



Population level outcomes and cost-effectiveness of expanding guidance for age-based hepatitis C testing in the U.S.



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OBJECTIVE

- To investigate population-level outcomes and cost-effectiveness of expanding guidance for age-based HCV testing in the U.S.

BACKGROUND

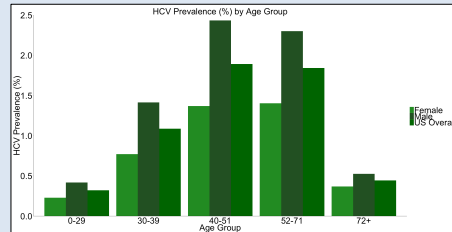
- Historically, the highest HCV prevalence in the U.S. has been among persons born between 1945 and 1965¹ but there is rising HCV incidence among young persons who inject drugs (PWID).²
- The U.S. Centers for Disease Control and Prevention (CDC) and USPSTF recommend one-time HCV testing of persons born 1945-1965, the "birth cohort," and targeted testing of high-risk persons.^{3,4}
- Birth cohort testing is cost-effective⁵ but may miss opportunities to identify HCV cases, especially among persons younger than the birth cohort with unreported risk factors.
- A national plan to reduce HCV prevalence in the U.S. should focus on case finding and treatment outside the "birth cohort."
- We projected long-term outcomes and estimated the cost-effectiveness of expanding the recommendation for one-time HCV testing in the U.S.

METHODS

- Simulation model of screening and treatment for HCV
- Simulated 4 strategies: 1) Standard of care—recommendation of one time testing for persons born between 1945 and 1965 2) recommendation of one time testing adults ≥ 40 years 3) recommendation of one time testing adults ≥ 30 years 4) recommendation of one time testing adults ≥ 18 years
- Modeled recommendation of one time testing as an increased probability of being tested, which resulted in variability of the number of tests a given individual may receive
- Outcomes include: proportion of cases identified, linked to care, treated, and cured; proportion of patients diagnosed with HCV prior to reaching cirrhosis, quality-adjusted life years (QALY); discounted costs from health sector perspective, incremental cost-effectiveness ratios (ICERs), and proportion of incremental costs related to HCV infection
- All strategies assumed continued targeted testing of PWID
- Data from national databases, clinical trials, and cohorts to inform base-case parameters for chronic HCV prevalence, the HCV continuum of care, treatment efficacy, disease progression, toxicity, QoL, and costs. Used MarketScan[®], a large claims-based dataset, to estimate current HCV testing rates and calibrated those estimates to the positivity rate observed in large commercial laboratory databases
- HCV treatment with pan-genotypic regimen (sofosbuvir/velpatasvir)
- Non-HCV mortality and healthcare costs are time-updated to reflect substance use, with higher cost and mortality in current drug users
- Sensitivity analysis performed on all parameters
- Included an alternate scenario in which we assumed it would take approximately twice the rate of HCV screening to identify the same number of HCV cases (inefficient screening).

SELECTED PARAMETERS

HCV PREVALENCE⁹

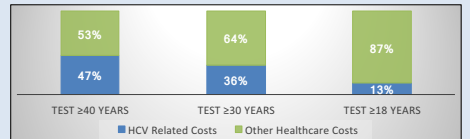


Parameter	Estimate	Reference
Median time to cirrhosis (years)	34	Smith, <i>et al.</i> , 2015 ⁶
HCV antibody test cost (2016 USD)	\$19	CMS 2016 ⁷
HCV therapy cost (2016 USD)	\$71,000-89,000	Redbook Online ⁸

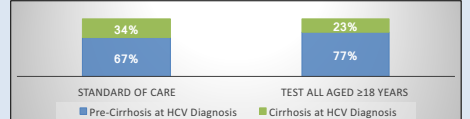
HCV TESTING RATES (per 100 person-years)¹⁰

	Strategy			
	Standard of Care	40 years and older	30 years and older	18 years and older
Non-Drug Users				
Uninfected born before 1945	2.69	5.38	5.38	5.38
Uninfected born 1945-1965	2.41	5.38	5.38	5.38
Uninfected 1965+ >40	2.69	5.38	5.38	5.38
Uninfected 1965+ >30	2.69	2.69	5.38	5.38
Uninfected 1965+ >18	2.69	2.69	2.69	5.38
Uninfected 1965+ <18	2.69	2.69	2.69	2.69
Infected				
Infected born before 1945	4.83	9.66	9.66	9.66
Infected born 1945-1965	10.61	10.61	10.61	10.61
Infected 1965+ >40	4.83	9.66	9.66	9.66
Infected 1965+ >30	4.83	4.83	9.66	9.66
Infected 1965+ >18	4.83	4.83	4.83	9.66
Infected 1965+ <18	4.83	4.83	4.83	4.83
Drug users				
Uninfected	38.8	38.8	38.8	38.8
Infected	38.8	38.8	38.8	38.8

PROPORTION OF INCREMENTAL COST ATTRIBUTABLE TO HCV VS OTHER HEALTHCARE



FIBROSIS STAGE AT DIAGNOSIS OUTSIDE BIRTH COHORT



CONCLUSIONS

- Routine HCV testing among all adults in the U.S. leads to decreased liver-related mortality, earlier stage of fibrosis at diagnosis, and decreased HCV related costs and is cost-effective.
- Our findings were robust in sensitivity analyses that directly assess the impact of treatment on cost, utility, and mortality.
- Limitations arise from the limited availability of adequate national surveillance data for HCV infection and substance use disorder
- Routine testing of adults 18 years and older appears to be a reasonable national strategy to reduce the population health burden of HCV, and appears to provide good value for money based on typical cost-effectiveness benchmarks

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BASE CASE AND SENSITIVITY ANALYSIS RESULTS

Strategy	Incr Cost	Incr QALY	ICER (\$/QALY)
Base Case			
Standard of Care	--	--	--
Routine testing ≥ 40 years	\$62.39	0.00214	Dominated
Routine testing ≥ 30 years	\$8.36	0.00037	Dominated
Routine testing ≥ 18 years	\$3.75	0.00014	\$28,000
No utility benefit treating early stage			
Standard of Care	--	--	--
Routine testing ≥ 40 years	\$62.24	0.00206	Dominated
Routine testing ≥ 30 years	\$8.44	0.00034	\$29,000
Routine testing ≥ 18 years	\$3.54	0.00011	\$31,000
No change to cost in treated HCV			
Standard of Care	--	--	--
Routine testing ≥ 40 years	\$80.52	0.00214	Dominated
Routine testing ≥ 30 years	\$11.67	0.00037	\$37,000
Routine testing ≥ 18 years	\$4.97	0.00013	\$38,000
Inefficient screening scenario			
Standard of Care	--	--	--
Routine testing ≥ 40 years	\$74.30	0.00214	Dominated
Routine testing ≥ 30 years	\$10.75	0.00037	\$34,000
Routine testing ≥ 18 years	\$6.02	0.00014	\$44,000

CONTINUUM OF HCV CARE BY STRATEGY

