Hepatitis C Virus Antibody Testing: Result Availability at Time of Discharge for Emergency Department Patients

To the Editors:

The Centers for Disease Control and Prevention recommend targeted hepatitis C virus (HCV) screening in health care settings including emergency departments (EDs).1 In April 2014, we integrated triage nurse HCV screening and adjunctive physician diagnostic HCV testing into ED clinical operations, using a laboratory-based testing protocol and native staffing to offer, perform, and disclose results.2 Because of concerns regarding the potential impact of HCV screening on ED throughput, our protocol did not require patients to wait for the results of their HCV tests before discharge. An accurate understanding of ED length of stay in relation to HCV test turnaround times, however, is needed to better inform screening policies and procedures.

We performed a retrospective cohort study to determine the proportion of ED patients tested for HCV whose test results were available before discharge in an attempt to quantify the impact of our policy of not holding patients in the ED pending their HCV test result. We compared prospectively collected timestamped laboratory data with timestamped hospital admission and discharge times. We used logistic regression to determine factors associated with HCV test result availability before patient discharge. The study received hospital institutional review board approval with a waiver of written informed consent.

Highland Hospital is an urban teaching hospital and trauma center with an accredited emergency medicine residency program in Oakland, CA. The annual ED census is 90,000 patients, 45% are Black, 44% are women, and 85% have public insurance. Patients presenting for care are triaged in a non-private centralized area and designated for treatment in either the main ED (70%) or the Fast Track (FT) (30%). All blood is sent by tube system and processed immediately by the laboratory. Anti-HCV-antibody tests are performed on the Abbott Architect (Abbott Laboratories, Abbott Park, IL) with a laboratory median turnaround time of 70 minutes. The median laboratory turnaround time for complete blood count (CBC) testing is 22 minutes.

Data routinely collected during an ED visit, including demographic information and timestamped laboratory and discharge data, were exported to spreadsheets (Microsoft Excel 2007; Microsoft Corporation, Redmond, WA). Patient-specific laboratory data, including reason for HCV-antibody testing, results of HCV testing, and whether a CBC test was performed (a surrogate for other blood testing), were captured from the laboratory electronic medical record (Novus, Siemens Corporation) and linked to the spreadsheet by means of patient account numbers. Patient identifying information was then removed and each visit was assigned a unique study number.

The primary outcome is the proportion of HCV-tested ED patients whose tests results were available before discharge. Order time was obtained from the timestamp generated when staff orders a test, blood receipt time was obtained from the timestamp generated on the receipt of the specimen by the laboratory, discharge time was obtained from the timestamp generated when a patient leaves the department for admission or discharge, and result availability time was obtained from the timestamp generated when the laboratory uploads the result electronically to the electronic medical record. We dichotomized HCV tests as being received in the laboratory either < or ≥30 minutes from the time the test was ordered.

Visit level data are presented and descriptive analyses were performed for all variables. Continuous data are reported as medians with interquartile ranges (IQRs) and categorical data are reported as numbers and percentages. We excluded patients with missing discharge or admission timestamp data and those who eloped or left against medical advice. Bivariate analyses were performed to explore the relationships between various visit characteristics and having the HCV-antibody result available before discharge. We then specified logistic regression models to explore relationships between variables believed to plausibly affect result availability, using HCV test results available before discharge as the dependent variable. All statistical analyses were performed using Stata version 13 (StataCorp LP, College Station, TX). This study is supported by a grant from Gilead Sciences. The funding agency had no role in study design, results interpretation, or manuscript preparation.

From April 2014 through March 2015, the medical center recorded 83,721 visits to the ED and 3360 HCV-antibody tests were performed of which 363 (10.8%) were anti-HCV-antibody positive. The mean age of HCV-tested patients was 47.9 years (SD = 13.2), 1844 (55%) were men, 1617 (48%) were Black, 161 (5%) were homeless, 2414 (72%) received care in the ED, 2885 (86%) were discharged home, and 1620 (48%) also had a CBC test performed. Patients in the main ED were more likely to test HCV-antibody positive than FT patients [ED prevalence 11.6% (280/2414) vs. FT prevalence 8.8% (83/940), P = 0.02].

Hepatitis C virus test results were available in the electronic medical record before discharge for 1797 of the 3360 (53%) HCV-tested patients. Of the 1563

D.A.E.W. conceived the study and obtained research funding. D.A.E.W., S.K.P., E.S.A., and T.K.T. designed the study. S.K.P. acquired and managed the data. D.A.E.W., E.S.A., and T.K.T. analyzed and interpreted the data. D.A.E.W. drafted the manuscript, and all authors contributed substantially to its revision. D.A.E.W. takes responsibility for the manuscript as a whole.

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patients who were discharged before their results were completed, 145 (9.3%) of them were HCV-antibody positive. Factors associated with HCV-test result availability before discharge are shown in the Table 1. In the adjusted logistic regression (aOR), factors associated with increased likelihood of HCV result availability included being admitted to the hospital (93% available; aOR = 4.0, 95% CI: 2.7 to 5.8), having a CBC test performed (83% available; aOR = 6.5, 95% CI: 5.4 to 7.9), and receiving care in the main ED, (69% available, aOR = 5.5, 95% CI: 4.4 to 6.8).

In the FT, 20% (27/133) of HCV tests received by the laboratory <30 minutes from order time were available before discharge compared with only 13% (104/803) of tests received ≥30 minutes from order time, \( P = 0.024 \). In the ED, there was no difference in result availability between HCV tests received in the laboratory <30 minutes [68% (295/434)] than with tests received ≥30 minutes [70% (1447/2081)], \( P = 0.673 \).

If the testing protocol mandated that patients wait for results before leaving the ED, the median length of stay for the 1563 patients who left before result availability would have increased by 83 minutes (IQR 48–125). Median length of stay increases would have been greater than 1 hour in both the main ED [72 minutes (IQR 33–120)] and FT [92 minutes (IQR 63–129)].

We designed our HCV screening and diagnostic testing protocol to be integrated into existing procedures by taking advantage of nurse and laboratory infrastructure. Our protocol, however, did not mandate patients to remain in the department until their results were available. Result availability at the time of discharge is important, especially in resource-poor settings such as safety-net urban EDs, where access to care is limited and having patients return for result disclosure and confirmatory testing is logistically challenging.

With such a protocol, we show that nearly half of the HCV-antibody tests are not completed by the time patients are discharged, of which nearly 10% are HCV-antibody positive. We demonstrate that patients being seen in the main ED who had other blood tests performed and who were admitted to the hospital are more likely to have results available before discharge. In fact, when HCV testing was limited to patients undergoing CBC testing, results were available 85% of the time. Most of the results of the HCV tests performed in FT, however, were not available before discharge.

Although a strategy of targeting subpopulations for HCV screening with a goal to maximize result availability may be reasonable, such a strategy comes at a cost of missed diagnosis. Had we excluded screening in the low acuity, rapid turn over FT, 30% of our HCV-antibody positive patients would have remained undiagnosed.

This study was performed in an urban, academic ED with a site-specific protocol that may limit the generalizability of our findings. Timestamp data were not available for all patients and the accuracy of staff-initiated timestamps may be inaccurate.\(^{*}\) Result availability is also not synonymous with result disclosure and additional studies need to examine screening models that not only increase the availability of test results but also address factors associated with the communication of test results to patients.

In conclusion, EDs that implement HCV screening are faced with the

| TABLE 1. Factors Associated With an HCV Test Result Being Available at the Time of Discharge: Unadjusted and Adjusted Odds Ratios |
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| **Characteristic** | **Number HCV Tested,** \( n = 3360 ^*\) | **HCV Test Result Available,** \( n = 1797 ^†\) | **Unadjusted OR (95% CI)** | **Adjusted OR (95% CI)** |
| Disposition, n (%) | | | | |
| Admitted | 475 (14) | 440 (24) | 7.9 (6.0 to 10.4) | 4.0 (2.7 to 5.8) |
| Discharged | 2885 (86) | 1357 (76) | Ref | Ref |
| Reason for testing, n (%) | | | | |
| Screening | 2124 (63) | 1158 (64) | 1.2 (1.0 to 1.3) | 1.4 (1.1 to 1.7) |
| Diagnostic | 1236 (37) | 639 (36) | Ref | Ref |
| CBC tested, n (%) | | | | |
| Yes | 1620 (48) | 1339 (75) | 12.7 (10.7 to 14.9) | 6.5 (5.4 to 7.9) |
| No | 1740 (52) | 458 (25) | Ref | Ref |
| Area of care, n (%) | | | | |
| ED | 2414 (72) | 1665 (93) | 13.4 (11.0 to 16.4) | 5.5 (4.4 to 6.8) |
| FT | 940 (28) | 131 (7) | Ref | Ref |
| HCV specimen receipt time,‡ n (%) | | | | |
| <30 min | 434 (13) | 232 (13) | 1.0 (0.8 to 1.2) | 1.1 (0.9 to 1.5) |
| ≥30 min | 2911 (87) | 1552 (86) | Ref | Ref |
| Test result, n (%) | | | | |
| Positive | 363 (11) | 215 (12) | 1.3 (1.0 to 1.6) | 1.0 (0.8 to 1.4) |
| Negative | 2997 (89) | 1582 (88) | Ref | Ref |

\(*^\text{Missing data: area of care (n = 6); HCV specimen receipt time (n = 15).}^\text{†}^\text{Missing data: area of care (n = 1); HCV specimen receipt time (n = 13).}^\text{‡}^\text{HCV specimen receipt time was measured from time HCV test ordered until specimen received by the laboratory.}^\text{OR, odds ratio.}^
challenges to design streamlined and integrated programs that minimally impact operations while balancing other important functions, such as ensuring index-visit result disclosure and referrals for positives. To maximize the proportion of patients whose results are available before discharge, targeting screening to patients receiving care in the main ED, to those who are admitted, or to patients who are having other laboratory tests performed, may be considered.

Douglas A. E. White, MD*
Erik S. Anderson, MD**†
Sarah K. Pfeil, BS*
Tarak K. Trivedi, MD*

*Department of Emergency Medicine, Alameda Health System, Highland Hospital, Oakland, CA
†Department of Emergency Medicine, Stanford University, Palo Alto, CA

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Veteran’s Administration Care Continuum Uses the Wrong Denominator

To the Editors:

The integrated HIV care provided by the Department of Veterans Affairs (VA) is to be commended, but to compare the proportion of people living with HIV who are in care at the VA and virally suppressed (77%) with the national HIV care continuum, viral suppression (VS) measurement (46%) is inappropriate.¹

The denominator used in the national care continuum includes not only those currently in care but also persons previously and never in care.² Bachus et al¹ use a denominator of “all HIV-infected patients in VA care in 2013… defined as having at least 1 outpatient visit in the year.” Thus, a more appropriate comparison with national data would be the proportion of VS among persons engaged in care in 2013. Using the data provided in Figure 1, VS among those engaged in care is 84% (16,641/19,732) for the VA population and 76% (361,764/478,433) for the national population. This measure still reflects the excellent care people living with HIV receive through the VA, with a more appropriate comparison to the national data.

Jane Kelly, MD
Pascale Wortley, MD, MPH
Cherie Drenzek, DVM, MPH

Georgia Department of Public Health, HIV/AIDS Epidemiology Program, Atlanta, GA

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Additional Indicators to Measure New HIV Diagnoses: A Response to Chow et al

To the Editors:

The recent letter by Chow et al¹ is a welcomed addition to the discussion about new indicators to measure and understand the HIV epidemic. They propose a new HIV diagnosis rate to put the number of diagnoses each year in the context of the size of the population living with HIV. We agree that it is important to look beyond the absolute numbers, in this case new HIV diagnoses (or notifications), and understand them in the overall context of increasing HIV prevalence trends. A nuanced understanding of new diagnoses is particularly relevant in light of the updated 2020 National HIV/AIDS Strategy, which sets the goal of serostatus awareness for 90% of all persons living with HIV (PLWH).² In the case of the United States, the number of new HIV diagnoses has remained relatively stable from 2009 to 2012, ranging approximately from 44,000 to 47,000, whereas HIV prevalence has increased from 1,161,800 to 1,218,400 over the same period.³,⁴

To further understand recent trends in HIV diagnosis, we believe that there is an additional method to analyze new HIV diagnoses that provides useful insight into how effective testing services are in reaching the remaining undiagnosed PLWH. As previously described by Holgate,⁵ we propose that dividing the number of new HIV diagnoses in a given year by the number of undiagnosed PLWH in the previous year is a useful previously underused HIV indicator. Using the most recent Centers for Disease Control and Prevention epidemiologic data,³,⁴ we determined the number of new HIV diagnoses in a given year divided by the number of undiagnosed PLWH in the previous year using the formula:

Table 1 displays our input parameters and results. Available data from Centers for Disease Control and Prevention allowed us to examine this measure from 2009 to 2012. We report that the percentage of new HIV diagnoses in a given year to undiagnosed PLWH in the previous year was 26.0% in 2009, 25.9% in 2010, 26.1% in 2011, and 27.7% in 2012.

Our analysis suggests that not only does the number of new HIV diagnoses remain roughly constant over the 4-year study period, but also that approximately 26% of individuals unaware of their serostatus are being newly diagnosed each year (Table 1). When this indicator is approximately constant over time, it signals that we must redouble our efforts to ensure full implementation of existing testing guidelines,⁵,⁶ as well as innovate new clinical and community testing