Chronic Hepatitis C Virus (HCV) Burden in Rhode Island, United States: Modelling Treatment Scale-up and Elimination

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Background

- Chronic hepatitis C virus (HCV) infection is a significant public health problem in the United States (US).
- More people in the U.S. are now dying of HCV than all other top 60 notifiable infectious diseases combined (Ly et al., 2016).

Objective

- To identify the most effective HCV treatment and prevention policies that will lead to a substantial decrease, and eventual elimination, of chronic HCV infection in Rhode Island (RI).

Methods

- Mathematical model was constructed in Excel, and state-specific estimates were used to parameterize the model (wherever possible).
- Model was adapted from a previously validated and published framework (Razavi et al., 2013).
- Estimates were abstracted from existing literature and also sourced through expert consultations; input parameters were subjected to various sensitivity analysis.
- Model was probed under four treatment scenarios and projections made up to year 2030:

1. **Base Scenario:** Current HCV treatment paradigm continues (~120 patients treated annually, restricted to Medicaid fibrosis stage F3 and above)
2. **Treat ≥F2:** An immediate scale-up of treatment (to 360 annually, and treat fibrosis stage F2 and above)
3. **Treat ≥F0:** An immediate treatment scale-up to 360 and no fibrosis stage restriction (treat F0 and above)
4. **Elimination Scenario:** Continued treatment scale-up needed to achieve >90% reduction in viremic cases by 2030, no restriction on liver stage.

Results

- Immediate treatment scale-up under the ≥F2 and ≥F0 fibrosis stage restriction scenarios, and under the elimination scenario, could respectively lead to the following by the year 2030:
  - reduction in the number of cirrhotic cases by 25%, 16% and 72% (fig 1);
  - reduction in the number of liver-related deaths by 23% , 14% and 68% (fig 2);
  - reduction in total viremic infections by 20%, 20% and 85% (fig 3).
- To achieve a >90% reduction in viremic cases by 2030, almost 2,000 persons need to be treated annually by 2025.

Fig 1: Estimated cirrhotic cases (base case and treatment scale-up scenarios)

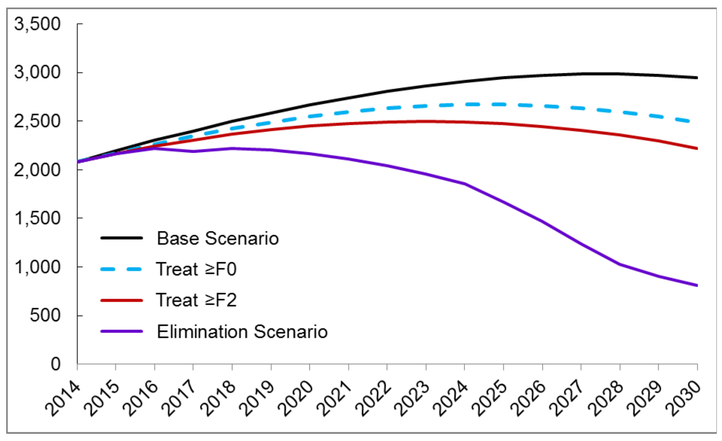


Fig 2: Estimated liver-related deaths (base case and treatment scale-up scenarios)

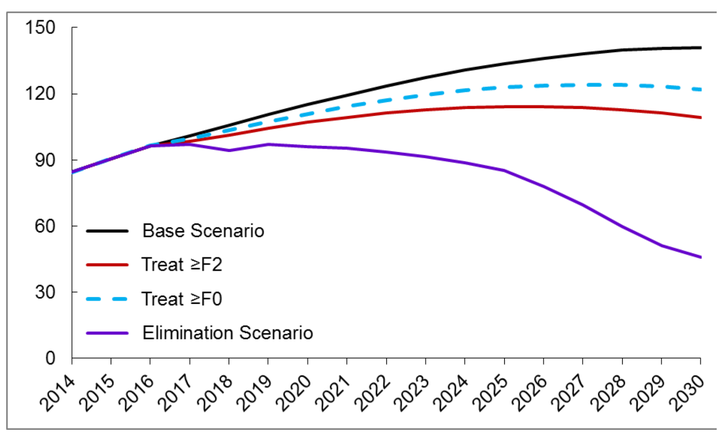
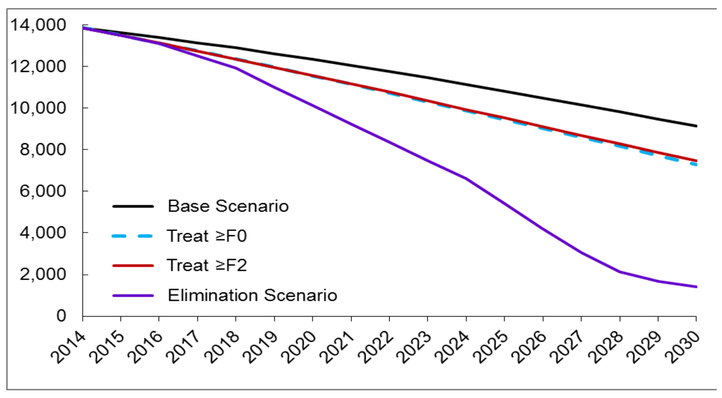


Fig 3: Estimated total viremic infections (base case and treatment scale-up scenarios)



Conclusions

- ✓ Current Medicaid HCV treatment criteria are not sufficient to substantially reduce the burden of HCV in Rhode Island.
- ✓ Ramping up treatment is needed to achieve a significant impact on HCV burden (**treating approximately 2000 persons yearly by 2025 is needed to eliminate the disease)**
- ✓ Increased screening of at-risk populations is also needed.

Limitations

(1) Modelling output is dependent on validity of input data and assumptions (2) We assumed constant incidence over the study period (number of new infections may be underestimated) (3) Model did not account for transmission nor cost of treatment.

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