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Impact and costs of a hepatitis C virus screening programme for adults hospitalised at an academic medical centre

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INTRODUCTION

Approximately 1.7% of the US population has chronic hepatitis C virus (HCV) infection, but among adults born between 1945 and 1965 prevalence increases to 3.25%, and this birth cohort accounts for almost 75% of the total burden of HCV.[1 2] The availability of effective direct-acting antiviral (DAA) therapy for HCV makes screening, linkage to care and treatment a national priority. The Centers for Disease Control and Prevention (CDC) and US Preventative Services Task Force (USPSTF) have recommended one-time HCV screening for persons born between 1945 and 1965,[2 3] yet only 14%–17% of this cohort has been screened for HCV.[4 5]

To improve adherence to HCV screening recommendations for patients hospitalised at our medical centre, the Division of Infectious Diseases (ID) at the University of Vermont Medical Center (UVMMC) undertook a quality improvement (QI) initiative to screen patients born between 1945 and 1965 who were seen by the ID Consultation Service. UVMMC is a 562-bed academic medical centre affiliated with the Robert Larner MD College of Medicine at the University of Vermont (UVM) and serves over 1 million patients in Vermont and New York State. Recognising that the baseline prevalence rate of HCV is 1.45% of adults in Vermont and 1.49% in New York,[1] we hypothesised that screening hospitalised patients seen by the ID Consultation Service would increase screening rates, identify undiagnosed HCV infections and link patients to care.

METHODS

We developed a protocol to identify patients born between 1945 and 1965 seen by the ID Consultation Service, perform HCV screening and link patients to outpatient care. All patients receiving a consult were being treated for conditions unrelated to HCV (eg, osteomyelitis, endocarditis, urinary tract infections). ID physicians reviewed the electronic medical record (EMR) (Epic Systems Corporation; Verona, Wisconsin, USA) for evidence of prior screening, then offered a one-time HCV antibody screening to previously unscreened patients. All patients with a positive HCV antibody test underwent confirmatory HCV-RNA PCR viral load testing. Patients were notified of results either during hospitalisation or via a letter if discharged before available test results. Patients with previously or newly diagnosed chronic HCV infection were offered follow-up treatment with the UVMMC ID Clinic. Programme costs were calculated based on Medicare reimbursement for laboratory tests (a cost surrogate), estimated physician and analyst hours, and the mean hourly wage for physicians ($98.02) and computer systems analysts ($40.25) reported by the US Bureau of Labor Statistics.[6]

A secure database (Access 2016; Microsoft Corporation; Redmond, Washington, USA) was used to track screening results and basic demographic information to allow outpatient clinic staff to coordinate follow-up care as needed. According to the policy defining research activities at UVM, this project met criteria for operational improvement activities exempt from ethics review.

Prior to initiating our screening protocol, and monthly during our ID Division meetings, we reviewed the goals, objectives and progress updates to raise awareness among

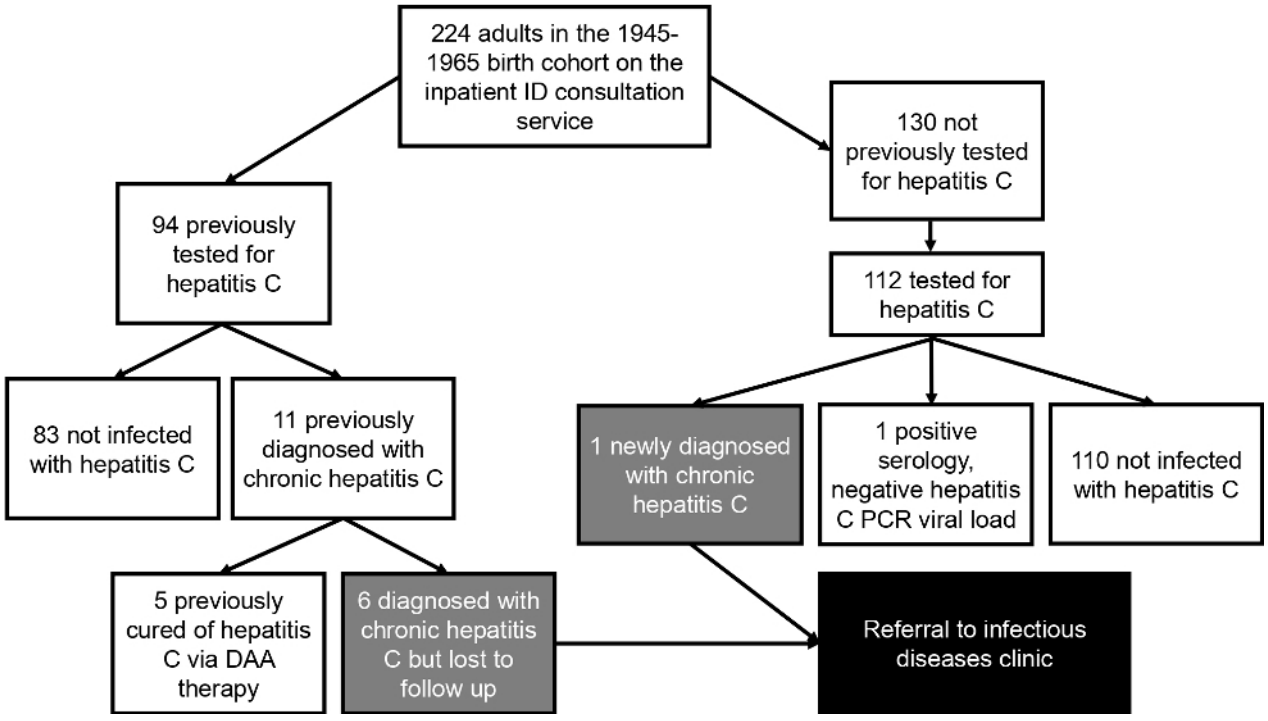

Figure 1 Results of hepatitis C virus screenings for hospitalised patients in the 1945–1965 birth cohort who were on the University of Vermont Medical Center Infectious Diseases (ID) Consultation Service; May 2019–February 2020. DAA, direct-acting antiviral.

physicians. As this was an ID physician-directed protocol, nursing staff were not part of this effort.

RESULTS

From May 2019 through February 2020, ID providers were consulted on 541 patients in the 1945–1965 birth cohort and enrolled 224 (41%) in this project (figure 1). Ninety-four (42%) of these patients had been screened for HCV prior to admission and 11 (12%) had previously been diagnosed with HCV with 6 having evidence of active infection. Of the 130 (58%) patients with no documented prior HCV screening, 112 (86%) had a protocol-driven HCV antibody screening serology performed during their hospitalisation, and 1 (1%) patient had positive results on both the HCV antibody and PCR testing. Screening was not performed on 18 (14%) inpatients due to transition to comfort measures, discharge prior to testing or primary team non-adherence with recommendations. Out of the seven patients with newly identified or previously known HCV infection, none attended the post-discharge scheduled outpatient appointments and none received DAA therapy. The reasons for lack of follow-up included opioid use disorder, lack of transportation and more urgent medical concerns. We estimated the HCV screening initiative required 27 physician-hours and 10 analyst-hours to complete, resulting in $3049 in labour costs and $1939 in laboratory costs.

DISCUSSION

An ID physician-driven QI initiative aimed at increasing HCV screening and treatment rates in hospitalised patients in the 1945–1965 birth cohort identified only one new patient with HCV and six previously diagnosed patients with untreated chronic HCV infection. All these patients were lost to follow-up post-discharge secondary to active drug use and social determinants of health, both well-described concerns in patients with chronic HCV infection. Our QI initiative cost approximately $5000 in labour and laboratory costs with essentially no immediate impact on the HCV cascade of care. Despite our inability to enrol patients in further HCV care, the initiative did present the opportunity for providers to re-engage patients with known HCV and offer them treatment.

At least 42% of the patients included in this initiative had previously been screened for HCV. The prevalence of HCV (12%) in those patients who had been screened prior to admission was predominantly attributable to prior intravenous drug use and was higher than the region's general population (1.45%), but lower than the prevalence reported in other samples of hospitalised patients.[1 7] This high baseline pre-admission screening rate may reflect prior outpatient HCV screening programmes in our primary care clinics and likely reduced the effectiveness of this inpatient screening programme.[8] Screening strategies targeting hospitalised patients may be more effective in regions where HCV prevalence rates are higher and outpatient HCV screening is less frequent.[1] Screening protocols in such regions would require periodic updates as HCV

rates change and screening recommendations evolve to include a larger birth cohort.[1 9]

Our findings have several limitations. First, in this prospective QI initiative, outpatient records were not available for 40 of the 130 patients without known prior screening. They may have undergone HCV screening prior to admission, which would raise the baseline testing rate above the 42% we measured. Second, due to competing information technology demands at the time of our initiative, we were not able to incorporate automated EMR alerts to identify and prompt screening for eligible patients and instead relied on physicians remembering to recommend screening and engage with patients, leading to missed opportunities.[10 11] These missed opportunities for screening decreased our sample size and may have impacted our baseline HCV testing positivity rate of only 1%. Future efforts should include team-based measures to improve the continuum of care in outpatient populations with higher prevalence. Although previous evidence that HCV screening programmes represent a cost-effective strategy,[12] our initiative to screen hospitalised patients in a low-prevalence region with high baseline screening rates failed to improve screening rates and linkage to care for patients with chronic HCV infection. To address the burden of HCV in the USA, we suggest leveraging EMR clinical decision support and interprofessional teams in the outpatient setting to diagnose HCV infection and link patients to care in accordance with CDC and USPSTF recommendations.

Contributors TJW, CDN, AJH, DS, WKA, ABR and SGD served on a divisional QI subcommittee and conceived the intervention discussed in the manuscript, which was then reviewed and approved by all coauthors. TJW, CDN, AJH, DS, KKP, LBP, BDK, JD, LMS, TL, CDH, LJC, PG, SB and WKA are Infectious Diseases providers at our academic medical centre who provided direct patient care and related care follow-up. TJW, SGD and ABR led the drafting of this manuscript with significant contributions from the entire coauthor team.

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