

Population-Based Hepatitis C Surveillance and Treatment in a National Managed Care Organization

Deborah Shatin, PhD; Stephanie D. Schech, MPH; Keyur Patel, MD;
and John G. McHutchison, MD

Objectives: To use a national population-based automated claims database to study the testing rate, prevalence, and prescribing patterns for chronic hepatitis C.

Study Design: A retrospective descriptive study that analyzes medical and pharmacy automated claims from affiliated health plans in 4 regions of the United States.

Methods: Data were collected from 11 UnitedHealth Group-affiliated health plans (3.9 million members) from January 1, 1997, to December 31, 1999. Medical claims were used to identify persons tested for hepatitis C virus (HCV). Persons with chronic HCV were identified through medical and pharmacy claims. Patterns of drug use and treatment were analyzed, including prescribing physician specialty and proportion of patients receiving baseline and follow-up testing.

Results: Of 27 871 members tested for HCV (0.7%), 1869 (6.7%) were diagnosed as having chronic HCV. Tested patients were more likely to be female (odds ratio [OR], 1.1) and older (≥ 25 years; OR, 4.1). Of 3259 patients with HCV, most were male (OR, 1.8) and older (≥ 25 years; OR, 32.0). Of these patients, 33.6% ($n = 670$) of men and 25.2% ($n = 319$) of women received treatment. Combination therapy users were more likely to undergo baseline (OR, 4.8) and follow-up (OR, 6.2) testing compared with interferon alfa monotherapy users.

Conclusions: Of the total population, 0.7% were tested for HCV, of whom 6.7% were diagnosed as having chronic HCV. Although women were more likely to undergo testing, prevalence and therapy rates for chronic HCV were higher in men. Most patients did not receive recommended baseline and follow-up testing, and the approximate 30% therapy rate suggested that many patients with HCV remain untreated.

(*Am J Manag Care.* 2004;10:250-256)

During the past 2 decades, hepatitis C virus (HCV) has been recognized as a silent epidemic and an emerging public health threat.^{1,2} Estimates by the Centers for Disease Control and Prevention suggest that approximately 4 million persons in the United States are infected with HCV.² Many have not been diagnosed, because fewer than 20% are symptomatic³ and the condition may be latent.⁴ Chronic HCV infection is the leading cause of liver transplantation in the United States and Europe.⁵ Hepatitis C virus also may account for a 2-fold increase in the incidence of hepatocellular carcinoma between 1975 and 1998.⁶ The total societal cost estimates may be as high as \$600 million

per year in the United States.²

Most of the prevalence data on hepatitis C in the United States are derived from the National Health and Nutrition Examination Study (NHANES) study, which was a survey of noninstitutionalized civilians carried out between 1988 and 1994. The prevalence of anti-HCV was 1.8%, indicating that there were 3.9 million persons infected with HCV, of whom 2.7 million had chronic infection.⁷ Prevalence rates vary according to the population studied. A San Francisco Veterans Administration medical center study⁸ of more than 1000 patients indicated an anti-HCV prevalence of 18%, while another study⁹ of homeless veterans suggested an HCV prevalence of 42%. The global prevalence of anti-HCV is estimated at 2.9%, with lower prevalence rates noted in Western Europe, Australia, and Southeast Asia.¹⁰ *Healthy People 2000*¹¹ set a goal of decreasing the prevalence of this virus from 18.3 per 100 000 persons in 1987 to 13.7 per 100 000 persons in 2000. *Healthy People 2010*¹² specifies the additional goal of reducing new cases of HCV from 2.4 per 100 000 persons in 1996 to 1 per 100 000 persons in 2010.

Managed care organizations (MCOs) are key sites for surveillance of the prevalence and treatment of HCV for several reasons. First, healthcare delivery has increasingly shifted from the public sector to private healthcare systems through MCOs. Second, the age group most frequently diagnosed as having HCV, ages 30 to 49 years, is likely to be employed and covered by employer-insured healthcare. Approximately 93% of privately insured persons receiving coverage from their employer are enrolled in managed care.¹³ Third, a national MCO setting pro-

From the UnitedHealth Group, Center for Health Care Policy and Evaluation, Minneapolis, Minn (DS, SDS), and the Duke Clinical Research Institute and Division of Gastroenterology, Duke University Medical Center, Durham, NC (KP, JGM).

No financial support was provided for this study, directly or through a third party.

The results of this study were presented in part at the 52nd Annual Meeting of the American Association for the Study of Liver Disease, November 9-11, 2001, Dallas, Tex.

Address correspondence to: Deborah Shatin, PhD, UnitedHealth Group, Center for Health Care Policy and Evaluation, 12125 Technology Drive, MN002-0260, Minneapolis, MN 55344. E-mail deborah_shatin@uhc.com.

vides population-based automated data to determine the prevalence and treatment pattern of HCV in the general medical community. Previous studies have focused on select regional practices, rather than a broader comparison across several geographic areas.¹⁴ In addition, most of the published literature on the treatment of HCV summarizes clinical trials that may not reflect treatment patterns in the general medical community.¹⁵

The objectives of this retrospective population-based administrative claims study were to determine the prevalence of chronic HCV infection in a national MCO by age, sex, geographic region, and insurance type; to quantify the rate of testing for HCV in a national MCO by these same factors; and to characterize the prescribing of medications for HCV, including patterns of drug use and treatment.

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METHODS

Data Source and Study Population

Employer-insured and Medicaid-covered populations of 11 geographically diverse health plans affiliated with UnitedHealth Group were included in this study. These 11 plans, with 3.9 million persons enrolled from January 1, 1997 to December 31, 1999, were located in the following geographic regions: Midwest (6 plans, 2.1 million enrollees), Southeast (3 plans, 1.1 million enrollees), Northeast (1 plan, 450 000 enrollees), and West (1 plan, 326 000 enrollees). The plans were mostly independent practice association models, contracting with large networks of physicians typically reimbursed on a discounted fee-for-service basis.

UnitedHealth Group maintains longitudinally linked computerized claims research databases.^{16,17} The data used in this study include enrollment files with demographics, outpatient pharmacy claims, and physician and facility claims. The prescription claims database contains information on prescription drugs dispensed to health plan members in the ambulatory care setting from retail pharmacies. Employer-insured members paid a higher copayment for brand drugs compared with generic equivalents. Medications not on the Preferred Drug List were available to enrollees for a higher copayment. Physician claims include services provided by physicians and other health care providers on an outpatient basis (including laboratory tests), whereas hospital and other facility claims include emergency care and inpatient services provided to health plan members.

Analyses were conducted in the aggregate and by geographic region. Patient confidentiality was preserved because the files used for the study analyses did not contain patient-specific identifiers. An independent institutional review board approved this study.

Testing for HCV

During the 3-year study, outpatient physician and facility claims were used to identify members who underwent testing for HCV, using HCV antibody and HCV RNA tests. Hepatitis C testing was defined as at least 1 outpatient claim with a *Current Procedural Terminology-4 (CPT-4)* procedure code for 1 or more of the following: (1) hepatitis C antibody test (86803); (2) hepatitis panel (80059) that includes hepatitis A, B, and C antibody tests; (3) hepatitis C confirmatory test (86804); or (4) HCV RNA test (87520, 87521, or 87522) used to confirm active infection and monitor disease progression during drug therapy. Laboratory tests from inpatient facility claims were not included in the study because they could not reliably identify tests for HCV, as they are bundled under hospital billing codes. The rate of HCV testing by age, sex, geographic region, and insurance type (employer-insured vs Medicaid) was calculated, using each health plan's enrollee population as a denominator.

Patients With Chronic HCV

A combination of physician, facility, and pharmacy claims files was screened during the study to identify health plan members with chronic HCV, defined as having at least 1 primary or secondary *International Classification of Diseases, Ninth Revision (ICD-9)* diagnosis code for chronic HCV (070.44 or 070.54) or at least 1 prescription for interferon in combination with ribavirin. The prevalence rate of chronic hepatitis C by age group, sex, geographic region, and insurance type was calculated using enrollee population as a denominator.

Patterns of Drug Use and Treatment

The automated outpatient pharmacy claims of patients with chronic HCV were screened to determine the proportion of patients receiving interferon monotherapy, combination interferon alfa-2b and ribavirin therapy, or no treatment. The following types of interferon were included: interferon alfa-2a, interferon alfa-2b, interferon alfacon-1, and interferon alfa-n3. Interferons commonly used for the treatment of conditions other than hepatitis C, such as multiple sclerosis, were excluded from this study (eg, interferon beta-1a, interferon beta-1b, and interferon gamma-1b). The percentages of patients with interferon claims alone (monotherapy users), combination therapy claims alone (combination therapy), or both interferon and combination therapy claims (both) were calculated. The specialty type of the prescribing physician was also determined based on the pharmacy claims.

Further analyses of drug treatment patterns, including duration of treatment and baseline and follow-up

testing, were completed on a subset of patients meeting certain criteria. First, patients had to be “new users” of these medications. A patient was considered a new user if he or she had no prescriptions for interferon or combination therapy during the 3 months before the first prescription (index date). For some patients, a break in therapy of at least 3 months’ duration may signify the start of a new course of therapy. Second, new users had to be continuously enrolled in the health plan, with no gap in enrollment greater than 32 days from at least 3 months before the index date through 6 months after the index date (a minimum of 9 months’ continuous enrollment). These additional criteria allowed for appropriate standardized comparisons across treatment groups because patients had to be enrolled at least 9 months and were new users (of these medications). Duration of therapy was determined by calculating the number of months between the patient’s first and last prescriptions and then adding the days’ supply amount of the final prescription.

Treatment Monitoring

Pharmacy claims were analyzed to determine whether recommended guidelines for monitoring the response to drug therapy were followed. We determined if a patient received a baseline HCV RNA (CPT codes, 87520, 87521, or 87522) or alanine aminotransferase (CPT codes, 84460, 80058, or 80012-80019) test before

initiating treatment with interferon alone or combination therapy. In addition, we identified whether a patient received follow-up testing within the first 6 months following treatment initiation.

Statistical Analysis

Data were analyzed using the Statistical Analysis System program (SAS Institute Inc, Cary, NC). Rates of chronic HCV and testing for HCV were calculated. Logistic regression analyses were conducted to evaluate the effects of sex, age, geographic region, and insurance type on the prevalence of chronic HCV and testing for the disease. For the subset of patients receiving drug therapy for chronic HCV, differences in the rates of baseline and follow-up testing also were examined.

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RESULTS

Testing for HCV

Of 3.9 million members, 27 871 (0.7%) were tested for HCV (Table). More than half of those tested (53.3%) were female (n = 14 849). Women had a higher overall testing rate (74.8%) than men (66.6%), 1.08; 95% confidence interval [CI], 1.05-1.10 (Figure 1). Testing rates increased with age from 119 per 100 000 for children younger than 18 years of age, to 1461 per 100 000 for the group aged 55 to 64 years. As expected, patients 25 years or older were more likely than younger patients to undergo testing for HCV (OR, 4.1; 95% CI, 4.0-4.3). The Northeast region had the highest testing rate (1582/100 000), and the West had the lowest (497/100 000). Compared with the Midwest region, patients in the Northeast were significantly more likely to undergo testing (OR, 2.5; 95% CI, 2.4-2.6). Medicaid beneficiaries had a higher rate of testing (917/100 000) compared with employer-insured members (696/100 000) (OR, 1.6; 95% CI, 1.5-1.7). Of the patients who underwent testing for HCV, 6.7% (n = 1869) had a claims diagnosis for chronic HCV. Whereas the testing rate was higher for women, patients who were tested

Table. Demographic Characteristics of the Study Population*

Characteristic	Total Study Population (n = 3 939 523)	Population Tested (n = 27 871) [0.7]	Population With Chronic HCV (n = 3259) [0.08] [†]
Sex			
Female	1 984 173 (50.4)	14 849 (53.3)	1265 (38.8)
Male	1 955 350 (49.6)	13 022 (46.7)	1994 (61.2)
Age, mean ± SD, y	27 ± 17	36 ± 13	41 ± 9
Insurance coverage			
Employer-insured	3 742 277 (95.0) [‡]	26 062 (93.5)	2970 (91.1)
Medicaid	197 246 (5.0) [§]	1809 (6.5)	289 (8.9)
Geographic region			
Midwest	2 111 589 (53.6)	13 104 (47.0)	1508 (46.3)
Northeast	450 117 (11.4)	7122 (25.6)	573 (17.6)
Southeast	1 051 147 (26.7)	6020 (21.6)	845 (25.9)
West	326 670 (8.3)	1625 (5.8)	333 (10.2)

*Data are given as number (percentage) unless otherwise indicated.

[†]The number with a positive result for hepatitis C virus (HCV) infection relative to the population tested was 1869 (6.7).

[‡]Percentage of women was 49.9%.

[§]Percentage of women was 59.8%.

and diagnosed with chronic HCV were more likely to be male (61.7% of those tested and diagnosed).

Disease Prevalence

Across the 11 health plans, 3259 members (0.08% of the total population) were identified as having chronic HCV based on the diagnosis codes in claims data (Table). Of these, 38.8% (n = 1265) were female. As shown in **Figure 2**, the rate of chronic HCV was 64 per 100 000 for women and 102 for 100 000 for men. Men were significantly more likely to have a diagnosis code for chronic HCV compared with women (OR, 1.76; 95% CI, 1.64-1.89). The group aged 45 to 54 years had the highest observed prevalence rate of chronic HCV infection (277 per 100 000), followed by the group aged 35 to 44 years (190/100 000). Persons younger than 25 years had the lowest disease prevalence (13/100 000). Those diagnosed with chronic HCV tended to be 25 years or older (OR, 32.0; 95% CI, 26.3-39.0). Compared with the Midwest, the Northeast region had the highest rate of chronic HCV based on claims diagnosis codes (127/100 000) (OR, 1.6; 95% CI, 1.4-1.7). Overall, Medicaid beneficiaries had a higher rate of chronic HCV than employer-insured members (OR, 4.3; 95% CI, 3.8-4.9), based on claims data.

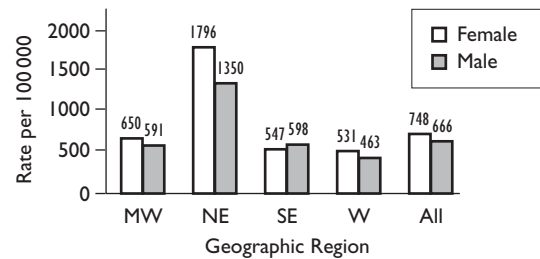
Patterns of Drug Use and Treatment

Of 3259 patients with chronic HCV, 989 (30.3%) received treatment during the 3-year study. Approximately 33.6% (n = 670) of men and 25.2% (n = 319) of women underwent drug therapy for HCV. Most treated patients (67.7%) were men. The highest rate of treated patients was in the Northeast region (35/100 000) and the lowest in the West (13/100 000). Of those who received treatment, 22.3% were prescribed interferon monotherapy, 58.0% were prescribed combination therapy, and 19.6% both therapies. Approximately 62.5% of prescriptions for these medications were written by gastroenterologists, 15.3% by primary care physicians, and 12.7% by other specialists, including oncologists (5.2%), infectious disease specialists (3.6%), and hematologists (1.3%). A further 9.4% of prescriptions were obtained at facilities such as hospitals, emergency departments, and urgent care centers.

Of the 989 patients with chronic HCV who underwent treatment, 704 (71.2%) met the new user criteria (no treatment in the 3 months before the index date) and had continuous enrollment of at least 9 months. Subsequent analyses were conducted on this subset of patients, including duration of drug therapy and baseline and follow-up testing.

Of the 704 new users, 57.0% (n = 401) were combination therapy users, 22.9% (n = 161) were interferon

Figure 1. Hepatitis C Virus Testing Rate by Sex and Region



Overall, a slightly higher rate of tests was completed for women compared with men. The highest testing rate was for the Northeast (NE) region, and the lowest was for the West (W). MW indicates Midwest; SE, southeast.

monotherapy users, and 20.2% (n = 142) received both. Of the 142 users of both, 78.9% (n = 112) were initially prescribed interferon monotherapy, and 21.1% (n = 30) initially received combination therapy. This suggests that many patients who received combination therapy were likely to have failed interferon monotherapy first.

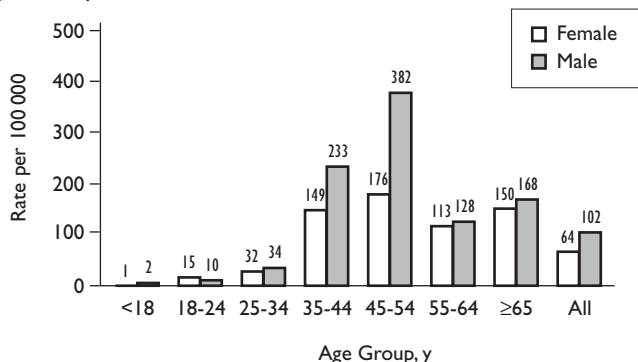
As expected, duration of treatment was shorter for patients who received combination therapy only (median, 5 months; range, <1 to 24 months) than for those who received interferon monotherapy (median, 7 months; range, <1 to 32 months). Patients filling prescriptions for both interferon and combination therapy had the longest duration of treatment (median, 14 months; range, 2-37 months), with 53.5% (76/142) taking more than 1 year to complete the course of treatment for both therapies.

Of combination therapy users, 64.8% (260/401) completed the standard 6-month therapy regimen within 6 months, while 75.8% (122/161) of interferon monotherapy users completed the standard 12-month therapy regimen within 12 months. These criteria are based on the recommended course of therapy. The proportion of treated patients who discontinued therapy within the first 3 months was 28.2% (113/401) for combination therapy users and 19.9% (32/161) for interferon monotherapy users. Although it is likely that these patients discontinued therapy because of nonresponse, we cannot be certain of this based on the claims data alone.

Treatment Monitoring

Of the 704 persons who received treatment for chronic HCV, 454 (64.5%) had a claim for baseline RNA or alanine aminotransferase testing before beginning drug therapy. **Figure 3** shows the percentage of patients undergoing baseline testing by type of drug treatment (interferon monotherapy, combination therapy, or both). Of 161 interferon-only users, 44.1% (n = 71) received baseline testing, compared with 78.3%

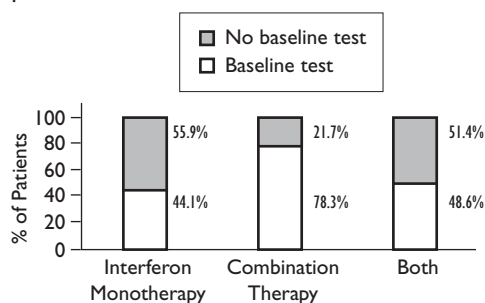
Figure 2. Prevalence of Chronic Hepatitis C Virus (HCV) by Age Group and Sex



Overall, men had a higher rate of HCV infection compared with women, with the highest prevalence rates observed in the group aged 45 to 54 years.

(314/401) of combination therapy-only users. Only 6.2% (10/161) of interferon-only users received an RNA test and an alanine aminotransferase test, compared with 34.7% (139/401) of combination therapy users. The likelihood of receiving a baseline test was associated with the type of drug a patient was prescribed. Combination therapy users were significantly more likely than interferon monotherapy users to receive a baseline test (OR, 4.8; 95% CI, 3.2-7.2). Approximately 87% of all baseline testing occurred between the ages of 35 and 54 years, with the group aged 45 to 54 years having the highest rate of baseline testing (44/100 000), followed by the group aged 35 to 44 years (27/100 000). Patients 25 years or older also were more likely to get a baseline test than younger patients (OR, 13.3; 95% CI, 2.7-65.0). No differences were found with respect to sex, geographic region, or insurance type.

Figure 3. Baseline Hepatitis C Virus (HCV) RNA or Alanine Aminotransferase (ALT) Testing by Treatment Group



More than one half (56%) of patients who received interferon monotherapy did not have a baseline HCV RNA or ALT test, compared with 22% of patients who received combination therapy.

Overall, 32.5% (229/704) of patients received an RNA test within the first 6 months of treatment. For combination therapy-only users, this percentage was higher at 41.6% (167/401), compared with 10.6% (17/161) for interferon-only users. Combination therapy users also were significantly more likely to receive follow-up testing compared with interferon monotherapy users (OR, 6.2; 95% CI, 3.6-10.7). No differences were found with respect to age, sex, geographic region, or insurance type.

DISCUSSION

Despite a significant decline in the incidence of HCV infection during the past decade, morbidity and mortality among patients with chronic HCV will continue to rise during the next 10 to 20 years, resulting in a substantial societal health and economic burden.¹⁸ The cost of treating chronic liver disease from HCV will fall, in large part, on MCOs.¹⁹ Although research suggests that standard interferon and ribavirin combination therapies are cost effective,²⁰⁻²² we found that approximately 70% of patients infected with HCV did not receive antiviral therapy. This may have significant implications for the economic burden during the next 10 to 20 years. Many of these patients are likely to have asymptomatic disease, which may also explain their low referral rate for treatment. Assuming a 20% referral for treatment, a previous analysis of HCV screening in average-risk, asymptomatic patients was found not to be cost effective.²³ An increased referral pattern for treatment and a higher disease progression may improve the cost-effectiveness ratio of screening. However, the approximate 30% treatment rate in our study may still not be enough to show a cost benefit for screening. In our study, men had a greater overall incidence of chronic HCV infection and were more likely to receive drug therapy. Women, however, had a higher rate of diagnostic testing. This suggests the need to promote awareness of risk factors to increase screening for high-risk men in MCOs. In general, treatment is cost effective, and although screening should be reserved for patients at high risk, there is a need to increase rates of referral for treatment.

The rate of treatment monitoring varied by the type of drug therapy at baseline and during follow-up. About two thirds of patients treated for HCV had a claim for baseline RNA or alanine aminotransferase testing, with a higher rate of testing for combination therapy (78.3%) than for interferon monotherapy (44.1%). The recommendation for HCV RNA monitoring within 6 months

of initiating therapy was followed only one third of the time, again with a higher rate for combination therapy (41.6%) than for interferon monotherapy (10.6%). These findings suggest that increases in the rate of baseline testing are needed and an even greater need exists to improve the rate of follow-up testing. This was especially evident for interferon monotherapy, although higher rates of monitoring for the newer combination therapy suggest a trend toward increased rates of testing.

It is difficult to gauge how different our results would be if our study included the current standard of care with the combination of pegylated interferon and ribavirin therapy. The pegylated interferons were not available outside the clinical trial setting during our study. There may have been an increased referral for treatment due to the incremental benefits in terms of sustained virologic response for the pegylated interferon and ribavirin therapy. If our study had been moved forward by 18 months, the proportion of patients receiving interferon monotherapy would have been expected to decline. Furthermore, we would have expected a higher proportion of patients to receive baseline HCV RNA testing before initiation of combination therapy, as this is an important predictor of response.

Several interesting patterns emerged regarding HCV surveillance and treatment. With respect to geographic comparisons, the health plan with the greatest testing rate also had the highest rate of HCV (Northeast), defined by claims for diagnosis or drug therapy. This underscores the importance of testing to identify HCV and the need to provide subsequent treatment. In general, we found a greater prevalence of HCV in the Medicaid-covered population than among employer-insured enrollees. Possible reasons may include a higher rate of injection drug use among the unemployed and poor, as well as comorbid associations such as human immunodeficiency virus and alcohol use, which may worsen liver injury and prompt earlier testing in this population. However, many cases of HCV infection are detected incidentally during routine health screening, when minor abnormalities of liver enzyme test results may prompt further investigations.²⁴

There are few studies of healthcare delivery to patients with HCV, and most of the interest appears to lie with optimizing current treatment regimens and response outcomes.²⁵⁻²⁷ A multidisciplinary approach is required to ensure adequate healthcare delivery and adherence to therapy. This requires the combined efforts of healthcare providers such as the treating physician and assistants, psychiatrists, social workers, nurses, pharmacists, and other support care staff. Our study indicated that many of the prescriptions were written by nongastroenterologists, and better education

among primary care physicians regarding risk factors may lead to more appropriate HCV testing practices and subsequent referral for treatment. However, there is discordance regarding appropriateness of therapy for HCV infection even among hepatologists.²⁸ There is a nonuniform practice of HCV testing and education among drug treatment programs. A significant proportion of these programs did not test for HCV, and residential drug-free programs were more likely to provide better education and testing for HCV compared with outpatient-based services.²⁵ This may relate to differences in available resources and more favorable patient-staff ratios. There is a need to enhance healthcare delivery systems to create a better link with screening and referral patterns in the community setting.

Because our study is large and US population-based, covering different geographic locations, it summarizes information on HCV surveillance through testing and treatment using an extensive automated claims database. Denominators are available through enrollment files, allowing calculation of rates of testing and prevalence of HCV infection using claims data. In addition, we are able to link patient characteristics and health services use across sites of care to provide a longitudinal perspective and use patterns of therapies. Most important, we can estimate treatment patterns of HCV in the general medical community, in contrast to clinical trials conducted with a subset of the patient population in tertiary and specialty centers. Analyzing testing patterns, we also can compare actual clinical practice with recommended guidelines.

As with any study based on administrative claims data, there are certain inherent limitations. We may have underestimated testing and prevalence because each was claims-based and required the submission of a bill for payment. Because providers were paid only after submission of a bill, it is likely that this information is complete. Claims for nonparticipating providers also are included in the automated database. However, if a test was conducted or a drug prescribed outside the managed care system and not submitted, this information would not be available. For patients who may have been tested or received a diagnosis of HCV before enrollment in this setting, such information also would not be part of the claims files. Therefore, although the rates of testing and treatment may be underestimated, comparative rates across subgroups should be accurate (such as comparisons by sex or age group). Our method of classifying patients as having chronic HCV may overestimate the number of patients with chronic disease (defined as having HCV RNA or polymerase chain reaction testing) because we do not have access to the test results for positive confirmation. Therefore, we also

studied rates of treatment with HCV therapies. Due to costs, we did not review medical records to validate claims for HCV testing, diagnosis, or treatment. Finally, for those patients who discontinued treatment, this study did not attempt to identify the reasons for discontinuation from submitted claims because these reasons may be multifactorial or not apparent.

In summary, this study allowed us to analyze some of the epidemiologic and treatment-related issues in chronic HCV infection from a larger, national frame of reference outside the scope of the randomized clinical trial setting. The study also demonstrates the value of studying chronic HCV surveillance and treatment using population-based claims data in a national, employer-insured managed care setting. Based on nearly 4 million members in 11 geographically diverse health plans, the overall rate of HCV testing was 0.7%, of which 6.7% of patients were diagnosed based on claims for chronic HCV. Whereas the incidence and use of drug therapy were greater for men, women were more likely to be tested for HCV. The low overall therapy rate of approximately 30% suggests the need for development of drug therapies with fewer adverse effects that may be suitable for a larger number of patients infected with HCV and a greater awareness of appropriate therapies.

In addition, a greater understanding of recommendations for baseline and follow-up testing during the course of drug therapy is needed. This may be achieved by the implementation of guidelines for prevention, HCV testing, and treatment, along with the education of healthcare providers, as well as quality assurance measures to ensure that recommended practices are followed. Simple algorithms and regular updates through education meetings for primary care providers may improve initial testing rates and ensure better counseling for infected patients. Collaborative treatment and support networks among practices also may enhance testing rates and encourage attendance at clinics. The provision of improved healthcare delivery systems needs to be extended to special populations that do not have access to services or are ineligible for current therapies. Healthcare providers involved in the care of these patients or other high-risk populations also need to be encouraged to regularly attend educational programs regarding HCV infection. Lessons learned from this population-based study provide greater insight into community practice as it relates to HCV infection and may help identify important areas for further public health research and education.

Acknowledgments

We thank Paula Rheault for programming expertise and Bharati Manda, MS, for statistical expertise.

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