Improvement in risk prediction, early detection and prevention of breast cancer in the NHS Breast Screening Programme and family history clinics: a dual cohort study

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Plain English summary

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Plain English summary

In the UK, women are invited for 3-yearly breast screening through the NHS Breast Screening Programme (NHSBSP) from the ages of 47–50 years to the ages of 69–73 years. Women who have family histories of breast cancer can obtain enhanced screening from the age of 40 years. Risk prediction models are able, using known risk factors such as family history/hormonal/reproductive factors, to categorise women by risk, although accurate individual risk prediction has remained difficult. The identification of other important risk factors such as mammographic breast density (MD) and common variations in a person's genes (single nucleotide polymorphisms) has made it possible to improve breast cancer risk prediction models. We have shown, in two large studies of over 63,000 women, that the Tyrer–Cuzick (TC) risk prediction model accurately predicts breast cancer risk, although further improvements are probably required.

Risk identification is improved by using deoxyribonucleic acid (DNA) and a visual assessment of MD. In the NHSBSP, using a combination of TC and MD predicts that 70% of the population with average or below average risks have very low rates of advanced breast cancer. A preliminary analysis suggested that using a risk-based screening programme could be a good use of NHS resources. However, more research is needed to generate evidence of the impact of introducing the proposed risk-based screening programme at a national level on health-care resource use and patient benefits.

We conclude that risk precision can be improved significantly by using DNA and MD, and can potentially be used to stratify NHSBSP screening to identify those at greater risk of high-stage cancers for enhanced screening, but that 3-yearly screening appears effective in 70% of the population.

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