EVIDENCE BRIEF

Newborn screening
(DCP4 ID: MNH08)

FairChoices
DCP Analytic Tool

Universal newborn screening and management of congenital endocrine or metabolic disorders

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Description of condition and intervention

Universal newborn screening targets to detect any abnormalities of endocrine or metabolic disorders and institute timely management to prevent their progression to advanced stages. Some countries routinely screen babies for disorders of thyroid or adrenal gland before discharging them from health facility. Congenital hypothyroidism is a treatable cause of mental retardation, and if detected early may prevent life-long disability from the cause. We assess the effect and cost of this intervention as part of FairChoices: DCP Analytical tool.

Universal newborn screening and management of congenital endocrine or metabolic disorders

Intervention attributes

Type of interventions

Chronic care management

Delivery platform

First-level 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

Table 1: Population in need of interventions

Intervention	**Treated population**		**Affected population**		**Disease state addressed**
	Treated age	Treated fraction	Affected age	Affected fraction	
Congenital hypothyroidism, screening	births; both genders	1	No effects for diagnostic intevention		Endocrine, metabolic, blood, and immune disorders
Congenital hypothyroidism, management	births; both genders, incidence	0.2 Incidence under age of 1	0 to 99years	0.0006	Endocrine, metabolic, blood, and immune disorders

Intervention effect and safety

Table 2: Effect and safety of management of congenital hypothyroidism

Effect of intervention		Certainty of evidence
Mortality Congenital hypothyroidism, management	0.9 relative reduction in neonatal mortality (assumed)	Low See appendix

Model assumptions

Table 3: Summary of model parameters and values used in FairChoices – DCP Analytical Tool

Category	Model parameter	Notes
Interventions	Congenital hypothyroidism, screening Congenital hypothyroidism, management	
Cost parameters		
Treated population	See Table 1	Global Burden of Disease Study 2019
Gender		
Age		
Treated fraction		
Effect parameters		
Affected population	Those with condition	
Affected gender	See Table 1	
Affected fraction age		
Affected fraction		
Comparison	No intervention	
Mortality Reduction (RRR)	0.9	

Intervention cost

The cost for universal newborn screening and management of congenital endocrine or metabolic disorders (for example, congenital hypothyroidism, phenylketonuria) that have high incidence rates and for which long-term treatment is feasible in limited-resource settings is estimated to be 0.7 USD per live birth and 1198.3 USD per episode respectively in 2001 in the Philippines (Padilla CD et al 2003).

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References

WHO 2021: Available from https://www.who.int/news-room/fact-sheets/detail/congenital-anomalies

Johansson KA et al 2020: Johansson KA, Coates MM, Økland JM, Tsuchiya A, Bukhman G, Norheim OF, Haaland Ø. Health by disease categories. Distributional Cost-Effectiveness Analysis: Quantifying Health Equity Impacts and Trade-Offs. 2020 Sep 30:105.

Padilla CD et al 2003: Padilla CD, Dans LF, Estrada SC, Tamondong MR Jr, Laceste JJ, Bernal RM. Cost-benefit analysis of newborn screening for galactosemia in the Philippines. Southeast Asian J Trop Med Public Health. 2003;34 Suppl 3:215-20. PMID: 15906739.

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)