The Treatment Cascade for People with Chronic Hepatitis C Virus Infection in the United States

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Background

- People with chronic hepatitis C virus (HCV) infection need to fulfill several steps along a care continuum to achieve optimal health outcomes.

- First, persons must be aware of their HCV diagnosis and seek care.

- Once in care, patients should have HCV RNA confirmation testing and undergo liver fibrosis staging to help make decisions regarding HCV therapy.

- Lastly, individuals must receive and adhere to HCV treatment to achieve a sustained virologic response (SVR).

- This systematic review and meta-analysis provides estimates of the number of chronic HCV-infected persons living in the U.S. completing each step along the HCV treatment cascade.

Methods

-We searched MEDLINE, EMBASE, and the Cochrane Database of Systematic Reviews for English language articles published between January 2003 and July 2013 addressing the following 7 key steps along the HCV treatment cascade:

(1) number of people with chronic HCV infection.
(2) proportion of step 1 diagnosed and aware of their infection;
(3) proportion of step 1 with access to outpatient care;
(4) proportion of step 1 with HCV RNA confirmed;
(5) proportion of step 1 disease staged by liver biopsy;
(6) proportion of step 1 prescribed HCV treatment;
(7) proportion of step 1 who achieved SVR.

- Titles and abstracts were screened by a single reviewer. Two independent reviewers evaluated articles selected for full-text review using a standardized form.

- Bibliographies of included studies were reviewed for additional studies, and 3 experts were contacted to ensure no relevant studies were missed.

- Data from each included study were extracted by one author into tables stratified by HCV treatment cascade step and verified by another author for accuracy.

- For each cascade step with multiple studies identified, we performed random-effects meta-analysis to determine pooled prevalence estimates with 95% confidence intervals (CIs). We assessed the heterogeneity between study results using the I^2 statistic. Significant heterogeneity was defined as an I^2 statistic ≥50%.

- Because of differences in the management of chronic HCV infection between U.S. Veterans and non-Veterans, primary analysis focused on non-VA studies.

Figure 1. Summary of Article Search, Screening, and Selection Process

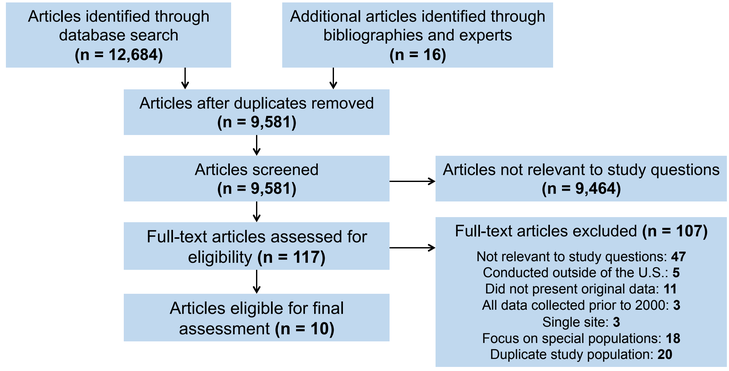
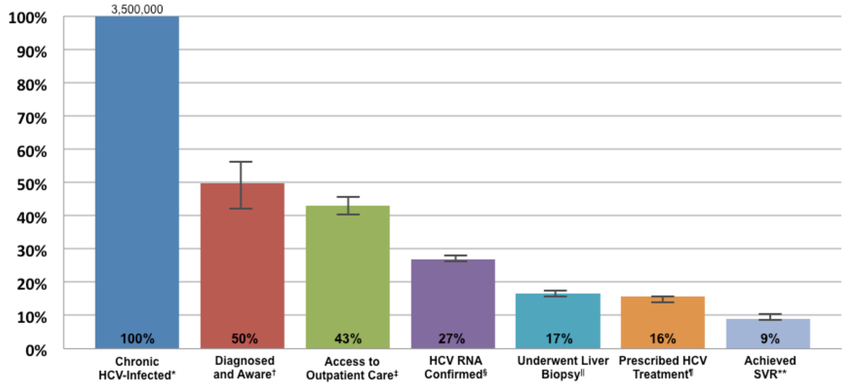


Table 1. Chronic HCV Treatment Cascade Estimates by Step

Author, Year	Data Source	Time Period	Sample Size	Estimate (95% CI)	Pooled Prevalence Estimate (95% CI)
Cascade Step 1: Number of people with chronic HCV infection					
Armstrong et al, 2006	NHANES	1999-2002	15,079	3,500,000 people	--
Cascade Step 2: Proportion diagnosed and aware of their infection					
Younossi et al, 2013	NHANES	2001-2010	203	49.8% (42.9-56.7)	--
Cascade Step 3: Proportion with access to healthcare, among those aware of their infection					
Younossi et al, 2013	NHANES	2001-2010	101	86.9% (80.3-93.5)	--
Cascade Step 4: Proportion HCV RNA confirmed, among those in care					
Moorman et al, 2013	4 HCOs	2001-2010	8,810	62.9% (61.9-63.9)	--
Cascade Step 5: Proportion disease staged by liver biopsy, among those in care					
Moorman et al, 2013	4 HCOs	2001-2010	8,810	38.4% (37.4-39.4)	--
Groessl et a, 2012	*VA*	*1996-2006*	*171,893*	*16.7% (16.5-16.9)*	
Cascade Step 6: Proportion prescribed HCV treatment, among those in care					
Moorman et al, 2013	4 HCOs	2001-2010	8,810	36.4% (35.4-37.4)	36.7% (35.8-37.6)
Kanwal et al, 2010	Insurance claims	2003-2006	2,893	37.5% (35.7-39.3)	
Kanwal et al, 2012	*VA*	*2003-2006*	*34,749*	*17.9% (17.5-18.3)*	--
Cascade Step 7: Proportion achieving SVR, among those in care and prescribed HCV treatment					
Mitra et al, 2010	Insurance claims	2002-2006	575	58.4% (54.4-62.4)	58.8% (56.1-61.5)
Arora et al, 2011	22 clinics	2004-2009	407	58.0% (53.2-62.8)	
Russell et al, 2012	Health system	2002-2008	259	60.1% (54.1-66.1)	
Backus et al, 2011	*VA*	*2001-2009*	*16,864*	*44.1% (43.4-44.9)*	--

Figure 2. Treatment Cascade for People with Chronic HCV Infection, Prevalence Estimates with 95% CI



Conclusions and Implications

- This review identifies large gaps between current practice and treatment goals for people with chronic HCV infection, and highlights multiple opportunities for improving engagement along the HCV treatment cascade.

- Individuals' progression along the HCV treatment cascade varied widely, with large drop-offs occurring at diagnosis and awareness of infection, prescription of antiviral therapy, and achievement of SVR.

- Recent recommendations for one-time HCV testing without prior ascertainment of risk for persons born between 1945 and 1965 may improve the proportion of individuals diagnosed and aware of their infection and referred to care.

- The advent of new direct-acting antiviral agents will help shorten treatment duration, increasing the number of people offered treatment, and improve HCV cure rates.

- Studies are needed to evaluate and compare the population-level benefits and costs of interventions, such as new direct-acting antiviral therapies, at each step.

- The proposed HCV treatment cascade provides a framework for monitoring and identifying gaps in care.