Active case finding and management of diabetes (glycaemic control, antihypertensives, statins, and consistent foot care)

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Description of condition and intervention

Opportunistic screening of diabetes is to identify people at high risk of diabetes and initiate further clinical action for those with type 1 and type 2 diabetes. Opportunistic screening is done at the point of care when an individual is seen by a clinician at a health facility for other health conditions. Type 2 is the most common diabetes condition in adults (>80% of all diabetes is type 2). Diabetes is diagnosed either with a glucometer by either a fasting plasma glucose concentration (≥7·0 mmol/L (126 mg/dL)) or a glucose tolerance test (≥11·1 mmol/L (200 mg/dL) 2 h after intake of 75 g oral glucose), or with HbA1c (≥ 6·5% (48 mmol/mol)). Presence of risk factors like hypertension, family history of diabetes, obesity, and lipid derangements can predispose an individual to increased risk of diabetes. Source: ADA 2003, *BMJ Best Practice, WHO 2003, WHO 2006,* Andermann 2008.

Type 1 diabetes is characterised by hyperglycaemia due to deficiency of insulin in the body. It is commonly presented as an acute condition in individuals under 20 years of age, affecting males and females equally. Chief acute symptoms for type 1 diabetes include polyuria, polydipsia, and loss in weight. Starting with insulin therapy is urgent, though newer advancements are also emerging. Diabetic ketoacidosis is an acute complication in type 1 diabetes, that can be life-threatening. Type 1 predisposes an individual to higher risk of development of chronic microvascular (retinopathy and nephropathy) and macrovascular (affects heart, brain) complications. The treatment algorithm for type 1 diabetes is individualised, aimed to maintain blood glucose levels under recommended values; along with addressal of risk factors. *Sources: BMJ Best Practice*

Type 2 is common in adults and more prevalent globally than type 1 diabetes. Type 2 diabetes is characterised by insulin resistance and abnormalities in glucose metabolism. An individual with type 2 diabetes is at a higher risk of hypertension, obesity, and lipid derangements. Type 2 diabetes predisposes an individual to higher risk of development of microvascular (retinopathy and nephropathy) and macrovascular (affects heart, brain) complications. The treatment algorithm for type 2 diabetes is individualised, aimed to maintain blood glucose levels under recommended values; along with addressal of risk factors. Pharmacotherapy for glycaemic control includes oral hypoglycaemic drugs and insulin therapy. *Sources: BMJ Best Practice*

In this evidence brief, we present the effects and costs of the interventions specified in Table 1 below and this is used an input parameter in the analyses of these interventions in FairChoices: DCP Analytics tool.

Organization	Indications/recommendations	Applicability in LIC & Lower MIC settings
World Health Organization	Definition and diagnosis of diabetes	Yes

Intervention attributes

Type of interventions & Delivery platform

Table 1: Type of interventions & delivery platform

Intervention	Type	Delivery platform
Diabetes opportunistic screening	Diagnostic	Health centre
Diabetes type 1, insulin	Curative	Health centre
Diabetes type 2, antidiabetic drugs and insulin	Curative	Health centre
Retinopathy screening and photocoagulation*	Curative	First-level hospital
Neuropathy screening and preventive foot care**	Curative	First-level hospital

* This intervention is described in separate Evidence Brief
** Not analysed in FairChoices yet

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

Moderate level of urgency except for insulin for Diabetes type 1 with high level of urgency. Treatment outcomes not highly affected by some days of delay except for insulin for Diabetes type 1.

Population in need of interventions

Table 2: Population in need of interventions

Intervention	**Treated population**		**Benefitting population**		**GBD disease state addressed**
	Treated population	Treated fraction	Affected population	Affected fraction	
1. Diabetes opportunistic screening	0 to 99 years both genders; incidence based	1	No effects		Diabetes mellitus
2. Diabetes type 1, insulin	0 to 99 years both genders; prevalence based	1	0 to 99 years both genders; prevalence based	1	Diabetes mellitus type 1
3. Diabetes type 2, antidiabetic drugs and insulin	0 to 99 years both genders; prevalence based	1	0 to 99 years of those with the condition	1	Diabetes mellitus type 2

Intervention effect and safety

In general, diagnostic interventions do not provide direct health benefits per se unless they are linked with other treatments. A recent Cochrane Database Systematic Review by Peer et al 2020 ascertained the health effects of screening (mass, targeted or opportunistic) as compared to no screening for type 2 diabetes mellitus (Table 3). The findings from Peers et al 2020 indicated uncertainty about the effects of intervention on mortality (all-cause and diabetes related). No findings on side-effects of screening, new cases of type 2 diabetes, health related quality of life were noted by the included study in this systematic review. Source: Peer et al 2020

Table 3: Effect and safety of for type 1 and type 2 diabetes management

Effect of intervention		Certainty of evidence
Diabetes type 1, insulin	100% reduction of mortality	No RCTs identified, expert opinion
Diabetes type 2, antidiabetic drugs and insulin	10% reduction for those treated with either metformin or insulin or combination (Source: UKPDS-33)	See appendix

Model assumptions

Table 4: Summary of model parameters and values used in FairChoices – DCP Analytics Tool

Category	Model parameter	Notes
Population	See table 2 for values on treated and affected parameter	GBD 2019
Interventions	Diabetes opportunistic screening Diabetes type 1, insulin Diabetes type 2, antidiabetic drugs and insulin	
Comparison	No intervention	
Outcome/Effect	Diabetes opportunistic screening: No effect Diabetes type 1, insulin: 100% mortality reduction Diabetes type 2, antidiabetics+insulin: 10% mortality reduction	

Intervention Cost

The unit cost for diabetes screening is estimated to be 6,59 USD per screening in 2011 in India. The annual cost per diabetes (type I and type II) Diabetes Mellitus with insulin is estimated at USD 151 per patient in 2014 in Rwanda (Eberly LA et al 2019).

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Appendix

Effect & safety

A systematic literature search was done to gather the published evidence for the effectiveness of the opportunistic screening for diabetes. This search was done in the database Epistemonikos, with a filter for type of publication to systematic reviews (See Box 1). A total of 801 records were screened manually and one systematic review was included to summarize the health effects of the intervention.

Box 1: Search strategy used in Epistemonikos

title:(("screening" OR "opportunistic screening" OR "case-finding")) OR abstract:(("screening" OR "opportunistic screening" OR "case-finding"))) AND (title:("diabetes" OR "type 1 diabetes" OR "insulin-dependent diabetes" OR "type 2 diabetes" OR "Non-insulin dependent diabetes") OR abstract:("diabetes" OR "type 1 diabetes" OR "insulin-dependent diabetes" OR "type 2 diabetes" OR "Non-insulin dependent diabetes")) [Filters: protocol=no, classification=systematic-review]

For other interventions, Level 1 search was done 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, metaanalysis, systematic review, clinical practice guidelines).