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CDC Screening Recommendation for Baby Boomers and Hepatitis C Virus Testing in the US Military Health System

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Abstract

Objectives: Chronic hepatitis C virus (HCV) is the most common blood-borne infection in the United States, with an estimated 2.7 to 3.9 million cases as of 2014. In August 2012, the Centers for Disease Control and Prevention (CDC) recommended 1-time HCV testing of all baby boomers. The objectives of this study were to (1) determine the proportion of people screened for HCV in the US Department of Defense Military Health System before and after the CDC screening recommendation for baby boomers and (2) assess whether certain patient or system factors were associated with screening for HCV before and after August 2012.

Methods: We used a dataset containing 5% of beneficiaries randomly selected from the Military Health System Data Repository medical claims database for the period July 2011 through September 2013.

Results: Of 108 223 people eligible for HCV screening during the first period (July 2011 through July 2012), 1812 (1.7%) were screened. Of 109 768 people eligible during the second period (September 2012 through September 2013), 2599 (2.4%) were screened. HCV screening receipt was related to benefit type (Prime before August 2012: adjusted odds ratio [aOR] = 2.16; 95% confidence interval [CI], 1.89-2.46; Prime after August 2012: aOR = 1.93; 95% CI, 1.73-2.16) and care source (direct care before August 2012: aOR = 1.80; 95% CI, 1.57-2.07; direct care after August 2012: aOR = 2.45; 95% CI, 2.18-2.75); male sex (aOR = 1.17; 95% CI, 1.06-1.29) and black race (aOR = 1.20; 95% CI, 1.05-1.37) were associated with HCV testing only before August 2012.

Conclusions: Interventions should be implemented to increase awareness and knowledge of the current national HCV testing recommendation among baby boomers to seek out testing and health care providers to perform screening.

Keywords

hepatitis C virus, clinical practice guidelines, screening

Chronic hepatitis C virus (HCV) is the most common blood-borne infection in the United States, with an estimated 2.7 to 3.9 million cases as of 2014.[1] Because most infected people have no symptoms, many are unaware of their HCV status. Those born during 1945-1965 (ie, the baby boomer cohort) compose >75% of all current infections.[2] Because of the high burden of HCV infection in the United States, including the number of deaths from liver cancer and end-stage liver disease and the large proportion of undiagnosed cases, advisory bodies have released updated recommendations to include 1-time screening of baby boomers.[3,4]

In August 2012, the Centers for Disease Control and Prevention (CDC) augmented its previous risk-based screening strategy to an age-based screening strategy, recommending 1-time testing of people born during 1945-1965, regardless of other risk factors.[3] After release of the updated recommendations, HCV screening practices were examined among baby boomer populations, such as US veterans[5] and those in hospital settings.[6] However, few studies have examined the effect of this recommendation nationally.[7] One study found low HCV screening rates (2%) among baby boomers in primary care settings after the CDC recommendation.[8]

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Receipt of HCV screening may be related to access to care.[9,10] The US Department of Defense (DoD) Military Health System (MHS) maintains Tricare, which provides universal health care access to nearly 9.4 million beneficiaries, including active-duty members, retirees, and their dependents.[11] To our knowledge, no study has examined receipt of HCV screening among DoD beneficiaries and whether certain factors, such as benefit type, care source, and other demographic characteristics, are related to HCV screening.

The primary Tricare benefit options include Tricare Prime, Tricare Standard, and Tricare Extra. Out-of-pocket costs vary among benefit options, but beneficiaries generally pay less for medical care than the general population does. When enrolled in Tricare Prime, active-duty service members, who are required to use Tricare Prime, and their family members have no enrollment or out-of-pocket costs. Retirees and their family members pay an annual enrollment fee and copayments for health care services received from Tricare-authorized network providers. All beneficiaries can receive direct care at military treatment facilities or purchased care at civilian hospitals and providers, with the costs paid by the DoD's Defense Health Program.[11]

The primary objective of this study was to determine the proportion of people screened for HCV in the Military Health System before and after release of CDC's updated screening recommendation for baby boomers in August 2012. A secondary objective was to assess whether certain factors were associated with HCV screening before and after August 2012.

Methods

We used data from the MHS Data Repository medical claims database. We selected a random 5% sample of all DoD Tricare beneficiaries for the control (ie, cancer-free) population based on the last 2 digits of their social security number. We created a list of 5 two-digit numbers based on the assumption that all of the last 2 digits (00-99) of a social security number are equally likely to occur. Beneficiaries whose last 2 social security number digits matched the listed numbers were included in the control sample. The data are part of the MHS Data Repository database, which contains information on DoD beneficiaries, including active-duty members, retirees, and National Guard and National Reserve members, as well as their dependents. The MHS Data Repository contains administrative, medical claims, and demographic data for inpatient and outpatient services provided both at military treatment facilities and by civilian providers paid for by the Defense Health Program. The data linkage project was reviewed and approved by the institutional review boards of the Walter Reed National Military Medical Center, Defense Health Agency, and the National Institutes of Health. Data analysis took place from March to June 2016.

Study Enrollment

People born during 1945-1965 were eligible for this study. Data for this study were available through September 2013. Because CDC released its updated recommendation for screening baby boomers in August 2012, our study used data from July 2011 through September 2013 to compare equal time periods (13 months) before (July 2011 through July 2012) and after (September 2012 through September 2013) the recommendation was released. We excluded from the study people diagnosed with HCV before screening. People with records throughout the study period were eligible to be screened once during the first period and once during the second period. We limited screening to 1 time before August 2012 to provide a comparison between the time periods before and after the CDC recommendation. People diagnosed with HCV during the study period were excluded from further screening eligibility to reduce the possibility of capturing data from diagnostic HCV tests.

We defined HCV screening based on Current Procedural Terminology codes for HCV antibody screening (86803, 86804).[12] If people had >1 test, we counted the first occurrence in each period (before and after recommendation release). Thus, people could be screened a maximum of 2 times during the study period.

Study Variables

Demographic characteristics included sex, race (white, black, other/unknown), and year of birth (1945-1949, 1950-1955, 1956-1960, 1961-1965). We defined Tricare benefit status as Prime if the person had Prime at any point during the study period, non-Prime if the person was enrolled in other Tricare benefit programs during the study period, and other if the benefit status was unknown. We classified care source as direct, purchased, or both direct and purchased. Because many beneficiaries receive care at both military treatment facilities and civilian facilities, we classified people as having received direct care if $\geq$80% of their records were from military treatment facilities. We classified people as having received purchased care if $\geq$80% of their records were from civilian providers. Otherwise, we classified people as having received both direct care and purchased care.

Statistical Analysis

We described HCV screening proportions by period (before August 2012 and after August 2012) for demographic characteristics, benefit type, and care source. We used multivariable logistic regression analysis on receipt of screening to assess predictors of screening before and after August 2012. We mutually adjusted the models for all other variables of interest to calculate adjusted odds ratios (aORs) and 95% confidence intervals (CIs). We performed all statistical

Table 1. Hepatitis C virus screening among baby boomers in the US Department of Defense Military Health System, by demographic characteristics, care source, and benefit type, 2011-2013[a]

	Before August 2012[b] (n = 108 223)		After August 2012[b] (n = 109 768)	
Variable	**Total No.**	**No. (%) Screened**	**Total No.**	**No. (%) Screened**
Overall	108 223	1812 (1.7)	109 768	2599 (2.4)
Sex				
Male	53 932	994 (1.8)	54 824	1354 (2.5)
Female	54 291	818 (1.5)	54 944	1245 (2.3)
Race				
White	60 221	1031 (1.7)	60 309	1479 (2.5)
Black	12 687	313 (2.5)	12 665	413 (3.3)
Other/unknown	35 315	468 (1.3)	36 794	707 (1.9)
Year of birth				
1945-1949	29 444	289 (1.0)	29 577	427 (1.4)
1950-1955	29 711	462 (1.6)	30 355	711 (2.3)
1956-1960	23 942	441 (1.8)	24 321	672 (2.8)
1961-1965	25 126	620 (2.5)	25 515	789 (3.1)
Care source				
Direct	14 428	332 (2.3)	15 484	517 (3.3)
Purchased	76 543	920 (1.2)	76 910	1170 (1.5)
Both direct and purchased	15 012	546 (3.6)	15 012	886 (5.9)
Unknown	2240	14 (0.6)	2362	26 (1.1)
Benefit type				
Tricare Prime	56 860	1408 (2.5)	56 902	2003 (3.5)
Tricare non-Prime	45 381	354 (0.8)	45 774	521 (1.1)
Unknown/other	5982	50 (0.8)	7092	75 (1.1)

[a]Data source: Military Health System Data Repository medical claims database.
[b]The time periods signify before and after the release of Centers for Disease Control and Prevention recommendations for hepatitis C virus screening among baby boomers.[3]

analyses using SAS version 9.3[13] and set 2-sided significance at $P < .05$.

Results

Of 108 223 people eligible for HCV screening during the first period (July 2011 through July 2012), 1812 (1.7%) were screened for HCV. Of 109 768 people eligible for HCV screening during the second period (September 2012 through September 2013), 2599 (2.4%) were screened. We observed an increase in screening for all subgroups stratified by sex, race, year of birth, care source, and benefit type. Before August 2012, people who were male (994/53 932, 1.8%), black (313/12 687, 2.5%), and born during 1961-1965 (620/25 126, 2.5%) had higher proportions of screening than did those who were female (818/54 291, 1.5%), white (1031/60 221, 1.7%), and born earlier (range, 1.0%-1.8%). People who used both care sources (546/15 012, 3.6%) had higher proportions of screening than did those who used a single or unknown care source (range, 0.6%-2.3%). Those who were enrolled in Tricare Prime (1408/56 860, 2.5%) had higher screening proportions than did those with non-Prime or unknown benefit types (0.8%). After August 2012, the results were similar to the first period in care source and benefit type (Table 1).

Results from the multivariable logistic regression models showed that before August 2012, more men than women (aOR = 1.17; 95% CI, 1.06-1.29) and more black than white people (aOR = 1.20; 95% CI, 1.05-1.37) were likely to receive HCV screening. We also found differences by year of birth: people in earlier birth cohorts were less likely to be screened than were those born during 1961-1965. People using direct care (aOR = 1.80; 95% CI, 1.57-2.07) and both care sources (aOR = 2.07; 95% CI, 1.85-2.33) were more likely to be screened than were those using purchased care. Finally, people enrolled in Tricare Prime were twice as likely to be screened as those who were not enrolled in Prime (aOR = 2.16; 95% CI, 1.89-2.46). After August 2012, sex and race were no longer significantly related to HCV screening receipt. By year of birth, only the 1945-1949 birth cohort was less likely to be screened than those born during 1961-1965 (aOR = 0.74; 95% CI, 0.66-0.84) (Table 2).

Discussion

To our knowledge, this study is the first to estimate HCV screening proportions among DoD beneficiaries born during 1945-1965 using medical claims data. The MHS equal-access health care system also provides a unique environment in which to study receipt of HCV screening because cost and access to care are less likely to be barriers to

Table 2. Odds of receiving hepatitis C virus screening among baby boomers in the US Department of Defense Military Health System, by demographic characteristics, care source, and benefit type, 2011-2013[a]

	Before August 2012[b] (n = 108 223)		After August 2012[b] (n = 109 768)	
Variable	**aOR (95% CI)**	***P* Value**	**aOR (95% CI)**	***P* Value**
Sex				
Male	1.17 (1.06-1.29)	.003	1.04 (0.96-1.13)	.256
Female	1.00 (Reference)		1.00 (Reference)	
Race				
Black	1.20 (1.05-1.37)	.011	1.08 (0.97-1.21)	.157
Other/unknown	1.06 (0.94-1.19)	.250	1.06 (0.96-1.16)	.193
White	1.00 (Reference)		1.00 (Reference)	
Year of birth				
1945-1949	0.61 (0.53-0.71)	<.001	0.74 (0.66-0.84)	<.001
1950-1955	0.78 (0.69-0.88)	<.001	0.95 (0.86-1.06)	.251
1956-1960	0.81 (0.72-0.92)	.001	0.98 (0.88-1.09)	.373
1961-1965	1.00 (Reference)		1.00 (Reference)	
Care source				
Direct	1.80 (1.57-2.07)	<.001	2.45 (2.18-2.75)	<.001
Both direct and purchased	2.07 (1.85-2.33)	<.001	2.92 (2.65-3.22)	<.001
Unknown	0.71 (0.42-1.22)	.181	1.09 (0.74-1.62)	.364
Purchased	1.00 (Reference)		1.00 (Reference)	
Benefit type				
Tricare Prime	2.16 (1.89-2.46)	<.001	1.93 (1.73-2.16)	<.001
Unknown/other	0.57 (0.41-0.79)	.001	0.41 (0.31-0.53)	<.001
Tricare non-Prime	1.00 (Reference)		1.00 (Reference)	

Abbreviations: aOR, adjusted odds ratio; CI, confidence interval.
[a]Data source: Military Health System Data Repository medical claims database.
[b]The time periods signify before and after the release of Centers for Disease Control and Prevention recommendations for hepatitis C virus screening among baby boomers.[3]

screening among beneficiaries compared with patients in the general US population.

Overall HCV screening proportions among eligible baby boomers were low. However, we found an increase in the proportion of people screened after release of the CDC recommendation, suggesting that more providers are implementing this guideline in practice. One possible explanation for the low rate of screening after August 2012 is slow uptake of the updated CDC recommendation.[14-16] Our data on HCV screening receipt after August 2012 were based on records dated September 2012 through September 2013, the year immediately after the CDC recommendation. The US Preventive Services Task Force released a B grade recommendation for HCV screening among baby boomers in June 2013,[4] near the end of our study period. Provider knowledge of risk groups to be screened for HCV varies; one recent study found that nearly 20% of primary care physicians failed to identify baby boomers as a high-risk population despite national recommendations.[17] In addition, patients born during 1945-1949 may have lower receipt of screening because of competing comorbidities. Our screening proportions are on par with research that suggests that uptake of HCV screening is low in the general US population.[7,8,15,16,18,19]

Our study found that before August 2012, screening differed by demographic characteristics, including sex, race, and birth year. Men were more likely than women and black people were more likely than white people to be screened. This finding may be because men and black people are more likely to be infected with HCV than are women and people from other racial groups[20,21] and, thus, may be more likely to undergo HCV screening. A recent study found that among baby boomers seen at the US Department of Veterans Affairs, a higher proportion of black patients than white patients and those from other racial groups were screened for HCV.[22] The differences in HCV screening by race and sex in our study were largely eliminated after August 2012. These findings suggest a slight uptake of HCV screening for baby boomer patients of various sex and racial backgrounds in the DoD after the CDC recommendation. However, after release of the 2012 recommendation, people born during 1945-1949 were still less likely to be screened than were those born later, even though the CDC recommendation states that all people born during 1945-1965 be tested.[3] Some people in the 1945-1965 birth cohort were enrolled in Medicare; as such, their records would not be complete in our data.

We found differences in HCV screening by care source before and after August 2012. People who were enrolled in Tricare Prime compared with those not enrolled in Tricare Prime, and those using direct and both care sources compared with those using indirect care, were more likely to

receive HCV screening. The associations between care source and benefit type and screening were significant after August 2012, despite sex and race no longer being significant. Because people enrolled in Tricare Prime generally have lower health care costs,[11] these people may visit health care providers (for both preventive and acute-care needs) more frequently. People who have more frequent visits would have more opportunities to be offered HCV screening than would people who visit health care providers only for acute-care needs. During visits for acute-care needs, preventive services such as HCV screening may not be addressed. The finding that patients with Tricare Prime were more likely to receive screening may be related to the increased likelihood of receiving screening in direct and both care sources, whereby people who use direct care often pay fewer out-of-pocket costs,[10] and those who use both care sources may have more choices in seeking medical care.

Limitations

This study had several limitations. First, the data for this study were subject to limitations associated with medical administrative databases, such as incomplete data and coding inaccuracies. The low HCV screening proportions might be related to several factors. For example, some people might have been screened outside of the study period and, thus, might not have been screened again during our study period. In particular, records for people who were dually enrolled in Tricare and Medicare during our study period might have had incomplete data because Medicare pays first for Medicare-covered services and Tricare pays for the rest.[23] In addition, identifying HCV screening through Current Procedural Terminology screening codes might have underestimated the true screening percentages because Current Procedural Terminology HCV codes for asymptomatic people might not have been well established and used during the study period.

Second, people born during 1945-1949 may have competing comorbidities, and providers may be less likely to order an HCV screening test for this subset than for patients without comorbidities. Third, the study period included the year immediately after release of the CDC recommendations. Adoption of recommendations among providers takes time, and this delay might have resulted in a lower-than-expected HCV screening percentage in our study. Thus, the analysis would have been stronger if later data had been available.

Fourth, for the results by benefit type, it is possible that some people with Prime did not have Prime when they were screened for HCV during the study period, as our definition was based on enrollment in Prime at any point during the study. Thus, benefit type might not reflect the benefit type when screening was received. Finally, people might have been misclassified by care source. Although $\geq 80\%$ of their records came from the source in which they were grouped, the source in which they received HCV screening might have differed. Although providers at military treatment facilities have access to an electronic health record system, which can improve delivery of care[24] by providing reminder prompts at the point of care to screen for HCV, people in our study could receive care from military treatment facilities and civilian hospitals and providers, and the level of care provided might vary.

Conclusion

Despite a national recommendation for testing all baby boomers for HCV, screening rates were low. The associations of care source and benefit type with screening suggest disparities in screening within the DoD. Interventions should be implemented to increase awareness and knowledge of the current national HCV testing recommendation among baby boomer patients to seek out testing and health care providers to perform screening.

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