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Population based glaucoma screening

Stoutenbeek, Remco

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Chapter 1

Introduction

Screening is the systematic application of a test or inquiry, to identify individuals at sufficient risk of a specific disorder to benefit from further investigation or direct preventive action, among persons who have not sought medical attention on account of symptoms of that disorder.¹ There are several ongoing population based screening programmes in the Netherlands, focused on early detection of breast cancer (mammography), cervical carcinoma (Papanicolaou test, "Pap smear"), and congenital metabolic diseases (heel prick or Guthrie test). Early detection and intervention is intuitively attractive, because it may avoid potentially serious consequences of a disease. However, population based screening requires a large amount of resources to be allocated to a specific health problem at the expense of alternative potentially beneficial uses. Therefore, it is important to investigate whether a health problem is suitable for screening prior to introducing a screening programme for it.

This thesis explores whether population based glaucoma screening should be introduced. Glaucoma is an eye disease that causes glaucomatous optic neuropathy with subsequent visual field loss, which can eventually lead to irreversible blindness. It is the second leading cause of blindness, both worldwide and in Western Europe.² Diagnosis is based on perimetry and evaluation of the optic disc and surrounding retinal nerve fibre layer. Intraocular pressure (IOP) is the most important risk factor for onset and progression of glaucoma; treatment consists of lowering of IOP.³⁻⁶ Glaucoma is an insidious disease: early stages do not cause any symptoms, and visual field loss often goes unnoticed initially. Patients become aware of their eye disease only after extensive damage has occurred. Therefore, screening is often noted as an option to reduce the glaucoma burden. At present, a glaucoma screening programme does not exist in the Netherlands. However, opportunistic case finding by ophthalmologists, optometrists, and opticians has become common practice. Nevertheless, only about half of all people with glaucoma are known (i.e. detected as having glaucoma, and visiting an ophthalmologists regularly).⁷⁻⁹ Mass screening would be required to find the remaining half.

The most common form of glaucoma in the Netherlands is primary open-angle glaucoma (POAG). This type of glaucoma is characterized by an open angle on gonioscopy combined with the absence of any identifiable ocular or systemic abnormalities that would lead to increased IOP. For easier readability, glaucoma will be used as a synonym for POAG throughout this thesis, unless otherwise specified.

Outline of the thesis

Chapter two (literature review) provides an overview of available relevant literature regarding different aspects of screening. The five studies described in

chapters three through seven are aimed at lacunae in the existing literature, as identified in chapter two. In chapters three and four, the efficacy of frequency doubling perimetry (FDT) as a screening test for glaucoma is evaluated. Chapter five assesses whether the majority of the population at risk for glaucoma could be reached by optician based screening, which would attain a substantial cost reduction compared to a normal screening programme. Chapter six evaluates the additional yield of population based screening compared to opportunistic case finding. Chapter seven evaluates supra-threshold perimetry as a screening test for glaucoma, but also serves to interpret the results of chapter six more accurately. Whether or not a population based screening programme should be introduced in the Netherlands is discussed in chapter eight (general discussion).