Cost Effectiveness of Checking Immunity for HAV Before Vaccination in HCV Patients

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Introduction

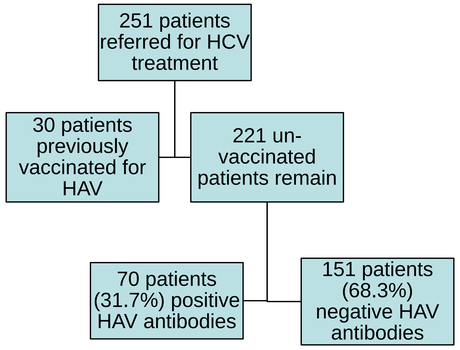
Acute hepatitis A virus (HAV) infection in a setting of chronic liver disease can lead to liver decompensation, liver failure, or death. It can be prevented with vaccination or with immunity from previous resolved infection. There is significant cost associated with ensuring HAV immunity and vaccination of all patients with chronic liver diseases. Appropriate cost-effective strategy needs to be taken to avoid unnecessary cost.

At our institute, we screen for HAV immunity in patients with chronic hepatitis C virus (HCV) by serology and vaccinate only those who are not immune. Alternatively, some centers with low HAV seropositivity rate empirically vaccinate all candidates, eliminating the cost of serology tests. In this study, we compared which of these two strategies is more cost effective.

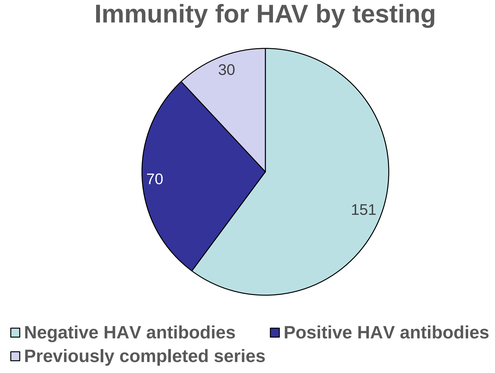
Methods

Retrospective analysis of patients with HCV ages >18 who were referred for HCV treatment from March 2021 - March 2022 and who also underwent screening for HAV immunity.
We assessed prevalence of HAV immunity in this cohort, cost associated with testing for immunity by serology, and cost of administration of vaccination. We compared the cost associated with the two strategies.

Results



The patient charge accrued for antibody testing at our facility for Hepatitis A IgG & IgM is estimated to be 10.3% of the cost of a complete vaccination course. Total cost of vaccination of the 151 patients was 21.4% less expensive than empiric vaccination of all 221 patients.



HAV Immunity Testing Equation

V: Vaccinated
NV: Not vaccinated
SN: Seronegative
SP: Seropositive
Cv: Cost of Vaccination
Cs: Cost of Serology

Strategy 1: **Cost of vaccinating all NV** = NV x Cv
Strategy 2: **Cost of vaccinating only SN** = NV x Cs + SN x Cv

Strategy 1 and 2 are the same if: Nv x Cv= NV x Cs + SN x Cv

$1 = \frac{NV\ (Cs)}{NV\ (Cv)} + \frac{SN\ (Cv)}{NV\ (Cv)}$

1= Cs/Cv + SN/NV

1-SN/NV = Cs/Cv

SP/NV= Cs/Cv

If seropositivity rate < $\frac{\text{Cost of serology}}{\text{Cost of Vaccination}}$ → Vaccinate all unvaccinated

If seropositivity rate > $\frac{\text{Cost of serology}}{\text{Cost of Vaccination}}$ → Check serology and vaccinate if needed

Discussion

The cost associated with hepatitis A vaccination includes cost of serology to confirm absence of immunity and cost of vaccine administration for those in whom it is needed. Vaccinating all patients empirically would be more economical only if the seropositivity rate is less than the ratio of cost of serology test to vaccine administration charges. Based on our results, we found it to be more cost-effective at our institution to verify absence of immunity before vaccinating patients with HCV.

Limitations

A possible limitation of this study is availability of vaccination records of all patients which may have led to more serology testing. However, many patients receive care within our integrated health system.

References

1. Moro PL, Arana J, Marquez PL, et al. Is there any harm in administering extra-doses of vaccine to a person? Excess doses of vaccine reported to the Vaccine Adverse Event Reporting System (VAERS), 2007-2017. *Vaccine*. 2019;37(28):3730-3734. doi:10.1016/j.vaccine.2019.04.088
2. Nelson NP, Weng MK, Hofmeister MG, et al. Prevention of Hepatitis A Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices, 2020 [published correction appears in MMWR Morb Mortal Wkly Rep. 2021 Feb 26;70(8):294]. *MMWR Recomm Rep*. 2020;69(5):1-38. Published 2020 Jul 3. doi:10.15585/mmwr.rr6905a1
3. Rio CD, Springer SA. Hepatitis C in the United States: One Step Forward, Two Steps Back. *Am J Public Health*. 2021;111(5):768-769. doi:10.2105/AJPH.2021.306251
4. Vento S. Fulminant hepatitis associated with hepatitis A virus superinfection in patients with chronic hepatitis C. *J Viral Hepat*. 2000;7 Suppl 1:7-8. doi:10.1046/j.1365-2893.2000.00019.x