Retinopathy screening and photocoagulation*

Authors: Genet M. Hirpesa, Gunjeet Kaur, Øystein A. Haaland, Sali Ahmed, Mathew M. Coates, Jan M Økland, David Watkins, Kjell Arne Johansson

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Description of condition and intervention

Diabetes retinopathy is a non-communicable disease (NCD). It is one of the major problems of global heath and vision problem, which contributes for 0.86 million cases in 2020. Whereas over 600 million individuals with diabetic mellitus estimated by 2040 (Collaborators., 2020). (Hashemi, 2020) It is the common causes of blindness and visual impairment in high-income countries (HICs). Types of diabetes are type 1, type 2 and gestational diabetes. About 78,236 individuals were died due to type 1 diabetes mellitus, and 1,472,934 due to type 2 ((GBD), 2019). The type `1 diabetes is responsible for around 4,580,404 disability-adjusted life years (DALYs), were type 2 is 66,299,751 DALYs in 2019 ((GBD), 2019). This causes of vision loss can be occurred in long-term, due to too much sugar in blood that can damage the eye retina. The four stages of diabetic retinopathy are stage 1: Mild non proliferative, stage 2: Moderate no proliferative, stage 3: Severe non-proliferative and stage 4: Proliferative diabetic retinopathy. This problem of blindness and visual impairment can be prevented through physical activity, maintain healthy weight, eat a healthy diet, avoid sugar and saturated fats. The Laser surgery and screening are cost effective methods to treat this cause.

The Kenya guidelines check list, clinical examination, (the retinal examination methods included slit lamp bio microscopy, direct ophthalmoscopy, binocular indirect ophthalmoscopy, mydriatic retinal photography (conventional fundus camera), and non-mydriatic retinal photography) and referring to the ophthalmologist if any the patient with ocular symptoms, visual acuity

worse than 6/12, where retinal findings are unclear and where the retinal examination cannot be done. The duration of referring to ophthalmologist is in between <1 months and 3 months. The follow-up of the patients is depending on the clinical findings. In this evidence brief, we present the effect and cost of the following intervention being analysed in FairChoices:DCP Analytical tool:

*Retinopathy screening and photocoagulation**

International guidelines

Organization	Indications/recommendations	Applicability in LIC & Lower MIC settings
MoH, Kenya	Guidelines for the screening and management of diabetic retinopathy	yes

Source: Guidelines for the screening and management of Diabetic Retinopathy in Kenya

Intervention attributes

Type of interventions

Curative

Delivery platform

This intervention is delivered at referral and specialty hospital.

Equity

In addition to considerations like cost-effectiveness and health systems factors, dimensions of equity can be relevant for priority setting. The opportunity for a long and healthy life varies according to the severity of a health condition that individuals might have, so there are inequities in individuals' opportunities for long and healthy lives based on the health conditions they face. Metrics used to estimate the severity of illness at an individual level can be used to help prioritize those with less opportunity for lifetime health. FairChoices: DCP Analytics Tool uses Health adjusted age of death (HAAD), which is a metric that estimates the number of years lived from birth to death, discounting years lived with disability. A high HAAD thus represents a disease less severe in terms of lifetime health loss, while a low HAAD represents a disease that is severe on average, causing early death or a long period of severe

disability. It is also possible to estimate the distribution of HAAD across individuals with a health condition. FairChoices shows for each intervention an average HAAD value of the conditions that are affected by respective interventions that have health effects. Additionally, a plot shows HAAD values for around 290 conditions (Johansson KA et al 2020).

Time dependence

Low level of urgency. Treatment outcomes not highly affected by some days of delay.

Population in need of interventions

Individuals in the age-group of 15 to 99 years with diabetes mellitus (prevalent cases). Considering bi-annual frequency of screening for retinopathy, the treated fraction is considered as 0.5. The affected population and fraction are same as those receiving the intervention.

Disease state/s addressed

This intervention targets to treat retinopathy due to diabetes mellitus type 2 in the target population.

Intervention effect and safety

Table 1: Effect and safety of retinopathy screening and photocoagulation*

Effect of intervention		Certainty of evidence
Disability	Evans JR 2014 reported a protective effect of 51% (RR: 0.49, 95% CI: 0.37 to 0.64) for progression of diabetic retinopathy at follow up of 12 months. This meta-analysis included 4 randomized controlled trials (sample size 8331 people with diabetic retinopathy from ophthalmology clinics) that compared laser photocoagulation to no treatment or deferred treatment. This effect estimate of intervention is for treating high risk proliferative diabetic retinopathy state.	Meta-analysis

*Effects and costs of this intervention are considered in Cardiovascular cluster.

Model assumptions

Table 2: Summary of model parameters and values used in FairChoices – DCP Analytical Tool

Category	Model parameter	Notes
Intervention	**Retinopathy screening & photocoagulation**	
Cost fraction		
Treated population	Adults with condition	Prevalence of retinopathy due to diabetes mellitus from GBD 2019 used to model this population
Gender	Both	
Age	30 to 99 years	
Treated fraction Screening Photocoagulation	 0.5 0.1	bi-annual screening
Unit cost (US$ per case) Photocoagulation Screening	 11.75 8.86	From Ethiopia study (see below)
Effect calculation		
Affected Population	Adults with condition	
Affected gender	Both	
Affected fraction age	30 to 99 years	
Affected fraction	1	
Comparison	No intervention	
Disability Reduction (RRR)	0.51	Refer to table 1 (Evans JR 2014)

*Effects and costs of this intervention are considered in Cardiovascular cluster.

Intervention Cost

Cost assumptions are from an ongoing health economic evaluation from Ethiopia and primary data source is Alert hospital in Addis Ababa. The total unit cost for photocoagulation is estimated to be $11.75 (Year: 2020) per treated person in Ethiopia. The total unit cost for screening is estimated to be $8.86 (Year: 2020) per screened person in Ethiopia. The overhead total unit cost (including laundry, cleaning, and security) is estimated to be $0.32 per screening per person in 2020, but overhead costs are currently not included in the FairChoices analysis.

References

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Appendix

Literature Review for effectiveness & safety

This literature search is an example of Level 1 search for intervention inputs taken from DCP3 or generated in an ad hoc manner (e.g., quick google search found one study of cervical cancer screening cost-effectiveness that was used to create an effectiveness parameter for that intervention).

Level of evidence of efficacy studies:

1. low (expert opinions, case series, reports, low-quality case control studies)
2. moderate (high quality case control studies, low quality cohort studies)
3. high (high quality cohort studies, individual RCTs)
4. very high (multiple RCTs, meta-analysis, systematic review, clinical practice guidelines)