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Critical Reviews

Association between comorbidity and participation in breast and cervical cancer screening: A systematic review and meta-analysis

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ABSTRACT

Background: Comorbidity is associated with poor outcomes for cancer patients but it is less clear how it influences cancer prevention and early detection. This review synthesizes evidence from studies that have quantified the association between comorbidity and participation in breast and cervical screening.
Methods: PubMed, CINAHL and EMBASE databases were systematically searched using key terms related to cancer screening and comorbidity for original research articles published between 1 January 1991 and 21 March 2016. Two reviewers independently screened 1283 studies that met eligibility criteria related to *Population* (adult, non-cancer populations), *Exposure* (comorbidity), *Comparison* (a 'no comorbidity' group), and *Outcome* (participation in breast cancer or cervical screening). Data was extracted and risk of bias assessed using a standardised tool from the 22 studies identified for inclusion (17 breast; 13 cervical). Meta-analyses were performed for participation in breast and cervical screening, stratified by important study characteristics.
Results: The majority of studies were conducted in the United States. Results of individual studies were variable. Most had medium to high risk of bias. Based on the three "low risk of bias" studies, mammography screening was less common among those with comorbidity (pooled Odds Ratio 0.66, 95% CI 0.44–0.88). The one "low risk of bias" study of cervical screening reported a negative association between comorbidity and participation.
Conclusion: While a definitive conclusion could not be drawn, the results from high quality studies suggest that women with comorbidity are less likely to participate in breast, and possibly cervical, cancer screening.

Contents

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1. Introduction

Breast and cervical cancers have a pre-clinical 'sojourn time' during which disease can be detected and treated early [1]. Mammography screening can reduce breast cancer morbidity and mortality [1–5], beyond reductions attributable to improvements in treatment [6,7]. Cervical screening, historically most commonly carried out via Papanicolaou (Pap) smears, can detect early cancers and pre-cancerous cervical changes, thus leading to a reduction in associated incidence and mortality [1,8–11].

The success of organised screening programs is largely dependent on women's participation. A previous meta-analysis in 2007 identified poor cervical screening participation as the primary predictor for cervical cancer development, with 54% of invasive cervical cancer cases being under-screened and 42% never screened [12]. In a review of 16 countries with organised breast and cervical screening programs, most countries had participation rates above 60% for breast (n = 8) and cervical cancer screening (n = 13) [13]; however, participation within these countries vary and are possibly influenced by health system factors (e.g. availability of services [14–16], physician recommendations [17,18]) and individual factors (e.g. cancer-related knowledge and beliefs [14,19–21]).

The presence of chronic disease may also influence whether an individual participates in screening for breast and cervical cancer. One 2009 narrative review concluded the association between comorbidity and elderly patients' cancer screening participation was unclear, with results of published studies too variable to draw a consistent conclusion [22]. To our knowledge, this review is the only one which has attempted to synthesise knowledge on this topic. Thirteen studies examining mammography or Pap smears were included, with the majority focused on single physical or psychological conditions. Some studies used proxy measures for comorbidity such as self-reported health status or frailty, and two studies which used a summary measure of comorbidity lacked a 'no comorbidity' comparison group. The review's lack of detail about the study methods and use of a very broad definition of comorbidity limited its interpretation.

The definition and quantification of comorbidity are particularly important for such an examination. A comorbidity measure attempts to quantify the total burden of chronic disease within an individual, rather than simply describe the prevalence of a single comorbid illness. It is differentiated from related constructs that aim to measure risk factors, symptoms, or outcomes of chronic disease, such as frailty, functional status, or life expectancy [23]. When it leads to greater contact with the healthcare system, comorbidity may foster more opportunistic screening or may increase a patient's understanding of screening services and recommendations. This hypothesis may explain why comorbidity is associated with earlier stage of colorectal cancer diagnosis [24]. Conversely, treating or managing comorbidity may be prioritised over screening for asymptomatic cancer or may disguise cancer symptoms, leading to less or delayed screening [23].

Understanding the role comorbidity plays in adherence to breast and cervical cancer screening guidelines is an important element of cancer prevention and control. Therefore, in this current study, we systematically reviewed the scientific evidence and used meta-analysis to synthesise previously reported results to estimate the odds of participation in screening for breast cancer and cervical cancer, separately, for women with comorbidity compared to those without comorbidity. Additionally, subgroup analyses stratified by study characteristics (e.g. type of measure used, study's risk of bias rank) were conducted to assess whether these factors modified the association between comorbidity and screening participation.

2. Methods and design

2.1. Search strategies

A systematic review was conducted to summarise and synthesise available evidence regarding the association between comorbidity and participation in breast and cervical screening in countries with fully or partially-organised programs [13,25]. PubMed, CINAHL, and EMBASE databases were searched for indexed peer-reviewed journal articles from 1 January 1991 to 21 March 2016, using search terms related to (1) breast and cervical cancer; (2) cancer screening, mammography or Pap smear; and (3) comorbidity, multimorbidity, polypathology, or chronic disease. Reference lists of included full-text articles were also reviewed and potentially relevant articles were considered.

The search was restricted to original research articles published as full-text from 1991 onwards, after considering the timeframe when most cervical and breast cancer screening programs were established [26] and the opportunity for evaluations to be published. Reviews, editorials, policy guidelines, and abstracts only were excluded, as were studies published in languages other than English, Spanish, Portuguese, or German.

2.2. Search selection

Titles, abstracts, and full-text articles were independently screened for inclusion by two authors. Disagreements were resolved through consensus, with adjudication of a third author when necessary. Inclusion criteria were based around the PICO-statement of population, intervention/exposure, comparison, and outcome [27].

2.2.1. Population

Only studies that reported on adults (≥18 years) in countries with partially- or fully-organised screening programs were included [13,25]. Studies that exclusively reported on cancer