Editor's Choice: Five-year Outcomes in Men Screened for Abdominal Aortic Aneurysm at 65 Years of Age: A Population-based Cohort Study

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WHAT THIS PAPER ADDS

In this study, where a cohort of 3,268 men invited to screening at age 65 was re-invited and re-screened at age 70, AAA prevalence rose from 1.5% at age 65 to 2.4% at age 70, and AAA had developed among 0.7% men with <25 mm at age 65, and among 52.5% of men with sub-aneurysmal (25—29 mm) aortas at age 65. Screening was safe with high 5-year surgery rates for screening detected AAA (50%) in conjunction with no observed peri-operative mortality and ruptured AAA occurring only among non-attenders.

Objective: Acquiring contemporary data on prevalence and natural history of abdominal aortic aneurysms (AAA) is essential in the effort to optimise modern screening programmes. The primary aim of this study was to determine the fate of a 65-year-old male population 5 years following an invitation to an aortic ultrasound (US) examination.

Methods: In this population-based cohort-study, men were invited to US examination at age 65, and were re-invited at age 70. Mortality, AAA repair, and risk factors were recorded. An AAA was defined as a diameter ≥30 mm, and a sub-aneurysmal aorta as 25—29 mm.

Results: In 2006—2007, 3,268 65-year-old men were invited, and 2,736 (83.7%) were examined. After 5 years, 24 had completed AAA repair (6 died within 0—4 years), an additional 239 had died, and 194 had moved. Thus, 2,811 70-year-old men were re-invited, and 2,247 (79.9%) were examined. The AAA prevalence increased from 1.5% at 65 to 2.4% (95% CI: 1.8 to 3.0) at 70, and of sub-aneurysmal aortas from 1.7% at 65 to 2.6% (2.0 to 3.3), at 70. Of 2,041 with <25 mm at 65, 0.7% had an AAA at 70. Of 40 with a sub-aneurysmal aorta at 65, 52.5% progressed to AAA at 70. In a Cox regression analysis, sub-aneurysmal aorta at 65 (hazard ratio [HR] 59.78) and smoking (HR 2.78) were independent risk factors for AAA formation. Among 44 with AAA at 65, 22 completed AAA repair with no 30-day mortality.

Conclusion: AAA screening in a contemporary setting was safe at 5 years, with a single AAA rupture observed among non-attenders. Men with a screening detected AAA had a high repair rate and high non-AAA related mortality. AAA-formation was common among men with sub-aneurysmal dilatation, indicating a possible need for surveillance of this group.

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INTRODUCTION

Evidence from randomised controlled trials (RCT) and observational studies demonstrate that screening elderly men for abdominal aortic aneurysm (AAA) reduces long-term mortality from ruptured AAA.[1—5] The most widespread strategy, one-time screening of men at age 65, is partially or fully implemented in several countries.[6] This specific strategy is, however, not evidence-based and several aspects need further research, such as the threshold diameter for surveillance, the long-term natural course of those screened normal as well as the fate of those not attending the screening programme.

Since the start of a AAA screening programme targeting 65-year-old men in the County of Uppsala, Sweden, in 2006,[7] a pending longitudinal cohort-study was initiated offering all men in the County of Uppsala AAA screening every 5-years, at the ages of 65, 70, 75, and 80 years.

The primary aim of this first report from that initiative was to determine the fate of a 65-year-old male population 5 years following an invitation to an aortic ultrasound (US) examination. The specific aims were to study (1) the rate of de novo AAA formation following a normal scan, (2) the rate of AAA events, and (3) the mortality rate. A

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secondary aim was to analyse risk factors associated with AAA formation.

PATIENTS AND METHODS

In the County of Uppsala all men born 1941 and 1942, identified in the National Population Registry, were invited to screening for AAA with US at age 65 years (primary screening cohort) during the years 2006 and 2007. Individuals with an infrarenal aortic diameter ≥25 mm were scheduled for US surveillance at regular intervals, 25—29 mm after 5 years, 30—39 mm after 2 years, 40—44 mm after 1 year, 45—49 after 6 months, and ≥50 mm every 3 months. Surgery was considered at 55 mm or more, or in individuals with symptomatic or rapidly expanding AAA.

The cohort of men born in 1941—1942 was re-invited during the years 2011—2012 for an US examination of the abdominal aorta at age 70 years. Individuals with a history of AAA repair were excluded from invitation. No other exclusion criteria were used.

The maximum antero-posterior diameter of the infrarenal aorta was recorded using the leading edge to leading edge principle.[8] An AAA was defined as a maximum infrarenal diameter of 30 mm or more. A diameter of 25—29 mm was classified as a sub-aneurysmal aorta.

Information on smoking habits, family and medical history, as well as current medication was collected at ages 65 and 70 from those attending screening. Smoking status was classified as never, former, or current. Medical history consisted of self-reported history of coronary artery disease (angina pectoris or myocardial infarction), hypertension, hyperlipidaemia, cerebrovascular disease (stroke or transient ischaemic attack), claudication, diabetes mellitus (dietary or medical treatment), renal insufficiency, and chronic obstructive pulmonary disease.

Mortality data were retrieved from the National Population Registry. Information on AAA repair of screening detected and opportunistically detected AAA (detected outside of screening programme) was retrieved from the Swedish Vascular Registry (Swedvasc) for the past 5 years.[9]

Statistical analysis

Differences in proportions were analysed with uncorrected chi-square test and results presented with 95% confidence intervals (95% CI). Independent-sample Student *t* test was used for comparison of continuous data. Risk factors associated with AAA formation with $p < .1$ in a univariable analysis were entered as covariates into a Cox proportional hazards regression model; where hazard ratios (HR) and

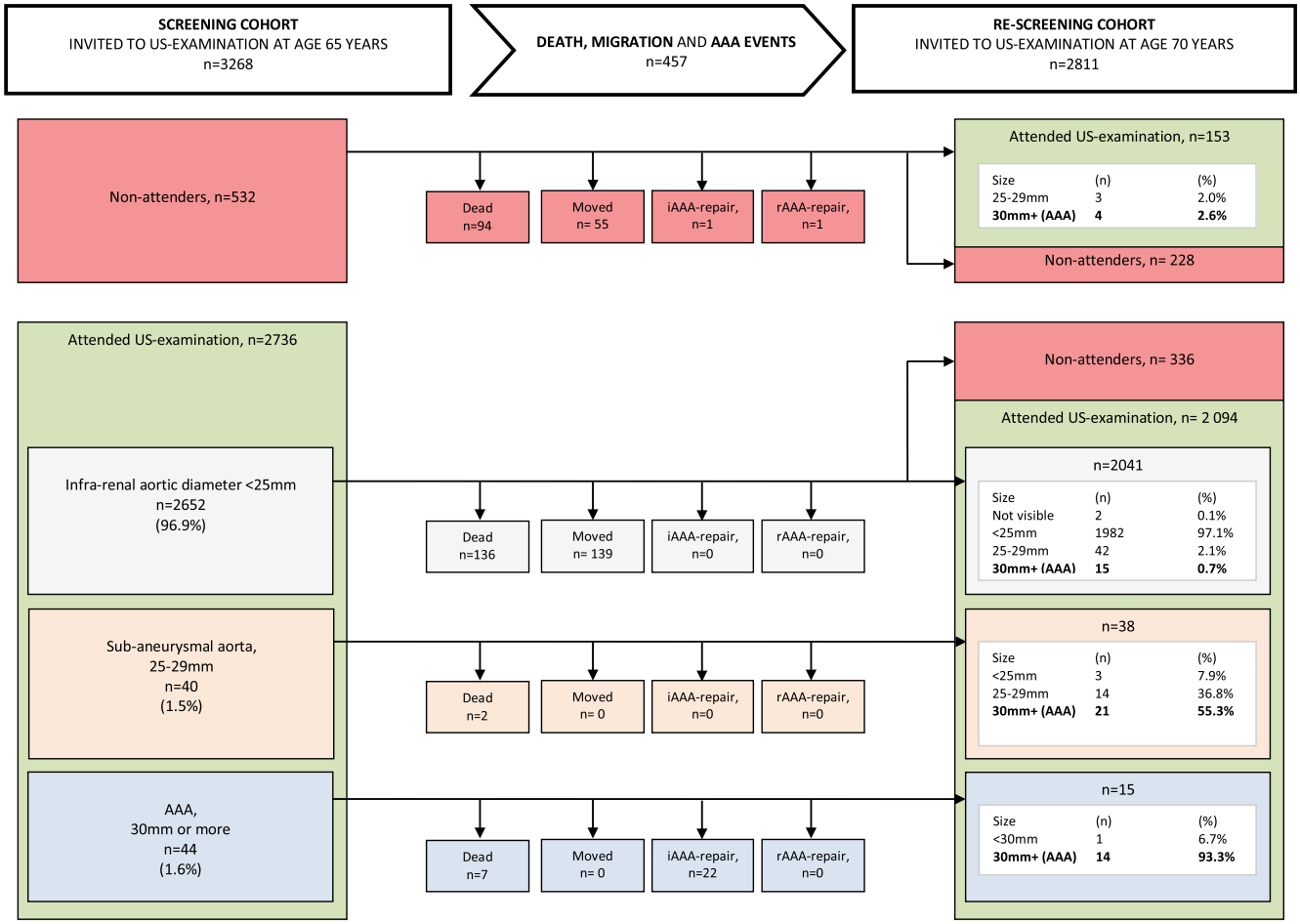

Figure 1. Trial profile. AAA = abdominal aortic aneurysm; iAAA = intact abdominal aortic aneurysm; rAAA = ruptured abdominal aortic aneurysm; US = ultrasound.

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