Supplementary Material accompanying the manuscript titled, "Prevention of Hepatitis C By Screening and Treatment in United States Prisons" by Tianhua He, Kan Li, Mark S. Roberts, Anne C. Spaulding, Turgay Ayer, John J. Grefenstette, Jagpreet Chhatwal.

Supplementary Appendix 1: Model Structure and Inputs

Supplementary Appendix 2: Model Validation

Supplementary Appendix 3: Additional Results

Supplementary Appendix 1: Model Structure and Inputs

S1.1 Overall Model Features

We developed *TapHCV* (treatment as prevention of hepatitis C virus) model, an agent-based model (ABM) to simulate the population dynamics of both prisoners and general population in the community in order to gain insight into the relationship between prison-related interventions and hepatitis C virus (HCV) disease burden in society. Agents in our model were prisoners or community members with or without HCV. The model was developed in Java, a general-purpose computer programming language (1), and consisted of the following major components: HCV disease transmission and progression, HCV screening and treatment, and simulation of prison and general population dynamics. The baseline population in the model represented the United States population in 2015.

We used 2 million agents to define our population and adjusted all results by a factor of 152.6 to project national data. We stratified our model's population, based on data in year 2009, with age, gender, health states, prevalence of HCV, range of HCV genotype, treatment acceptability, treatment experiences, injection drug use, and incarceration history (Appendix S1.2). All agents followed the same rule of behaviors, which include aging and dying, incarceration and release from prisons, initiating and quitting drug use, infecting others, disease progression, etc. These actions are dependent on patient demographics as well as the location of agents. We assumed that the agents' behavior rules were not changed in the next 30-years due lack of data on future trends.

We simulated the long-term benefits and costs of 5 HCV screening scenarios in prison, from mild to intense, starting from year 2015: 1) no screening, 2) 1-time risk-based screening of currently incarcerated and entrants who were active or former IDUs for 1 year (1Yr-Risk), 3) 1-time opt-out universal HCV screening of currently incarcerated inmates followed by opt-out screening of all incoming inmates for up to 1 year (1Yr-All), 4) 5 years (5Yr-All), and 5) 10 years (10Yr-All).. Diagnosed patients were eligible for treatment, based on their fibrosis score, with recently approved direct-acting antivirals (DAAs). We projected 30-year cumulative costs and quality-adjusted life years (QALYs) for each scenario. In addition, we projected reduction in costs and disease burden by reduction in the number of new HCV infections, decompensated cirrhosis, hepatocellular carcinoma, liver transplants and liver-related deaths.

We performed all model runs on MD Anderson RISTS HPC Cluster with 2.2 GHz AMD Opteron 6174 processor. We ran our model in parallel, 40 times using different random number seeds. The average execution time of each run was 15.32 hours.

S1.2 Baseline Population

The initial condition was modeled to simulate socio-demographic feature of US population in year 2009 due to lack of HCV-related data in 2015. We generated 2 million heterogeneous agents to define our population and adjusted all results by a factor of 152.6 to project national data. Among those, 0.5% were inside state or federal prisons at any given time (eTable 1)(2). Our model didn't include population in jails, which are short-stay facilities while prisons are long-term facilities.

We probabilistically assigned population characteristics to the model, including age, gender, and drug use behavior (active or former injection drug users [IDUs] and non-IDU). We used the statistical reports of US Census Bureau and Bureau of Justice Statistics (BJS) to define age distribution of general and incarcerated population, respectively (eTable 2) (2-5). Then we assigned a proportion of individuals between age 15 and 50 to be either active or former injection IDU based on published surveys (6, 7). We adjusted HCV prevalence using two hazard ratios—one for active and former IDUs, and the other for inmates (eTable 3). Then we assigned HCV infection status based on individuals' characteristics and further define their health states, genotype of HCV virus, treatment acceptability, and treatment history.

We also considered population growth. Newborns were added each year based on the annual birth rates in the US (8). We used 2011 census life-tables for the annual mortality rates from non-hepatic causes (9). For injection drug users and inmates, we adjusted the baseline mortality rates by standardized mortality ratio (SMR) (eTable 1) (10, 11).

The prevalence of HCV for IDUs and non-IDUs by age were derived from NHANES data (eTable 3) (12). To assign HCV prevalence in IDUs and prisoners in the model we used hazard ratios for IDUs and prisoners, which were back-calculated such that the HCV prevalence among prisoners was 17.6% and that among active IDUs was 35%(12, 13). We found that the hazard ratios of 18 and 12 for IDUs and prisoners, respectively, provided the HCV prevalence within +/- 5% of the reference values. We defined the baseline distribution of the four most common HCV genotypes (G1, 2, 3 and 4), and chronic HCV stages using METAVIR fibrosis scores (no fibrosis [F0], portal fibrosis without septa [F1], portal fibrosis with few septa [F2], numerous septa without fibrosis [F3], or compensated cirrhosis [F4]), advanced HCV states (decompensated cirrhosis, hepatocellular carcinoma, liver transplant, and liver-related death) and treatment history (previously treated or treatment-naïve) using published studies (eTable 4) (14-17).

eTable 1. Baseline Demographics in the Model

Model Parameters	Value
Population	
General population	2 000 000
Prisoners	10 000
Proportion of inmates (2)	0.5%

Gender (Male%)		
Prisoners (2)	91%	
General population (4)	52%	
Prevalence of IDUs (6, 7)	Active IDUs	Former IDUs
In prisons	26%	20.5%
Outside of prisons	1.2%	1.3%
Birth-rate (18)		
Number of newborns per 1000 population per year	14.3	
Standardized mortality ratio (SMR)		
IDUs (10)	2.54	
Inmates (11)	0.85	

Abbreviations: IDU, injection drug user.

eTable 2. Baseline Age Distribution

Age Category	In General Population (4)		In Prisons (2, 5)	
	Female %	Male %	Female %	Male %
0-5	6.7	7.2	---	---
5-9	6.6	7.1	---	---
10-14	6.3	6.8	---	---
15-19	6.6	7.1	---	---
18-19	**---**	---	0.9	1.5
20-24	6.8	7.3	11.2	12.4
25-29	6.7	7.2	17.4	16.4
30-34	6.5	6.7	17.5	16.6
35-39	6.2	6.3	14.8	13.8
40-44	6.7	6.8	14.1	12.6
45-49	7.2	7.2	11.8	11.1
50-54	7.2	7.1	7	7.7
55-59	6.5	6.3	3.2	4.1
60-64	5.8	5.6	1.4	2.1
65-69	4.2	3.7	0.9	1.7
70-74	3.2	2.8	---	---
75-79	2.6	2.0	---	---
80-84	2.2	1.6	---	---
>85	2.0	1.2	---	---

eTable 3. Baseline Hepatitis C Prevalence

Model Parameters	Value	
HCV Prevalence by Age and Gender (12)	**Male**	**Female**
0-6	0.0093%	0.0093%
6-20	0.0498%	0.0498%

20-29	0.1231%	0.0704%
30-39	1.0523%	0.6023%
40-49	3.9494%	2.2604%
50-59	4.3334%	2.4801%
> 60	0.8069%	0.4618%
Overall	1.9798%	1.1331%
HCV prevalence among newborns (19)	0.0093%	
Hazard ratio of HCV prevalence in IDUs (back-calculation)	18	
Hazard ratio of HCV prevalence in inmates (back-calculation)	12	

Abbreviations: HCV, hepatitis C virus; IDU, injection drug user.

eTable 4. Baseline Hepatitis C Disease Distributions

Model Parameters	Value
HCV Genotype (14)	
G1	79.6%
G2	13.0%
G3	6.3%
G4	1.1%
Chronic Hepatitis C Disease Stage (15)	
METAVIR score F0	13.7%
METAVIR score F1	24.6%
METAVIR score F2	18.7%
METAVIR score F3	16.7%
METAVIR score F4	22.9%
Decompensated cirrhosis	3.1%
Hepatocellular carcinoma	0.3%
Proportion of Patients Aware of HCV Infection	
General population (20)	50.0%
Prisoners (21)	25.0%
Proportion of Treatment-Experienced Patients (22)	
Among all diagnosed patients	39.0%
Previous Treatment Response in Genotype 1 Patients (17)	
Prior relapse	53.0%
Prior partial response	19.0%
Prior null response	28.0%
Previous Treatment Response in Genotype 2/3/4 Patients (16)	
Prior relapse	47.0%
Prior partial response	16.0%
Prior null response	37.0%

Abbreviations: G1–4, genotype 1–4; METAVIR, Meta-analysis of histologic data in viral hepatitis; IDU, injection drug user.

S1.3 HCV Transmission

We modeled two kinds of HCV transmission, 1) IDU-related, and 2) everything else, separately in prisons and in the general population. We explicitly modeled IDU-related transmission in the model, which contributes to 60% of all HCV transmissions (23, 24). Because data on non-IDU transmission is limited, we did not simulate specific modes of transmission, and instead grouped them together.

At each month, we constructed links between agents to simulate HCV transmission among them and updated these links in every cycle. For that purpose, we probabilistically formed pairs between individuals. HCV-infected individual inside prisons could only pair with those inside prisons, and vice versa. IDUs had a higher probability of pairing with other IDUs, and vice versa. Note that we did not explicitly model sexual transmission in our model due to lack of data on the sexual behaviors and transmission rates.

Once a possible transmission pair was formed, an infected individual could transmit HCV to a susceptible individual with a probability, $P_{trans.}$ This transmission probability was dependent on: awareness of infector's HCV status, prior HCV treatment, and injection drug use status of both infector and infectee.

We calculated P_{trans} as follows:

$$P_{trans} = P_D \times (1 - A_I) \times (1 - T_I)$$

where P_D was:

$$P_D = 1 - (1 - P_0)^{D_I \times D_E}$$

A_1 was a reduction factor for infectors' HCV awareness status, T_I was a reduction factor for prior HCV treatment, D_I was the hazard ratio for injection drug use of an infector, and D_E was the hazard ratio for injection drug use of an infectee (eTable 5). Thus we differentiated agents by their prior treatment and HCV awareness in terms of their likelihood to be infected.

Because some transmission-related parameters are not known, we estimated their values using a calibration process (25). Particularly, we ran our simulation model with several possible combinations of three unknown variables: baseline transmission probability, IDU-IDU interaction probability, and hazard ratio of infection due to needle sharing (eTable 5) and selected the combination that matched the computer generated output with the known HCV incidence reported by the Center for Disease Control and Prevention (CDC) reports (26). This process is referred to as *calibration*, and has been applied to several disease models (27). We used the standard Calibration Reporting Checklist to define our calibration approach (27). These were defined as: 1) Target data and corresponding model output: 10-year cumulative incidence of HCV in IDUs; 2) Search algorithm: trial and error; 3) goodness of fit metric: relative distance of within 5%; 4) Acceptance criteria: within 5% of target value; 5) Stopping rule: manual; and 6) Validation: none. Our model projected the 10-year cumulative incidence of HCV in IDUs to be 179 700, which was

5% over that reported by the CDC. We assumed that the awareness of one's HCV status and a successful prior HCV treatment would reduce the contact probability by 50% and 70%, respectively. Our results were not sensitive to any of above parameters (see supplementary appendix 3 for details).

eTable 5. Transmission-Related Parameters

Transmission Probability per Contact (Assumed and Calibrated)	
Baseline transmission probability [a]	0.00015
IDU-IDU interaction probability [a]	98.8%
Hazard ratio of infection due to needle sharing (D_I or D_E) [a,b]	12
Awareness reduction factor (A_I) [c]	50%
Treatment reduction factor (T_I) [c]	70%

[a] Calibrated parameters

[b] Infection due to needle sharing occurs at the situation where an infected IDU pairs with a susceptible IDU.

[c] Assumptions: awareness of the disease would decrease the probability of transmitting HCV to others by 50%; and previous treatment history would decrease the probability of transmitting HCV to others by 70%.

Abbreviations: IDU, injection drug user.

S1.4 HCV Disease Progression

All newly infected individuals started with the acute phase of HCV. The acute infection lasted for six months and ended with either a recovery at 25% chance or otherwise advancement to the chronic phase of HCV disease (28). The natural history of chronic HCV was defined using a Markov model (Figure 1). The chronic disease progressed through different stages of fibrosis, as defined by Meta-Analysis of Histologic Data in Viral Hepatitis (METAVIR) scale units, F0 to F4. We used meta-regression equations from 111 studies to estimate the progression of fibrosis (29). Patients at METAVIR fibrosis score F3 and F4 could develop advanced diseases such as decompensated cirrhosis, hepatocellular carcinoma (28, 30-40). Patients with decompensated cirrhosis or hepatocellular carcinoma were eligible for receiving a liver transplant or they could die because of high liver-related mortality (eTable 6) (15, 41-44). We assumed that patients while inside prisons were not eligible for a liver transplant.

Disease progressed at the same rate for patients who failed to achieve SVR as in untreated patients. Those who achieved SVR were assumed to not progress if they were not cirrhotic. In cirrhotic patients, we assumed that the disease would progress even after achieving SVR, though at a slower rate (28).

eTable 6. Natural History Transition Probabilities

Model Parameters	Value
Equations Providing Fibrosis Progression Probabilities (Annual)(29)	
F0 to F1	$\exp[-2.0124 - (0.07589 \times duration) + (0.3247 \times 0.5) + (0.5063 \times f(\text{male})) + (0.4839 \times f(\text{G1}))]$
F1 to F2	$\exp[-1.5387 - (0.06146 \times duration) + (0.8001 \times f(excess\ alcohol))]$
F2 to F3	$\exp[-1.6038 + (0.0172 \times \text{age at HCV}) - (0.05939 \times duration) + (0.4539 \times 0.19)]$
F3 to compensated cirrhosis (F4)	$\exp[-2.2898 + (0.01689 \times \text{age at HCV}) - (0.03694 \times duration) + (0.5963 \times f(IDU)) + (1.1682 \times 0.31) - (0.4652 \times f(\text{G1}))]$
Transition Probabilities (Annual)	
F3 to hepatocellular carcinoma (30)	0.008
Compensated cirrhosis (F4) to decompensated cirrhosis (32)	0.039
Compensated cirrhosis (F4) to hepatocellular carcinoma (32)	0.014
SVR after cirrhosis to decompensated cirrhosis (28)	0.008
SVR after cirrhosis to hepatocellular carcinoma (28)	0.005
Decompensated cirrhosis to hepatocellular carcinoma (40)	0.068
Decompensated cirrhosis to liver transplant in general population (41, 45)	0.023
Decompensated cirrhosis to liver transplant inside prisons (Assumption)	0

Decompensated cirrhosis (first year) to liver-related death (40)	0.182
Decompensated cirrhosis (subsequent year) to liver-related death (40)	0.112
Hepatocellular carcinoma to liver transplant in general population (42, 43)	0.040
Hepatocellular carcinoma to liver transplant inside prisons (Assumption)	0
Hepatocellular carcinoma to liver-related death (32)	0.427
Liver transplant (first year) to liver-related death (44)	0.116
Liver transplant (subsequent year) to liver-related death (44)	0.044

215 *f*(male) = 1, if patient is male; and 0 if patient is female.

216 *f*(G1) = 1, if patient has hepatitis C virus (HCV) genotype 1; and 0 otherwise.

217 *f*(excess alcohol) = 1, if patients has excess alcohol consumption; and 0 otherwise. The prevalence of excess alcohol
218 consumption was 24% for male inmates, 17% for female inmates, and 23% for general population (46).

219 *f*(IDU) = 1, if patients are active injection drug users; and 0 otherwise.

220 Abbreviations: SVR, sustained virology response; METAVIR, meta-analysis of histologic data in viral hepatitis; F0–F4,
221 METAVIR fibrosis score.

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S1.5 HCV Diagnosis and Treatment

Inside prisons, patients could get diagnosed with the implementation of one of the four screening scenarios. In risk-based screening scenario, we assumed that 75% of prisoners with active IDU or IDU history received HCV screening (eTable 7) (47). Our assumption is based on the Arrestee Drug Abuse Monitoring (ADAM) jail study, in which even when detainees were told that a survey on drug use will be confidential and the survey will be followed by urine testing, only 50% with opiates in urine disclosed their IDU. We conservatively assumed that 75% of IDU would admit to using drugs (our assumption favored risk-based screening, and hence provided a conservative estimate of ICERs of opt-out screening). In all opt-out screening scenarios, we assumed that the uptake rate was 90%, similar to that of HIV opt-out screening in prisons (48). We also assumed that all HCV tests were 100% sensitive and 100% specific, and HCV-infected chronic persons aware of their status would not be screened because their status wouldn't change without treatment.

Outside prisons, patients could get diagnosed following the current standard-of-care of HCV screening, which included birth-cohort screening, risk-based screening, and usual care (49, 50). We implemented the standard-of-care by probabilistically making unaware patients aware of their disease. We used a previously published study to implement the screening practice in the general community (eTable 7) (22).

Only patients who were aware of their status could get antiviral treatment. Following the current clinical practice (51), our model assigned treatment to patients with METAVIR fibrosis score F3 and F4. We assumed that F0-F2 patients would receive APRI test every year and become eligible for treatment if they advanced to F3 state. According to the recent guidelines by Federal Bureau of Prison, HCV patients with APRI score > 1.0 or between 0.7 and 1.0 are prioritized for treatment (52). The cost of APRI is negligible and was not included. With the availability of cheaper generic drugs in 2030, we assumed that all patients irrespective of their fibrosis scores would get antiviral treatment (53). Furthermore, inside prisons, only inmates with remaining length of sentence of more than 12 months were eligible for treatment. We ran alternative scenario where all HCV positive, F0 to F4, were eligible for treatment if their length of sentence was more than 12 months (eTable 20).

Because of a limited treatment capacity in prisons, eligible patients were assigned treatment based on a published study—2.6% per month for patients in community and 4.1% per month for inmates (54). The probability of initiating treatment was higher in prisons because of better linkage to care than in the community (54). We also simulated a hypothetical scenario where every eligible candidate was treated at diagnoses (eTable 21).

We estimated the proportion of diagnosed HCV patients who were eligible for treatment with oral DAAs. In prisons, 11.5% inmates had contraindications to antiviral treatment and 8.5% inmates

declined treatment (55, 56). Therefore, 80% of the diagnosed prisoners were eligible for treatment. In the general community, we assumed 74.3% of the patients were eligible for treatment with oral DAAs, which also took into account access to insurance (57, 58).

We used the AASLD-IDSA guidelines to assign therapies to individuals according to their HCV genotype, treatment history, and presence of cirrhosis (51). Efficiency data and duration of each therapy were extracted from published clinical trials (eTable 8). Because the treatment recommendations are in flux and being updated frequently, we used the efficacy data from sofosbuvir-based therapies as a reference (59-66). Most of the recently approved regimens reported similar efficacy data; therefore, other results and conclusions are applicable to all oral therapies. We assumed that patients who failed to achieve SVR are eligible for another treatment after a gap of 6 months. We restricted the number of retreatments after failing to achieve SVR to a maximum of 2 times. SVR rates of 2nd re-treatment were assumed to be identical to that of 1st re-treatment.

eTable 7. Probability of Getting Diagnosed for Inmates and General Population

Model Parameters	Value
Uptake Rate of HCV Testing inside Prison	
Risk-based (47)	75%
Opt-out (48)	90%
Probability of Becoming Aware of HCV under Standard-of-care by Disease Stage (Annual) (22)	
METAVIR score F0	0.03700
METAVIR score F1	0.02971
METAVIR score F2	0.04218
METAVIR score F3	0.04604
METAVIR score F4	0.16259

We assumed that all patients with decompensated cirrhosis and hepatocellular carcinoma would be aware of their disease.

Abbreviations: METAVIR, meta-analysis of histologic data in viral hepatitis; F0–F4, METAVIR fibrosis score.

eTable 8. Treatment Duration and Sustained Viral Response (SVR) Rates of oral DAAs by Virus Genotype, Disease States, and Treatment History.

Simplified regimens are generated according to AASLD/IDSA-Recommended Therapies.

Virus Genotype	Duration (Weeks)	SVR Rates Non-Cirrhosis (F1-F3)	SVR Rates Cirrhosis (F4)	Ref.
Treatment-Naïve Patients				
G1	8/12[a]	97%	97%	(59, 60)
G2	12	97%	83%	(61)
G3	24	94%	92%	(62)

G4	24	92%	92%	(63)
Treatment-Experienced Patients				
G1	12/24 [b]	95%	99%	(64)
G2	12	96%	60%	(65)
G3	24	85%	60%	(62)
G4	12	95%	95%	(66)

Abbreviations: DAA, Direct Antiviral Agents; AASLD, American Association for the Study of Liver Diseases; IDSA, Infectious Diseases Society of America; G1–4, genotype 1–4; METAVIR, meta-analysis of histologic data in viral hepatitis; F0-F4, METAVIR fibrosis score; SVR, sustained virologic response.

[a] In non-cirrhotic treatment-naïve patients, the duration of oral DAAs depends on patient's baseline HCV RNA. Those with HCV RNA less than 6 million IL/mL are considered for 8 weeks of treatment, and 12 weeks otherwise. Among this patient group, 57% of patients were eligible for 8 weeks of treatment.

[b] Patients with cirrhosis were assigned 24 weeks of treatment.

S1.6 Arrest and Release of Prisoners

We simulated movement of people from community to prisons and vice versa. At each cycle, agents in our model could get arrested with some probability. We estimated the baseline crime probabilities separately for people with and without incarceration history using the BJS data and published surveys (eTable 9) (67-70). We estimated the length of sentence from BJS reports (5). Because the *actual* length of stay in prisons is typically less than the *assigned* length of sentence, we estimated the *actual* stay in prison by adjusting for the proportion of the assigned sentence completed (eTable 10) (71). We assumed that patients with hepatocellular carcinoma or after a liver transplant have 50% less likelihood to commit a crime and get arrested. In addition, we assumed that people below the age 14 or over 70 would not get arrested. After completing the assigned duration of sentence, inmates would transition in the community.

eTable 9. Probability of Incarceration

Model Parameters				Value
Probability of Incarceration for Individuals without Incarceration History (Monthly) (67-69)				
Age				**Probability**
18-19				0.000234
20-24				0.00083
25-29				0.000978
30-34				0.001034
35-39				0.000916
40-44				0.000806
45-49				0.000519
50-54				0.000312
55-59				0.000187
60-64				0.000115
65-70				4.12E-05
Probability of Incarceration for Individuals within 36 Months after Release (Monthly) (70)				
Age at Release	**Probability (By Months after Release)**			
	0-6 months	6-12 months	12-24 months	24-36 months
18-24	0.00986	0.00534	0.00415	0.00218
25-29	0.00879	0.00475	0.0037	0.00194
30-34	0.00846	0.00458	0.00356	0.00187
35-39	0.00784	0.00424	0.0033	0.00173
40-44	0.00599	0.00324	0.00252	0.00132
45 or older	0.00553	0.00299	0.00233	0.00122

eTable 10. Length of Sentence

Model Parameters	Value

Sentence Length (Years) at Admission (5)	Proportion
<2	13.70%
2-4	43.50%
5-9	24.40%
10-19	12.30%
20-49	4.10%
50-99	0.40%
100	0.10%
Life/death	1.50%
Assigned Length of Sentence at Admission(71)	**Actual Length served (% of assigned length)**
<3 months	90%
3-12 months	80%
1-3 years	70%
3-7 years	60%
>7 years	50%

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S1.7 Injection Drug Use

We modeled a dynamic change in behavior with respect to injection drug use. Active IDUs could stop injecting drugs. Similarly, inactive IDUs or persons between age 15 and 50 with no history of injecting drugs could start injecting drugs. In our model, we assigned probabilities of initiating and quitting injection drugs per month. We assumed that non-IDUs who have IDU history would have a higher probability of resuming drug use than those who did not have any IDU history. Because these parameters are not known and difficult to estimate in real life, we used a calibration process to estimate their values. We ran our model with several combinations of these unknown parameters. We selected the combination that kept the number of active and former IDUs stable over time, and also matched model's projected annual incidence of drug use with the reported value of 0.115% per person-year (72). During our calibration process, we assumed that the number of IDUs remain stable over time because some active IDU would stop injecting and other inactive IDUs could start injecting. The estimated monthly probabilities of initiating and quitting injection drugs were 0.00885% and 0.558%. The corresponding annual probabilities were 0.106% and 6.494%. The hazard ratio of initiating IDU in persons with IDU history equal to 20. The standard Calibration Reporting Checklist is defined as: 1) Target data and corresponding model output: annual incidence of drug use of 0.115% per person-year; 2) Search algorithm: trial and error; 3) goodness of fit metric: relative distance of within 5%; 4) Acceptance criteria: within 5% of target value; 5) Stopping rule: manual; and 6) Validation: our calibrated model was further validated by comparing the prevalence of active IDUs from model with known studies (6, 7). We found that the prevalence of IDUs remained stable at 26% inside prisons and at 1.2% in the general community.

S1.8 Cost and Quality-of-Life Weights

Cost-related model parameters included HCV screening costs, antiviral treatment costs, and chronic hepatitis C management costs.

The cost of HCV screening consisted of the costs of anti-HCV antibody test, HCV RNA test, HCV genotype assay and FibroSure test (eTable 11) (73, 74). Persons who tested positive on anti-HCV antibody test were given HCV-RNA test, and among those who were viremic were tested for HCV genotype. To determine treatment eligibility, we assumed that all viremic persons got FibroSure test to determine their fibrosis stage. We assumed that F0-F2 patients would receive APRI test every year, and the cost of APRI is negligible and was not included (52).

The cost of antiviral treatment was determined by the duration and combination of drug regimens, which was dependent on patient's HCV genotype, prior treatment history, and fibrosis stage (eTable 8). We used the weekly wholesale acquisition costs (WAC) of sofosbuvir-based regimens in the base case, and conducted sensitivity analyses using 46% discount of WAC and the average wholesale price (eTable 11) (75-77). Average wholesale price was assumed to be 20% higher than the WAC. HCV treatment is influx and several alternatives are available (and more will be available in future); however, our base case results are applicable to alternative therapies as well because they are priced similar to sofosbuvir-based treatments.

We assigned health-related quality-of-life (QOL) weights to each person, which were dependent on liver health, age, sex and injection drug use (eTable 14). We assumed the QOL of patients who achieved SVR were equivalent to uninfected people if they had F0 or F1 METAVIR scores, and worse than healthy people, otherwise.

eTable 11. Cost Parameters (In 2014 US Dollars)

Model Parameters	Value ($)
HCV Management Costs (Annual)	
F0, F1 (78, 79)	720
F2 (78, 79)	732
F3 (78, 79)	1500
Compensated cirrhosis (F4) (79)	1740
Decompensated cirrhosis (79)	19 380
Hepatocellular carcinoma (79)	35 652
Liver transplant, first year (79)	105 269
Liver transplant, subsequent year (79)	27 060
HCV Test Costs (1-time)	
HCV ELISA test (anti-HCV antibody test) (73)	33

Quantitative HCV RNA (73)	92
HCV Genotype assay (73)	408
FibroSure test (74)	250
Cost per case identified outside prisons (22)	2873
HCV Treatment Costs (Weekly) (75)	
Ribavirin	309
Sofosbuvir	7000
Ledipasvir	1125

Abbreviations: SVR, sustained virology response; METAVIR, meta-analysis of histologic data in viral hepatitis; F0–F4, METAVIR fibrosis score; HCC, hepatocellular carcinoma; ELISA, enzyme-linked immunosorbant analysis; SVR, sustained viral response.

eTable 12. Health-Related and Age-Related Quality-of-Life Inputs

Model Parameters	Value	
Health-Related Quality-of-Life Weights		
METAVIR score F0, F1 (80)	0.93	
METAVIR score F2, F3 (80)	0.93	
Compensated cirrhosis (METAVIR score F4) (80)	0.90	
Decompensated cirrhosis (80)	0.80	
Hepatocellular carcinoma (80)	0.79	
Liver transplant (first year) (80)	0.84	
Liver transplant (subsequent year) (80)	0.84	
Post SVR (F0-F1) (Assumption)	1.00	
Post SVR (F2-F4) (Assumption)	0.93	
Antiviral therapy multiplier, no anemia (81)	0.90	
Antiviral therapy multiplier, anemia	0.95	
Anemia multiplier (82)	0.83	
Active injection drug use multiplier (72, 83)	0.83	
Former injection drug use multiplier	1.00	
Age-Related Quality-of-Life Weights (84)		
Age Group	Male	Female
0–29	0.928	0.913
30–39	0.918	0.893
40–49	0.887	0.863
50–59	0.861	0.837
60–69	0.84	0.811
70–79	0.802	0.771
>80	0.782	0.724

Abbreviations: METAVIR, meta-analysis of histologic data in viral hepatitis; F0-F4, METAVIR fibrosis score; SVR, sustained virologic response.

Supplementary Appendix 2: Model Validation

S2.1 Natural History of HCV

To validate the natural history of our model, we compared the intermediate model outcomes with a large clinical study of HCV disease progression (85). We ran a submodel with the natural history Markov chain in patients with similar demographic and health characteristics (mean age 48; fibrosis score: F3, 27% and F4, 74%; SVR and no SVR) as included in the clinical study. We compared our model's 10-year projected incidence rates of decompensated cirrhosis, hepatocellular carcinoma and liver-related death/liver transplantation with the reported values (eTable 13) (85). The projected incidence rates were within the reported 95% confidence intervals, except for that the model underestimated 10-year cumulative incidence of decompensated cirrhosis in patients who failed to achieve SVR.

eTable 13. Validation of the Natural History of HCV

Initial Treatment Response	Subsequent Liver Complication	10-year Cumulative Incidence	
		van der Meer et al.	Model Prediction
Patients who did not achieve SVR	DC	29.9% (95% CI: 24.3–35.5%)	23.9%
	HCC	21.8% (95% CI: 16.6–27.0%)	22.3%
	LRD plus LT	27.4% (95% CI: 22.0–32.8%)	26.5%
Patients who achieved SVR	DC	2.1% (95% CI: 0–4.5%)	1.4%
	HCC	5.1% (95% CI: 1.3–8.9%)	3.7%
	LRD plus LT	1.9% (95% CI: 0–4.1%)	3.6%

Abbreviations: SVR, sustained virologic response; DC, decompensated cirrhosis; HCC, hepatocellular carcinoma; LRD, liver-related death; LT, liver transplant; CI, confidence interval.

S2.2 Arrest and Release of Prisoners

We performed external validation by comparing our model's projected number of admissions to prisons with BJS data (71, 86, 87). Specifically, we compared the admission turnover rate, which is the ratio of the number of new court commitments during a year, divided by the total sentenced prisoners at the end of last year. The predicted admission turnover rates were between 28—30%, which matched with reference value. Because BJS reports provide data until year 2012, we started our model in year 2009 to validate our model's projected number of admissions and releases during 2009–2012 (eTable 14).

eTable 14. Validation of Admission and Release of Prisoners

	BJS reports(5, 67, 86, 87)		Model prediction	
Year	Total Prison Population	Arrest Turnover Rate [a]	Total Prison Population	Arrest Turnover Rate
2009	1 615 487	29.40%	1 602 300	28.11%
2010	1 613 803	28.40%	1 602 895	29.31%
2011	1 598 968	28.43%	1 618 621	29.26%
2012	1 570 397	28.31%	1 645 211	29.70%

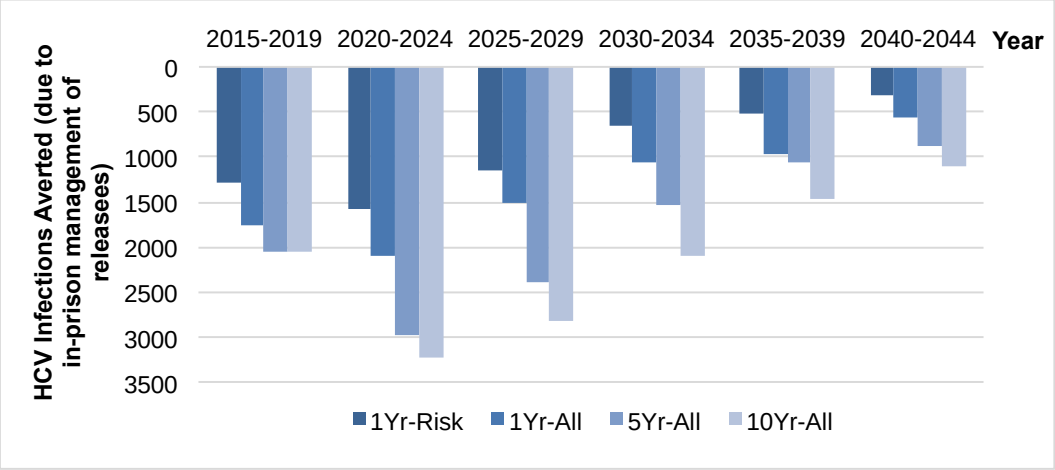
[a] Arrest turnover rate is calculated by dividing number of arrested prisoners during year X by total prison population at the end of year (X-1).

Abbreviations: BJS, bureau of justice statistics.

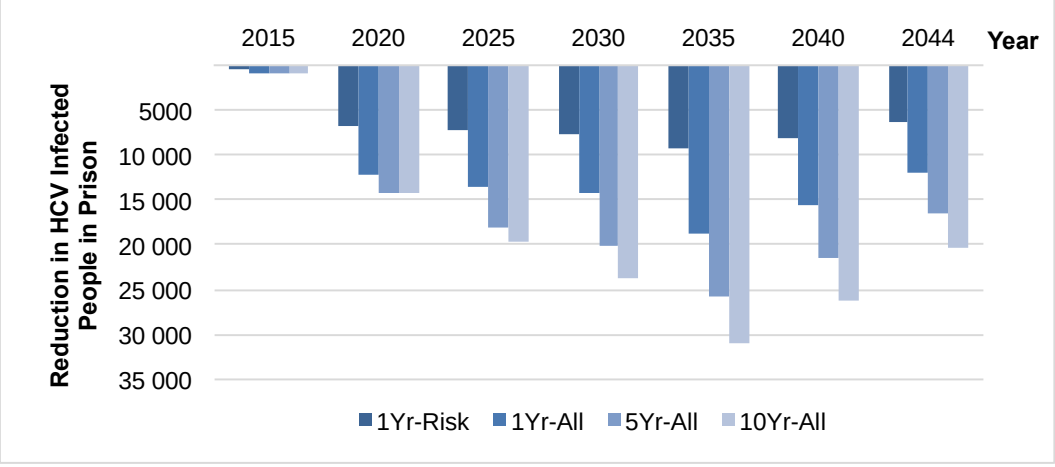
Supplementary Appendix 3: Additional Results

S3.1 Additional Base-case Results

Our model projected that the number of HCV infections averted would peak between 2020 and 2024 and decline afterwards (eFigure 1). Interventions in prisons would reduce the number of HCV-infected people in prisons over time, and the benefits of screening will peak around year 2035 and decline afterwards (eFigure 2).



eFigure 1. HCV Infections Averted over Time

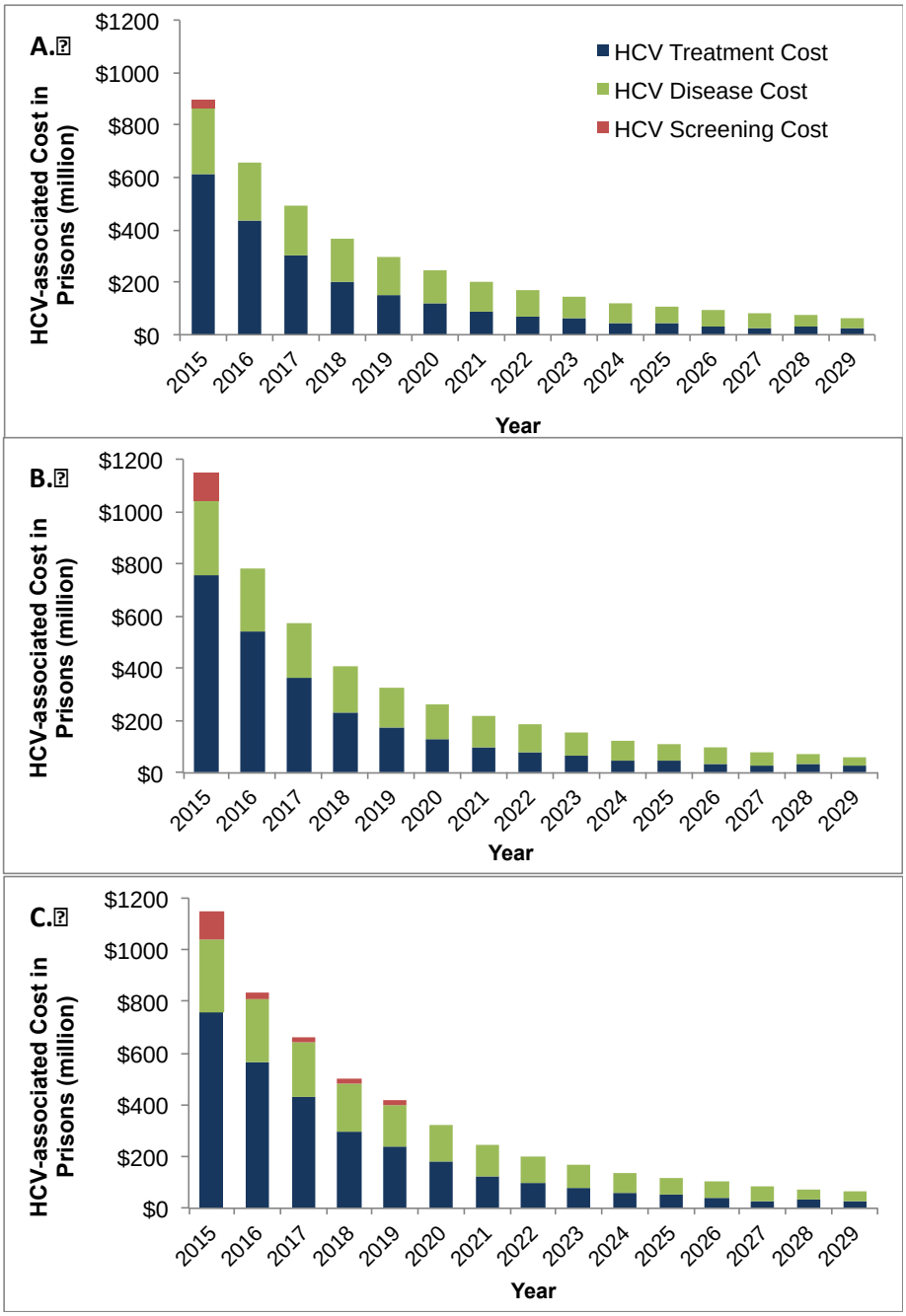


eFigure 2. Reduction in HCV Infected People in Prison over Time

Budget Impact on Prison System

We estimated the budget needed to treat HCV patients for all screening scenarios and compared it with the current healthcare spending in US prisons. Total Federal and state prisons spending in 2014 Dollar was estimated at $54.72 and $6.86 billion, respectively (88, 89). Of the total prison budget, 15%–17.7% was spent of healthcare, which is $9.24–$10.88 billion. Therefore, the

first-year budget needed to implement risk-based and opt-out screening followed by treatment with DAAs would require an additional 9.7% and 12.4% over the current healthcare budget, respectively.



eFigure 3. Total Cost of HCV Screening and Treatment in Prisons from 2015 to 2029. The budget needed to screen, treat HCV infection, and manage chronic hepatitis C in prisons under (A) 1-time risk-based screening of currently incarcerated and entrants who were active or former IDUs for 1 year (1Yr-Risk), (B) 1-time opt-out universal screening of currently

incarcerated inmates and entrants for 1 years (1Yr-All scenario), and (C) for 5-years (5-Yr-All scenario).

S3.2 Sensitivity Analyses

We ran 1-way sensitivity analysis on a total of 64 model parameters. We presented new infections averted, liver-related deaths averted, ICERs, 1-year and 15-year prison budget impact for different screening scenarios (eTables 15–19).

eTable 15. Results of 1-Way Sensitivity Analysis Showing New Infections Averted

Parameter	Value (Low / High)	New Infections	New Infections Averted[a] (Compared with No Screening)			
		No Screening	1Yr-Risk	1Yr-All	5Yr-All	10Yr-All
Base Case		**166 084**	**5508**	**8041**	**11 001**	**12 603**
Transition Probabilities (Annually)						
F0 to F1[b]	0.104	**167 911**	6088	7965	11 230	13 000
	0.130	**168 113**	6683	9430	11 627	13 748
F1 to F2[b]	0.075	**169 429**	6134	8011	11 459	13 458
	0.096	**167 415**	6164	9063	11 612	13 824
F2 to F3[b]	0.109	**165 710**	5813	8362	11 795	13 153
	0.133	**163 490**	6531	8835	11 337	12 924
F3 to compensated cirrhosis (F4)[b]	0.104	**163 921**	5340	8346	11 566	13 122
	0.129	**161 937**	5279	7950	11 032	12 695
F3 to hepatocellular carcinoma	0.003	**168 487**	5951	9262	11 795	13 748
	0.014	**164 672**	5676	9109	11 017	13 137
Compensated cirrhosis (F4) to decompensated cirrhosis	0.010	**170 596**	6027	8240	11 017	12 726
	0.039	**164 302**	5707	8423	10 635	12 466
Compensated cirrhosis (F4) to hepatocellular carcinoma	0.010	**172 054**	6454	8987	12 191	13 809
	0.079	**156 482**	5890	8041	11 047	12 634
Decompensated cirrhosis to hepatocellular carcinoma[2]	0.030	**166 664**	5356	7873	10 833	12 893
	0.083	**166 549**	5661	8835	11 368	12 878
Decompensated cirrhosis to liver transplant[2]	0.010	**166 301**	6668	8575	11 535	13 168
	0.062	**166 770**	6470	7339	11 245	13 244
Decompensated cirrhosis (first year) to liver-related death[2]	0.065	**167 224**	5752	9033	11 886	13 153
	0.190	**166 744**	6073	9155	11 642	13 397
Decompensated cirrhosis (subsequent year) to liver-related death	0.065	**167 713**	5890	8636	11 535	13 534
	0.190	**164 558**	6454	8301	11 383	12 939
Hepatocellular carcinoma to liver transplant	0.000	**164 840**	6103	7858	10 818	12 298
	0.140	**168 693**	5600	9002	11 596	13 229
Hepatocellular carcinoma to liver-related death	0.330	**167 453**	5478	7614	10 910	12 527
	0.860	**162 632**	5340	8453	10 254	12 405

Liver transplant (first year) to	0.060	**166 652**	6134	8438	10 910	13 107
liver-related death	0.420	**165 668**	6027	8178	11 825	13 290
Liver transplant (subsequent	0.024	**166 782**	5417	8117	11 413	12 970
year) to liver-related death	0.110	**165 657**	5447	7965	11 078	13 031
SVR after cirrhosis to	0.002	**166 084**	5508	8041	11 001	12 603
decompensated cirrhosis	0.036	**169 345**	5920	8819	10 772	12 573
SVR after cirrhosis to	0.002	**166 080**	6042	8301	11 963	13 626
hepatocellular carcinoma	0.013	**167 327**	6821	8926	11 764	13 992
Agent's Behavior Inputs						
Uptake rate of HCV testing in	0.5	**166 084**	3860	8041	11 001	12 603
prison under risk-based scenario	1.0	**166 084**	7492	8041	11 001	12 603
Uptake rate of HCV testing in prison under opt-out scenarios	0.8	**166 084**	5508	6836	9903	11 657
	1	**166 084**	5508	8713	11 535	13 092
F0 HCV diagnosis probability	0.02787	**167 842**	6424	8346	11 352	13 214
	0.04606	**165 615**	5997	8911	11 276	13 260
F1 HCV diagnosis probability	0.02236	**167 980**	5524	8453	10 818	12 603
	0.03702	**164 844**	6012	8285	10 727	12 375
F2 HCV diagnosis probability	0.03179	**168 739**	6103	8468	11 261	12 848
	0.05246	**164 108**	5936	8133	10 177	12 573
F3 HCV diagnosis probability	0.03471	**169 002**	6286	8911	11 581	13 717
	0.05724	**164 535**	5432	8240	10 681	12 451
F4 HCV diagnosis probability	0.12439	**169 147**	6515	8621	11 810	13 702
	0.19926	**163 982**	5661	8117	10 742	11 932
Probability of quitting IDU	0.004967	**174 628**	6744	9933	12 329	14 465
(monthly)	0.006655	**156 421**	5264	7400	9689	11 368
Treatment initiation probability	0.036	**166 687**	5569	8529	11 413	13 153
per month (prisoners) [2]	0.046	**166 629**	6180	8484	11 764	13 733
Treatment initiation probability	0.023	**167 709**	6149	8102	11 154	12 741
per month (general population)	0.029	**164 867**	5981	8575	11 337	13 076
Baseline crime probability	10% decrease	**170 219**	5035	7171	9292	10 833
	10% increase	**162 204**	5386	8957	11 520	13 427
HCV transmission probability	0.00005	**93 088**	3158	4761	6241	6775
	0.00025	**255 254**	9979	13 412	17 578	21 087
Awareness reduction factor	0.25	**208 632**	4715	6485	8316	10 711
	0.75	**126 118**	7568	10 208	13 794	15 518
Treatment reduction factor	0	**167 987**	6470	9140	12 039	13 824
	1	**165 912**	6180	7980	11 352	13 290
HCV-associated Agent Characteristics						
HCV prevalence among newborn	0.000061	**166 213**	6195	9262	11 673	13 565
	0.00018	**166 816**	5844	9216	11 581	13 534

Proportion of patients aware of HCV infection (General population)	25%	**193 736**	6592	9521	13 290	15 289
	75%	**139 408**	4455	6500	9109	10 284
Proportion of patients aware of HCV infection (Prisoners)	10%	**169 200**	6775	9475	12 466	13 412
	50%	**161 838**	5356	6576	8682	10 025
Proportion of treatment-experienced patients initially[2]	0.29	**166 538**	5432	7248	10 696	12 359
	0.49	**167 392**	6180	9063	11 612	13 305
Proportion of diagnosed patients eligible for treatment	Community: 30%, Prisons: 47%	**169 868**	5279	7278	10 299	11 947
	Community: 50%, Prisons: 78%	**158 565**	5951	8621	10 483	13 092
Additional treatment eligibility with interferon-free regimen	0.12975	**168 510**	5463	8896	10 650	12 878
	0.21625	**164 661**	6164	8377	11 200	13 412
Miscellaneous						
Drug price	46% discount of WAC	**166 084**	5508	8041	11 001	12 603
	AWP	**166 084**	5508	8041	11 001	12 603
Self-clearance probability after acute infection	0.23	**167 140**	5752	8545	11 352	13 092
	0.28	**165 176**	6470	8728	11 749	13 275
SMR of inmates	0.77	**166 851**	6134	8377	12 115	13 687
	0.94	**165 946**	5813	8148	11 306	13 199
SVR rates of oral DAAs	0% decrease	**166 084**	5508	8041	11 001	12 603
	15% decrease	**166 477**	6225	8529	10 910	13 549
Generic drug availability year	2025	**162 021**	6271	8438	11 520	13 595
	2032	**167 743**	5600	8117	10 925	12 436
Time horizon	20 years	**143 818**	4776	6439	9018	10 132
	40 years	**175 273**	5859	8453	11 581	13 549

[a] Infections averted in comparison with no screening were presented in the sensitivity analysis. Because the overall number of infections under no screening also changed for each parameter in the sensitivity analysis, the relative number of infections averted in the base case may not necessarily remain within the range obtained by low or high parameter values. Second, the trends may look inconsistent if the results obtained by low and high parameters are directly compared to each other. Third, because of small differences across strategies, results could be influenced by first-order uncertainty that could result in inconsistent trends.

[b] In the base case, we simulated fibrosis progression by using regression equations (eTable 6); however, for 1-way sensitivity analysis, we used fixed upper and lower values of fibrosis progression instead of equations.

Abbreviations: DAA, direct anti-viral agent; HCV, hepatitis C virus; METAVIR, meta-analysis of histologic data in viral hepatitis; F0-F4, METAVIR fibrosis score; SVR, sustained virologic response; SMR, standardized mortality ratio; WAC, wholesale acquisition cost; AWP, average wholesale price.

eTable 16. Results of 1-Way Sensitivity Analysis Showing Liver-Related Deaths Averted

Parameter	Value (low / high)	Liver-Related Deaths	Liver-Related Deaths Averted[a] (Compared with No Screening)			
		No Screening	1Yr-Risk	1Yr-All	5Yr-All	10Yr-All
Base Case		**780 803**	**4303**	**7950**	**10 360**	**11 734**
Transition Probabilities (Annually)						
F0 to F1[b]	0.104	**769 088**	3891	6775	9247	10 406
	0.130	**774 909**	4013	7614	10 116	11 123
F1 to F2[b]	0.075	**759 666**	3982	7309	9353	10 666
	0.096	**775 767**	4379	7522	10 025	11 413
F2 to F3[b]	0.109	**801 367**	4791	8377	11 368	12 695
	0.133	**822 370**	4700	8941	11 657	13 046
F3 to compensated cirrhosis (F4)[b]	0.104	**853 310**	4700	8194	11 169	12 573
	0.129	**882 694**	4425	8499	11 322	12 680
F3 to hepatocellular carcinoma	0.003	**745 964**	4120	8072	10 025	11 398
	0.014	**818 029**	4852	8575	10 833	12 466
Compensated cirrhosis (F4) to decompensated cirrhosis	0.010	**683 973**	3845	6912	9140	10 299
	0.039	**818 594**	4715	8407	11 291	12 909
Compensated cirrhosis (F4) to hepatocellular carcinoma	0.010	**689 046**	3616	6119	8545	9811
	0.079	**896 320**	6027	10 147	13 733	16 006
Decompensated cirrhosis to hepatocellular carcinoma	0.030	**776 164**	4379	7995	10 376	11 902
	0.083	**780 165**	4394	7767	10 345	11 642
Decompensated cirrhosis to liver transplant	0.010	**787 032**	4440	7965	10 803	12 191
	0.062	**764 381**	4639	8133	10 696	11 932
Decompensated cirrhosis (first year) to liver-related death	0.065	**789 134**	4455	8133	10 849	11 963
	0.190	**780 249**	4639	8209	10 803	12 100
Decompensated cirrhosis (subsequent year) to liver-related death	0.065	**773 673**	4227	7538	10 223	11 673
	0.190	**778 727**	4806	8590	11 093	12 680
Hepatocellular carcinoma to liver transplant	0.000	**790 663**	4822	7889	10 620	11 917
	0.140	**758 064**	4318	7675	10 010	11 306
Hepatocellular carcinoma to liver-related death	0.330	**782 782**	4150	7507	9948	11 306
	0.860	**765 884**	3799	7767	10 452	12 115
Liver transplant (first year) to liver-related death	0.060	**779 445**	4593	8270	11 017	12 527
	0.420	**787 440**	4791	7919	10 986	12 100
Liver transplant (subsequent year) to liver-related death	0.024	**767 078**	4227	7599	10 742	12 054
	0.110	**799 498**	4455	8148	10 894	12 146
SVR after cirrhosis to	0.002	**780 803**	4303	7950	10 360	11 734

decompensated cirrhosis	0.036	**949 728**	3189	6058	8224	9430
SVR after cirrhosis to	0.002	**755 481**	4745	8377	11 261	12 771
hepatocellular carcinoma	0.013	**841 828**	4089	7431	9887	11 017
Agent's Behavior Inputs						
Uptake rate of HCV testing in	0.5	**780 803**	2716	7950	10 360	11 734
prison under risk-based scenario	1.0	**780 803**	5859	7950	10 360	11 734
Uptake rate of HCV testing in	0.8	**780 803**	4303	6851	9613	11 169
prison under opt-out scenarios	1	**780 803**	4303	8514	11 749	13 092
F0 HCV diagnosis probability	0.02787	**781 165**	4593	7980	10 498	12 008
	0.04606	**780 158**	4181	7965	9964	11 612
F1 HCV diagnosis probability	0.02236	**781 443**	4349	8148	10 345	12 069
	0.03702	**779 856**	4486	7614	10 254	11 963
F2 HCV diagnosis probability	0.03179	**782 145**	4013	7767	9842	11 474
	0.05246	**778 727**	4394	7767	10 269	11 520
F3 HCV diagnosis probability	0.03471	**785 788**	4852	8606	11 459	12 939
	0.05724	**776 294**	4181	8041	10 421	11 795
F4 HCV diagnosis probability	0.12439	**793 284**	4776	8682	11 612	13 122
	0.19926	**771 785**	4379	7263	9521	10 833
Probability of quitting IDU	0.004967	**780 894**	4639	7843	10 772	12 283
(monthly)	0.006655	**780 238**	3693	7583	9948	11 368
Treatment initiation probability per	0.036	**780 871**	4013	7446	10 208	11 490
month (prisoners)	0.046	**780 741**	4486	8255	10 879	12 451
Treatment initiation probability per	0.023	**789 542**	4654	8011	10 528	11 581
month (general population)	0.029	**773 292**	4425	7995	10 498	11 795
Baseline crime probability	10% decrease	**781 066**	3616	6485	8301	9353
	10% increase	**779 990**	5569	9781	12 283	13 961
HCV transmission probability	0.00005	**769 477**	3769	7171	9353	10 421
	0.00025	**792 044**	4944	8117	11 154	13 061
Awareness reduction factor	0.25	**785 887**	4654	7675	10 650	12 176
	0.75	**775 844**	5081	8133	10 696	11 947
Treatment reduction factor	0	**780 772**	4394	7721	10 605	12 115
	1	**780 410**	3998	7583	10 269	11 444
HCV-associated Agent Characteristics						
HCV prevalence among newborn	0.000061	**780 375**	4593	7751	10 528	12 039
	0.00018	**781 245**	4349	8117	10 620	12 039
Proportion of patients aware of	25%	**836 175**	5661	9826	12 695	14 846
HCV infection (General population)	75%	**733 547**	4135	6866	9231	10 345
Proportion of patients aware of	10%	**782 733**	5066	8941	11 810	12 954

HCV infection (Prisoners)	50%	**776 309**	3967	6897	8835	9933
Proportion of treatment-experienced patients initially	0.29	**793 234**	4684	8240	11 017	12 603
	0.49	**776 626**	4440	7889	10 635	11 963
Proportion of diagnosed patients eligible for treatment	Community: 30%, Prisons: 47%	**771 232**	3860	6378	8743	9857
	Community: 50%, Prisons: 78%	**725 773**	5249	9460	12 649	14 221
Additional treatment eligibility with interferon-free regimen	0.12975	**800 394**	4333	7431	10 193	11 474
	0.21625	**759 658**	4715	8468	11 123	12 451
Miscellaneous						
Drug price	46% discount of WAC	**780 803**	4303	7950	10 360	11 734
	AWP	**780 803**	4303	7950	10 360	11 734
Self-clearance probability after acute infection	0.23	**781 577**	4516	7904	10 620	12 207
	0.28	**779 265**	4745	7767	10 559	11 932
SMR of inmates	0.77	**781 459**	4364	8514	11 001	12 542
	0.94	**780 467**	4639	8636	10 544	11 871
SVR rates of oral DAAs	0% decrease	**780 803**	4303	7950	10 360	11 734
	15% decrease	**781 092**	4455	8178	10 803	12 298
Generic drug availability year	2025	**779 265**	4257	8072	10 437	11 902
	2032	**781 050**	4211	7995	10 254	11 779
Time horizon	20 years	**645 914**	3616	6195	7904	8728
	40 years	**841 813**	4867	8453	11 596	13 321

[a] Liver-deaths averted in comparison with no screening were presented in the sensitivity analysis. Because the overall number of liver-deaths under no screening also changed for each parameter in the sensitivity analysis, the relative number of liver-deaths averted in the base case may not necessarily remain within the range obtained by low or high parameter values. Second, the trends may look inconsistent if the results obtained by low and high parameters are directly compared to each other. Third, because of small differences across strategies, results could be influenced by first-order uncertainty that could result in inconsistent trends.

[b] In the base case, we simulated fibrosis progression by using regression equations (eTable 6); however, for 1-way sensitivity analysis, we used fixed upper and lower values of fibrosis progression instead of equations.

Abbreviations: DAA, direct anti-viral agent; HCV, hepatitis C virus; METAVIR, meta-analysis of histologic data in viral hepatitis; F0-F4, METAVIR fibrosis score; SVR, sustained virologic response; SMR, standardized mortality ratio; WAC, wholesale acquisition cost; AWP, average wholesale price.

eTable 17. Results of 1-Way Sensitivity Analysis Showing the Cost-effectiveness of Screening Strategies

Parameter	Value (low /	Probability of Cost-effectiveness in 40 runs (%)[b]

	high)	No-Screening	1Yr-Risk	1Yr-All	5Yr-All	10Yr-All
Base Case		**0**	**0**	**5.0**	**22.5**	**72.5**
Transition Probabilities (Annually)						
F0 to F1[a]	0.104	0	0	5.0	17.5	77.5
	0.130	0	0	2.5	20.0	77.5
F1 to F2[a]	0.075	0	0	2.5	10.0	87.5
	0.096	0	0	2.5	15.0	82.5
F2 to F3[a]	0.109	0	0	2.5	12.5	85.0
	0.133	0	0	2.5	15.0	82.5
F3 to compensated cirrhosis (F4) [a]	0.104	0	0	0	22.5	77.5
	0.129	0	0	0	12.5	87.5
F3 to hepatocellular carcinoma	0.003	0	0	7.5	22.5	70.0
	0.014	0	0	2.5	10.0	87.5
Compensated cirrhosis (F4) to decompensated cirrhosis	0.010	0	0	5.0	25.0	70.0
	0.039	0	0	7.5	10.0	82.5
Compensated cirrhosis (F4) to hepatocellular carcinoma	0.010	0	0	2.5	22.5	75.0
	0.079	0	0	0	5.0	95.0
Decompensated cirrhosis to hepatocellular carcinoma	0.030	0	0	2.5	20.0	77.5
	0.083	0	0	2.5	20.0	77.5
Decompensated cirrhosis to liver transplant	0.010	0	0	7.5	10.0	82.5
	0.062	0	0	2.5	20.0	77.5
Decompensated cirrhosis (first year) to liver-related death	0.065	0	0	5.0	20.0	75.0
	0.190	0	0	2.5	10.0	87.5
Decompensated cirrhosis (subsequent year) to liver-related death	0.065	0	0	5.0	12.5	82.5
	0.190	0	0	2.5	20.0	77.5
Hepatocellular carcinoma to liver transplant	0.000	0	0	2.5	17.5	80.0
	0.140	0	0	5.0	10.0	85.0
Hepatocellular carcinoma to liver-related death	0.330	0	0	2.5	15.0	82.5
	0.860	0	0	2.5	17.5	80.0
Liver transplant (first year) to liver-related death	0.060	0	0	5.0	17.5	77.5
	0.420	0	0	2.5	20.0	77.5
Liver transplant (subsequent year) to liver-related death	0.024	0	0	2.5	15.0	82.5
	0.110	0	0	0	12.5	87.5
SVR after cirrhosis to decompensated cirrhosis	0.002	0	0	5.0	22.5	72.5
	0.036	0	3	10.0	25.0	62.5
SVR after cirrhosis to hepatocellular carcinoma	0.002	0	0	0	10.0	90.0
	0.013	0	0	2.5	32.5	65.0
Costs (2014 US dollars)						

HCV management costs: F0	540	0	0	5.0	22.5	72.5
	912	0	0	5.0	22.5	72.5
HCV management costs: F1	540	0	0	2.5	20.0	77.5
	912	0	0	5.0	22.5	72.5
HCV management costs: F2	552	0	0	2.5	20.0	77.5
	924	0	0	5.0	22.5	72.5
HCV management costs: F3	1128	0	0	2.5	22.5	75.0
	1872	0	0	5.0	22.5	72.5
HCV management costs:	1308	0	0	5.0	22.5	72.5
compensated cirrhosis (F4)	2184	0	0	5.0	22.5	72.5
HCV management costs:	14 544	0	0	5.0	22.5	72.5
decompensated cirrhosis	24 240	0	0	2.5	22.5	75.0
HCV management costs:	26 736	0	0	5.0	22.5	72.5
hepatocellular carcinoma	44 568	0	0	5.0	22.5	72.5
HCV management costs: liver	78 949	0	0	5.0	22.5	72.5
transplant, first year	131 589	0	0	5.0	22.5	72.5
HCV management costs: liver	20 292	0	0	5.0	22.5	72.5
transplant, subsequent year	33 828	0	0	2.5	22.5	75.0
HCV ELISA test	25	0	0	2.5	20.0	77.5
	41	0	0	5.0	22.5	72.5
Quantitation HCV RNA	69	0	0	5.0	22.5	72.5
	115	0	0	5.0	22.5	72.5
FibroSure test	474	0	0	5.0	22.5	72.5
	789	0	0	5.0	22.5	72.5
HCV genotype assay	306	0	0	5.0	22.5	72.5
	510	0	0	5.0	22.5	72.5
Health-Related Quality-of-Life Inputs						
METAVIR score F0, F1	0.84	0	0	2.5	17.5	80.0
	0.99	0	0	7.5	20.0	72.5
METAVIR score F2, F3	0.84	0	0	0	12.5	87.5
	0.99	0	0	7.5	25.0	67.5
Compensated cirrhosis	0.81	0	0	2.5	15.0	82.5
(METAVIR score F4)	0.99	0	0	7.5	25.0	67.5
Decompensated cirrhosis	0.57	0	0	2.5	20.0	77.5
	0.99	0	0	5.0	22.5	72.5
Hepatocellular carcinoma	0.54	0	0	2.5	20.0	77.5
	0.99	0	0	5.0	22.5	72.5
Post liver transplant	0.77	0	0	2.5	22.5	75.0
	0.93	0	0	5.0	22.5	72.5
Post SVR (F0-F1)	0.92	0	0	7.5	25.0	67.5

	1.00	0	0	5.0	22.5	72.5
Post SVR (F2-F4)	0.92	0	0	20.0	30.0	50.0
	1.00	0	0	5.0	22.5	72.5
Agent's Behavior Inputs						
Uptake rate of HCV testing in prison under risk-based scenario	0.5	0	0	5.0	22.5	72.5
	1.0	0	0	5.0	22.5	72.5
Uptake rate of HCV testing in prison under opt-out scenarios	0.80	0	0	0	15.0	85.0
	1.00	0	0	2.5	15.0	82.5
F0 HCV diagnosis probability	0.02787	0	0	5.0	10.0	85.0
	0.04606	0	0	2.5	10.0	87.5
F1 HCV diagnosis probability	0.02236	0	0	2.5	10.0	87.5
	0.03702	0	3	2.5	12.5	82.5
F2 HCV diagnosis probability	0.03179	0	0	7.5	7.5	85.0
	0.05246	0	0	2.5	25.0	72.5
F3 HCV diagnosis probability	0.03471	0	0	2.5	25.0	72.5
	0.05724	0	0	0	15.0	85.0
F4 HCV diagnosis probability	0.12439	0	0	5.0	17.5	77.5
	0.19926	0	0	10.0	27.5	62.5
Probability of quitting IDU (monthly)	0.004967	0	0	5.0	12.5	82.5
	0.006655	0	0	2.5	17.5	80.0
Treatment initiation probability per month (prisoners)	0.036	0	0	5.0	20.0	75.0
	0.046	0	0	2.5	7.5	90.0
Treatment initiation probability per month (general population)	0.023	0	0	5.0	37.5	57.5
	0.029	0	0	2.5	20.0	77.5
Baseline crime probability	10% decrease	0	0	7.5	35.0	57.5
	10% increase	0	0	0	22.5	77.5
HCV transmission probability	0.00005	0	0	5.0	10.0	85.0
	0.00025	0	0	2.5	10.0	87.5
Awareness reduction factor	0.25	0	0	2.5	10.0	87.5
	0.75	0	3	2.5	12.5	82.5
Treatment reduction factor	0	0	0	7.5	7.5	85.0
	1	0	0	2.5	25.0	72.5
HCV-associated Agent Characteristics						
HCV prevalence among newborn	0.000061	0	0	2.5	5.0	92.5
	0.00018	0	0	2.5	12.5	85.0
Proportion of patients aware of HCV infection (General population)	25%	0	0	0	5.0	95.0
	75%	0	0	2.5	30.0	67.5
Proportion of patients aware of HCV infection (Prisoners)	10%	0	0	5.0	32.5	62.5
	50%	0	0	5.0	30.0	65.0

Proportion of treatment-experienced patients initially	0.29	0	0	5.0	12.5	82.5
	0.49	0	0	2.5	22.5	75.0
Proportion of diagnosed patients eligible for treatment	Community: 30%, Prisons: 47%	0	0	0	15.0	85.0
	Community: 50%, Prisons: 78%	0	0	0	10.0	90.0
Additional treatment eligibility with interferon-free regimen	0.12975	0	0	10.0	10.0	80.0
	0.21625	0	0	2.5	15.0	82.5
Miscellaneous						
Drug price	46% discount of WAC	0	0	0	5.0	95.0
	AWP	0	0	7.5	25.0	67.5
Self-clearance probability after acute infection	0.23	0	0	5.0	12.5	82.5
	0.28	0	0	2.5	22.5	75.0
SMR of inmates	0.77	0	0	2.5	10.0	87.5
	0.94	0	0	0	12.5	87.5
SVR rates of oral DAAs	0% decrease	0	0	5.0	22.5	72.5
	15% decrease	0	0	2.5	20.0	77.5
Generic drug availability year	2025	0	0	2.5	2.5	95.0
	2032	0	0	5.0	20.0	75.0
Time horizon	20 years	0	8	45.0	45.0	2.5
	40 years	0	0	0	12.5	87.5

[a] In the base case, we simulated fibrosis progression by using regression equations (eTable 6); however, for 1-way sensitivity analysis, we used fixed upper and lower values of fibrosis progression instead of equations.

[b] We conducted sensitivity-analysis by running the model 40 times for each parameter value and presented the probability of each strategy being cost-effective using $50,000 willingness to pay threshold. Because of small differences across strategies, results could be influenced by first-order uncertainty that could lead to inconsistent trends such as extended dominance. To avoid presentation of misleading trends, we did not present ICERs; instead we presented the likelihood of each strategy being cost-effective, as commonly done in generating cost-effectiveness acceptability curves.

Abbreviations: DAA, direct anti-viral agent; HCV, hepatitis C virus; METAVIR, meta-analysis of histologic data in viral hepatitis; F0-F4, METAVIR fibrosis score; ELISA, enzyme-linked immunosorbant analysis; SVR, sustained virologic response; SMR, standardized mortality ratio; WAC, wholesale acquisition cost; AWP, average wholesale price.

eTable 18. Results of 1-Way Sensitivity Analysis Showing 1-year Prison Budget

Parameter	Value (low / high)	Prison First Year Budget Impact		
		No-Screening	1Yr-Risk	1Yr-All, 5Yr-All,

				10Yr-All
Base Case		**$4 074 758**	**$5 899 396**	**$7 510 893**
Transition Probabilities (Annually)				
F0 to F1[a]	0.104	$4 062 312	$5 854 316	$7 437 367
	0.130	$4 066 321	$5 865 092	$7 450 046
F1 to F2[a]	0.075	$4 019 835	$5 748 351	$7 292 109
	0.096	$4 048 879	$5 794 809	$7 364 541
F2 to F3[a]	0.109	$4 044 249	$5 875 886	$7 493 219
	0.133	$4 129 002	$6 025 773	$7 684 629
F3 to compensated cirrhosis (F4) [a]	0.104	$4 047 586	$5 869 647	$7 486 397
	0.129	$4 146 777	$5 976 819	$7 587 216
F3 to hepatocellular carcinoma	0.003	$4 060 008	$5 900 951	$7 518 109
	0.014	$4 086 000	$5 891 742	$7 491 215
Compensated cirrhosis (F4) to decompensated cirrhosis	0.010	$3 960 608	$5 881 349	$7 567 082
	0.039	$4 096 842	$5 871 704	$7 452 557
Compensated cirrhosis (F4) to hepatocellular carcinoma	0.010	$4 067 594	$5 969 343	$7 650 098
	0.079	$4 012 725	$5 634 025	$7 122 607
Decompensated cirrhosis to hepatocellular carcinoma	0.030	$4 095 794	$5 930 079	$7 531 566
	0.083	$4 060 892	$5 879 253	$7 487 799
Decompensated cirrhosis to liver transplant	0.010	$4 081 105	$5 895 103	$7 499 163
	0.062	$4 057 228	$5 860 476	$7 466 719
Decompensated cirrhosis (first year) to liver-related death	0.065	$4 184 443	$5 996 126	$7 604 141
	0.190	$4 065 372	$5 870 050	$7 472 356
Decompensated cirrhosis (subsequent year) to liver-related death	0.065	$4 173 384	$5 989 459	$7 601 461
	0.190	$3 939 115	$5 758 742	$7 371 299
Hepatocellular carcinoma to liver transplant	0.000	$4 056 856	$5 859 602	$7 468 970
	0.140	$4 085 756	$5 896 058	$7 508 216
Hepatocellular carcinoma to liver-related death	0.330	$4 206 043	$6 016 820	$7 626 999
	0.860	$3 719 660	$5 521 241	$7 127 338
Liver transplant (first year) to liver-related death	0.060	$4 078 512	$5 895 709	$7 513 066
	0.420	$4 068 670	$5 881 902	$7 488 173
Liver transplant (subsequent year) to liver-related death	0.024	$4 073 886	$5 902 594	$7 513 465
	0.110	$4 066 405	$5 884 900	$7 499 492
SVR after cirrhosis to decompensated cirrhosis	0.002	$4 074 758	$5 899 396	$7 510 893
	0.036	$4 097 578	$5 930 033	$7 540 576
SVR after cirrhosis to hepatocellular carcinoma	0.002	$4 069 698	$5 892 860	$7 505 971
	0.013	$4 086 766	$5 918 790	$7 535 440
Costs (2014 US dollars)				

HCV management costs: F0	540	$4 070 797	$5 890 338	$7 497 180
	912	$4 078 722	$5 908 461	$7 524 614
HCV management costs: F1	540	$4 066 345	$5 881 402	$7 483 915
	912	$4 083 177	$5 917 403	$7 537 887
HCV management costs: F2	552	$4 066 917	$5 883 443	$7 487 181
	924	$4 082 596	$5 915 342	$7 534 593
HCV management costs: F3	1128	$4 061 162	$5 873 593	$7 471 736
	1872	$4 088 359	$5 925 207	$7 550 060
HCV management costs:	1308	$4 043 313	$5 846 346	$7 436 560
compensated cirrhosis (F4)	2184	$4 106 204	$5 952 448	$7 585 227
HCV management costs:	14 544	$3 927 029	$5 751 163	$7 362 174
decompensated cirrhosis	24 240	$4 222 489	$6 047 631	$7 659 612
HCV management costs:	26 736	$3 946 618	$5 770 365	$7 380 827
hepatocellular carcinoma	44 568	$4 202 900	$6 028 429	$7 640 959
HCV management costs: liver	78 949	$4 074 758	$5 899 396	$7 510 893
transplant, first year	131 589	$4 074 758	$5 899 396	$7 510 893
HCV management costs: liver	20 292	$4 068 566	$5 893 204	$7 504 700
transplant, subsequent year	33 828	$4 080 951	$5 905 589	$7 517 085
HCV ELISA test	25	$4 074 758	$5 880 783	$7 418 066
	41	$4 074 758	$5 918 014	$7 603 738
Quantitation HCV RNA	69	$4 074 758	$5 892 823	$7 498 066
	115	$4 074 758	$5 905 970	$7 523 720
FibroSure test	474	$4 074 758	$5 887 865	$7 488 182
	789	$4 074 758	$5 910 928	$7 533 603
HCV genotype assay	306	$4 074 758	$5 875 932	$7 464 561
	510	$4 074 758	$5 922 859	$7 557 220
Agent's Behavior Inputs				
Uptake rate of HCV testing in	0.5	$4 074 758	$5 329 834	$7 510 893
prison under risk-based scenario	1.0	$4 074 758	$6 475 577	$7 510 893
Uptake rate of HCV testing in prison under opt-out scenarios	0.8	$4 074 758	$5 899 396	$7 158 083
	1	$4 074 758	$5 899 396	$7 928 777
F0 HCV diagnosis probability	0.02787	$4 069 499	$5 896 348	$7 512 250
	0.04606	$4 083 674	$5 909 147	$7 516 477
F1 HCV diagnosis probability	0.02236	$4 065 632	$5 892 400	$7 504 311
	0.03702	$4 086 686	$5 906 729	$7 512 441
F2 HCV diagnosis probability	0.03179	$4 062 505	$5 893 355	$7 515 787
	0.05246	$4 087 411	$5 904 980	$7 512 064
F3 HCV diagnosis probability	0.03471	$4 049 854	$5 894 429	$7 515 400
	0.05724	$4 103 721	$5 911 603	$7 501 904
F4 HCV diagnosis probability	0.12439	$3 942 251	$5 833 266	$7 489 934
	0.19926	$4 128 365	$5 892 093	$7 467 748

Probability of quitting IDU (monthly)	0.004967	$4 105 123	$6 002 639	$7 574 949
	0.006655	$4 018 096	$5 736 224	$7 382 269
Treatment initiation probability per month (prisoners)	0.036	$3 879 673	$5 569 521	$7 082 444
	0.046	$4 171 609	$6 132 803	$7 838 978
Treatment initiation probability per month (general population)	0.023	$4 150 094	$5 967 410	$7 577 512
	0.029	$3 993 495	$5 817 332	$7 425 646
Baseline crime probability	10% decrease	$3 229 337	$4 636 703	$5 914 624
	10% increase	$4 839 182	$6 969 502	$8 896 631
HCV transmission probability	0.00005	$4 069 499	$5 896 348	$7 512 250
	0.00025	$4 083 674	$5 909 147	$7 516 477
Awareness reduction factor	0.25	$4 065 632	$5 892 400	$7 504 311
	0.75	$4 086 686	$5 906 729	$7 512 441
Treatment reduction factor	0	$4 062 505	$5 893 355	$7 515 787
	1	$4 087 411	$5 904 980	$7 512 064
HCV-associated Agent Characteristics				
HCV prevalence among newborn	0.000061	$4 074 755	$5 899 752	$7 511 040
	0.00018	$4 074 836	$5 899 503	$7 510 889
Proportion of patients aware of HCV infection (General population)	25%	$3 605 233	$5 744 340	$7 723 569
	75%	$4 487 064	$5 825 451	$7 163 655
Proportion of patients aware of HCV infection (Prisoners)	10%	$3 829 148	$5 797 063	$7 454 315
	50%	$4 533 852	$6 056 427	$7 407 256
Proportion of treatment-experienced patients initially	0.29	$4 056 354	$5 844 771	$7 479 506
	0.49	$3 959 982	$5 748 713	$7 356 685
Proportion of diagnosed patients eligible for treatment	Community: 30%, Prisons: 47%	$4 090 263	$5 646 580	$7 074 776
	Community: 50%, Prisons: 78%	$4 287 902	$6 370 549	$8 173 870
Additional treatment eligibility with interferon-free regimen	0.12975	$3 869 903	$5 626 965	$7 182 358
	0.21625	$4 285 471	$6 184 092	$7 829 396
Miscellaneous				
Drug price	46% discount of WAC	$2 840 163	$4 042 927	$5 229 743
	AWP	$4 611 539	$6 706 557	$8 502 697
Self-clearance probability after acute infection	0.23	$4 056 354	$5 844 771	$7 479 506
	0.28	$3 959 982	$5 748 713	$7 356 685
SMR of inmates	0.77	$4 079 331	$5 911 287	$7 520 294
	0.94	$4 068 860	$5 891 886	$7 496 164
SVR rates of oral DAAs	0% decrease	$4 074 758	$5 899 396	$7 510 893
	15% decrease	$4 074 758	$5 899 396	$7 510 893
Generic drug availability year	2025	$4 074 758	$5 899 396	$7 510 893

	2032	$4 074 758	$5 899 396	$7 510 893
Time horizon	20 years	$4 074 758	$5 899 396	$7 510 893
	40 years	$4 074 758	$5 899 396	$7 510 893

[a] In the base case, we simulated fibrosis progression by using regression equations (eTable 6); however, for 1-way sensitivity analysis, we used fixed upper and lower values of fibrosis progression instead of equations.

Abbreviations: DAA, direct anti-viral agent; HCV, hepatitis C virus; METAVIR, meta-analysis of histologic data in viral hepatitis; F0-F4, METAVIR fibrosis score; ELISA, enzyme-linked immunosorbant analysis; SVR, sustained virologic response; SMR, standardized mortality ratio; WAC, wholesale acquisition cost; AWP, average wholesale price.

eTable 19. Results of 1-Way Sensitivity Analysis Showing 15-year Prison Budget

Parameter	Value (low/ high)	Prison Fifteen Year Budget Impact				
		No-Screening	1Yr-Risk	1Yr-All	5Yr-All	10Yr-All
Base Case		**$ 21 551 720**	**$ 26 255 477**	**$ 30 176 159**	**$ 33 211 401**	**$ 34 917 431**
Transition Probabilities (Annually)						
F0 to F1[a]	0.104	$ 21 148 032	$ 25 713 984	$ 29 580 662	$ 32 453 951	$ 34 019 550
	0.130	$ 21 284 170	$ 25 914 911	$ 29 798 723	$ 32 714 871	$ 34 351 330
F1 to F2[a]	0.075	$ 20 873 640	$ 25 333 110	$ 29 161 773	$ 31 963 231	$ 33 506 299
	0.096	$ 21 294 283	$ 25 879 519	$ 29 783 848	$ 32 664 934	$ 34 338 107
F2 to F3[a]	0.109	$ 22 192 544	$ 27 009 107	$ 31 091 247	$ 34 260 180	$ 36 008 526
	0.133	$ 22 687 587	$ 27 678 903	$ 31 909 692	$ 35 194 034	$ 36 985 327
F3 to compensated cirrhosis (F4) [a]	0.104	$ 21 639 171	$ 26 443 005	$ 30 393 538	$ 33 470 181	$ 35 175 218
	0.129	$ 22 113 393	$ 26 922 296	$ 30 872 493	$ 33 816 578	$ 35 465 985
F3 to hepatocellular carcinoma	0.003	$ 21 481 938	$ 26 323 862	$ 30 281 142	$ 33 361 347	$ 35 128 029
	0.014	$ 21 636 583	$ 26 307 346	$ 30 196 742	$ 33 135 837	$ 34 817 279
Compensated cirrhosis (F4) to decompensated cirrhosis	0.010	$ 20 675 931	$ 25 654 187	$ 29 885 193	$ 33 105 300	$ 34 932 187
	0.039	$ 21 840 681	$ 26 364 542	$ 30 189 588	$ 33 149 929	$ 34 845 628
Compensated cirrhosis (F4) to hepatocellular carcinoma	0.010	$ 21 810 610	$ 26 814 290	$ 31 025 363	$ 34 214 860	$ 36 024 620
	0.079	$ 20 286 695	$ 24 350 982	$ 27 855 580	$ 30 590 609	$ 32 147 933
Decompensated cirrhosis to hepatocellular carcinoma	0.030	$ 21 978 573	$ 26 771 278	$ 30 709 945	$ 33 722 093	$ 35 437 955
	0.083	$ 21 448 482	$ 26 147 591	$ 30 079 797	$ 33 089 706	$ 34 826 201
Decompensated cirrhosis to liver transplant	0.010	$ 21 583 609	$ 26 341 962	$ 30 284 461	$ 33 265 594	$ 34 968 817
	0.062	$ 21 609 813	$ 26 337 357	$ 30 290 057	$ 33 324 746	$ 35 005 403
Decompensated cirrhosis (first year) to liver-related death	0.065	$ 22 345 784	$ 27 103 689	$ 31 033 224	$ 34 020 334	$ 35 705 320
	0.190	$ 21 487 272	$ 26 180 863	$ 30 165 014	$ 33 224 138	$ 34 957 395

Decompensated cirrhosis	0.065	$ 22 600 252	$ 27 294 757	$ 31 219 772	$ 34 235 399	$ 35 922 454
(subsequent year) to liver-related death	0.190	$ 20 304 229	$ 25 043 629	$ 28 989 450	$ 32 031 068	$ 33 733 061
Hepatocellular carcinoma	0.000	$ 21 318 199	$ 26 018 705	$ 29 947 142	$ 32 945 089	$ 34 685 574
to liver transplant	0.140	$ 21 995 729	$ 26 730 014	$ 30 659 916	$ 33 653 889	$ 35 423 076
Hepatocellular carcinoma	0.330	$ 22 714 951	$ 27 400 622	$ 31 360 321	$ 34 319 966	$ 36 061 548
to liver-related death	0.860	$ 18 922 246	$ 23 762 552	$ 27 789 325	$ 30 857 379	$ 32 604 137
Liver transplant (first year)	0.060	$ 21 600 941	$ 26 362 871	$ 30 313 787	$ 33 381 337	$ 35 152 260
to liver-related death	0.420	$ 21 382 824	$ 26 113 774	$ 30 014 477	$ 33 072 818	$ 34 801 622
Liver transplant	0.024	$ 21 591 358	$ 26 320 030	$ 30 260 653	$ 33 253 308	$ 34 954 448
(subsequent year) to liver-related death	0.110	$ 21 350 687	$ 26 107 970	$ 30 051 011	$ 33 021 390	$ 34 743 347
SVR after cirrhosis to	0.002	$ 21 551 720	$ 26 255 477	$ 30 176 159	$ 33 211 401	$ 34 917 431
decompensated cirrhosis	0.036	$ 22 555 202	$ 27 385 373	$ 31 364 622	$ 34 458 398	$ 36 213 174
SVR after cirrhosis to	0.002	$ 21 451 142	$ 26 119 399	$ 30 077 318	$ 33 095 929	$ 34 791 137
hepatocellular carcinoma	0.013	$ 21 763 681	$ 26 431 060	$ 30 363 294	$ 33 466 501	$ 35 159 155
Costs (2014 US dollars)						
HCV management costs:	540	$ 21 518 364	$ 26 199 641	$ 30 099 809	$ 33 120 919	$ 34 819 440
F0	912	$ 21 585 097	$ 26 311 349	$ 30 252 557	$ 33 301 941	$ 35 015 485
HCV management costs:	540	$ 21 477 689	$ 26 132 404	$ 30 009 010	$ 33 017 951	$ 34 710 562
F1	912	$ 21 625 797	$ 26 378 630	$ 30 343 415	$ 33 404 975	$ 35 124 432
HCV management costs:	552	$ 21 476 221	$ 26 135 132	$ 30 014 016	$ 33 027 283	$ 34 722 710
F2	924	$ 21 627 181	$ 26 375 764	$ 30 338 221	$ 33 395 428	$ 35 112 057
HCV management costs:	1128	$ 21 466 552	$ 26 120 465	$ 29 985 102	$ 32 999 004	$ 34 695 012
F3	1872	$ 21 636 912	$ 26 390 528	$ 30 367 270	$ 33 423 858	$ 35 139 914
HCV management costs:	1308	$ 21 348 019	$ 25 962 529	$ 29 787 169	$ 32 804 327	$ 34 502 092
compensated cirrhosis (F4)	2184	$ 21 755 424	$ 26 548 431	$ 30 565 155	$ 33 618 482	$ 35 332 778
HCV management costs:	14 544	$ 20 443 428	$ 25 181 634	$ 29 119 361	$ 32 171 123	$ 33 881 963
decompensated cirrhosis	24 240	$ 22 660 019	$ 27 329 328	$ 31 232 963	$ 34 251 686	$ 35 952 906
HCV management costs:	26 736	$ 20 630 420	$ 25 364 275	$ 29 302 856	$ 32 357 328	$ 34 068 540
hepatocellular carcinoma	44 568	$ 22 473 028	$ 27 146 688	$ 31 049 469	$ 34 065 482	$ 35 766 331
HCV management costs:	78 949	$ 21 551 720	$ 26 255 477	$ 30 176 159	$ 33 211 401	$ 34 917 431
liver transplant, first year	131 589	$ 21 551 720	$ 26 255 477	$ 30 176 159	$ 33 211 401	$ 34 917 431
HCV management costs:	20 292	$ 21 444 151	$ 26 147 896	$ 30 069 062	$ 33 104 304	$ 34 810 334
liver transplant, subsequent year	33 828	$ 21 659 288	$ 26 363 058	$ 30 283 255	$ 33 318 497	$ 35 024 528
HCV ELISA test	25	$ 21 551 720	$ 26 236 864	$ 30 083 332	$ 33 029 923	$ 34 638 467
	41	$ 21 551 720	$ 26 274 094	$ 30 269 004	$ 33 392 915	$ 35 196 452
Quantitation HCV RNA	69	$ 21 551 720	$ 26 248 904	$ 30 163 332	$ 33 192 185	$ 34 893 029
	115	$ 21 551 720	$ 26 262 051	$ 30 188 986	$ 33 230 618	$ 34 941 834

FibroSure test	474	$ 21 551 720	$ 26 243 946	$ 30 153 448	$ 33 181 154	$ 34 883 011
	789	$ 21 551 720	$ 26 267 009	$ 30 198 869	$ 33 241 648	$ 34 951 851
HCV genotype assay	306	$ 21 551 720	$ 26 232 013	$ 30 129 828	$ 33 149 828	$ 34 847 379
	510	$ 21 551 720	$ 26 278 940	$ 30 222 486	$ 33 272 968	$ 34 987 477
Agent's Behavior Inputs						
Uptake rate of HCV testing in prison under risk-based scenario	0.5	$ 21 551 720	$ 24 714 749	$ 30 176 159	$ 33 211 401	$ 34 917 431
	1.0	$ 21 551 720	$ 27 841 055	$ 30 176 159	$ 33 211 401	$ 34 917 431
Uptake rate of HCV testing in prison under opt-out scenarios	0.8	$ 21 551 720	$ 26 255 477	$ 29 207 223	$ 32 030 103	$ 33 720 556
	1	$ 21 551 720	$ 26 255 477	$ 31 222 114	$ 34 426 023	$ 36 194 758
F0 HCV diagnosis probability	0.02787	$ 21 505 427	$ 26 256 247	$ 30 183 780	$ 33 226 663	$ 35 008 320
	0.04606	$ 21 621 546	$ 26 300 836	$ 30 268 130	$ 33 251 753	$ 34 952 752
F1 HCV diagnosis probability	0.02236	$ 21 460 494	$ 26 176 796	$ 30 096 300	$ 33 174 214	$ 34 964 259
	0.03702	$ 21 591 823	$ 26 287 387	$ 30 219 733	$ 33 189 259	$ 34 869 974
F2 HCV diagnosis probability	0.03179	$ 21 461 496	$ 26 170 672	$ 30 121 365	$ 33 193 216	$ 34 987 292
	0.05246	$ 21 622 164	$ 26 312 144	$ 30 198 967	$ 33 237 403	$ 34 913 924
F3 HCV diagnosis probability	0.03471	$ 21 403 116	$ 26 163 960	$ 30 104 704	$ 33 240 204	$ 35 065 694
	0.05724	$ 21 649 339	$ 26 295 090	$ 30 197 550	$ 33 180 087	$ 34 890 870
F4 HCV diagnosis probability	0.12439	$ 21 141 919	$ 25 994 826	$ 30 054 620	$ 33 284 579	$ 35 149 471
	0.19926	$ 21 808 590	$ 26 339 622	$ 30 154 955	$ 33 108 846	$ 34 724 209
Probability of quitting IDU (monthly)	0.004967	$ 21 855 243	$ 26 874 743	$ 30 696 696	$ 33 789 250	$ 35 561 382
	0.006655	$ 21 070 156	$ 25 468 064	$ 29 581 771	$ 32 551 437	$ 34 167 996
Treatment initiation probability per month (prisoners)	0.036	$ 21 147 700	$ 25 692 225	$ 29 493 840	$ 32 421 798	$ 34 112 535
	0.046	$ 21 863 310	$ 26 680 592	$ 30 737 393	$ 33 871 741	$ 35 657 557
Treatment initiation probability per month (general population)	0.023	$ 22 124 272	$ 26 839 429	$ 30 837 129	$ 33 876 177	$ 35 594 010
	0.029	$ 21 039 618	$ 25 784 717	$ 29 753 005	$ 32 781 248	$ 34 521 899
Baseline crime probability	10% decrease	$ 17 353 598	$ 21 053 012	$ 24 208 441	$ 26 631 855	$ 27 975 997
	10% increase	$ 25 671 631	$ 31 320 358	$ 36 073 518	$ 39 655 067	$ 41 707 597
HCV transmission probability	0.00005	$ 21 505 427	$ 26 256 247	$ 30 183 780	$ 33 226 663	$ 35 008 320
	0.00025	$ 21 621 546	$ 26 300 836	$ 30 268 130	$ 33 251 753	$ 34 952 752
Awareness reduction factor	0.25	$ 21 460 494	$ 26 176 796	$ 30 096 300	$ 33 174 214	$ 34 964 259
	0.75	$ 21 591 823	$ 26 287 387	$ 30 219 733	$ 33 189 259	$ 34 869 974
Treatment reduction factor	0	$ 21 461 496	$ 26 170 672	$ 30 121 365	$ 33 193 216	$ 34 987 292
	1	$ 21 622 164	$ 26 312 144	$ 30 198 967	$ 33 237 403	$ 34 913 924
HCV-associated Agent Characteristics						
HCV prevalence among newborn	0.000061	$ 21 514 922	$ 26 228 108	$ 30 157 027	$ 33 211 775	$ 34 945 852
	0.00018	$ 21 524 216	$ 26 237 754	$ 30 166 522	$ 33 201 840	$ 34 933 336
Proportion of patients	25%	$ 20 576 076	$ 26 257 558	$ 30 842 773	$ 34 655 315	$ 36 717 664

aware of HCV infection (General population)	75%	$ 22 604 109	$ 26 461 171	$ 29 602 069	$ 32 039 725	$ 33 416 313
Proportion of patients aware of HCV infection (Prisoners)	10%	$ 20 937 420	$ 26 203 493	$ 30 425 645	$ 33 612 707	$ 35 380 462
	50%	$ 22 908 891	$ 26 837 063	$ 30 110 890	$ 32 837 505	$ 34 452 948
Proportion of treatment-experienced patients initially	0.29	$ 22 001 390	$ 26 857 076	$ 30 684 807	$ 33 961 217	$ 35 699 829
	0.49	$ 21 774 164	$ 26 482 017	$ 30 348 723	$ 33 369 556	$ 35 099 313
Proportion of diagnosed patients eligible for treatment	Community: 30%, Prisons: 47%	$ 20 976 548	$ 25 093 814	$ 28 586 186	$ 31 200 079	$ 32 732 573
	Community: 50%, Prisons: 78%	$ 22 271 739	$ 27 646 902	$ 31 989 922	$ 35 385 275	$ 37 322 299
Additional treatment eligibility with interferon-free regimen	0.12975	$ 20 927 489	$ 25 481 182	$ 29 270 434	$ 32 191 813	$ 33 831 811
	0.21625	$ 22 179 781	$ 27 069 479	$ 31 122 906	$ 34 262 707	$ 36 074 225
Miscellaneous						
Drug price	46% discount of WAC	$16 443 602	$19 445 843	$22 183 850	$24 161 288	$25 368 047
	AWP	$23 772 640	$29 216 188	$33 651 075	$37 146 233	$39 069 338
Self-clearance probability after acute infection	0.23	$ 22 001 390	$ 26 857 076	$ 30 684 807	$ 33 961 217	$ 35 699 829
	0.28	$ 21 774 164	$ 26 482 017	$ 30 348 723	$ 33 369 556	$ 35 099 313
SMR of inmates	0.77	$ 21 605 268	$ 26 364 824	$ 30 321 364	$ 33 364 209	$ 35 106 510
	0.94	$ 21 552 107	$ 26 242 642	$ 30 201 036	$ 33 220 979	$ 34 921 458
SVR rates of oral DAAs	0% decrease	$ 21 551 720	$ 26 255 477	$ 30 176 159	$ 33 211 401	$ 34 917 431
	15% decrease	$ 21 548 753	$ 26 294 375	$ 30 207 667	$ 33 249 143	$ 34 961 994
Generic drug availability year	2025	$ 20 596 669	$ 25 211 883	$ 29 095 847	$ 32 030 274	$ 33 423 264
	2032	$ 21 551 720	$ 26 255 477	$ 30 176 159	$ 33 211 401	$ 34 917 431
Time horizon	20 years	$ 21 551 720	$ 26 255 477	$ 30 176 159	$ 33 211 401	$ 34 917 431
	40 years	$ 21 551 720	$ 26 255 477	$ 30 176 159	$ 33 211 401	$ 34 917 431

[a] In the base case, we simulated fibrosis progression by using regression equations (eTable 6); however, for 1-way sensitivity analysis, we used fixed upper and lower values of fibrosis progression instead of equations.

Abbreviations: DAA, direct anti-viral agent; HCV, hepatitis C virus; METAVIR, meta-analysis of histologic data in viral hepatitis; F0-F4, METAVIR fibrosis score; ELISA, enzyme-linked immunosorbant analysis; SVR, sustained virologic response; SMR, standardized mortality ratio; WAC, wholesale acquisition cost; AWP, average wholesale price.

S3.3 Scenario Analyses

eTable 20. 30-year cumulative incidences of infection, advanced diseases, and results of cost-effectiveness analysis of scenario when all F0-F4 patients were eligible for treatment.

	No screening	1Yr-Risk vs. No Screening	1Yr-All vs. No Screening	5Yr-All vs. No Screening	10Yr-All No Screening
30-year Cumulative Incidences					
Total HCV Infections	153 644	-7080	-10 128	-14 709	-16 635
Decompensated Cirrhosis	631 606	-2956	-5398	-7221	-8228
Hepatocellular Carcinoma	726 483	-3624	-6386	-8453	-9605
Liver Transplants	92 306	-339	-603	-801	-927
Liver-related Deaths	776 141	-5226	-8957	-11 825	-13 385
30-year Total Cost ($, million)					
Screening Cost	$0	+$37	+$107	+$179	+$250
Treatment Cost	$88 927	+$1590	+$2975	+$4052	+$4663
Advanced HCV Complications Cost	$91 339	-$200	-$332	-$490	-$560
Cost-Effectiveness Analysis	**No screening**	**1Yr-Risk vs. No screening**	**1Yr-All vs. 1Yr-Risk**	**5Yr-All vs. 1Yr-All**	**10Yr-All vs. 5Yr-All**
QALY	5 677 427 916	+52 189	+42 148	+27 900	+12 386
Total Cost ($, million)	$180 266	+$1426	+$1323	+$992	+$611
ICER ($ per QALY)	-	$27 331	$31 387	$35 559	$49 346

Scenarios:

"No screening": No screening inside prisons;

"1Yr-Risk": 1-time risk-based screening of currently incarcerated and entrants who were active or former IDUs for 1-year.

"1Yr-All": 1-time opt-out screening of currently incarcerated inmates and entrants for 1 year.

"5Yr-All": 1-time opt-out screening of currently incarcerated inmates and entrants for 5 year.

"10Yr-All": 1-time opt-out screening of currently incarcerated inmates and entrants for 10 years.

Abbreviations: QALY, quality-adjusted life-years; ICER, incremental cost-effectiveness ratio.

Note that any discrepancies in ICERs may be due to rounding.

eTable 21. 30-year cumulative incidences of infection, advanced diseases, and results of cost-effectiveness analysis of scenario when F3-F4 patients were treated immediately after diagnosed.

	No screening	1Yr-Risk vs. No	1Yr-All vs. No	5Yr-All vs. No	10Yr-All No

		Screening	Screening	Screening	Screening
30-year Cumulative Incidences					
Total HCV Infections	156 341	-5859	-8453	-11 772	-14 068
Decompensated Cirrhosis	591 503	-2464	-5009	-6702	-7404
Hepatocellular Carcinoma	683 370	-3807	-6382	-8518	-9651
Liver Transplants	86 233	-366	-710	-954	-1057
Liver-related Deaths	712 109	-5009	-8751	-11 524	-13 023
30-year Total Cost ($, million)					
Screening Cost	$0	+$37	+$107	+$179	+$250
Treatment Cost	$75 500	+$851	+$1569	+$2051	+$2339
Advanced HCV Complications Cost	$84 792	-$134	-$213	-$350	-$384
Cost-Effectiveness Analysis	**No screening**	**1Yr-Risk vs. No screening**	**1Yr-All vs. 1Yr-Risk**	**5Yr-All vs. 1Yr-All**	**10Yr-All vs. 5Yr-All**
QALY	5677 199 951	+41 905	+33 696	+20 201	+9898
Total Cost ($, million)	$160 292	+$754	+$709	+$419	+$324
ICER ($ per QALY)	-	$15 210	Dominated	$16 915	$27 650

Scenarios:

"No screening": No screening inside prisons;

"1Yr-Risk": 1-time risk-based screening of currently incarcerated and entrants who were active or former IDUs for 1-year.

"1Yr-All": 1-time opt-out screening of currently incarcerated inmates and entrants for 1 year.

"5Yr-All": 1-time opt-out screening of currently incarcerated inmates and entrants for 5 year.

"10Yr-All": 1-time opt-out screening of currently incarcerated inmates and entrants for 10 years.

Abbreviations: QALY, quality-adjusted life-years; ICER, incremental cost-effectiveness ratio.

Note that any discrepancies in ICERs may be due to rounding.

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