Screening for diabetic retinopathy: a quantitative overview of the evidence, applied to the populations of health authorities and boards

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Authors' objectives
To provide evidence of population requirements for diabetic retinopathy screening, in terms of the burden of illness, and the effectiveness and efficiency of the diagnostic and therapeutic measures available.

Searching
MEDLINE, EMBASE and ISI databases were searched from 1980 to March 1996; the primary search terms were provided.

Study selection
Study designs of evaluations included in the review
No inclusion criteria relating to the study design were specified for diagnostic accuracy studies. Studies of treatment effectiveness were included only if they were randomised controlled trials (RCTs).

Specific interventions included in the review
Screening for diabetic retinopathy.

Diagnostic tests: direct ophthalmoscopy and non-stereoscopic retinal photography. The studies had to provide an adequate description of the test to be included.

Treatment: laser photocoagulation.

Reference standard test against which the new test was compared
Diagnostic accuracy studies had to include a reference standard comprising either retinal examination by an ophthalmologist or stereoscopic retinal photography.

Participants included in the review
Patients with diabetes. The studies had to define the population to be included.

Outcomes assessed in the review
The outcomes assessed were the sensitivity and specificity of the tests and, for treatment studies, visual loss or blindness.

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
The quality of the studies was assessed using a checklist of appraisal criteria proposed by Sackett et al. (see Other Publications of Related Interest). The authors did not state how the papers were assessed for quality, or how many reviewers performed the quality assessment.

Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction.
Methods of synthesis

How were the studies combined?
The studies were combined in a narrative description. A meta-analysis was also performed; however, details of the methods used do not appear to have been reported.

How were differences between studies investigated?
No formal tests for heterogeneity appear to have been performed. The trials were grouped for estimating the effectiveness of treatment, according to the stage of disease.

Results of the review

There were 14 studies on the validity and reliability of screening tests, and 6 RCTs on the effectiveness of treatment.

Retinal photography appeared to be more sensitive than direct ophthalmoscopy, but no screening test was clearly superior. Both methods may achieve high sensitivity or specificity under optimal conditions. Combined retinal photography and direct ophthalmoscopy was more sensitive than either test alone.

The relative risk (RR) of severe visual loss or blindness was 0.39 (95% confidence interval, CI: 0.28, 0.55) after treatment with laser photocoagulation, compared with control eyes. For eyes with non-proliferative or early proliferative retinopathy, early laser photocoagulation resulted in an RR of blindness of 0.77 (95% CI: 0.56, 1.06), compared with eyes in which photocoagulation was deferred until retinopathy progressed to more severe grades. Treatment was more effective for patients with both macular oedema and mild-to-moderate non-proliferative retinopathy (RR 0.44).

Cost information

Yes. It was estimated that the direct health service cost of screening by retinal photography was £13 per screening episode.

Authors’ conclusions

There was little evidence about the best strategies for optimising the quality and efficiency of screening. It appears that retinal photography, especially with mydriatic cameras, can improve the test’s sensitivity and specificity in comparison with direct ophthalmoscopy. Central reading of retinal photographs may also lead to more reliable diagnoses.

It may be most cost-effective and feasible to use a combination of ophthalmoscopy and retinal photography for high-risk strata of the diabetic population.

CRD commentary

A comprehensive review of the area was presented. However, the review lacked details on the review methodology, such as the number of reviewers involved in the different stages of the review. In particular, details of the methods used to synthesise the study results were not reported. A detailed quality assessment was performed, although this does not appear to have been considered in the synthesis of the results. Details of the studies were adequately presented in tabular format. The authors’ conclusions are supported by the results presented.

Implications of the review for practice and research

Practice: The authors stated that there is evidence to suggest that an organised screening programme would reduce blindness among people with diabetes, but they make no specific recommendations for screening practice.

Research: The authors stated that priorities for future research are evaluations over time of coherent screening programmes based on geographically defined populations; evaluations of attempts to improve test performance through training and quality assurance; evaluations of different screening intervals and test combinations in different risk strata; and evaluations of attempts to increase screening uptake among high-risk patients not currently taking part in screening.
Bibliographic details
Bachmann M, Nelson S. Screening for diabetic retinopathy: a quantitative overview of the evidence, applied to the populations of health authorities and boards. Bristol: University of Bristol, Department of Social Medicine, Health Care Evaluation Unit. 1996

Other publications of related interest

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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.