Hepatitis C treatment

Authors: Kaur G, Ahmed S, Johansson KA, Coates MM, Watkins D, Økland JM, Haaland ØA

Date: 2021-07-21

Description of condition and intervention

Hepatitis C virus (HCV) infection leads to hepatitis C disease, that may manifest in acute and chronic forms of disease. Disease severity may range from mild illness to a severe illness that could lead to cirrhosis and cancer. Global estimates of disease burden from World Health Organization (WHO) indicate that 58 million people have chronic hepatitis C condition. Further, about 1.5 million new infections occur every year. About 290,0000 deaths in 2019 were attributed to hepatitis C, primarily from complications like cirrhosis and liver cancer. In terms of geographic regions, HCV burden is a global health challenge in all WHO regions.

HCV infection is acquired through the exposure to blood from unsafe injections, unsafe health care including unscreened blood transfusions and blood products, injection drug use through sharing injection practices and unsafe sexual practices. Management of hepatitis C infection involves testing and confirmatory diagnosis for this condition followed by subsequent treatment, depending upon person's eligibility based on immune response, whether its acute or chronic condition. Pan-genotypic direct acting antivirals (DAAs) are generally recommended as primary treatment modality for persons over 12 years of age with chronic hepatitis C infection. (Source: WHO 2021). In this evidence brief, we present the effect and cost of the following intervention being analysed in FairChoices:DCP Analytical tool:

HCV testing and referral to care

HCV treatment

(DCP4 ID: INFCTN02-02)
Cluster: Infection in general

International guidelines

Organization	Indications/recommendations	Applicability in LIC & Lower MIC settings
World Health Organization 2018	Guidelines for the care and treatment of persons diagnosed with chronic hepatitis C virus infection	

Source: WHO 2018

Intervention attributes

Type of interventions
Curative

Delivery platform
This intervention may be delivered at the 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 may not be affected by some days of delay.

Population in need of interventions

Treated population: All individuals (prevalent cases) with total burden of hepatitis C infection of the age (12 to 99 years) and gender are eligible to receive the intervention. The starting age for commencement of treatment is aligned with WHO treatment of hepatitis C guidelines.The treated fraction is assumed to be 0.827 addressed by the intervention.

Affected population: The affected population is all and both genders in the age group (0 to 99 years). The affected fraction is assumed to be same for the health state as treated.

Disease states addressed

This intervention targets sustained virologic remission among individuals with chronic HCV (total burden of disease due to hepatitis C) and affects disease states cirrhosis due to hepatitis C and liver cancer due to hepatitis C.

Intervention effect and safety

Table 1: Effect and safety of anti-viral treatment for hepatitis C infection

Effect of intervention		Certainty of evidence
Mortality	In a randomized double-blind placebo-controlled study (ASTRAL-1) by Feld et al 2015 of velpatasvir in treatment-naïve and treatment-experienced patients with or without compensated cirrhosis, 624 patients (HCV genotype 1,2,4,5 or 6) received the study drug. They were randomized to receive either sofosbuvir 400 mg plus velpatasvir 100 mg for 12 weeks or placebo. A sustained virological response (SVR) of 99% (95% CI: 98 to >99) was achieved in this phase III trial. This SVR is defined as undetectable viral load and considered as a surrogate marker for cure in HCV trial. SVR of 99% is considered as a proxy of mortality reduction in those who completed 12 weeks treatment course and led to impact later in life	This trial was funded by Gilead Sciences.

EVIDENCE BRIEF

Hepatitis C treatment

FairChoices
DCP Analytic Tool

(DCP4 ID: INFCTN02-02)
Cluster: Infection in general

through reduction in incidence of cirrhosis and liver cancer.

Model assumptions

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

Category	Model parameter	Notes
Intervention	**Hepatitis C treatment**	**Antiviral treatment with Sofosbuvir plus Velpatasvir for 12 weeks**
Cost calculation		
Treated population	Based on total burden of hepatitis C	Global Burden of disease study 2019
Gender	Both	
Age	12 to 99 years	Based on treatment guidelines for hepatitis C where treatment is given over 12 years
Treated fraction	0.827	assumed
Effect calculation		
Affected Population	Cirrhosis due to hepatitis C Liver cancer due to hepatitis C	Global Burden of disease study 2019
Affected gender	Both	
Affected fraction age	12 to 99 years	
Affected fraction	0.8	
Comparison	placebo	
Incidence reduction (RRR) for cirrhosis and liver cancer	0.99	See table 1

Intervention Cost

For Hepatitis C (HCV) management, the cost for testing is estimated at 10 USD per case screened for LIC countries in 2016 (Nayagam S et al 2016), and the cost for Hepatitis C is estimated at 900 USD per incident case in Egypt in 2012 (Graham CS, Swan T 2015).

EVIDENCE BRIEF

Hepatitis C treatment

(DCP4 ID: INFCTN02-02)
Cluster: Infection in general

FairChoices
DCP Analytic Tool

References

WHO 2021: Health Topics-hepatitis C. Available from https://www.who.int/news-room/fact-sheets/detail/hepatitis-c (accessed on 18 November 2021)

World Health Organization. WHO guidelines on hepatitis B and C testing. World Health Organization; 2017.

World Health Organization. Guidelines for the care and treatment of persons diagnosed with chronic hepatitis C virus infection.2018

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.

Feld JJ, Jacobson IM, Hézode C, Asselah T, Ruane PJ, Gruener N, Abergel A, Mangia A, Lai CL, Chan HL, Mazzotta F, Moreno C, Yoshida E, Shafran SD, Towner WJ, Tran TT, McNally J, Osinusi A, Svarovskaia E, Zhu Y, Brainard DM, McHutchison JG, Agarwal K, Zeuzem S; ASTRAL-1 Investigators. Sofosbuvir and Velpatasvir for HCV Genotype 1, 2, 4, 5, and 6 Infection. N Engl J Med. 2015 Dec 31;373(27):2599-607. doi: 10.1056/NEJMoa1512610. Epub 2015 Nov 16. PMID: 26571066.

Nayagam S et al 2016: Nayagam S, Conteh L, Sicuri E, Shimakawa Y, Suso P, Tamba S, Njie R, Njai H, Lemoine M, Hallett TB, Thursz M. Cost-effectiveness of community-based screening and treatment for chronic hepatitis B in The Gambia: an economic modelling analysis. Lancet Glob Health. 2016 Aug;4(8):e568-78. doi: 10.1016/S2214-109X(16)30101-2. Erratum in: Lancet Glob Health. 2016 Nov;4(11):e794. PMID: 27443782.

Graham CS, Swan T. A path to eradication of hepatitis C in low- and middle-income countries. Antiviral Res. 2015 Jul;119:89-96. doi: 10.1016/j.antiviral.2015.01.004. Epub 2015 Jan 20. PMID: 25615583.

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:

Hepatitis C treatment

(DCP4 ID: INFCTN02-02)
Cluster: Infection in general

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).

Certainty of evidence was assessed by using the following operational classification:

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)].