Is It More Cost-Effective to Treat Hep C Before or After a Liver Transplant?

It depends on an individual’s MELD score, which is a measure of end-stage liver disease severity.

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For those with end-stage liver disease and hepatitis C virus (HCV) who are waiting for a liver transplant, the severity of liver damage determines whether treating the virus before or after a transplant is cost-effective or even saves money.

Publishing their findings in Clinical Gastroenterology and Hepatology, researchers sought to clarify conflicting past results in published analyses of the optimal timing of hep C treatment among those awaiting liver transplants.

The authors of three recent studies conducted such analyses. Two studies concluded that treating HCV before a liver transplant is always cost-effective. A third study found that HCV treatment before a transplant was cost-effective only if individuals had a MELD (Model for End-Stage Liver-Disease) score of 25 or below while awaiting a liver transplant; with a pretransplant MELD score higher than that threshold, it is more cost-effective to treat HCV after the transplant.

Used to prioritize individuals for liver transplants, a MELD score is a measure of liver disease severity and the probability of death. The higher the score—the highest is 40—the higher the risk of death.

When conducting analyses about the cost-effectiveness of health interventions, researchers consider how the intervention—direct-acting antiviral (DAA) treatment for HCV in this case—affects a measure known as quality-adjusted life-years (QALYs). One QALY is 1.0 additional year of life spent in optimal health. If health is less than optimal, that QALY is worth less than 1.0 proportional to how poor an individual’s health is. (Zero means death.) Ultimately, DAAs may add QALYs in two ways: by extending life and by improving health quality; thus the additional number of QALYs is a composite of those two factors.

An intervention is considered cost-saving if it increases QALYs and decreases costs. An intervention is considered cost-effective if it increases QALYs and costs less than the figure that insurers consider the upper limit of what is reasonable to pay for an additional QALY, which for the purposes of this paper was $100,000.
The timing of hep C treatment among those awaiting a liver transplant is a delicate matter. Those who are treated before a transplant may see their liver disease severity improve and their risk of death fall. However, treatment at this time may wind up delaying a liver transplant if an individual’s MELD score improves. Such a scenario is known as “MELD limbo” or “MELD purgatory.”

Additionally, treating hep C before a transplant means that some individuals will no longer be eligible to receive a liver from an HCV-positive donor, thus possibly narrowing their chances of receiving a transplant.

On the flip side, some who decide to wait until after a liver transplant to receive HCV treatment could experience worsening liver disease and even death while waiting for an available organ.

In the new analysis, researchers relied on a validated mathematical model called SIM-LT, or simulation of liver transplant candidates. They used this model to simulate a virtual clinical trial that compared the long-term health outcomes of treating hep C before a liver transplant with treating it after among 1 million people with hep C and decompensated cirrhosis (the more advanced form of cirrhosis) who did not have hepatocellular carcinoma (HCC, the most common form of liver cancer).

The simulation relied on data from the SOLAR-1 and -2 studies of Harvoni (ledipasvir/sofosbuvir), the United Network for Organ Sharing and other published research. The population of individuals in the simulation was 50 years old on average and had MELD scores between 10 and 40.

The researchers simulated two scenarios for each person: treating hep C before a liver transplant (while on the waiting list) and treating HCV after a liver transplant. Everyone was treated with Harvoni plus ribavirin for up to 12 weeks. The presumed cure rate was 95 percent, based on the findings of the SOLAR studies.

The study authors found that those with lower MELD scores gained more QALYs if they treated their HCV before rather than after a liver transplant; for those with higher MELD scores, the findings were reversed. Specifically, those with a MELD score of 27 or below would benefit from pretransplant HCV treatment, and those with a MELD score higher than that threshold would benefit from treating HCV after a transplant.

Treating HCV before a transplant was cost-saving for those with a MELD score of 15 or below and cost-effective for those with MELD scores between 16 and 21. For those with MELD scores of 22 to 27, pretransplant hep C treatment led to higher QALYs but was not cost-effective. Treating hep C before a transplant became cost-effective for those with MELD scores of 22 to 23 if the price of DAAs fell below $51,000; for those with MELD scores of 24 to 25, pretransplant treatment for HCV was cost-effective if the price of DAAs fell below $16,000. There was no reduction in DAA price that could make pretransplant HCV treatment cost-effective for those with MELD scores of 26 to 27.

For those with a MELD score of 27 or greater, posttransplant HCV treatment was more cost-effective than pretransplant HCV treatment. And for those with a MELD score of 30 or higher,
treating hep C after a transplant resulted in cost savings.

The investigators also analyzed their results to account for differences in liver transplant wait times by region within the United Network for Organ Sharing. In the regions with relatively shorter wait times, treating hep C before a transplant was cost-effective and cost-saving in those with a MELD score of 19 or lower, rather than 21 in the main analysis. For the other regions, the cost-effectiveness findings remained the same as in the main analysis.

“We do not recommend that clinicians or payers should make a decision about the timing of HCV treatment guided exclusively by [the] cost-effectiveness analysis,” the authors wrote. “Instead, we propose a comprehensive approach to the decision that includes patients’ perspective, clinical effectiveness, budget constraints, and medical urgency not captured by MELD score.”

To read the study abstract, click here.