20-year results from breast cancer screening program show a significant drop in deaths, limited harm and reasonable cost

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Results from one of the longest-running national breast cancer screening programmes have shown that it has contributed to a drop in deaths from the disease, that any harm caused by the screening, such as false positives and over-diagnosis, has been limited, and that the costs have been reasonable.

The Dutch population-based mammography breast cancer screening programme began in 1989, and today Mr Jacques Fracheboud, a senior researcher at the Erasmus University Medical Center (Rotterdam, The Netherlands), reported on the first 20 years to the eighth European Breast Cancer Conference (EBCC-8).

"Compared with the pre-screening period 1986 to 1988, deaths from breast cancer among women aged 55-79 fell by 31% in 2009," said Mr Fracheboud. "We found there was a significant change in the annual increase in breast cancer deaths: before the screening programme began, deaths were increasing by 0.3% a year, but afterwards there was an annual decrease of 1.7%. This change also coincided with a significant decrease in the rates of breast cancers that were at an advanced stage when first detected."

Between 1990 and 2009, 16.6 million personal invitations were sent to 3.6 million women aged between 50-75 (in 1998 the screenings were extended to the age of 75 from the original cut-off point of 69). Overall

attendance was 80%, increasing from 73.5% in 1990 to 81.5% in 2009. In the same period, 13.2 million screening examinations were performed among 2.9 million women (an average of 4.6 examinations per woman), resulting in 178,490 (1.35%) referral recommendations, 95,757 (0.72%) biopsies and 66,562 (0.5%) breast cancer diagnoses. Referral rates increased by approximately 200% in initial screenings between 1990-1997 and 2005-2009, and by approximately 100% in subsequent screenings, resulting in an increase in detection rates of more than 30%.

For a woman who was 50 in 1990 and who had ten screenings over the 20-year period, the cumulative risk of something being detected that turned out not to be breast cancer (a false positive result) was 6%. Over-diagnosis (detection of tumours that would never progress to become a problem) was limited to 2.8% of all breast cancers diagnosed in the total female population and 8.9% of screen-detected breast cancers.

The total annual cost of the programme was €51.7 million in 2009, or €56.65 per examination. Adjusted for inflation, a breast screening cost approximately €3.50 less than in 1996. In addition, the screening programme was accurate, with high sensitivity (the proportion of positive results that were correctly identified) and specificity (proportion of negative results that were correctly identified). Up to 2005, sensitivity was 74.3% for initial and 67.6% for subsequent screens, and the sensitivity was 99% and 99.4% respectively.

Mr Fracheboud said: "These results provide convincing evidence that the programme contributed to the breast cancer mortality decrease that has been observed in the last 20 years in The Netherlands, and that harms such as the false-positive rates, the interval cancer rate – cancers that are diagnosed in the interval between screenings – and the proportion of over-diagnosed breast cancers were quite limited. Our study also shows that the programme is of a high quality and is continually improving. It has a high acceptance rate among women aged 50-75 and the costs of the

programme are reasonable.

"We are convinced that the benefits of the screening programme outweigh all the negative effects. These results may also be of value for other mammography breast cancer programmes that are strictly population-based, centrally organised, where quality assurance is guaranteed and that are continuously monitored and evaluated.

"The implementation of our breast cancer screening programme was based on previous practical experience from two regional pilot screening programmes, and on an extensive cost-effectiveness analysis. These 20-year results appear to be largely in line with the outcomes predicted around 1990," he concluded.

Professor David Cameron, from the University of Edinburgh (Edinburgh, UK), and chair of EBCC-8 said: "This study reports the findings of a 20-year national screening programme. Many of the pivotal randomised studies of breast screening did not directly assess the benefit of 20 years' screening, as is increasingly being used in many national programmes. Therefore, these data will help inform the current debate about the risks and benefits of many of the current national screening programmes implemented around the world."

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