The use of MRI screening in the population screening programme for breast cancer

Executive summary

Health Council of the Netherlands

In the population screening programme for breast cancer an X-ray (mammogram) is used to examine women's breast tissue for any abnormalities that might indicate breast cancer. In women whose breasts contain a great deal of fibroglandular tissue (dense breast tissue) in relation to the amount of fatty tissue, any abnormalities are less visible on a mammogram. As a result, the population screening programme more often fails to detect breast cancer in these women, even though the composition of their breast tissue means that they are at greater risk of breast cancer. Thus, the standard population screening programme is less effective for these women than for those who do not have dense breast tissue. A study has been under way since 2011 to determine whether supplemental MRI screening would be more efficacious for these women. The first results from DENSE study were published at the end of 2019. The State Secretary for Health, Welfare and Sport has asked the Health Council of the Netherlands whether it would be appropriate to include supplemental MRI screening in the population screening programme for breast cancer, for women with extremely dense breast tissue. The Health Council's Committee on Population Screening has examined this issue.

The benefits of supplemental MRI screening barely outweigh the drawbacks

The DENSE study has shown that the use of supplemental MRI screening in women with extremely dense breast tissue reduced the risk of failing to detect instances of breast cancer that might otherwise have proved fatal. While this is certainly a benefit, here are also a number of drawbacks. Supplemental MRI screening generates more false-positive results and more instances of overdiagnosis and overtreatment, which can be very stressful, both psychologically and physically. The Committee feels that these drawbacks are so substantial that the benefits of supplemental MRI screening barely outweigh the drawbacks.

Fewer cases of cancer in the intervals between screening rounds

It takes many years for an intervention's ultimate impact on breast cancer mortality to become visible. For this reason, the DENSE study examined the impact on the interval cancer rate – the number of instances of breast cancer detected in the intervals between screening rounds. The international consensus is that fewer cases of interval cancer are indicative of less instances of breast cancer mortality. In the standard population screening programme for breast cancer, women between the ages of 50 and 75 are sent invitations for Mammography once every two years. When abnormalities are seen that may indicate breast cancer, the women in question are referred for follow-up testing.

In the DENSE study, women with extremely dense breast tissue, whose mammograms revealed no abnormalities, were randomly divided into an intervention group and a control group. The intervention group was offered MRI screening, in addition to the standard mammogram. The control group only received a mammogram.

Fewer cases of interval cancer occurred in the intervention group than in the control group. In addition, the rate of interval cancer in those intervention-group women who accepted the offer of MRI screening was about the same as in women without dense breast tissue in the standard population screening programme (i.e. outside the DENSE study). Furthermore, in the second round of screening, fewer tumours were found in the intervention group than in the control group. This indicates that the main effect of MRI screening is to accelerate the diagnosis of instances of breast cancer.

More false-positive results, overdiagnosis, and overtreatment

The DENSE study also showed that a supplemental MRI screening for women with extremely dense breast tissue has significant drawbacks. For example, it often leads to a false-positive result. This is when an abnormality is seen that, upon follow-up testing, turns out not to be cancer. A false-positive result is psychologically and physically stressful – it causes needless anxiety and results in unnecessary follow-up testing.

MRI screening also leads to more instances of overdiagnosis. This means that tumours are detected that would never have come to light without screening. That outcome can only be determined retrospectively, and it cannot be predicted in individual cases. Accordingly, any similar instances of breast cancer that are detected will be treated the same. In this way, overdiagnosis will lead to overtreatment. In other words, women whose breast cancer would never have come to light, nevertheless, undergo treatment. That too, is both psychologically and physically stressful.

Investing in MRI screening would be inefficient

The Committee feels that it would be inefficient to add MRI screening to the population screening programme for breast cancer. It may seem cost-effective to offer women with extremely dense breast tissue a supplemental MRI screening. However, as far as the Committee is concerned, adding MRI screening to the population screening programme for breast cancer is not future-proof.

In the Netherlands, the reference value for the cost-effectiveness of preventive interventions (such as population screening) is usually €20,000 per quality-adjusted life year (QALY). According to a cost-effectiveness analysis, the cost per QALY of supplemental MRI screening for women with extremely dense breast tissue would currently be less than this.

However, that cost-effectiveness analysis did not include some of the investments that would be required. Given the irrevocable nature of these investments, plus the fact that they are not particularly future proof, the Committee feels that it would be inefficient to add MRI screening to the population screening programme for breast cancer. This is because, before too long, CEM is expected to provide a simpler and cheaper alternative. CEM stands for contrast-enhanced mammography, or mammography in which a contrast agent is used. This method is not only significantly cheaper than MRI screening, but it would probably be much more economical to scale up our existing mammography capacity than to create sufficient MRI screening capacity.

As yet, the risk-benefit ratio of CEM in a population screening programme is unclear. Accordingly, a research for trial screening is needed. Some studies have already been conducted into the use of CEM in women with suspected or confirmed breast cancer. These studies appeared to show that CEM is just as effective as MRI, but it yields fewer false positive results and cases of overdiagnosis. Both MRI and CEM involve the use of contrast agents, which can trigger allergic reactions.

Recommendation

The Committee recommends that, at the present time, supplemental MRI screening should not be included in the population screening programme for breast cancer, for women with extremely dense breast tissue. The Committee is fully cognisant of the need to address the problem faced by these women, for whom the standard population screening programme is relatively less effective. However, it does not consider MRI screening to be future-proof. Since CEM appears to be a promising alternative to MRI, the Committee recommends that at the earliest opportunity.

The Committee also recommends that a coherent short-term and long-term research strategy is drawn up. Aside from the screening trial, this strategy should at least feature the following:

- Research into the risk-benefit ratio and efficiency of supplemental examination methods in the population screening programme for women with extremely dense breast tissue, with different scenarios. This could involve lengthening or shortening the intervals between screening rounds or switching back to mammography alone if there is a decrease in the density of the breast tissue.
- Research into relevant developments that affect not only those women with extremely dense breast tissue, but all women in the population screening programme for breast cancer. For instance, the options for using artificial intelligence to identify risk factors for breast cancer or to interpret mammograms.

Finally, the Committee recommends that the entire population screening programme for breast cancer should be evaluated within a few years, partly based on the results of the various studies.

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