Review

Are we ready for the challenge of implementing risk-based breast cancer screening and primary prevention?

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ABSTRACT

Background: Increased knowledge of breast cancer risk factors provides opportunities to shift from a one-size-fits-all screening programme to a personalised approach, where screening and prevention is based on a woman's risk of developing breast cancer. However, potential implementation of this new paradigm could present considerable challenges which the present review aims to explore.
Methods: Bibliographic databases were searched to identify studies evaluating potential implications of the implementation of personalised risk-based screening and primary prevention for breast cancer. Identified themes were evaluated using thematic analysis.
Results: The search strategy identified 5699 unique publications, of which 59 were selected for inclusion. Significant changes in policy and practice are warranted. The organisation of breast cancer screening spans several healthcare delivery systems and clinical settings. Feasibility of implementation depends on how healthcare is funded and arranged, and potentially varies between countries. Piloting risk assessment and prevention counselling in primary care settings has highlighted implications relating to the need for extensive additional training on risk (communication) and prevention, impact on workflow, and professionals' personal discomfort breaching the topic with women. Additionally, gaps in risk estimation, psychological, ethical and legal consequences will need to be addressed.
Conclusion: The present review identified considerable unresolved issues and challenges. Potential implementation will require a more complex framework, in which a country's healthcare regulations, resources, and preferences related to screening and prevention services are taken into account. However, with the insights gained from the present overview, countries expecting to implement risk-based screening and prevention can start to inventory and address the issues that were identified.

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1. Introduction

Population-based mammographic screening programmes that adhere to a one-size-fits-all paradigm are effective in reducing breast cancer mortality [1,2]. Effective screening implies that the benefits of screening outweigh the known harms (e.g. false positives and overdiagnosis). Although this balance is favourable at population level, it may be skewed when considering individual breast cancer risk [3].

Increased knowledge of breast cancer risk factors has spurred on research looking at ways to revise the current screening paradigm, evaluating the possibility of proceeding towards a personalised risk-based approach. Taking individual risk factors into account will enable the classification of women into groups at varying risk of breast cancer. Consequently, screening frequency, modality, and/or age range could be adjusted to potentially optimise the harm-benefit ratio of mammographic screening for these subgroups of women. Moreover, utilising the screening infrastructure, increased opportunities for prevention will arise, enabling women to actively attempt to reduce their breast cancer risk [4]. Implementing integrated risk-based breast cancer screening and prevention on a population level, however, would present considerable challenges which the present review aims to explore.

Extensive changes in current screening practice will be required. Fig. 1 presents a flowchart of a potential risk-based screening and subsequent prevention programme according to National Institute for Health and Care Excellence (NICE) guidance [5]. This flowchart merely functions to illustrate the paradigm and does not fit the current pathway of care. Risk stratification first requires the integration of breast cancer risk assessment in screening. Breast cancer risk can, for example, be assessed with the Gail or the Tyrer-Cuzick model [6,7]. These models include several known modifiable and non-modifiable breast cancer risk factors and perform reasonably well on a population level. They lack discriminative accuracy, however, when applied to individual women [8].

The feasibility of assessing and relaying risk in a population-based screening programme was established by Evans and colleagues, who assessed the breast cancer risk of 50,000 women participating in the United Kingdom National Health Service Breast Screening Programme (UK NHSBSP) [9]. They found that 95% of women were interested in knowing their breast cancer risk at the start of the study [10]. Although advice on screening and prevention was provided to women participating in the study, the results of these recommendations have not yet been published.

To our knowledge, there are currently no published studies on the integration of prevention advice in a population-based breast cancer screening programme. However, perceptions of risk-based prevention for breast cancer have been studied using hypothetical scenarios with population average to moderate risk women. Additionally, perceptions of risk-reducing medication have been evaluated with women attending a high-risk breast cancer clinic [11]. These studies showed a general reluctance of moderate-high risk women to take risk-reducing medication or adhere to a lifestyle programme [11–14].

Implementing a personalised risk-based breast cancer screening and prevention programme is far from straightforward. It involves a more complex organisational system than the current one-size-fits-all model, with a wider variety of stakeholders [15]. Risk-based screening and prevention advances through several stages of assessment over a longer period of time, which requires more interaction between service providers and the target population [15]. To facilitate implementation, it is essential to explore all procedural pathways and professionals' perceptions relating to personalised screening and prevention. Therefore, the aim of the present review is to explore implications associated with the potential implementation of personalised risk-based breast cancer screening and prevention, from the perspective of healthcare professionals and policy makers.

2. Methods

2.1. Search strategy

Bibliographic databases Medline, EMbase, and PsycINFO were searched from 1990 to August 2016. It was decided to start searching from 1990 onwards, because personalised risk-based screening and subsequent primary prevention for breast cancer is a relatively novel concept. Therefore, we did not expect to find relevant studies that were executed before 1990 which were not referenced in articles identified through the current search. A comprehensive search was undertaken using index terms such as: Prevention[Mesh], Primary prevention[Mesh], Risk assessment [Mesh], Mammography[Mesh], Ethics[Mesh], Anxiety [Mesh], Communication[Mesh], Informed consent[Mesh], legislation and jurisprudence[Subheading], Genetic testing[Mesh], Breast Neoplasms[Mesh], breast cancer(s), early detection, screening, individualised, personalised, implementation, intention, decision, facilitator, and barrier. The complete search strategy is available upon request. References of included articles were screened to identify additional studies that met the inclusion criteria.

2.2. Selection criteria

All titles, abstracts and full-text articles were screened by one researcher (LR). Studies were selected for inclusion when they met the following eligibility criteria: 1) a full-text article in English, 2)