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Original Research

Costs of screening for prostate cancer: Evidence from the Finnish Randomised Study of Screening for Prostate Cancer after 20-year follow-up using register data

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Abstract ***Objectives:*** Few empirical analyses of the impact of organised prostate cancer (PCa) screening on healthcare costs exist, despite cost-related information often being considered as a prerequisite to informed screening decisions. Therefore, we estimate the differences in register-based costs of publicly funded healthcare in the two arms of the Finnish Randomised Study of Screening for Prostate Cancer (FinRSPC) after 20 years.
Methods: We obtained individual-level register data on prescription medications, as well as inpatient and outpatient care, to estimate healthcare costs for 80,149 men during the first 20 years of the FinRSPC. We compared healthcare costs for the men in each trial arm and performed statistical analysis.
Results: For all men diagnosed with PCa during the 20-year observation period, mean PCa-related costs appeared to be around 10% lower in the screening arm (SA). Mean all-cause healthcare costs for these men were also lower in the SA, but differences were smaller than for PCa-related costs alone, and no longer statistically significant. For men dying from PCa, although the difference was not statistically significant, mean all-cause healthcare costs were around 10% higher. When analysis included all observations, cumulative costs were slightly higher in the CA; however, after excluding extreme values, cumulative costs were slightly higher in the SA.

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Conclusions: No major cost impacts due to screening were apparent, but the FinRSPC's 20-year follow-up period is too short to provide definitive evidence at this stage. Longer term follow-up will be required to be better informed about the costs of, or savings from, introducing mass PCa screening.

1. Introduction

Although there is some evidence of the effectiveness of organised screening in reducing prostate cancer (PCa) mortality [1], there has been a dearth of published empirical analyses of the actual impact of such mass screening on healthcare costs in real-world settings. Prostate-specific antigen (PSA)–based screening potentially provides a means of altering the clinical course of the PCa and thereby improving prognosis and outcomes [2]. However, a presumption is often made that early intervention will reduce overall healthcare costs ([2–4]), and this presumption should be assessed, ideally through a pragmatic randomised controlled trial (RCT) ([5,6]). The primary objective of this analysis is to compare register-based healthcare cost estimates between the two arms of the Finnish Randomised Study of Screening for Prostate Cancer (FinRSPC), primarily using intention-to-screen (ITS)—analysis after a maximum of 20 years of follow-up.

2. Methods

2.1. Participants and intervention

Although the European Randomized study of Screening for Prostate Cancer (ERSPC) offers comparable data from each participating centre on outcome measures such as PCa mortality [1], it is unlikely that the ERSPC can offer comparable data on healthcare costs, as costs are known to be dependent on the healthcare system in question [7]. Given such differences in cost accounting and costs even within Europe, and the well-established registers of healthcare cost-related information in Finland, our study is restricted to the FinRSPC, which contributes the largest number of trial participants to the ERSPC. The analysis of healthcare costs presented here is carried out as part of the FinRSPC, the primary objective of which is to investigate the impact of mass PSA-screening on PCa mortality [8]. Secondary objectives of the FinRSPC include the investigation of the trial's impact on costs and health-related quality of life, and then the combination of these sources of information to provide information on cost-effectiveness [9]. The target population of the FinRSPC was selected from the Finnish population registry and consists of men born in 1929–1944 and residing in the Helsinki or Tampere region during the recruitment period (1996–99, total randomised n = 80,458). The main exclusion criterion was PCa-diagnosis before the date of randomisation (this information was obtained from the Finnish Cancer Registry, [FCR]). Further details about the study design can be obtained from Booth *et al.* [10]. The men in the screening group (screening arm, SA) were invited to the screening test (serum PSA) at a local clinic. The men in the reference group (control arm, CA) received no invitation as part of the trial.

3. Materials and analytical methods

The research protocol for the present study was approved by Finnish data-protection authorities and by the National Institute for Health and Welfare (THL). The protocol was also reviewed by the Tampere University Hospital Ethics committee (reference number R05053). After receiving study approval, we were permitted to collate and link the data supplied by a number of registries to the FinRSPC database, using each man's unique Finnish personal identity code for retrieval. This study was undertaken in close co-operation with the FCR, with resources and expertise from the FCR helping to create, maintain, and improve the FinRSPC trial database and its links with the FCR's cancer register [11]. The main data sources used in this study are described in the Appendix: these are the FinRSPC trial database, the Care Register for Health Care (CRHC) and the prescription-medicine reimbursement register (PMRR). The costs of the screening intervention have been estimated to be approximately 50 Euros per screen (including the organisation of the invitation, the drawing of the blood sample and the PSA determinations), and this figure is used in all analyses. All total or average Euro amounts we report in our results are rounded to the nearest 100 Euros, as this gives a suitable level of precision for these cost estimates. The information on screening and healthcare costs from all the above sources is specific to each man in the trial and the date of each cost item is also recorded. PCa-related costs could be identified using the PCa identifier available in the PMRR and, in the case of the CRHC data, using the ICD-10 code C61. We followed cost-analysis guidelines for the analysis of costs ([14–17]) and examined differences between the arms using two-sided