Hepatitis B (HBV) management

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Description of condition and intervention

Hepatitis B is an important global health challenge, affecting most in the Pacific region (116 million people) and African region (81 million people) as per World Health Organization (WHO) estimates. Further, every year 1.5 million people new infections arise. An estimated 820,000 deaths were attributable to hepatitis B, mainly from cirrhosis and hepatocellular carcinoma caused by HBV.

Hepatitis B is a viral infection caused by hepatitis B virus, affecting liver and manifests as both acute and chronic infection. It can be life-threatening if untreated and may progress to severe forms of disease like cirrhosis and liver cancer. Management of HBV at prevention level includes HBV vaccination that offers protection against this viral infection. HBV vaccination is instituted in infancy and childhood and recommended in adults who are unvaccinated or that are high risk groups. Transmission of HBV occurs through perinatal transmission (mother to child), through exposure to infected blood and body fluids, needlestick injury, reuse of contaminated needles or syringes in health care settings or among persons who inject drugs.

Laboratory investigations are necessary to diagnose the HBV infection including whether acute or chronic condition. In terms of treatment for HBV, generally no specific treatment is recommended for the acute phase of HBV infection. It primarily involves symptomatic management, replacement of fluids lost from vomiting, diarrhea and avoiding any unnecessary

medication. Chronic HBV treatment generally warrants continued treatment with oral antiviral drugs (tenofovir or entecavir recommended by WHO) to suppress the viral load.

In this evidence brief, we present the effects and costs of the following intervention being analysed in FairChoices:DCP Analytical tool:

Hep B vaccination, high risk groups

HBV testing and referral to care

HBV treatment

International guidelines

Organization	Indications/recommendations	Applicability in LIC & Lower MIC settings
World Health Organization 2015	Guidelines for the prevention care and treatment of persons with chronic hepatitis B infection	Yes

Source: WHO 2015

Intervention attributes

Type of interventions

Table 1: Type of interventions & delivery platform

Intervention	Type	Delivery platform
1. Hep B vaccination, high risk groups	Preventive	Health centre
2. HBV testing and referral to care	Diagnostic	Health centre
3. HBV treatment	Curative	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

Moderate level of urgency. Treatment outcomes may be affected by some days of delay.

Population in need of interventions

Table 2: Population in need of interventions

Intervention	**Treated population**		**Affected population**		**Disease state addressed**
	Treated age	Treated fraction	Affected age	Affected fraction	
Hep B vaccination, high risk groups	15 to 99 years both genders; prevalence based	0.001	15 to 99 for each	0.001 for each	Acute hepatitis B Cirrhosis and other chronic liver diseases due to hepatitis B Liver cancer due to hepatitis B
HBV testing and referral to care	15 to 99 years both genders; prevalence based	1	No effects		Total burden due to hepatitis B

HBV treatment	30 to 99 years both genders; prevalence based	0.8	30 to 99 years of those with the condition	0.016 assumed for each (See appendix)	Cirrhosis and other chronic liver diseases due to hepatitis B Liver cancer due to hepatitis B

Intervention effect and safety

Table 1: Effect and safety of HBV management

Effect of intervention		Certainty of evidence
Incidence HBV vaccination	A meta-analysis by Chen, Gluud 2005 reported a protective effect of 49% (RR: 0.51, 95% CI: 0.35 to 0.73) for risk of hepatitis B infection in health workers vaccinated (plasma derived vaccine) for hepatitis B, as compared to placebo.	See appendix
HBV treatment	Assumed 0.50 relative risk reduction	

Model assumptions

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

Category	Model parameter	Notes
Intervention	Hepatitis B vaccination, high risk groups HBV testing and referral to care HBV treatment	
Cost calculation		

Treated population	See table 2	GBD Study 2019
Gender		
Age		
Treated fraction	See table 2	
Effect calculation		
Affected Population	With condition	
Affected gender	Both	
Affected fraction age	See table 2	
Affected fraction		
Comparison	Placebo	
Incidence Reduction (RRR) HBV vaccination in high-risk groups HBV treatment	0.49 for risk of hepatitis B infection (Chen, Gluud 2005) 0.50 reduction assumed based on expert opinion	

Intervention Cost

The total unit cost for hepatitis B vaccination per person is estimated to be USD 0.67 (Year: 2016).

The total unit cost for hepatitis B treatment (acute hepatitis B) per person is estimated to be USD 121.76 (Year: 2013).

References

World Health Organization. Guidelines for the prevention care and treatment of persons with chronic hepatitis B infection: Mar-15. World Health Organization; 2015 Aug 5.

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.

Chen, Gluud 2005: Chen W, Gluud C. Vaccines for preventing hepatitis B in health-care workers. Cochrane Database Syst Rev. 2005 Oct 19;(4):CD000100. doi: 10.1002/14651858.CD000100.pub3. PMID: 16235273.

Appendix

Literature Review for effectiveness & safety

This literature search is an example of a structured, focused review of literature and guidelines. You can choose to do one of the following literature reviews for your Evidence Brief:

Level 1: 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).

Estimation of affected fraction: Longitudinal studies of patients with chronic hepatitis B indicate that, after diagnosis, the 5-year cumulative incidence of developing cirrhosis ranges from 8-20%. Morbidity and mortality in chronic hepatitis B are linked to evolution to cirrhosis or HCC. The 5-year cumulative incidence of hepatic decompensation is approximately 20%. The 5-year probability of survival is approximately 80-86% in patients with compensated cirrhosis. Patients with decompensated cirrhosis have a poor prognosis (14-35% probability of survival at 5 years). HBV-related end-stage liver disease or HCC are responsible for at least 500,000 deaths per year (Marcellin P et al 2005).

Conservatively estimating 8%/5 =0.016 every year

Marcellin P, Castelnau C, Martinot-Peignoux M, Boyer N. Natural history of hepatitis B. Minerva Gastroenterol Dietol. 2005 Mar;51(1):63-75. PMID: 15756147.

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).