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Benefits of hepatitis C treatment outweigh costs for patients with advanced disease

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A towering $60,000 bill, a year of fierce, flu-like symptoms and a running risk of depression are among the possible costs of two new hepatitis C treatments. But according to Stanford University health policy researchers, they might be worth it.

Using a computer model of hepatitis C disease — which accounts for different treatments, outcomes, disease stages and genetics — a research team led by Jeremy Goldhaber-Fiebert, PhD, found that new triple-therapies for genotype-1 hepatitis C are cost-effective for patients with advanced disease. Their results will be published Feb. 21 in the *Annals of Internal Medicine*.

"With so many simultaneous factors, it's very hard to know what to do," said Shan Liu, a graduate student in management science and engineering in the School of Engineering and lead author of the study. "I think building models is a very eloquent and abstract way to inform difficult policy decisions."

Nearly 4 million people in the United States are infected with genotype-1 hepatitis C — a virus that attacks the liver, causing swelling, scarring, cancers and the need for transplants. Many of those infected are age 50 or older, meaning they may have long-term infections and could face serious hepatitis C-related diseases. Unlike hepatitis B, there is no vaccine for hepatitis C. Until last summer, hepatitis C treatments were a gamble with many side effects, including anemia, vomiting, hair loss and depression.

"These treatments are very uncomfortable and long — up to 48 weeks," said Goldhaber-Fiebert, assistant professor of medicine at the School of Medicine. "Many people likened the experience to cancer chemotherapy: hard to undergo if the chance of treatment success is not that high."

With an impending spike in illnesses among the hepatitis-C-infected population in the United States, researchers and physicians have been developing new tests and treatments. For instance, researchers recently identified a specific DNA sequence in the gene that codes an immune response regulator, called IL28b. Different IL28b sequences predict whether treatment will successfully clear the virus.

The latest in a series of improved therapies — and the focus of the study — are two new virus-targeting drugs called protease inhibitors, boceprevir (trade name Victrelis) and telaprevir (trade name Incivek).

The drugs, which came out in the summer of 2011, were designed to be taken in conjunction with the standard treatment, which itself is a combination of two drugs, an interferon and an antiviral called ribavirin. While the new triple therapies increase the chances of kicking the virus, they have more severe side effects — such as full body rash and rectal bleeding — and boost costs. Boceprevir adds $1,100 per week to the cost of treatment, and telaprevir adds $4,100 per week.

"At the outset, it was not at all clear to me that drugs as expensive as these, which are added onto the standard therapy, would result in sufficient benefits and reduced costs from averted liver cancers and transplants to make them cost-effective," said Goldhaber-Fiebert, who is also a faculty member of Stanford Health Policy at the university's Freeman Spogli Institute for International Studies.

Goldhaber-Fiebert, Liu and their colleagues wanted to know when or if

doctors should prescribe the new treatments. Should doctors prescribe them to all hepatitis C patients? Or, should only patients with advanced disease be treated with the new drugs? With such high costs, the answers could have sweeping impacts on health-care budgets, particularly for public health systems such as the Department of Veterans Affairs hospitals where many hepatitis C patients receive care.

To find the answers, they used their model to compare the pros and cons of three treatment strategies: Giving all hepatitis C patients the standard treatment, giving all of them a triple therapy or giving triple therapy only to those patients less likely — based on their IL-28B gene — to respond to standard therapy. For each strategy, they examined both of the new triple therapies. They also considered patients with mild and advanced disease.

After intense statistical and simulation analysis, the model showed that the new triple therapies were indeed cost-effective for chronic hepatitis C patients with advanced liver disease. Despite the large price tag and side effects, the new treatments help these patients avoid costly cancers and liver transplants — as well as allowing them to live longer, higher-quality lives.

For those patients with mild disease, the model indicated that determining their IL-28B genotype is the best next step, before prescribing a treatment.

The closer the threat of severe disease, the more justified treatment costs and risks become, said Goldhaber-Fiebert. "That would be the bottom line."

Though these new drugs may offer relatively desirable options now, both Goldhaber-Fiebert and Liu noted that additional, and perhaps more effective, drugs are already in clinical trials.

"As more and better treatments become available, the decision will continue to evolve, requiring further analysis," Liu said. "Patients and health systems could also benefit from price competition with multiple treatment options available." But ultimately, she added, treatment decisions will remain a private conversation between a doctor and a patient.

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