(DCP4 ID: RESPD02)
Cluster: Respiratory disorders

Management of stable asthma (Inhalators|steroids |theophylline)

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Description of condition and intervention

Asthma is a non-communicable disease (NCD) which affects both children and adults. It causes inflammation and tightening of muscles around the small airways of muscles due to which the air passage in the lungs becomes narrow. Common symptoms of asthma are: coughing, shortness of breath and chest tightness. Causes of asthma include familial predisposition, specific allergic conditions, exposure to range of environmental allergens etc. Early events of life low birth weight (LBW), prematurity, exposure to tobacco smoke also affects the development of lungs which can lead to asthma. In low-and middle-income countries (LMIC) asthma often remains undiagnosed, and can lead to sleep disturbance, tiredness during the day, and poor concentration among those suffering from it. Around 262 million people were affected by asthma in 2019 which caused 4,61,000 deaths. Most of the deaths occurred in developing countries and are preventable. Source: WHO factsheet 2021, GBD study 2019.

Sustained management with recommended medications can control the disease. GINA (Global Initiative for Asthma) is a stepwise approach in which treatment is escalated and de-escalated to establish the lowest level of treatment. In the GINA strategy, there are 5 treatment steps. Step 1 is as-needed use of a rapid- and short-acting beta2-agonist (for example, salbutamol) alone. Step 2 is adding the regular low-dose inhaled corticosteroids. Step 3 involves increase

in dose of inhaled corticosteroids. Step 4 involves increasing to a medium or high-dose inhaled corticosteroid combined with a long-acting beta2-agonist. In Step 5, alternatives may include a daily dose of oral corticosteroids (adjusted to the lowest dose that maintains freedom from exacerbations and maximal achievable daily freedom from symptoms). In this evidence brief, we present the effect and cost of the following intervention being analysed in FairChoices:DCP Analytical tool:

Management of stable asthma (Inhalators|steroids |theophylline)

International guidelines

Organization	Indications/recommendations
	Global Initiative for Asthma

Intervention attributes

Type of interventions

Chronic management care

Delivery platform

This intervention may be delivered at health centre and 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

High level of urgency. Treatment outcomes highly affected by some days of delay.

Population in need of interventions

Treated population for management of asthma are the prevalent cases of asthma in the age group of 0 to 99 years. The treated fraction is 100% for this intervention.

Affected population: We assume that 26% of asthma related deaths can be averted at the health center level. Therefore, the affected fraction for this intervention is 0.26 in the target population of age 0 to 99 years, both genders.

Disease state addressed

This intervention targets asthma.

Intervention effect and safety

Table 1: Effect and safety of treatment for management of stable asthma

Effect of intervention		Certainty of evidence
Mortality (due to condition) Low dose inhaled corticosteroids and bronchodilators	In a population-based cohort study in Saskatchewan, Canada, the adjusted rate ratio of asthma mortality was 0.15 for use of >6 canisters in the past year compared to none. This results in an 85% relative risk reduction for asthma mortality. With assumption that 26% of asthma related deaths can be averted at the health center	See appendix

	level, Asthma mortality reduction of this intervention: 85% * 26% = 22.1% (Source: NCD countdown appendix)	

Model assumptions

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

Category	Model parameter	Notes
Intervention	Management of stable asthma (Inhalators/steroids/ theophylline)	
Cost parameters		
Treated population	Prevalence of asthma	Global Burden of Disease Study 2019
Gender	Both male & female	
Age	0-99 years	
Treated fraction Low dose inhaled steroid + SABA	1	
Effect parameters		
Affected population	Those with condition	
Affected gender	Both male & female	
Affected fraction age	0 to 99 years	
Affected fraction for mortality outcome	0.26	
Comparison	No intervention	
Mortality Reduction (RRR)	0.221	NCD Countdown Appendix

Intervention cost

The cost of Low-dose inhaled corticosteroids and bronchodilators for asthma management is estimated to be 24.7 USD per person per year in a specified population in 2016 in low-income countries (LIC). The cost is estimated based on the sum of the cost of follow-up cost (15 min of nurse time twice per year* 1.5 to account for 50% increase with the Population weighted

mean monthly wage for a level 2 healthcare provider being $488.91), the costs of peak flow meter ($10) and, Beclomethasone ($0.0112 * 365*2 = $8.18) and Salbutamol inhalers at a two-dose per day average ($0.0058 * 365*2 = $4.23) based on the based on MSH price guides.
Limitation: We used the cost for Low-dose inhaled corticosteroids and bronchodilators for asthma as a proxy for the various Asthma management variation, including inhaled short-acting beta-agonists (SABA) for intermittent asthma, low dose inhaled steroid + SABA, high dose inhaled steroid + SABA, theophylline + High dose inhaled steroid + SABA, oral steroid + theophylline + High dose inhaled steroid + SABA. The cost estimates include the HRH; nevertheless, the cost of medication may vary.

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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, metaanalysis, systematic review, clinical practice guidelines).