Current Practice Patterns of Primary Care Physicians in the Management of Patients With Hepatitis C

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Approximately 4 million Americans are infected with the hepatitis C virus (HCV). Most patients with hepatitis C have no symptoms until cirrhosis is established. Thus, initial diagnosis and management of hepatitis C rely on primary care physicians identifying and screening high-risk individuals. We administered a survey to 1,233 primary care physicians in a health maintenance organization (HMO) in April 1997 to assess their knowledge of the risk factors for HCV infection and approach to the management of 2 hypothetical HCV antibody–positive patients, 1 with elevated and the other with normal alanine transaminase (ALT). Four hundred four (33%) physicians returned the survey. Ninety percent of respondents correctly identified the risk factors for HCV infection, but 20% still considered blood transfusion in 1994 as a significant risk factor for HCV infection. Sixty-two percent of respondents would refer HCV antibody–positive patients with abnormal transaminase levels, but 33% would follow these patients themselves, even though none of the respondents had treated any hepatitis C patient on their own. Forty-three percent of respondents overestimated, while 29% did not know the efficacy of interferon treatment. Sixty-five percent of respondents would retest patients for HCV antibody, regardless of risk factors and transaminase levels. We found that most primary care physicians correctly identified the significant risk factors for HCV infection and appropriately managed the 2 hypothetical patients, but there was considerable confusion about the use of HCV tests and the effectiveness of treatment. Educational programs for primary care physicians are needed to implement hepatitis C screening and to initiate further evaluation and management of those who test positive. (HEPATOLOGY 1999;30:794-800.)

It has been estimated that approximately 4 million Americans are infected with the hepatitis C virus (HCV).[1] Hepatitis C accounts for 8,000 to 10,000 deaths annually and is the leading indication for liver transplantation in the United States. Significant advances in the diagnosis and treatment of hepatitis C have been made in the years since the first diagnostic tests became available in 1990. This rapid growth of knowledge has taken place without formal standardization of crucial diagnostic tests or official recommendations for treatment. The lack of consensus on the best evidence-based approach to care for patients with hepatitis C led to the National Institutes of Health (NIH) consensus development conference in March 1997 and the release of the NIH consensus statement on hepatitis C.[2] The objective of this conference was to provide health care providers, patients, and the general public with a responsible assessment of currently available methods to diagnose and manage hepatitis C.

Many patients with hepatitis C are not aware that they are at risk for HCV infection. In addition, the vast majority of patients with hepatitis C have no or nonspecific symptoms until cirrhosis is established. The occult nature of the disease in its early stage means that initial diagnosis and management rely on primary care physicians recognizing and testing high-risk individuals. It is therefore imperative that primary care physicians can identify patients at risk for hepatitis C, institute proper diagnostic testing, and begin initial management or referral of these patients. However, the knowledge of primary care physicians concerning hepatitis C has not been assessed.

We designed this study to determine: 1) the knowledge base of primary care physicians on risk factors and management of hepatitis C; 2) the factors that influence primary care physicians' knowledge and approach to patients with hepatitis C; and 3) the effect of the NIH consensus statement on hepatitis C as an educational intervention in primary care physicians.

MATERIALS AND METHODS

We developed a survey to assess primary care physicians' knowledge of the risk factors for HCV infection and their approach to the management of patients with hepatitis C. The survey contained 9 questions on risk factors and 9 questions on the management of patients with hepatitis C. A copy of the survey is available from the authors (T.M.S.). The questions on risk factors listed various exposures, and the respondents were asked to rate each of the exposures as "significant" or "minimal" risk factors for HCV infection. Patient management questions were based on 2 clinical vignettes of patients who tested positive for HCV antibody by enzyme-linked immunoabsorbent assay (EIA). The first patient had normal and the second had elevated alanine transaminase (ALT) levels (Table 1). The survey also elicited basic demographic informa-

TABLE 1. Summary of the Two Clinical Vignettes

Vignette 1	Vignette 2
55-year-old male	32-year-old female
• Elevated ALT (150 U/L) during check-up for life insurance	• HCV antibody–positive (EIA) at blood donation
• Subsequent work-up: HCV antibody–positive (EIA)	• Subsequent work-up: normal ALT
• Otherwise healthy/asymptomatic	• Healthy/asymptomatic
• History of intravenous drug use in 1965	• No risk factor

tion on the respondents, including specialty, years in practice, number of hepatitis C patients seen in the previous year, and experience with interferon therapy in hepatitis C patients.

The study comprised 3 phases. First, we used the survey to assess the baseline knowledge of 1,233 primary care physicians in a large health maintenance organization (HMO) in Michigan in April 1997. The list of physicians' names and addresses was obtained from the HMO administrative office. The survey was mailed with a cover letter signed by one of the authors (A.S.-F.L.). The cover letter stated that the purpose of the survey was to assess the knowledge and practice of primary care physicians regarding hepatitis C and assured confidentiality of the results. The baseline knowledge of the respondents was compared with evidence-supported information in the NIH consensus statement. In July 1997, we mailed a summary of the NIH consensus statement to all the physicians who returned the initial survey. The summary contained 13 pages of text without illustrations. One month after the mailing of the consensus statement, we sent a new copy of the same survey to all the respondents and asked them to complete and return the second survey. To improve the response rate, a reminder was sent 2 weeks after the mailing of both the initial and the second surveys.

To identify factors that influence the physicians' responses, the responses to each question were further analyzed according to the physicians' specialty, number of years in practice, and the number of hepatitis C patients seen in the previous year. To determine if the responses were influenced by the NIH consensus statement, the responses between the initial and second surveys were compared. Statistical comparisons between groups were made using t tests.

RESULTS

Of the 1,233 primary care physicians, 404 (33%) returned the initial survey. One hundred twenty-six (31%) of those who responded to the initial survey returned the second survey.

Respondent Demographics. The majority of the respondents were family practitioners (48%) or internists (31%) (Table 2). The remaining respondents were comprised of pediatricians (17%), general practitioners (3%), and medicine subspecialists (1%). Approximately half (54%) of the respondents had been in practice for more than 10 years. Most respondents (84%) had seen less than 5 patients with hepatitis C in the previous year. At the time of the initial survey, 75% had not seen the NIH consensus statement, 23% had read excerpts of it, and only 2% had read the entire statement. The majority (71%) of the respondents had no experience with interferon therapy, and none had treated any patient with interferon without the assistance of a gastroenterologist.

There was no difference between the subgroup of respondents who completed both surveys and the total responder cohort with regard to specialty, number of years in practice, or number of hepatitis C patients seen in the previous year (Table 2). A higher proportion of the subgroup that responded to both surveys had experience in following patients

treated with interferon. However, fewer members of this subgroup had seen the NIH consensus statement on hepatitis C at the time of the initial survey.

Risk Factors for HCV Infection. The respondents were asked to rate various exposures as "significant" or "minimal" risk factors for HCV infection (Fig. 1). There was strong agreement between the respondents and the published data that intravenous drug use (98%), blood transfusion in 1982 (88%), and sexual contact with multiple partners (87%) were significant risk factors for HCV infection. The vast majority of the respondents also correctly identified casual household contact (92%) and sexual contact in a monogamous relationship (93%) as exposures associated with a minimal risk for HCV infection. Most (80%) respondents considered the risk of acquiring HCV infection by an infant born to a hepatitis C–infected mother as significant. A surprisingly high proportion (20%) of the respondents identified blood transfusion in 1994 as a significant risk factor for HCV infection.

When the responses to questions on risk factors were further analyzed based on the respondents' specialty, years in practice, and the number of hepatitis C patients seen during the previous year, there were significant differences based on specialty (Fig. 2). A higher proportion of internists correctly ranked blood transfusion in 1982 as a significant risk factor for HCV infection, and a lower proportion of internists ranked blood transfusion in 1994 as a significant risk factor for HCV infection. Internists were less likely than family

TABLE 2. Baseline Demographics of the Respondents

		Percent of Respondents		
	Percent of Entire HMO	All (n = 404)	Subgroup* (n = 126)	P
Specialty				
Internal medicine	34	31	30	NS
Family medicine	45	48	52	NS
Other	21	21	18	NS
Number of years in practice				
0-5 years	25	24	21	NS
6-10 years	25	22	17	NS
>10 years	50	54	62	NS
Number of hepatitis C patients seen in the previous year				
None		27	25	NS
1-5 patients		57	56	NS
6-10 patients		11	13	NS
>10 patients		5	6	NS
Experience with alpha interferon therapy				
None		71	43	<.0001
Followed patients treated by specialists		27	42	<.001
Treated patients along with specialist		2	13	<.0001
Treat patients alone		0	2	<.001
Exposure to the NIH consensus statement				
Have not seen it		75	83	<.05
Have read excerpts		23	14	<.03
Have read the entire statement		2	3	NS

*Subgroup represents the physicians who responded to both the initial and second surveys.
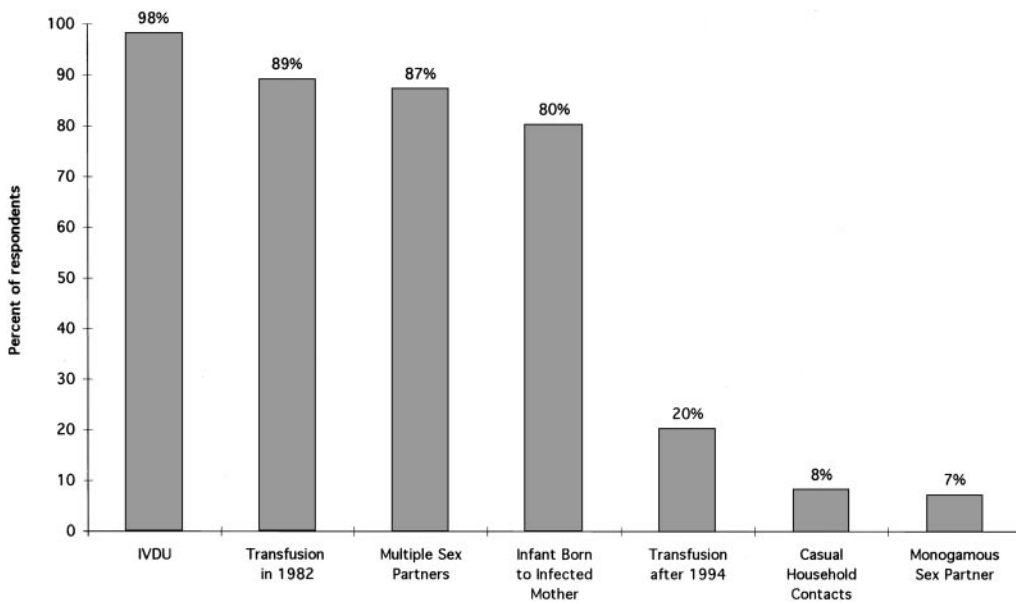
FIG. 1. Percent of all respondents (n = 404) identifying various exposures as significant risk factors for HCV infection.

practitioners to identify casual household contact (an exposure with negligible risk) as a significant risk factor for HCV infection. No significant difference in responses to questions on risk factors was found based on years in practice or the number of hepatitis C patients seen in the previous year (Fig. 3).

In the subgroup of physicians who completed both surveys, the only significant difference between the responses in the initial and second surveys was a decrease in the proportion of physicians who ranked birth to a hepatitis C–infected mother as a significant risk factor for HCV infection: 83% vs. 65% ($P < .001$) (Fig. 4).

Clinical Vignettes. The physicians were asked how they would manage 2 hypothetical patients who tested positive for HCV antibody using EIA (Table 1). As expected, the respondents were more likely to refer patient 1 to a gastroenterologist and to support further intervention, but they were less

certain about the need for and the choice of further HCV testing in the 2 patients.

Patient 1 had risk factor for HCV infection and abnormal ALT levels. Nevertheless, when asked what additional HCV tests should be performed, more than half of the respondents would recheck for HCV antibody including retesting with EIA (59%) (Table 3). The majority (82%) of the respondents would test for HCV RNA. Very few (15%) respondents would perform HCV genotyping. Most (62%) respondents would refer patient 1 to a gastroenterologist, but 33% would follow the patient themselves, even though none of the respondents had any experience in treating patients with hepatitis C on their own. An alarming response, albeit from a small minority (1%) of respondents, was to reassure the patient that he/she is immune to HCV infection. The vast majority of respondents would support gastroenterologists' recommendations to perform liver biopsy (89%) and to initiate interferon alfa therapy
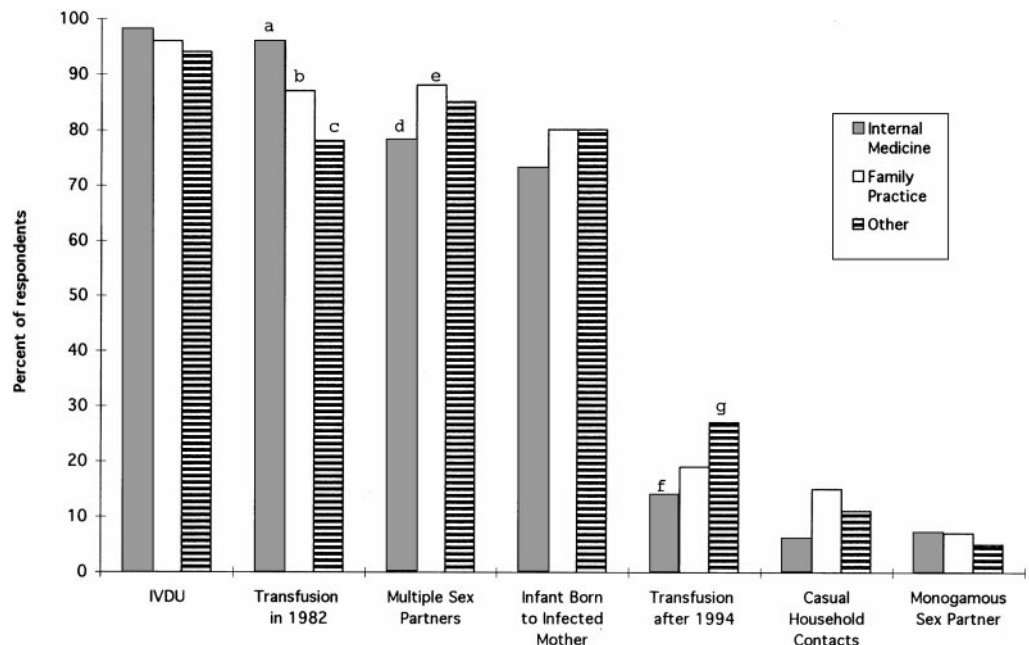

FIG. 2. Percent of all respondents (n = 404) identifying various exposures as significant risk factors for HCV infection based on respondents' specialty. a vs. b: $P = .007$; a vs. c: $P = .001$; d vs. e: $P = .02$; f vs. g: $P = .02$.
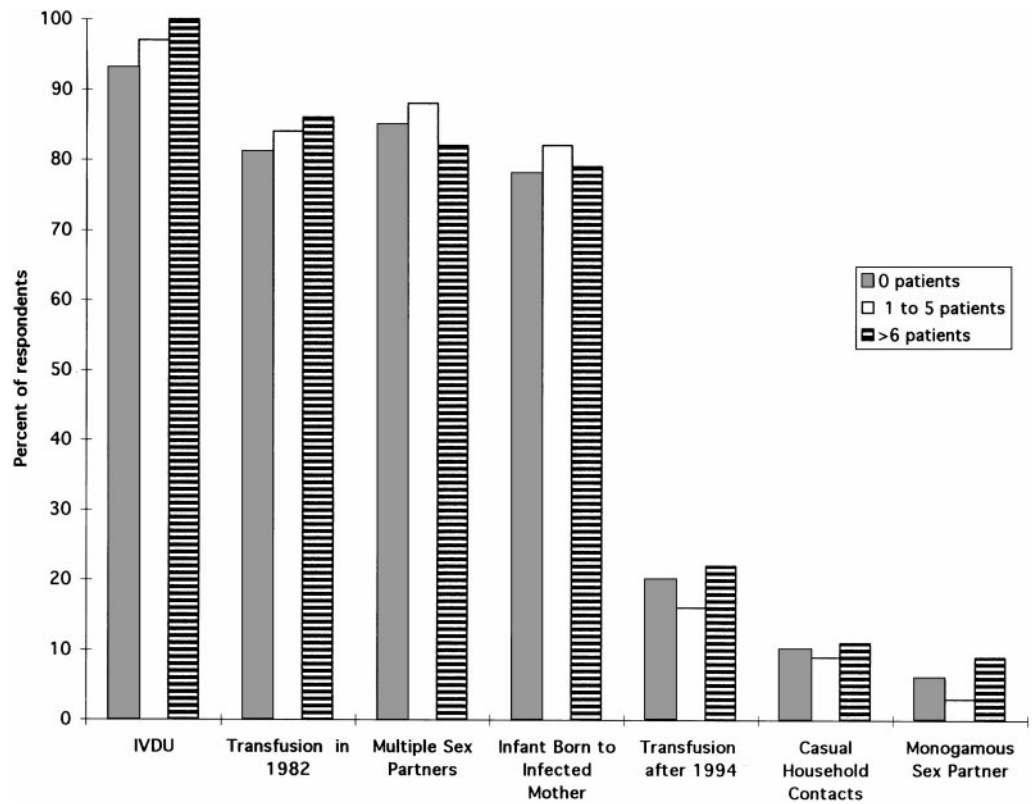
FIG. 3. Percent of all respondents (n = 404) identifying various exposures as significant risk factors for HCV infection based on respondents' experience with hepatitis C patients in the past year.

(84%). However, when asked to estimate the likelihood of a sustained response after one course of interferon therapy, 43% of the respondents overestimated the response rate, while 29% did not know the answer.

Patient 2 had normal ALT levels and no identifiable risk factor for HCV infection, yet the responses to further HCV testing were remarkably similar to patient 1. Most respondents agreed that confirmatory testing is necessary for this patient, but they were uncertain which should be the next test. A similar proportion would retest the patient for HCV antibody using EIA (68%) or recombinant immunoblot assay (RIBA) (63%) or for HCV RNA (70%) (Table 3). As expected,
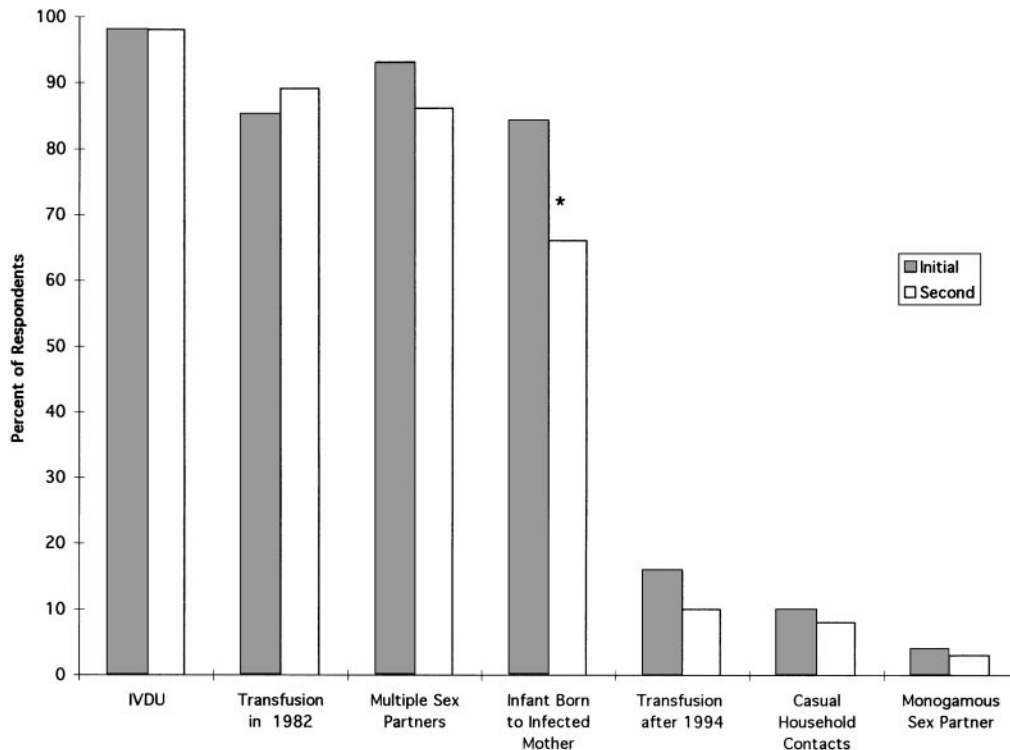

FIG. 4. Percent of respondents (n = 126) within the subgroup who responded to both surveys identifying various exposures as significant risk factors for HCV infection in the initial and second surveys. *P < .05.

TABLE 3. Management of Patients With Hepatitis C

	Percent of Respondents	
	Vignette 1	Vignette 2
At this point your next step would be to		
Reassure patient that s/he is immune to hepatitis C	1	3
Follow patient in clinic, no referral	8	37
Follow in clinic, refer if symptoms develop	25	38
Refer to a gastroenterologist	62	18
Don't know	4	4
Assume that you decided to do further testing; which tests would you perform next (check all that apply)		
Recheck HCV antibody by EIA	59	68
Quantitative/qualitative test for HCV RNA	82	70
Recheck for HCV antibody with RIBA	64	63
HCV genotyping	15	14
Would you support a liver biopsy if recommended by a gastroenterologist		
Yes	89	39
No	11	61
Would you support treatment with interferon if recommended by a gastroenterologist		
Yes	84	36
No	16	64
If patient is treated, what is the likelihood of sustained response after completion of a course of interferon		
Approximately 80%	5	Not Asked
Approximately 50%	38	
Approximately 20%	26	
Approximately <5%	2	
Don't know	29	

only a minority (18%) of the respondents would refer patient 2 to a gastroenterologist; most (75%) would follow the patient in their clinics. Contrary to patient 1, only one third of the respondents would support further intervention such as liver biopsy (39%) or interferon treatment (36%), even if recommended by a gastroenterologist.

To identify the factors that may influence the management of patients with hepatitis C, physician responses were further analyzed according to their specialty, years in practice, and number of hepatitis C patients seen in the previous year (Table 4). Internists were more likely to refer patient 1 to a gastroenterologist compared with other physicians. Internists and physicians who had seen more patients with hepatitis C were less likely to answer that they "did not know" when asked to estimate the likelihood of response to interferon therapy. The management of patient 2 was considerably more uniform irrespective of the physicians' specialty (Table 4), years in practice (Table 5), or number of hepatitis C patients seen in the previous year.

The responses on management of the 2 patients were similar in the initial and second surveys (Table 6).

DISCUSSION

In this study, we attempted to define the knowledge base of primary care physicians on risk factors and management of hepatitis C. As the "gatekeepers" to the health care system in the United States, primary care physicians must be able to identify patients at risk for hepatitis C and institute proper diagnostic testing and referral. The respondents in this study were able to identify most hepatitis C risk factors, but demonstrated considerable confusion over confirmatory testing and efficacy of treatment.

TABLE 4. Management of Hepatitis C Patients Based on Respondents' Specialty

	Percent of Respondents Replying Yes	
	Vignette 1	Vignette 2
Would you refer patient to a gastroenterologist?		
Internal medicine	70	15
Family practice	59	19
Other	51	18
Would you support a liver biopsy if recommended by a gastroenterologist?		
Internal medicine	86	34
Family practice	88	41
Other	79	29
Would you support interferon therapy if recommended by a gastroenterologist?		
Internal medicine	77	29
Family practice	84	33
Other	74	32
What is the likelihood of sustained response after completing a course of interferon. (% answering—Don't know)		
Internal medicine	16	Not asked
Family practice	28	
Other	45	

The HMO studied in this project was chosen because of the diversity of patients enrolled, the variety of practice settings represented, and its size. The demographics of the patients covered by this HMO are similar to the age and gender breakdown of the Michigan population. The study population represented over 1,200 physicians, with 404 physicians responding. This response rate of 33% is comparable with the

TABLE 5. Management of Hepatitis C Patients Based on Respondents' Year in Practice

	Percent of Respondents Replying Yes	
	Vignette 1	Vignette 2
Would you refer patient to a gastroenterologist?		
No. of years in practice		
0-5	68	21
6-10	64	19
>10	69	18
Would you support a liver biopsy if recommended by a gastroenterologist?		
No. of years in practice		
0-5	85	34
6-10	86	31
>10	87	27
Would you support interferon therapy if recommended by a gastroenterologist?		
No. of years in practice		
0-5	85	33
6-10	84	31
>10	82	36
What is the likelihood of a sustained response after completion of a course of interferon? (% answering don't know)		
No. of years in practice		
0-5	27	
6-10	25	
>10	31	

TABLE 6. Management of Hepatitis C Patients: Comparison of Responses
in the Initial and Second Surveys (n = 126)

| | Percent of Respondents Replying Yes | | | |
| | Vignette 1 | | Vignette 2 | |
	Initial	Second	Initial	Second
Would you refer patient to a gastro-enterologist?	61	68	19	20
Would you support a liver biopsy if recommended by a gastroenter-ologist?	89	92	42	45
Would you support interferon therapy if recommended by a gastroenterologist?	85	83	31	36
What is the likelihood of sustained response after completing a course of interferon? (% answer-ing—Don't know)	26	19	Not asked	

response rate of 30% in a study on primary care physicians' knowledge and practice patterns concerning *Helicobacter pylori* infection.[3] A higher response rate of 57% was obtained in a survey on management of patients with hepatitis C among gastroenterologists.[4] This may be related to the increased awareness of hepatitis C among gastroenterologists and the fact that the survey was conducted by the NIH and the American Gastroenterology Association on the AGA members. Despite the low response rate, we feel that our respondents were representative of the physicians in the HMO studied. The demographics of the 404 responding physicians were similar to that of the entire physician workforce of the HMO in terms of specialty, practice location, and years in practice (Table 2). The demographics of the subgroup of respondents who returned both surveys were also comparable with the total responding cohort (Table 2).

The vast majority (90%) of our respondents correctly identified intravenous drug use, blood transfusion before 1990, and multiple sex partners as significant risk factors, and casual household contact and monogamous sexual contact as exposures with low risk for HCV infection. Although the risk of perinatal transmission of hepatitis C is only 6%,[5] over 80% of the respondents considered this to be a significant risk factor. While the Centers for Diseases Control (CDC) recommends screening offspring of HCV-infected women,[6] it is important that primary care physicians correctly counsel these women that the risk of transmission is below 10% and that pregnancy, vaginal delivery, and breast-feeding should not be discouraged. Of greater concern is that 20% of the cohort still considered a blood transfusion in 1994, 4 years after implementation of blood donor screening for HCV antibody and 2 years after using more reliable second-generation EIA testing, as a significant risk factor for HCV infection. Currently, the risk of transmitting HCV infection through blood transfusion in the United States is estimated to be 1/100,000.[7] Overestimation of the risk of blood transfusion may result in unnecessary refusal of potentially life-saving blood products. Comparisons between the two surveys found that the only difference in responses was a significant decrease in respondents ranking birth to an HCV-infected mother as a significant risk factor for HCV infection in the second survey. The exact reason(s) for the change in response is not clear. The respondents may have

acquired new information between the two surveys, but the responses to other questions in the survey were unchanged. It is possible that the high percent of pediatricians and family practitioners among the respondents may have led to a search for information that has direct relevance to their practice, such as the risk of perinatal transmission of HCV infection. Finally, the perception of what constitutes a significant risk factor may have changed with time.

While the majority of respondents correctly identified the risk factors for HCV infection, our study did not address their accuracy in identifying these risk factors. Many studies have found that patients are often evasive about their history of drug or alcohol use. A recent study reported that 40% of blood donors who initially denied history of intravenous drug use subsequently admitted to having used intravenous drugs when interviewed after they tested positive for HCV antibody.[8] Carefully worded direct questioning is often necessary to elicit history of remote use of intravenous drugs. Exhaustive history-taking to identify potential risk factors for HCV infection depends on the level of suspicion and the physicians' perception of the importance of identifying these factors. Even after risk factors are identified, documentation of the information may be influenced by concerns about the confidentiality of the medical records and the potential impact of the information on future health care/employment. Our survey did not include questions on how often primary care physicians include risk factors for HCV infection in their histories or whether screening is performed if risk factors are present, a practice that is recommended by the Centers for Diseases Control and the NIH consensus statement.[2,7]

The NIH consensus statement recommended liver biopsy and consideration for treatment in patient 1 and further testing to confirm the diagnosis of chronic HCV infection in patient 2.[2] Liver biopsy and interferon treatment is not recommended for patient 2 if ALT levels are persistently normal.[2,9] As expected, most of our respondents recognized the difference in need for referral to a gastroenterologist and for intervention between the 2 patients. However, 38% of the respondents would not refer patient 1, even though none of them had any experience in treating hepatitis C patients on their own. The reluctance in referring patient 1 is surprising, because most (72%) respondents had no idea or overestimated the effectiveness of interferon therapy. We did not define sustained response or the dose and duration of a course of interferon therapy in the survey. At the time this survey was conducted, interferon monotherapy administered for 1 year was the standard, with rates of sustained biochemical and virological response being 15% to 25% and 10% to 20%, respectively.[10-12]

The biggest concern with regards to the responses in the two vignettes is the confusion about the use of hepatitis C tests. While the choice of further tests may depend on the primary care physicians' plans to refer or not to refer their patients to specialists, our question specifically asked, "Assume you decide to do further testing, which tests would you perform?" Inappropriate use of HCV tests may lead to misdiagnosis, unnecessary testing, and delays in treatment. Patient 1 had risk factors for HCV infection and an abnormal ALT level. Further testing to confirm the diagnosis of HCV infection is, strictly speaking, unnecessary.[13,14] However, HCV-RNA testing is recommended if treatment is contemplated. Patient 2 had a normal ALT level and no identifiable risk factor. Further testing to confirm the diagnosis of chronic

HCV infection is mandatory.[13,14] The NIH consensus statement recommends retesting for HCV antibody using RIBA.[2] This test is more specific than EIA. Patients with a negative RIBA result can be reassured, and no further evaluation is necessary. Those who have a positive or indeterminate RIBA result should be further tested for HCV RNA to determine if they are still infected. There is no value in repeating the EIA test. Although studies published in the last year suggest that knowledge of the patients' HCV genotype may influence the choice and duration of treatment,[15,16] the NIH consensus statement did not recommend HCV genotyping in clinical practice based on data available up to March 1997.

In summary, our study found that the majority of primary care physicians correctly identified the significant risk factors for HCV infection. However, up to 20% of the respondents still regarded blood transfusion after 1992 and a small but disturbingly high (8%) proportion considered casual household contact as a significant risk factor for HCV infection. Our study found that most primary care physicians recognize the need to refer HCV antibody–positive patients who have abnormal ALT levels and would support liver biopsy and interferon treatment if recommended by a gastroenterologist. Nevertheless, 38% of primary care physicians would not refer such patients. We also found considerable confusion about the use of HCV tests and the effectiveness of treatment for hepatitis C. Our data indicate that educational initiatives for primary care physicians are needed to implement the NIH and Centers for Diseases Control's recommendations on hepatitis C screening and to initiate further evaluation and management of those who test positive. We found that primary care physicians' knowledge of hepatitis C risk factors and management of patients who test positive for HCV antibody are remarkably similar regardless of their specialty, years in practice, and number of hepatitis C patients seen in the previous year.

Because of the small size of our study cohort and the fact that our study was confined to one HMO, we are not certain if our findings can be generalized to primary care physicians across the country. The lack of improvement in responses to "error-prone" questions in the second survey suggests that mailing of an information package is not a very effective educational tool. This may be related to the unappealing nature of 13 pages of black-and-white text, because the proportion of respondents who have read the entire NIH consensus statement increased from 2% to 22% only between the initial and second surveys. In addition to our intervention effort, many original and review articles on hepatitis C were published in the medical literature during our study period. Our results suggest that more effective educational programs with or without incentives such as continuing medical education credits are needed to improve primary care physicians' knowledge and understanding of hepatitis C. Other studies have demonstrated that knowledge acquisition and behavioral changes are greater in educational programs that actively involve the learner, such as case-based discussions or interactive lectures.[17,18] Our study was conducted in mid-1997, before major educational campaigns on hepatitis C. It is possible that primary care physicians' awareness and knowledge of hepatitis C have improved since our study as a result of educational efforts by professional organizations and propaganda in the media during the past year.

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