



Prioritizing Hepatitis C Treatment Decisions in U.S. Prisons

ABSTRACT:

About one out of six inmates in the United States (U.S.) is infected with hepatitis C virus (HCV). HCV prevalence in prison systems is ten times higher than the general population, and hence prison systems offer a unique opportunity to control the HCV epidemic. New HCV treatment drugs are very effective, but providing treatment to all inmates is prohibitively expensive, which precludes universal HCV treatment in prison systems. As such, current practice recommends prioritizing treatment based on clinical and incarceration-related factors, including disease staging, remaining sentence length, and injection drug use (IDU) status. However, there is controversy about how these factors should be incorporated because of the complicated tradeoffs. In this study, we propose a restless bandit modeling framework to support hepatitis C treatment prioritization decisions in U.S. prisons. We first prove indexability for our problem and derive several structural properties of the well-known Whittle's index, based on which, we derive a closed-form expression of the Whittle's index for patients with advanced liver disease. From the interpretation of this closed-form expression, we anticipate that the performance of the Whittle's index would degrade as the treatment capacity increases; and to address this limitation, we propose a capacity-adjusted closed-form index policy. We parameterize and validate our model using real-world data from Georgia state prison system and published studies. We test the performance of our proposed policy using a detailed, clinically-realistic simulation model and show that our proposed policy can significantly improve the overall effectiveness of the hepatitis C treatment programs in prisons compared with the current practice and other benchmark policies, including the commonly used Whittle's index policy. Our results also shed light on several controversial health policy issues in hepatitis C treatment prioritization in the prison setting and have important policy implications.