Cost-Effectiveness Analysis of Emergency Department-Based HCV Screening and Linkage-To-Care Program

Sun A Choi PharmD[1], Kandavadivu Umashankar PharmD, MS[1], Anjana Maheswaran MS[2], Michelle Martin PharmD, FCCP, BCPS, BCACP[1], Jean Lee PharmD Candidate[1], Matt Odishoo PharmD Candidate[1], Janet Lin MD, MPH, MBA[2], Daniel R Touchette PharmD, MA, FCCP[1]

[1]College of Pharmacy, University of Illinois at Chicago, Chicago, IL, USA; [2]College of Medicine, University of Illinois at Chicago, Chicago, IL, USA

Please email Sun Choi (schoi89@uic.edu) if you have any questions on this study.

PHARMACY SYSTEMS OUTCOMES AND POLICY COLLEGE OF PHARMACY

Background

- Hepatitis C virus (HCV) is a common bloodborne pathogen that can cause chronic liver infection and lead to serious liver complications, such as fibrosis, cirrhosis, hepatocellular carcinoma (HCC), and liver failure.[1]
- In the United States (US), over 2.4 million adults have HCV, yet only 50% are aware of their infection.[2,3]
- HCV can be cured. Screening is the first step in the HCV care cascade, yet HCV screening is not covered in settings outside of primary care in the US.[4]
- To expand access to HCV screening, the University of Illinois Health Systems (UIH) implemented Project HEAL (HIV & HCV Screening, Education, Awareness, Linkage to Care). Under this initiative, patients who presented to the emergency-department (ED) had the opportunity to receive HCV screening and linkage to care if they were at high risk for HCV infection (e.g., illicit injection drug users, HIV infection, etc.).
- As several studies have demonstrated the feasibility of ED-based HCV screening program, understanding the cost-effectiveness of such program is also important for policy-decision makers.[5,6]

Objective

- To examine the long-term cost-effectiveness of routine HCV screening and linkage to care for high-risk patients in the emergency department from the payer's perspective

Methods

- A hybrid decision-analytic Markov model was developed based on the HCV screening workflow in the ED and the natural history of HCV (Figures 1 and 2).
- Real-world data from Project HEAL was used to develop the decision analytic model.
- Costs of direct-acting antiviral (DAA) treatments included Mavyret, Epclusa, and Vosevi; ribavirin was added to some DAA regimens.

Figure 1. Decision tree

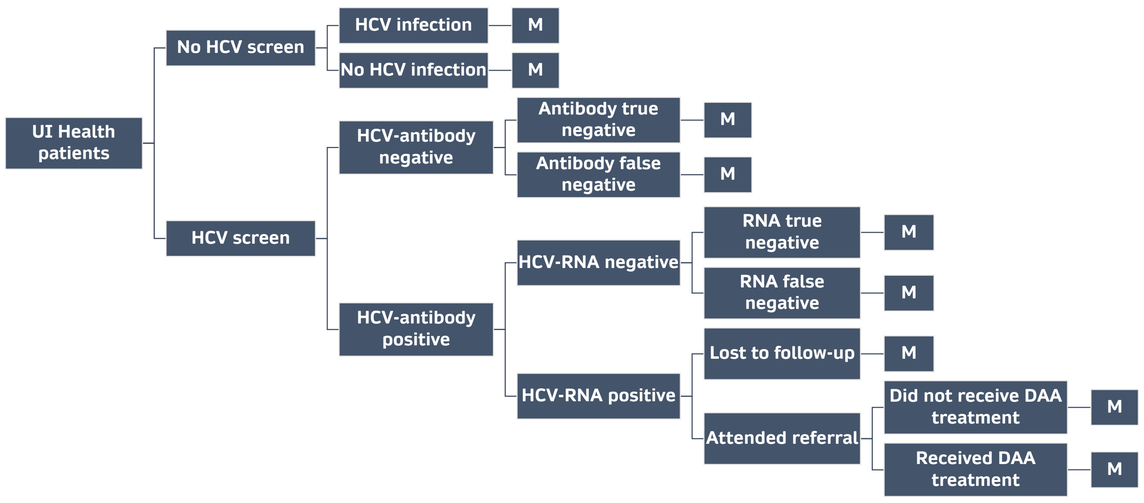

Figure 2. Markov Model

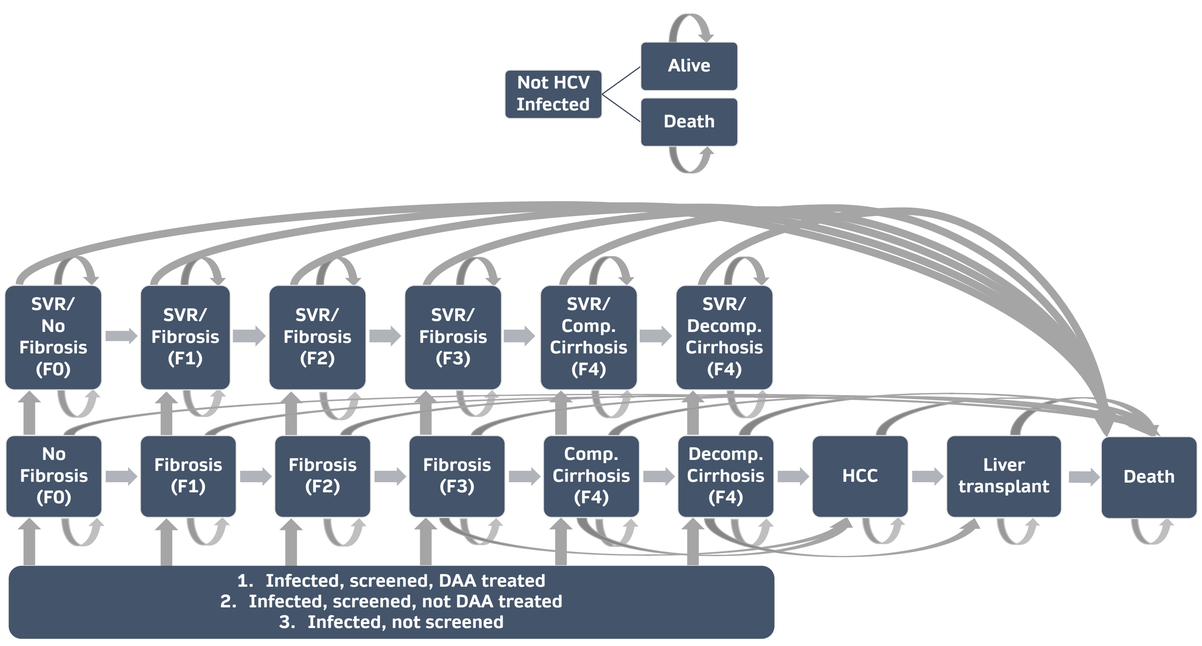

Table 1. Study Summary

Population	• Patients who presented to the UI Health ED
Interventions	• No HCV screening vs HCV screening
Setting	• Emergency department
Model Inputs	• Project HEAL, clinical trials, published literature, Redbook
Time Horizon	• 30 years
Cycle Length	• 1 year
Outcomes	• Total healthcare costs, quality-adjusted life years (QALYs), incremental cost-effectiveness ratio (ICER)
Perspective	• US payers
Discount Rate	• 3%
Willingness-to-pay threshold	• $100,000/QALY

Results

- **Base-Case**
  - All patients who received the ED-based HCV screening and initiated DAAs after their referral were treated regardless of their fibrosis stage.
  - Unscreened or untreated patients received DAAs when they developed decompensated cirrhosis.

Table 2. Base-Case Analysis Results

DAA Intervention in Untreated Group	Patient group	Total Healthcare Costs	QALY(s)	ICER
F4. Decomp. Cirrhosis	No HCV Screen	$155,186	11.472	
	HCV screen	$155,207	11.482	$2,147/QALY

- **Scenario Analysis**
  - Unscreened/untreated patients eventually developed liver complications and received DAAs at different fibrosis stages.

Table 3. Scenario Analysis Results

DAA Intervention in Untreated Group	Patient group	Total Healthcare Costs	QALY(s)	ICER
F0	No HCV Screen	$155,198	11.585	
	HCV screen	$155,218	11.585	Dominated
F1	No HCV Screen	$155,131	11.580	
	HCV screen	$155,158	11.581	$62,439/QALY
F2	No HCV Screen	$155,073	11.576	
	HCV screen	$155,104	11.577	$38,267/QALY
F3	No HCV Screen	$154,924	11.577	
	HCV screen	$154,968	11.560	$17,862/QALY
F4. Comp. Cirrhosis	No HCV Screen	$155,142	11.526	
	HCV screen	$155,167	11.532	$4,867/QALY

One-Way & Probabilistic Sensitivity Analysis

- The one-way sensitivity analysis indicated that ICERs were mostly affected by medical costs of fibrosis and cirrhosis, medical costs of fibrosis and cirrhosis with SVR, and mortality rates of fibrosis.
- The probabilistic sensitivity analysis demonstrated that ED-based HCV screening was 91% likely to be cost-effective at WTP threshold of $10,000/QALY and 100% likely to be cost-effective at WTP threshold of $15,000/QALY.

Limitations

1. The model was built based on the data derived from Project HEAL. This data includes the probability of linkage to care, proportion of HIV and PWID patients. Therefore, our results may not be generalizable to all US population.
2. Other non-pangenotypic HCV regimens (e.g., Harvoni, Zepatier) were not included in our study.
3. Limited information was available in the literature regarding quality of life in US patients with HCV-related conditions. Most estimates were derived from European studies.

Conclusion

- To our knowledge, our study is the first study that evaluated the cost-effectiveness of ED-based HCV screening and linkage to care using real-world estimates. The results indicate that ED-based HCV screening and linkage to care reduces morbidity and mortality and is extremely cost-effective.
- A reduction in infected persons in the community may provide additional benefits not evaluated in this study and would help the nation work toward HCV Eliminations.

References

1. Hepatitis C questions and answers for Health Professionals. Centers for Disease Control and Prevention. https://www.cdc.gov/hepatitis/hcv/hcvfaq.htm#section2. Published August 7, 2020. Accessed March 4, 2022.
2. Edlin BR, Eckhardt BJ, Shu MA, Holmberg SD, Swan T. Toward a more accurate estimate of the prevalence of hepatitis C in the United States. Hepatology. 2015;62(5):1353-1363. doi:10.1002/hep.27978
3. Screen all adult patients for hepatitis C. Centers for Disease Control and Prevention. https://www.cdc.gov/knowmorehepatitis/hcp/Screen-All-Patients-For-HepC.htm. Published June 14, 2021. Accessed October 21, 2022.
4. Screening for Hepatitis C Virus (HCV) in Adults (NCD 210.13). 2021. Available from: https:// https://www.uhcprovider.com/content/dam/provider/docs/public/policies/medadv-guidelines/s/screening-hepatitis-c-virus-hcv-adults.pdf. Published November 10, 2021
5. Schechter-Perkins EM, Miller NS, Hall J, et al. Implementation and Preliminary Results of an Emergency Department Nontargeted, Opt-out Hepatitis C Virus Screening Program. Acad Emerg Med. 2018;25(11):1216-1226. doi:10.1111/acem.13484
6. Galbraith JW, Franco RA, Donnelly JP, et al. Unrecognized chronic hepatitis C virus infection among baby boomers in the emergency department. Hepatology. 2015;61(3):776-782. doi:10.1002/hep.27410

*This study was not funded or sponsored by any organizations.