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Combination interventions for Hepatitis C and Cirrhosis reduction among people who inject drugs: An agent-based, networked population simulation experiment

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Abstract

Hepatitis C virus (HCV) infection is endemic in people who inject drugs (PWID), with prevalence estimates above 60% for PWID in the United States. Previous modeling studies suggest that direct acting antiviral (DAA) treatment can lower overall prevalence in this population, but treatment is often delayed until the onset of advanced liver disease (fibrosis stage 3 or later) due to cost. Lower cost interventions featuring syringe access (SA) and medically assisted treatment (MAT) have shown mixed results in lowering HCV rates below current levels. However. little is known about the potential cumulative effects of combining DAA and MAT treatment. While simulation experiments can reveal likely long-term effects, most prior simulations have been performed on closed populations of model agents—a scenario quite different from the open, mobile populations known to most health agencies. This paper uses data from the Centers for Disease Control's National HIV Behavioral Surveillance project, IDU round 3, collected in New York City in 2012 to parameterize simulations of open populations. To test the effect of combining DAA treatment with SA/MAT participation, multiple, scaled implementations of the two intervention strategies were simulated. Our results show that, in an open population, SA/MAT by itself has only small effects on HCV prevalence, while DAA treatment by itself can lower both HCV and HCV-related advanced liver disease prevalence. More importantly, the simulation experiments suggest that combinations of the two strategies can, when implemented together and at sufficient levels, dramatically reduce HCV incidence. We conclude that adopting SA/MAT implementations alongside DAA interventions can play a critical role in reducing the long-term consequences of ongoing HCV infection.

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