Using a configurable EMR and decision support tools to promote process integration for routine HIV screening in the emergency department

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ABSTRACT

Given the clinical and public health benefits of routine Human Immunodeficiency Virus (HIV) testing in the emergency department (ED) and Centers for Disease Control and Prevention recommendations, Maricopa Medical Center, as part of Maricopa Integrated Health System, started Test, Educate, Support, and Treat Arizona (TESTAZ) and became the first and, to-date, only hospital in Arizona to implement routine, non-targeted, opt-out, rapid HIV screening in the ED. The authors describe the implementation of a universal, routine, opt-out HIV screening program in the adult ED of an urban safety-net hospital serving under-served populations, including the uninsured and under-insured. Through a controlled and collaborative process, the authors integrated custom documentation elements specific to HIV screening into the triage/intake process, implemented and utilized clinical decision support tools to guide clinicians in each step of the process, and used electronic data collection and reporting to drive new screening protocols that led to a significant increase in overall HIV testing rates.

Keywords: HIV, emergency department, clinical decision support, electronic medical record

OBJECTIVE

In 2006, the Centers for Disease Control and Prevention (CDC) published recommendations for routine, voluntary (opt-out) Human Immunodeficiency Virus (HIV) screening for patients between 13 and 64 years of age in all healthcare settings (including emergency departments (EDs)), if the undiagnosed prevalence is ≥0.1%.¹ The goals of these recommendations are to increase screening for HIV, detect HIV infections sooner, maximize infection awareness by patients, improve linkage to clinical care and prevention services, and reduce further transmission of the virus.¹ In 2010, the Arizona Department of Health Services (ADHS) received funding from the CDC and partnered with Maricopa Integrated Health System (MIHS) to initiate routine, opt-out HIV screening in Maricopa Medical Center’s adult ED for patients aged 18–64 years who were having labs drawn via venipuncture as part of their care.

Implementing an effective HIV screening program in the ED faced significant challenges and, as noted in other studies, depended heavily on individual provider attitudes and preconceived notions toward preventative screening for HIV in the ED.² Earlier studies have suggested that HIV testing in the ED requires significant time, extra funding, and/ or additional resources (including dedicated staff), or risk deterring from primary functions and/or lead to delayed patient care.³ As such, the success of a routine screening program in the ED is contingent on being expeditious, practical, and not interfering with acute patient care or patient flow through the ED.⁴ Other institutions have addressed these concerns by implementing scheduled testing hours, using point-of-care tests, hiring dedicated staff, developing educational programs, electing physician champions, or performing targeted testing.⁵,⁶ Still, missed opportunities for earlier diagnosis and treatment of HIV remain despite program implementation.⁷ Because the majority of individuals who are aware of their HIV positive status substantially reduce sexual behaviors that may transmit HIV, each missed opportunity represents a preventable risk of undiagnosed individuals unknowingly spreading the infection to others.¹,⁷ Computerized reminders or electronic feedback systems have been used but were often targeted, focused on primary care, based on pre-programmed qualifications, and/or reported only “modest” improvements.⁸–¹¹

In this report we detail how MIHS, through the Test, Educate, Support, and Treat Arizona project (TESTAZ), was able to: (1) use a configurable electronic medical record (EMR) application system to integrate custom documentation elements specific to HIV screening into the triage/intake process; (2) utilize clinical decision support (CDS) tools to guide clinicians in the process of providing and documenting consent information, placing an order for an HIV test, and providing guidance for follow-up orders upon a reactive test result; and (3) use electronic data collection and reporting to drive new screening protocols that led to a significant increase in overall HIV testing rates for eligible patients.¹²

METHODS

Electronic medical record

At program onset, MIHS was instituting a phased install of its EMR system, Epic.¹³ This application is able to not only align with and maintain established workflows but can quickly adapt to new requirements or overcome impediments. Together with a carefully controlled change management process, Epic was quickly updated for clinicians to begin routine HIV screening in the adult ED.

TESTAZ was designed to offer routine (24 × 7), nontargeted, opt-out testing to all eligible patients (regardless of primary complaint), with hopes to maximize the number of tests performed and minimize the possibility of missed diagnoses. Due to the large percentage of ED patients we anticipated would qualify for testing, and due to an already
historical location for information gathering, triage or intake (the doorway to the ED) was identified as the best option for providing informed consent information to each qualified patient. Exclusions from TESTAZ, some for their lack of ability to consent, include: altered mental status, alcohol and/or substance intoxication, in custody of law enforcement, known HIV positive, and psychiatric or trauma patients. It was decided the reasons for exclusion, together with previous testing and results, would be collected and documented in the EMR as part of the consent process for data collection and reporting purposes.

Updated in October 2008, Arizona law regarding HIV-related testing no longer requires separate written informed consent. Instead the patient must have capacity to consent or an authorized representative and must be provided “informed consent information” either orally or in writing. Informed consent information is defined by statute as information that explains HIV infection, the meaning of a positive test result, and notifying the patient they may ask questions or decline testing.10 HIV testing outside this scope is left for emergency situations directly related to the diagnosis and treatment of the patient’s medical condition. Although not required by statute, MIHS documents the provision of HIV consent information in the medical record even if the patient has capacity to consent. An oral informed consent statement was agreed upon, and HIV testing consent questions were built into the already existent, safety screening section of the triage navigator (Figure 1). This section of nursing documentation flow sheets includes topics such as fall risk, domestic violence, tuberculosis exposure, and suicidal ideation. HIV consent screening integrated quite well here due to both the section theme and the positive support of ED nurses for completing it routinely.

Clinical decision support
Our EMR application also includes an assortment of widely applicable CDS tools that can be designed to address specific needs. An alert feedback system was already in place to ensure that required triage documentation was complete and accurate. Additional logic was added to evaluate the accuracy and completeness of the HIV screening questions, specifically consent information, and provide feedback to the nurse. This alert is visible in the triage navigator on every patient age 18 and older but withdraws once the documentation satisfies predefined requirements. Provided the patient had HIV testing within our organization in the past, the previous 5 results appear in the alert, enabling the nurse to quickly confirm patient reported testing without searching previous visit records.

The risk of an ED clinician ordering an HIV test without first obtaining valid consent was introduced by having consent information collected and documented by the triage nurse in EMR flow sheets while the HIV order was placed by an ED provider. In order to reduce the risk due to the disconnect between these two processes, safeguards were implemented: 1) an alert is used to warn clinicians when they attempt to place an HIV order without a documented, valid consent; incomplete nursing documentation is provided with the alert to facilitate direct follow-up; 2) HIV consent documentation for the encounter is incorporated into the HIV order details when it is placed, prompting the ordering clinician to review the information and update if appropriate.

Our institution uses the Architect HIV Ag/Ab Combo Test, a fourth-generation antigen/antibody rapid assay from Abbott Laboratories (Abbott Park, IL, USA). HIV test results are typically returned within one hour. While still relying on direct communication from the lab upon a reactive HIV test, a third alert was created to notify the provider of that result and to provide a list of suggested follow-up orders (i.e., syphilis, hepatitis C, HIV RNA quantitative, and consultation to care management). Accepting these orders from the alert and signing them, specifically the consultation, initiates the linkage to care process.15 This process is a coordination between care management and the patient navigator located at the MIHS outpatient HIV clinic in the McDowell Healthcare Center. The patient navigator contacts newly diagnosed HIV-positive patients and facilitates the scheduling of an initial consultation with a medical provider, working with them for up to 1 year post-diagnosis. The main goals for the patient and the patient navigator are to link patients to and retain them in outpatient medical care.

Data collection and process improvement
At program outset, the collection, analysis, and publication of TESTAZ data were reviewed and approved as Exempt by the MIHS Institutional Review Board. The screening process design incorporated data collection elements that assist with measurements and abstraction to: (a) evaluate screening and testing rates for eligible patients, (b) identify patients that declined testing and/or met exclusionary criteria, (c) identify high-risk populations and positivity rates for newly-diagnosed HIV persons, and (d) identify barriers to testing and/or opportunities for improvement. While the triage alert is able to display and confirm previous testing and results within our organization, this information is recorded as patient-reported for HIV testing inside and outside our organization. Although some of these measurements require data input from the triage nurse (i.e., previous testing and results, reason testing declined, or reason informed consent not provided), the impact to workflows or nursing time was minimal compared to the benefit provided in determining testing eligibility. Other measurements allowed analyses of testing rates between provider shifts, patient age, gender, payer source, and race/ethnicity. Received daily, data reports are compiled into weekly, monthly, quarterly, and annual reports using Microsoft Excel (Microsoft Corporation, Redmond, Washington). The data includes information about HIV testing performed during the ED encounter. Data for patients not tested is then sorted for exclusionary criteria described above (including whether or not other blood tests drawn via venipuncture were processed). If the patient did not meet any exclusionary criteria and did not opt-out of testing, we refer to this encounter as a “Missed Opportunity.” Figure 2 includes not only the quarterly testing rates, but the number of patients tested and the number of missed opportunities.

Despite extended education, performance feedback, and innovative methods to remind physicians to order the HIV test, testing rates for eligible patients remained below MIHS expectations for TESTAZ. While blatant refusal to order due to preconceived notions still existed, it was rare. The majority of ED provider feedback resolved to simply forgetting to order the HIV test as it was not an order that addressed the differential diagnosis or acute care of the patient. After compiling staff feedback with a comprehensive analysis of the first year’s metrics, it was determined that the process needed to be improved in order to increase testing rates and decrease missed opportunities for HIV screening.

Triage protocol
A new process initiative was proposed and began in year 2 using a triage protocol order (signed directive) allowing nurses to place the HIV order “per protocol” in the adult ED when predetermined conditions have been met. This allows the nurse collecting and documenting consent information to immediately place the order under a physician’s name, thus eliminating the communication barrier between clinicians.

Our EMR was able to support protocol orders in the ED but required additional setup. Besides adjustments of current CDS targeting,
Figure 1: Illustration of nursing documentation flow sheet rows used to capture HIV consent information in the ED triage navigator. Some rows cascade, meaning certain answers trigger other questions to appear. Cascading rows are represented with a dashed arrow. Top-level questions (Q1 and Q2) appear by default. The first box contains the statement read by the nurse to the patient. In subsequent boxes, questions appear underlined while answers are not. Previous testing and results for HIV, both inside and outside our organization are recorded as patient reported. Although “ACCEPTS HIV testing” is an available response to “ACCEPTS/DECLINES HIV test?” it is understood to mean that the patient did not opt-out of testing. “ACCEPTS” and “DECLINES” are used to prevent confusion and facilitate communication.
several elements were updated to support protocol-based ordering in triage. First, an ordering section was added to the triage navigator to ensure triage nurses could remain on one screen while performing all necessary steps. Next, the HIV order itself was modified to “HIV: If labs drawn” and identified as a protocol order in the nursing preference list. Updates to the EMR typically occur in a standard release cycle (1–2 months), which allows time for analyst build, testing, deployment, and end-user training.

The specific order mode used by the nurse for protocol orders allows us to drive cosign requirements and route those requests to the proper individuals, including the ED physician who eventually cares for the patient. Under the signed directive, the medical director is initially listed as the authorizing provider. The system reroutes the cosign request to the next authorizing ED attending added to the patient’s treatment team. Providers maintain their autonomy to cancel the HIV order if necessary (e.g., no other labs ordered) or place an HIV order at their discretion. Uncollected specimens are addressed in order reconciliation or canceled by the system 4 hours postdischarge.

The changes to our triage protocols were conceptualized by the MIHS Chief Nursing Officer (CNO). Working with ED nurse management, the CNO revised internal policies and procedures to ensure that all regulatory and policy requirements were fulfilled. EMR build and flow sheet changes were authorized by IT management and implemented in accordance with our change management process.

RESULTS
From the start of TESTAZ, data collection and analyses were viewed as integral to its success. Both the EMR/CDS build and reporting teams are vital to the reporting process. The EMR build team ensures that required information can be collected in discreet fields, while the reporting team ensures that the collected information is included in data reports.

Table 1 provides examples of demographic data that were extracted from the EMR; in this particular case, the number of encounters and how HIV tests were processed during those encounters. After analyzing data from Table 1, Table 2 (online Supplementary) allows us to understand why patients from Table 1 were not tested. The use of an EMR, CDS tools, and data analysis provides rich insight into why TESTAZ has been so successful.

Overall, 67% of eligible patients were tested in the first year (Figure 2). With the shift to triage protocol ordering in year 2, the overall testing rate increased to 97% of eligible patients. Weekly abstraction in year 3 showed that staff had ultimately obtained 100% testing compliance on all eligible patients for a single week, raising the overall testing rate for the third year to 98%. Concurrent to increased testing rates, the number of missed opportunities has dwindled to fewer than 5% of eligible patients. From July 11, 2011 through June 30, 2014 the total number of preliminary positive HIV test results was 133. Of those, there were a total of 90 confirmed positives and 4 who were previously diagnosed. Out of 33,683 tests for positivity, this is a case finding rate of 0.27% and is nearly three times the rate recommended by the CDC for implementing routine HIV testing.15,16

Given the success of this program in the adult ED, TESTAZ has been expanded to include our Burn ED, Walk-in Clinic, and Whole Health Homes (providing integrated medical and behavioral healthcare to seriously mentally ill patients). Although the success of this program is specific to one ED using one EMR application, TESTAZ is recognized as a national model for the implementation and maintenance of a routine, opt-out HIV screening program in an adult ED.15,16

CONCLUSION
Triage protocol ordering for HIV screening, supported by CDS tools and a configurable EMR, immediately demonstrated that routine, nontargeted, opt-out HIV screening in the ED is not only feasible but also...
highly effective at maximizing the total number of patients tested and decreasing missed opportunities. This effectiveness has been realized at our organization without reports of disruption to patient flow through the ED. Integrating the process into a task-oriented, data-collection workflow was generally well received by nursing staff compared to the challenge of motivating providers to routinely order an HIV test while focused on acute care of the ED patient. While still a team effort, transitioning the order placement to the clinician performing the screening immediately removed communication barriers that otherwise hindered safe and confident order placement for HIV tests. Our experience demonstrates that success requires input from all organizational levels, from front-line nurses to senior management. TESTAZ will face continuous process improvement, yet the core process has demonstrated enough effectiveness and stability to be the development model for expanding to other areas within the organization that could benefit from routine HIV testing.

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COMPETING INTERESTS
The authors have no competing interests to declare.

CONTRIBUTORS
R.McG. and E.M. planned, prepared, drafted, and revised the manuscript for finalization and submission for publication. R.McG. assisted with the design, modifications, and implementation of the various components of the EMR configurations and CDS tools for the purposes of this project. E.M. managed the design and implementation of quality management reporting for the purposes of this project. Amy Edmonds, Robert Fromm MD, Kara Geren MD, Cheri Tomlinson, Brianne Trackey, and André Valdez PhD participated in proof reading, providing input or technical editing of the manuscript.

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SUPPLEMENTARY MATERIAL
Supplementary material is available online at http://jamia.oxfordjournals.org/.

Table 1: TESTAZ data (July 11, 2011 to June 30, 2014) extracted from the EMR and analyzed to show trends, patterns, testing rates, and other basic demographics. The data presented is encounter-level data and is not unduplicated

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REFERENCES


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