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The benefits and harms of breast cancer screening: an independent review

Response by Dr Hilary Burton, Director of PHG Foundation

An independent breast screening review was published yesterday. Commissioned jointly by Cancer Research UK and the Department of Health (England) it sets out a review of evidence concluding that roughly one death from breast cancer is prevented for every three cases over-diagnosed and treated. It recommends that the breast screening programme should be continued but that information should be available to women to enable them to make informed decisions.

At PHG Foundation we have been interested in breast cancer screening for a number of years through our involvement in the COGS project, a European Commission funded (FP7) programme focused on genetic susceptibility and risk stratification for breast, ovarian and prostate cancers. Through modelling we have particularly looked at the possibility of tailoring breast cancer screening (for example, starting date or frequency of mammography) according to risk and the many practical, ethical, legal and social issues that would arise. Estimating risk using known susceptibility variants can be used to stratify the population in a way that has clinical utility for optimising prevention. Further, consideration of genetic components of risk has also led us to revisit the idea of prevention at a population level (such as proposed by the breast screening programme) and the emphasis on individual decision-making. We suggest below that there must be a trade-off between these two purposes.

The balance of benefits and possible harms from breast cancer screening has been a topic of great debate during the last few years as more information emerges from research trials. Focus has been on the reduction in mortality attributable to screening, the number of women over-diagnosed and treated unnecessarily and the way in which risks and benefits are communicated to women invited for screening. A review requested by the Government and Cancer Research UK and conducted by an independent panel chaired by Sir Michael Marmot published its findings and recommendations on 30 October with an accompanying article in the Lancet.

The review concluded that the programme as whole reduces mortality from breast cancer but to the detriment of some individuals who have 'unnecessary' diagnosis and treatment. It makes a policy recommendation that UK breast screening programme should continue adding that, on a population basis, 'the greater the proportion of women who accept the invitation to be screened, the greater is the benefit to the public health in terms of reduction in mortality from breast cancer'. But for the individual woman the authors note that the choice has to be made between accepting mammography, having weighed up the risks and benefits for herself, or declining the offer.

As a public health organisation with 15 years' experience in considering the potential of genetics within public health programmes, we would like to offer two further perspectives that are of relevance for these high level policy recommendations. These relate firstly to the identification of breast cancer susceptibility variants that can help to stratify risk in the population and, secondly to the need to differentiate between the population and individual viewpoints, particularly in screening programmes.

As part of a programme funded by the European Commission (FP7), an international collaboration led by the Karolinska Institute, Sweden is investigating genetic susceptibility to breast cancer. More than 25 variants, each conferring a small increased risk, have been identified, and it is likely that many more will be identified in due course. For most women, their risk of breast cancer will depend on the combination of the variants they inherit, alongside personal factors such as age, reproductive history, body mass index and behaviours such as alcohol intake, smoking and physical activity. As part of this work, a group led by the PHG Foundation, Cambridge used modelling to show that it was possible to use information on polygenic risk to stratify a population into risk groups that were widely enough separated to be useful in offering women different preventive interventions such as different starting age or frequency of mammographic screening. Based on the identified susceptibility variants, offering mammographic screening to women between 35 and 79 based on polygenic risk rather than just age would result in a 24% reduction in the numbers of women being screened for only a 2% drop in cancers detected. This extends the opportunity to benefit to a wider age group than those currently screened and results in a more optimal benefit–harm ratio for the programme as a whole. For individual women, knowing which risk group they are in, and understanding that the mammography regime has been tailored to optimise benefit-harm for each group might be reassuring. Of course, this is only modelling and needs to be tested through trials and we also need to be sure of its effectiveness, cost-effectiveness, acceptability and practicality.

Secondly is the thorny issue of personal autonomy within a public health preventive programme and here the differentiation between the individual and the population is of great concern. Much of clinical utility is subjective and pertains to the individual. Some women may decide to be screened notwithstanding the fact that for many the surgical intervention and further treatment, if they test positive, would have been unnecessary. They, as individuals, are willing to take that risk. Whereas others, in exactly the same position (from the programme perspective), may choose differently. Thus the promotion of a population screening programme accompanied by statements that success in mortality reduction will be increased if a high proportion of women take up the offer of screening is at odds with rhetoric about ensuring that women should be enabled to make unbiased and very personal individual choices.

Our position as public health professionals of the 21st century should be to understand the distinction between the individual and population perspective and to ensure a balanced view is presented to our citizens, notwithstanding the possible consequence of having a higher average mortality from breast cancer should fewer women choose screening. In other words, we have to tolerate a trade-off between effectiveness and personal choice. It may be that, in the near future, stratification of risk, using genetic variants and other factors will enable the offer of prevention to be more finely tuned to the likely benefits and possible harms, which - if effectively communicated in a manner that is trusted by the public - may tip the 'trade-off' towards a programme of greater rather than lesser effectiveness.

The recommendations in the report refer to a 'modern health system' that clearly communicates benefits and harms to women. We believe that this communication should not be predicated on the underlying belief that high uptake will be beneficial to the population as a whole, but that it must also be honest about the implications for individual citizens who choose to participate in such a programme. Given unbiased information around a range of possible benefits and harms as well as costs and inconvenience, we should trust and respect the decision that an individual woman makes about screening; we should unequivocally accept and acknowledge this as the 'best' individual decision and concentrate efforts on ensuring that women and the professionals who support them, are properly informed.

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