# Breast cancer screening—towards a broader coverage of the general population

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The primary purpose of breast cancer screening is to detect breast cancer earlier at an asymptomatic stage hopefully before it becomes more advanced or metastasised, which is the major cause of patient death. The breast cancer detected under screening are usually smaller in size with better prognosis,[1,2] and patients can therefore benefit from less extensive surgical treatment with fewer complications such as lymphoedema. It may also reduce morbidity secondary to the use of systematic chemotherapy, and lower its recurrence rate.

In 2021, the Cancer Expert Working Group on Cancer Prevention and Screening (CEWG) updated its recommendations on breast cancer screening for the female general population of Hong Kong. Women with certain combinations of risk factors are recommended to consider mammography screening every 2 years.[3] Addressing the rising breast cancer incidence in Hong Kong, the updated recommendation is a big leap forward compared to the previous version which only mentioned 'insufficient scientific evidence to recommend or against mammography screening'.

The benefits of mammography have been widely reported in Western populations.[4] However, whether studies from Western populations are directly applicable in Chinese populations remains controversial, primarily because this population generally has denser breast tissue and difference in incidence. In this respect, a 10-year study conducted in Taiwan, involving over 1.4 million women of mainly Chinese ethnicity, found that universal biennial mammography was associated with reduction of mortality by 41% and stage II+ breast cancer by 30%, compared with annual clinical breast examination.[5] In Hong Kong, Lui et al[6] found that the crude cancer detection rate of an opportunistic screening programme was five per 1000 mammograms performed. Experience from Hong Kong Breast Cancer Foundation found a detection rate of 7.5 per 1000 asymptomatic women screened.[7] These data suggested that mammography screening is useful to detect breast cancers in Hong Kong.

Potential risks of breast screening have also been overstated, including overdiagnosis and overtreatment of ductal carcinoma in situ (DCIS) detected by mammography screening. However, Duffy et al[8] studied over 5 million women screened in the United Kingdom for four consecutive yearly screening rounds, and showed that there was a significant negative association between detection of DCIS at screening and invasive interval cancers. For every three screen-detected DCIS, there was one less invasive interval cancer over the next 3 years. These results indicate that early detection of DCIS and subsequent treatment is worthwhile in prevention of future invasive diseases.

Another risk that is often overstated is the effect of screening causing anxiety among patients. Anxiety in patients who received breast cancer screening tends to be short-term, and these women have a high tolerance for false positive results.[9-11] Findings from the longitudinal DMIST (Digital Mammographic Imaging Screening Trial) showed that the anxiety associated with false positive mammogram was only transient with no measurable health utility decrement, yet it increased women's intention to undergo future breast cancer screening.[12] Although there is potential for false positive results to cause anxiety and lead to unnecessary biopsy and treatment, the situation can be much alleviated with updated technology and quality assurance by experts with adequate experience in breast screening.

Bilateral two-view full-field digital mammography is currently the standard of screening mammography. With technological advancements, digital breast tomosynthesis (DBT), also known as 3D mammogram, has become more widely used. Friedewald et al[13] found that DBT was associated with a 41% increase in invasive cancer detection, 49% increase in positive predictive value for recall, 21% increase in positive predictive value for biopsy, and 15% reduction of overall number of recalls.

Older studies reported that the radiation dose of DBT was much higher than that of conventional two-dimensional (2D) digital mammography. However, these studies often compared the radiation dose between "DBT combined with digital mammography" and "digital mammography only". Using newer DBT technology with synthesised 2D mammogram capacity without separate scanning for

 

2D images, the radiation dose of DBT is comparable to that of conventional 2D digital mammography—and just less than half of the United States Food and Drug Administration Mammography Quality Standards Act dose limit for mammography.[14] And with the use of DBT, it is associated with fewer additional radiation exposure from recall for additional cone compression view. This newer DBT technology is now widely available in Hong Kong.

To implement a successful breast cancer screening programme in Hong Kong, modern hardware and manpower readiness are equally important. The imaging centre should have mammography machines, radiographers, and radiologists that meet the standards recommended by Hong Kong College of Radiologists.[15] Quality assurance, including regular auditing of the programme's performance should be in place. Multidisciplinary meetings with radiologists, surgeons, pathologists, and oncologists working in as a team should be held regularly to discuss relevant cases and to facilitate further investigations or treatment plans. There should also be administrative support to follow up on screening and biopsy results, and provide timely arrangement of further investigation or treatment if cancer is suspected or confirmed. A system should be implemented to remind patients to attend the next screening appointment.

To prepare for large-scale breast cancer screening, forward planning is essential, such as training of an adequate number of mammographers, radiologists with a special interest in breast screening, and breast surgeons specialised in early breast cancer surgery and treatment.

Whereas the risks of screening are frequently discussed, the harms of not screening are often overlooked. Those women not attending screening are associated with development of a significantly larger tumour, a more advanced stage of disease at diagnosis, poorer prognosis, lower survival rate, and higher recurrence rate. There is also a higher cost and extent of treatment, especially if there is a need for chemotherapy for advanced disease. It has been estimated that the cost of treating advanced metastatic breast cancer exceeds US$250 000 per patient, and the average cost of treating advanced cancer in the first year after diagnosis is almost double that of early cancers.[16] In addition to the cost for treatment, there are extra societal costs, including productivity loss and staff turnover, as well as the time and expenses of the caretakers of the patients.

The relatively dense breast tissue among Chinese women not only impairs the performance and resulting benefits of mammography, but also is an independent risk factor for breast cancer. The technology of DBT, supplemented by ultrasound or magnetic resonance imaging (MRI), may be used to enhance the sensitivity for detecting cancer. Whereas supplementary ultrasound is widely used because of its easy availability, a recent study found that contrast enhanced MRI provides the greatest increase in cancer detection and reduce interval cancers and late-stage disease.[17] The abbreviated MRI technique will reduce the cost and improve the availability of this technology. It is hoped that the CEWG may take this newer evidence into consideration in its next update.

With the updated recommendation of CEWG on risk-based screening, and the experience of opportunistic mammography screening in Hong Kong since 1993,[6] we believe that Hong Kong should have the capability and expertise to organise quality, population-based screening similar to other Asian countries and cities. Because breast screening is a primary care activity, we anticipate that district health centres may play a crucial role to enhance awareness and promote its implementation in the community as one of their key roles and functions. We are confident that the findings from evaluation of the Breast Cancer Screening Pilot Programme started on 6 September 2021 could further inform policy formulation.

### Author contributions

All authors contributed to the editorial, approved the final version for publication, and take responsibility for its accuracy and integrity.

### Conflicts of interest

The authors have declared no conflict of interest.

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