniform across the population – within the United Kingdom, variation in uptake in cancer screening programmes is observed in different population sub-groups: for both breast and cervical screening uptake is lower in deprived communities and in some black and ethnic minority communities; these same patterns are seen in the more recently introduced bowel screening programme, where gender has also been shown to affect participation.

Cancer screening uptake improvement strategies will continue to require careful and creative design; socio-demographic and cultural patterns of cancer screening uptake are well established, and though strategies for improving uptake differ according to the dynamics of the screening process, there are many generic lessons that are transferable between the different screening programmes.

There is, for example, a small but growing body of evidence to shape strategies targeting ethnic and deprived populations, and both age- and gender-based sub-groups; however, there is a need to develop a robust evidence base for effective interventions for diverse populations within the United Kingdom.

Cancer screening should ideally work in tandem with other awareness and early diagnosis initiatives. The NAEDI initiative is part of a major push to further improve the United Kingdom’s performance in cancer-related health outcomes (Department of Health Cancer Reform Strategy, 2007); cancer screening programmes with good coverage, well-informed invitees and equitable engagement of the population can have a major role.

Conflict of interest
The authors declare no conflict of interest.


Uptake in cancer screening programmes

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