

Effectiveness of Screening Postmenopausal Women for Cardiovascular Diseases: A Population Based, Prospective Parallel Cohort Study

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WHAT THIS PAPER ADDS

This is the first population based, prospective, parallel cohort study to report the short-term effectiveness of a multifaceted screening programme for cardiovascular diseases in women aged 60–77 years. At the 3 year follow up, screening had no effect on all cause mortality or hospital admission due to cardiovascular diseases. Substantial non-adherence to the recommended antiplatelet and cholesterol lowering therapy was found among women with screen detected abdominal aortic aneurysm, peripheral arterial disease, and/or carotid plaque. Adherence to cardiovascular pharmacological prophylaxis in screening warrants attention as non-adherence may be a modifier of effectiveness. Effectiveness analyses of long-term follow up data are warranted.

Objectives: To investigate the effectiveness of systematic screening for multifaceted cardiovascular disease (CVD) in postmenopausal women on all cause mortality and, secondarily, on CVD morbidity. Effectiveness was also evaluated across age strata.

Methods: This was a population based, prospective, parallel cohort study. In total, 107,491 women born in 1936–1951 living in the Central Denmark region were identified in the Danish Civil Registration System. From this population, all women born in 1936, 1941, 1946, and 1951 ($n = 1984$) living in the Viborg municipality were invited to attend screening. Of those invited to the screening, 1474 (74.3%) attended. The control group included all women from the general population born in 1936–1951 and living in the Central Denmark Region, excluding those invited for the screening. Information on medication and comorbidities prior to inclusion and study outcomes were retrieved from national registries for both groups. The screening included examination for abdominal aortic aneurysm (AAA), peripheral arterial disease (PAD), carotid plaque (CP), potential hypertension (HT), atrial fibrillation (AF), diabetes mellitus (DM), and dyslipidaemia. The adjusted Cox proportional hazards model with the intention to screen principle was used to assess effectiveness for the total population and across age groups.

Results: During follow up (median 3.3 years, IQR 2.9–3.9), the adjusted hazard ratios (HRs) for invited versus controls were the following: all cause mortality, 0.89 (95% CI 0.71–1.12); myocardial infarction (MI), 1.26 (95% CI 0.52–3.07); ischaemic heart disease (IHD), 0.72 (95% CI 0.49–1.05); PAD, 1.07 (95% CI 0.49–2.31); and ischaemic stroke, 1.20 (95% CI 0.78–1.85). A substantial number of women with AAA, PAD, and/or CP declined prophylactic therapy: 45% for antiplatelet and 35% for cholesterol lowering agents.

Conclusions: This multifaceted screening offer to a general population sample of postmenopausal women had no effects on all cause mortality or hospital admission for MI, IHD, PAD, and stroke within a short-term follow up period.

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INTRODUCTION

Cardiovascular diseases (CVDs) are predominant causes of morbidity and mortality, accounting for 34% of deaths in men and 40% in women in the European Union.¹ Moreover, more people are living with CVD, a tendency which is expected to continue due to the obesity epidemic, diabetes mellitus (DM),¹ and the ageing general population.² Consequently, CVD remains a public health concern, and efforts to

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identify cost-effective prevention strategies to reduce the burden of CVD are crucial. In 65 year old men, solitary screening for abdominal aortic aneurysm (AAA) was established as being cost-effective and has therefore been introduced in the United Kingdom and Sweden.^{3,4} The discussion of the cost-effectiveness of AAA screening for women is ongoing.⁵ A randomised screening programme for AAA, peripheral arterial disease (PAD), and hypertension (HT) among 65–74 year old men recently documented a reduction in all cause mortality.⁶ However, the benefits and cost-effectiveness of a multifaceted screening programme in postmenopausal women have yet to be established. One of the main uncertainties in women is that their CVD prevalence remains insufficiently clarified. Secondly, a previous study reported non-adherence towards initiation of recommended prophylactic medication among men diagnosed with AAA or PAD at screening.⁶ Similar trends have been found among women with screen detected AAA, PAD, and/or carotis plaque (CP).⁷ Whether this non-adherence impairs the rationale of such a screening offer also remains unknown. Thirdly, the short- and long-term effectiveness of multifaceted screening as a potentially beneficial prevention strategy must be clarified. Finally, the risk of CVD morbidity and mortality increases by age, whereas screening attendance is known to decrease by age.⁷ Therefore, it is relevant to identify the optimum target age group for screening. In accordance with the World Health Organization and national criteria for screening, these uncertainties need to be addressed.

Objectives

The primary aim in this study on postmenopausal women invited for screening and a non-invited control group was to assess the effectiveness of screening on all cause mortality

and secondly on cardiovascular events. Furthermore, screening effectiveness was evaluated across age strata.

METHODS

Study design

This was a population based, prospective, parallel cohort study with 3 year follow up.

This registry study was approved by the Regional Data Protection Agency (1-16-02-543-16). The screening programme was approved by the Regional Scientific Ethics Committee (M-20100116) and the Regional Data Protection Agency (1-16-02-221-16).

Study cohort

The study population was identified in the Danish Civil Registration System. Individuals were block included from October 2011 to January 2013 based on year of birth. In all, 107,491 women born in 1936–1951 living in the Central Denmark Region were identified. From this population, women born in 1936, 1941, 1946, and 1951 living in the Viborg municipality ($n = 1984$) were invited for to multifaceted CVD screening to study the acceptability of screening and preventive interventions, disease prevalences and effectiveness in age groups around 60, 65, 70, and 75 years. Controls comprised women from the general population born in 1936–1951, except those invited for screening (Fig. 1).

The screening programme was offered within an outpatient hospital setting, and has been reported previously.⁷ Briefly, participants were screened for AAA, PAD, CP, HT, atrial fibrillation (AF), DM type 2, and dyslipidaemia. The screening procedure, diagnostic criteria, confirmation of screening tests, and follow up are described in Table 1. Self reported information was collected on use of pharmacological drugs, comorbidities, family predisposition to

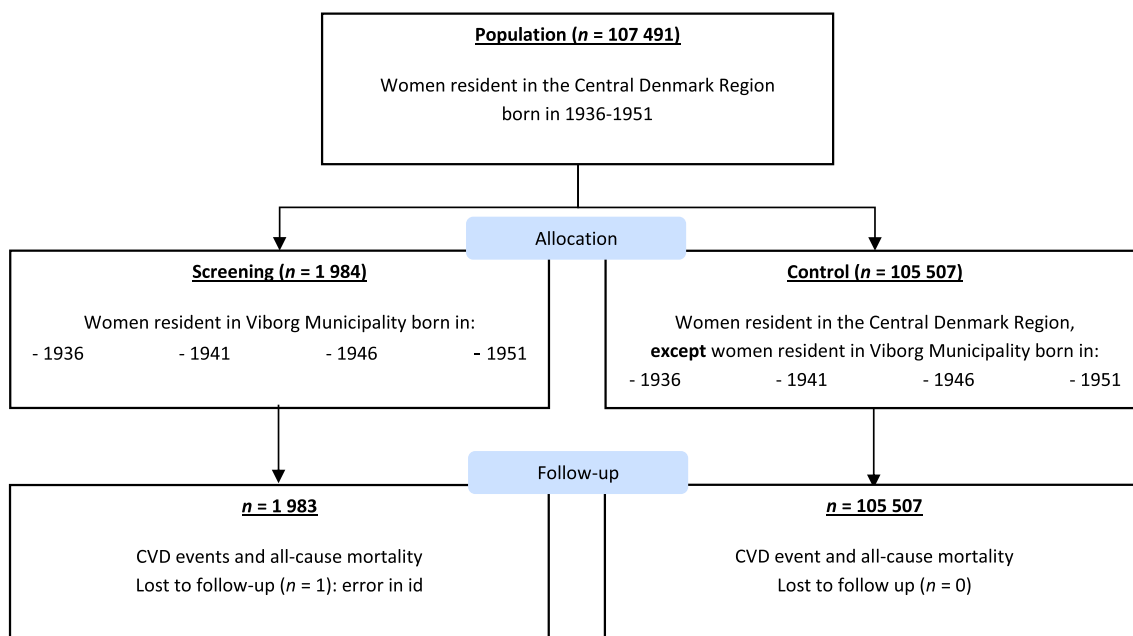


Figure 1. Flow chart of the women included in the observational study.

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