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Increased HIV testing among hospitalized patients who declined testing in the emergency department

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Abstract

Health-care systems have serial encounters with many of the same patients across care settings; however, few studies have examined the role of reoffering HIV testing after a patient declines. We assessed whether an intervention to increase HIV testing among hospitalized patients was associated with increased testing among those who declined a test while in the Emergency Department (ED). We studied 8-week periods pre- and post-implementation of an electronic medical record (EMR)-based intervention to increase HIV testing among hospitalized patients. We included all patients 21–64 years old who had no prior HIV test, declined HIV testing in the ED, and were subsequently hospitalized. We used logistic regression to test for an association between time of hospital admission (pre- vs. post-intervention) and whether an HIV test was performed prior to discharge. Pre- and post-implementation, 220 and 218 patients who declined HIV testing in the ED were hospitalized, respectively. There were no significant demographic or clinical differences among patients pre- and post-implementation. Pre- and post-implementation, the median proportion of patients tested weekly was 6.7% (IQR 6.5%, 10.0%) and 41.4% (IQR 33.3%, 41.9%), respectively (aOR 6.2; 95%CI: 3.6, 10.6). HIV testing increased among hospitalized patients who declined a test in the ED after implementation of an EMR-based intervention. Almost half of the patients who declined testing in the ED ultimately underwent testing after it was reoffered during hospitalization, suggesting that the decision to undergo HIV testing is a dynamic process. Leveraging EMR resources may be an effective tool for expanding HIV testing, and testing should be reoffered to patients who previously declined.

Keywords

Routine HIV testing; emergency department; hospital admission; reoffer; electronic medical record

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Introduction

Since 2006, the US Centers for Diseases Control and Prevention has recommended the routine offer of HIV testing for patients aged 13–64 years in health-care settings at least once, regardless of risk (Branson et al., 2006). Similar recommendations for routine, expanded HIV testing have subsequently been endorsed by several other federal agencies and panels (Moyer & US Preventive Services Task Force et al., 2013; White House Office of National AIDS Policy, 2010). While the goal of these recommendations is to increase the proportion of patients tested for HIV, significant gaps remain in our understanding of the optimal strategies for achieving this goal.

Variable rates of testing across different care settings, including the Emergency Department (ED), inpatient, and outpatient settings, suggest that some patients may be more likely to test in one setting over another (Burns et al., 2013; Cunningham et al., 2009; Goetz et al., 2008; Jain et al., 2008; Lin et al., 2014; Merchant et al., 2008). Health-care systems have serial encounters with the same patients across these care settings; however, few studies have examined the role of reoffering HIV testing after a patient declines. Many patients who are hospitalized arrive via the ED and, therefore, have the opportunity to be offered testing in both these settings. In our clinical experience, some hospitalized patients will consent to testing after declining a test in the ED, but the yield of reoffering has not been previously described. Interventions leveraging the electronic medical record (EMR) to increase HIV testing have been effective in various clinical settings (Avery, Toro, & Einstadter, 2012; Goetz et al., 2008; Lin et al., 2014; Wilbur, Huffman, Lofton, & Finnell, 2011) and may also be useful to facilitate the reoffer of testing. We sought to determine whether an EMR-based intervention to increase HIV testing among hospitalized patients was associated with increased testing specifically among the subgroup of patients who declined a test while in the ED.

Methods

Study design

We conducted a pre–post analysis of HIV testing among patients admitted to the hospital from the ED during the 8-week periods pre- and post-implementation of an intervention to increase HIV testing among hospitalized patients.

Setting

The study was performed at an academic, tertiary-care hospital in the Bronx, NY. Annually, the ED has approximately 110,000 adult visits and the hospital has 36,000 inpatient admissions. Approximately 25% of ED visits result in hospital admissions. The population served by the hospital is more than 80% black or Hispanic, and approximately one-third of patients live below the poverty level (United States Census Bureau, 2015). HIV prevalence in the Bronx is 2% (New York City Department of Health and Mental Hygiene, 2015).

Population

The study cohorts included all patients 21–64 years old who had no prior HIV test result in the EMR, declined an HIV test in the ED, and were subsequently admitted to the hospital during two 8-week periods pre- and post-implementation of the inpatient intervention. The study periods included the eight weeks preceding and following the implementation of the inpatient intervention, with a 14-day blackout period around the date of implementation. Patients with multiple admissions during the study periods were included at the time of their first admission. Because obstetric services have distinct processes for HIV testing, patients admitted to this service were excluded. The study was approved by the institutional review board of the Albert Einstein College of Medicine.

HIV testing in the ED

Since November 2013, the ED protocol calls for the routine offer of (opt-in) HIV testing to all adult patients either by an ED nurse or an HIV counselor. In the ED, an EMR order-set is used to order an HIV test, document patient self-report of HIV, document patient decline of HIV testing, or document that the patient is unstable or lacks capacity to consent. The ED protocol was unchanged throughout the study period.

HIV testing in hospital units and inpatient HIV testing intervention

For patients admitted to the hospital prior to March 2014, HIV testing was offered by providers, HIV counselors responding to orders placed by providers, or counselors approaching patients without an order from the provider. The protocol for counselor-initiated testing was consistent with the recommendation that all adult patients through age 64 be offered HIV testing at least once.

In March 2014, an inpatient EMR-based HIV testing intervention consisting of an automated prompt and order-set was implemented across all inpatient hospital units. When a provider placed any orders through the EMR for a patient admitted to the hospital who had no HIV test result on record, a prompt recommending the offer of an HIV test appeared. The automated logic driving the prompt captured prior HIV tests (or pending results) performed anywhere within the affiliated health-care system, including inpatient settings, outpatient settings, and EDs since 2002 (Felsen, Bellin, Cunningham, & Zingman, 2014). The prompt was accompanied by an order-set allowing providers to (1) request an HIV counselor to offer testing to the patient; (2) order an HIV test and document that consent was obtained by the provider; (3) document that the patient declined HIV testing; (4) document patient self-report of HIV; (5) document that the patient was medically unstable or lacked capacity to consent; or (6) document that the patient was terminally ill and HIV testing was not indicated. If no option from the order-set was selected, the prompt would continually reappear each time a provider placed orders in the patient's EMR until one of the options was chosen. For patients identified as unstable or lacking capacity, the prompt reappeared after 48 hours. Development of the intervention was supported by a systems-level-change HIV prevention contract from the New York City Department of Health and Mental Hygiene.

In both the pre- and post-implementation periods, the same HIV counselors staffed the hospital on weekdays from 9 a.m. to 5 p.m. Written consent was required for HIV tests performed on hospitalized patients. For hospitalized patients consenting to HIV testing offered either by a provider or a counselor, a phlebotomist would draw a blood specimen to be processed in the hospital's central laboratory.

Variables and definitions

Data were extracted from the EMR. The independent variable of interest was time of hospital admission (pre- vs. post-intervention). Additional covariates examined included patient demographic characteristics, admitting hospital service, and length of stay. Our primary outcome was whether an HIV test was performed prior to hospital discharge.

Prior to the implementation of the intervention, whether an HIV test was offered to hospitalized patients was not captured in the EMR and is therefore unavailable. To determine whether an HIV test was offered in the ED or in the hospital (post-implementation of the intervention), we used the action taken in the EMR order-sets. We considered any patient with the following scenarios to have been offered HIV testing: (a) an order was placed for an HIV test by the provider (ED or inpatient); (b) an order was placed for an HIV counselor to offer testing (inpatient only); or (c) documentation that the patient declined HIV testing (ED or inpatient). For patients offered testing, we considered the presence of an HIV test result as evidence of consent and the absence of a result as evidence of decline. For patients found to be HIV positive, chart reviews were performed to confirm new diagnoses.

Analyses

To compare characteristics of patients in the pre- versus post-implementation cohorts, we used Chi-squared tests for categorical variables and Wilcoxon rank-sum tests for non-normally distributed continuous variables. To test for an association between our intervention and performance of an HIV test prior to discharge, we built a logistic regression model with time of hospital admission (pre- vs. post-implementation) as the independent variable and presence of an HIV test result as the dependent variable. The model was adjusted for all covariates with a significant association in bivariate testing at a level of 0.20. To test for the presence of a secular trend affecting the rate of HIV testing prior to the implementation of the intervention, we built a logistic regression model using the pre-intervention week of hospital admission as the independent variable and the presence of an HIV test result as the dependent variable. All analyses were performed using STATA v12 (College Station, TX).

Results

Figure 1 illustrates the number of patients included in the pre- and post-implementation cohorts. During the pre-implementation period, 10,903 unique patients aged 21–64 years old visited the ED and 6030 (55.3%) had no prior HIV test. Among these patients, 1789 (29.7%) were offered HIV testing in the ED and 801 (13.3%) declined. The pre-implementation cohort includes the 220 (27.5%) from this group who were hospitalized from the ED. During the post-implementation period, 9995 unique patients aged 21–64 years old visited the ED

and 5721 (57.2%) had no prior HIV test. Among these patients, 1840 (32.2%) were offered HIV testing in the ED and 841 (14.7%) declined. The post-implementation cohort includes the 218 (25.9%) from this group who were hospitalized from the ED.

Table 1 displays the characteristics of the cohorts by study period. The majority of patients were female (53.9%) and the median age was 52 years (IQR 43–58). Most patients were Hispanic (42.9%) or black (36.8%). The majority of patients were English speakers (84.5%), but a substantial minority reported Spanish as their preferred language (13.7%). Most patients had public insurance (69.0%), were admitted to Medicine services (76.0%), and the median length of stay was two days (IQR 0–5). There were no significant differences in characteristics between the pre- and post-implementation cohorts.

Figure 2 displays the proportion of patients who underwent HIV testing each week during the pre- and post- implementation periods. The median proportion of patients tested each week in the pre- and post-implementation cohorts was 6.7% (IQR 6.5%, 10.0%) and 41.4% (IQR 33.3%, 41.9%), respectively. No secular trend in the rate of HIV testing was identified during the pre-implementation period (β for study week = -0.11 , 95% CI -0.32 , 0.10). In the logistic regression model adjusted for race/ethnicity, patients hospitalized post-implementation were significantly more likely to be HIV tested prior to discharge compared to the patients hospitalized pre-implementation (aOR = 6.2; 95% CI: 3.6, 10.6).

In the pre-implementation cohort, a total of 20 (9.1%) of the 220 hospitalized patients had an HIV test performed prior to discharge. All results were negative for HIV infection. In the post-implementation cohort, a total of 85 (39.0%) of the 218 hospitalized patients had an HIV test performed prior to discharge. Among those tested in the post-implementation cohort, one was newly diagnosed with HIV infection. While reoffering of HIV testing could not be captured in the pre-implementation cohort, in the post-implementation cohort, 188 (86.2%) of the 218 hospitalized patients were reoffered HIV testing (Figure 1).

Discussion

After implementation of an EMR-based intervention, HIV testing increased among hospitalized patients who declined a test in the ED. Almost half of the patients who had recently declined testing in the ED ultimately consented to a test after it was reoffered during hospitalization.

Multiple studies have demonstrated increased rates of HIV testing associated with EMR-based interventions in primary-care settings and EDs (Avery et al., 2012; Goetz et al., 2008; Lin et al., 2014; Wilbur et al., 2011). To our knowledge, ours is the first study to report the use of an EMR-based intervention to increase HIV testing among hospitalized patients, a population for which routine HIV testing is recommended (Branson et al., 2006; Moyer et al., 2013) but rarely performed (Voetsch et al., 2012).

Patient attitudes about and willingness to go undergo HIV testing vary among populations, settings, and testing strategies (Burns et al., 2013; Christopoulos et al., 2012; Cunningham et al., 2009; Goetz et al., 2008; Jain et al., 2008; Lin et al., 2014; Merchant et al., 2008). The majority of studies reporting on these attitudes and behaviors use cross-sectional designs that

do not account for the serial nature of how individual patients interact with health-care systems. Our results suggest that for many patients, willingness to undergo HIV testing is a dynamic process and that declining an HIV test during one interaction may not preclude willingness to undergo testing during another. This finding can inform health-care systems that repeatedly interact with patients across clinical settings and are seeking to implement expanded HIV testing strategies to maximize the proportion of patients undergoing testing. While we observed that a substantial proportion of patients who declined HIV testing in the ED consented to testing during hospitalization, we are unable to comment on reasons for this change. Understanding these reasons is important to further tailor expanded testing strategies and may be informed by further qualitative studies.

Among the goals of expanded testing is the identification of individuals who are HIV infected but undiagnosed. Although not formally addressed by our study, whether reoffering testing may play a role in mitigating missed opportunities for diagnosis is illustrated by the single patient in the 8-week post-implementation period who was newly diagnosed with HIV. It is possible that this patient would have been reoffered testing based on clinical suspicion even outside the presence of our intervention, although it is also possible that the intervention may have expedited the reoffer.

Our study has limitations. First, because we used an observational design, we cannot attribute causality to our intervention. However, to our knowledge, no other changes affecting HIV testing occurred during the study period that could account for the observed changes and we did not identify any secular trend in the rate of HIV testing during the pre-implementation period. Second, this study focused specifically on a subgroup of patients who declined HIV testing in the ED and may not be generalizable to all hospitalized patients or to patients who decline testing in other clinical settings. Reporting on the association between our EMR intervention and HIV testing among the general hospitalized population is planned. Finally, although our intervention targeted those without a prior HIV test in the affiliated health-care system, it is possible that some of these patients may have been previously tested elsewhere.

Our study demonstrated an increased rate of HIV testing among hospitalized patients who declined testing in the ED after implementation of an EMR-based intervention. Leveraging EMR resources may be an effective tool for implementing expanded HIV testing, and testing should be reoffered to patients who previously declined.

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Figure 1.

Derivation of study cohorts and outcomes. The pre-implementation and post-implementation periods include the two 8-week periods preceding and following the implementation of the EMR-based intervention with a 14-day blackout period around the date of implementation. A prior HIV test refers to a documented HIV test result in the EMR of the affiliated health-care system. Offer of an HIV test was defined according to the action taken in the EMR order-sets. Any patient with the following scenarios was considered to have been offered HIV testing: (a) an order was placed for an HIV test by the provider (ED or inpatient); (b) an order was placed for an HIV counselor to offer testing (inpatient only); or (c) documentation that the patient declined HIV testing (ED or inpatient). In the pre-implementation period, whether an HIV test was offered to hospitalized patients was not captured in the EMR and is therefore unavailable (dashed boxes). The horizontal dotted line separates processes taking place in the ED (above) and inpatient hospital units (below).

Figure 2.

Percent of patients with an HIV test performed prior to discharge by week. The ribbon below the graph displays the number of patients included in the study each week. Patients were included in the study if they (a) had no prior documented result of an HIV test; (b) declined an HIV test in the ED; and (c) were hospitalized from the ED.

Table 1

Characteristics of study population.

Characteristic	Pre-implementation (<i>N</i> = 220)		Post-implementation ^a (<i>N</i> = 218)		<i>p</i> -value ^b
	<i>N</i>	%	<i>N</i>	%	
Gender					0.63
Female	116	53	120	55	
Age (median years, IQR)	52	41–57	52	44–58	0.58
Race/ethnicity					0.18
Hispanic	92	42	96	44	
Black, non-Hispanic	81	37	80	37	
White, non-Hispanic	31	14	18	8	
Asian, non-Hispanic	2	1	6	3	
Other	9	4	15	7	
Unknown/missing	5	2	3	1	
Language					0.58
English	184	84	186	85	
Spanish	33	15	27	12	
Other	3	1	5	3	
Insurance					0.91
Public ^c	153	70	149	68	
Private	60	27	63	29	
Uninsured	7	3	6	3	
Admission service					0.23
Medicine	168	76	165	76	
Surgery	36	16	43	20	
Neurology	8	4	2	1	
Psychiatry	5	2	7	3	
Gynecology	3	1	1	0	
Inpatient length of stay (median days, IQR)	2	0–6	2	0–5	0.88

Note: IQR, interquartile range.

^aThe pre-implementation and post-implementation periods include the two 8-week periods preceding and following the implementation of the electronic medical record-based intervention with a 14-day blackout period around the date of implementation.^b*p*-values estimated using Wilcoxon rank-sum tests for non-normally distributed continuous variables and Chi-squared tests for categorical variables.^cPublic insurance includes Medicare or Medicaid.