Supplementary Table 1. Hepatitis C–Specific PMs and Their Operational Definitions

Process-of-care measure	Numerator	Denominator	Rate, % (Number eligible)
Pretreatment domain			
Confirmation of HCV viremia[a]	Patients who received hepatitis C RNA test before or within 12 mo after positive antibody test	Patients with positive hepatitis C antibody test	90.2 (31,193)
Specialty referral	Patients who saw a specialist[b] before or within 12 mo after positive RNA date	Patients with positive hepatitis RNA test	53.6 (34,212)
HCV genotype testing	Patients who received HCV genotype test before or within 12 mo after seeing a specialist	Patients with confirmed viremia who saw a specialist	75.9 (21,640)
Liver biopsy in genotype 1 patients[a]	Patients who received a liver biopsy before or within 12 mo after seeing a specialist	Patients with genotype 1 HCV who saw a specialist	26.3 (13,268)
Autoimmune liver disease testing	Patients who received testing to rule out an autoimmune liver disease before or within 12 mo after seeing a specialist	Patients with confirmed viremia who saw a specialist	53.8 (22,022)
Iron overload testing	Patients who received testing to rule out iron overload before or within 12 mo after seeing a specialist	Patients with confirmed viremia who saw a specialist	71.3 (22,022)
Hepatitis B testing	Patients who received testing to rule out hepatitis B virus co-infection before or within 12 mo after seeing a specialist	Patients with confirmed viremia who saw a specialist	91.2 (22,022)
Preventive and comorbid care domain			
HIV testing[a]	Patients who received an HIV test within 12 mo before or after positive HCV test date	Patients without a previous HIV diagnosis	27.7 (34,265)
Hepatitis A serology testing	Patients who received a hepatitis A serology test within 12 mo after positive HCV test date	Patients with no prior hepatitis A serology test or hepatitis A vaccination	66.5 (32,881)
Hepatitis B serology testing	Patients who received a hepatitis B serology test within 12 mo after positive HCV test date	Patients with no prior hepatitis B serology test or hepatitis B vaccination	81.6 (31,257)
Hepatitis A vaccination	Patients who received at least 1 hepatitis A vaccination[c] within 12 mo after positive HCV test	Patients with no prior hepatitis A vaccination or documented immunity within 1 y after HCV test date	25.1 (26,171)
Hepatitis B vaccination	Patients who received at least 1 hepatitis B vaccination[c] within 12 mo after positive HCV test	Patients with no prior hepatitis B vaccination or documented immunity within 1 y after HCV test date	30.1 (22,863)
Referral for depression management[a]	Patients who received ≥1 of the following treatments for depression: psychotherapy, antidepressant prescription, visit to mental health clinic within 28 d of depression diagnosis	Patients with HCV and a diagnosis of depression[d]	65.6 (13,326)
Referral for SUD	Patients who received ≥1 of the following treatments for SUD: psychotherapy, aversion therapy, visit to mental health clinic within 28 d of SUD diagnosis	Patients with HCV and a diagnosis of SUD[d]	48.7 (18,637)
Treatment monitoring domain			
RNA testing before treatment	Patients who received quantitative RNA test within 6 mo before start of antiviral therapy or 2 wk after	Patients who received their first interferon prescription,[e] and at least 6 mo of follow-up evaluation before interferon start date	69.8 (5588)
RNA testing at treatment week 12	Patients who received RNA test between 10 and 14 wk after start of antiviral therapy	Patients who received their first interferon prescription before 9/24/2006,[e] and at least 12 wk of ongoing treatment[f]	62.3 (4696)

Supplementary Table 1. Continued

Process-of-care measure	Numerator	Denominator	Rate, % (Number eligible)
RNA testing at treatment week 24	Patients who received RNA test between 20 and 28 wk after start of antiviral therapy	Patients who received their first interferon prescription before 6/18/2006,[e] and at least 24 wk of ongoing treatment[f]	62.6 (3427)
RNA testing at treatment week 48	Patients who received RNA test between 44 and 56 wk after start of antiviral therapy	Patients who received their first interferon prescription before 12/4/2005,[e] and at least 48 wk of ongoing treatment[f]	80.3 (1024)
Decreasing ribavirin dose for anemia	Patients who had a dose reduction or discontinuation of ribavirin within 35 d of hemoglobin test date	Patients with hemoglobin level <10 g/dL after first interferon start date and on ribavirin	22.2 (942)
No stimulating factors for low neutrophil count	Patients who did not receive any prescription for colony-stimulating growth factor after the low neutrophil count date	Patients with neutrophil count of 500–700/mm^3 after interferon start date	72.0 (579)

NOTE. For all laboratory tests (SVR HCV antibody, HCV RNA, HCV genotype, hepatitis A and B serology, and HIV), we used Logical Observation Identifiers Names and Codes in combination with laboratory test names to identify relevant tests. We then used laboratory test names and test results to limit to specific tests of interest. For autoimmune liver disease, we used the presence of an antinuclear antibody or smooth muscle antibody test in the laboratory file as evidence that patients received a test for autoimmune liver disease. For iron overload, we determined if a patient received any of the following tests: serum iron, total iron binding capacity, or serum ferritin. For hepatitis B, we used the presence of any of the following hepatitis B serology tests as evidence that the patient received a hepatitis B test: hepatitis B surface antigen, hepatitis B surface antibody, or hepatitis B core antibody. HCV medications were identified using the medication name in the pharmacy data.
HIV, human immunodeficiency virus; SUD, substance use disorder.
[a]Sensitivity analyses: (1) for the confirmation of HCV viremia, we used a broad time frame to allow for variation in clinical practice; some patients might incorrectly receive the antibody test after an RNA test. We opted to give these patients (and their clinicians) the benefit of the doubt if they did not receive another confirmatory test. In a sensitivity analysis, we removed any patient who had the RNA test performed before the HCV antibody test. The rate of confirmatory testing changed from 90.2% to 89.9%. (2) We recalculated the rate of liver biopsy measure by excluding patients with an International Classification of Diseases, 9th revision code for cirrhosis (571.2, 571.5) from the denominator. The rate of liver biopsy measure did not change much before (26.3% [3483 of 13,268]) vs after (26.7% [3310 of 12,417]) implementing this additional criterion. RNA testing at 24 weeks after end of treatment is used to assess SVR. (3) Managing depression in patients who become depressed while on treatment might be important to improve rates of antiviral treatment completion and SVR. Therefore, we reconstructed the depression PMs in those on treatment. We found 545 patients without a prior diagnosis of depression who developed depression while on antiviral treatment. In these patients, 52.3% (285 of 545) received psychotherapy, antidepressant prescription, or had a visit to a mental health clinic within 28 days of a depression diagnosis. (4) We redefined the HIV testing measure by including all patients who received an HIV test any time before or within 1 year of HCV testing. The rate increased from 27.7% to 31% in this analysis. Expanding the time frame for the HIV testing measure to include all HIV tests received by the patient regardless of the time frame increased the rate to 38.9%.
[b]Antiviral treatment is rendered by gastroenterologists (clinic stop code 307), infectious disease (310), and (in some VA facilities) by primary care providers (323). To ascertain which of these 3 clinics served as a specialty clinic for each VA facility, we used pharmacy data and selected the clinic responsible for writing the majority of the first interferon prescriptions for HCV patients in a given facility. We classified a patient as having seen the specialists if she/he had a clinic visit to the specialty clinic, which was accompanied with diagnostic codes for HCV, cirrhosis, or chronic liver disease not specified.
[c]Current Procedural Terminology codes were as follows: hepatitis A vaccination: 90632, 90633, 90634, 90636, and 90730; hepatitis B vaccination: 90636, 90740, 90743, 90744, 90746, 90747, 90748, and G0010. These codes have been reported to be highly predictive of the presence of vaccination in patients' medical records (positive and negative predictive values >90%). (Hachem CY, Kramer JR, Kanwal F, et al. Hepatitis vaccination in patients with hepatitis C: practice and validation of codes at a large Veterans Administration Medical Center. Aliment Pharmacol Ther 2008;28:1078–1087.)
[d]Depression was defined as 1 inpatient or 2 outpatient International Classification of Diseases, 9th revision codes within 1 year.[6] SUD was defined as 1 inpatient visit or outpatient International Classification of Diseases, 9th revision code within 1 year. These included the following: 291.xx, 292.xx, 304.xx, 305.0x, 305.2–305.9, 648.3x, 655.5x, 760.71–760.73, 760.75, 779.5x, 965.0x, 980.0x, V65.42, and 303.xx. In addition, we looked for laboratory evidence of illicit drug use and alcohol use based on blood levels for these agents.
[e]We included only those patients who received the first course of interferon. All patients had >3 months of follow-up evaluation before the first interferon prescription, ensuring that we did not include patients who might have entered the VA while on treatment, thus compromising the ascertainment of the treatment initiation date.
[f]We defined treatment duration by calculating the cumulative days of supply of interferon prescriptions, as previously described by Backus et al.[28] We identified gaps in treatment as the difference between the last date covered by previous prescriptions and the fill date for the next prescription, and classified patients to have received sequential treatment if they had gaps greater than 45 days.

Supplementary Table 2. Association of Process of HCV Care With Antiviral Treatment in Patients Without Treatment Exclusions in the Overall Nationwide Sample and in the Subsample of Patients With Chart Review Data

Process of HCV care	Treatment receipt OR (95% CI)	
	Excluding patients with possible treatment exclusions defined on the basis of clinical and administrative data in the nationwide sample (n = 18,079)	Excluding patients with a documented reason for not receiving treatment in the chart review subsample (n = 231)
Pretreatment care (reference – suboptimum care)	—	—
Optimum care	2.88 (2.57–3.24)	1.84 (0.47–7.19)
Preventive/comorbid care (reference – suboptimum care)	—	—
Optimum care	1.42 (1.21–1.65)	2.38 (0.5–11.38)