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## Evaluation of Opt-out Inpatient HIV Screening at an Urban Teaching Hospital

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### Abstract

This study evaluated opt-out inpatient HIV screening delivered by admitting physicians, and compared number of HIV tests and diagnoses to signs and symptoms-directed HIV testing (based on physician orders) in the emergency department (ED). The opt-out inpatient HIV screening program was conducted over a one year period in patients who were admitted to the 386-bed University of California San Diego (UCSD) teaching hospital. Numbers of HIV tests and

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#### Authors contributions:

G.O., M.H., J.Q. and S.L. conducted the data analysis and interpretation. G.O., J.Q., and S.L. implemented the design of the study. S.L., J.Q. and K.B. designed, implemented, and analyzed the data from the survey instruments. S.M. and S.R. provided guidance in the study implementation and data analysis. J.L. implemented the HIV screening tool for the hospital's electronic medical record. M.H., G.O. and S.L. prepared the manuscript. J.Q., K.B., S.M., S.R. and J.L. revised it critical for intellectual contact. All authors have given final approval of the version to be published

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#### Conflicts of interest

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diagnoses were compared to those observed among ED patients who underwent physician-directed HIV testing during the same time period. Survey data were collected from a convenience sample of patients and providers regarding the opt-out testing program. Among 8,488 eligible inpatients, opt-out HIV testing was offered to 3,017 (36%) patients, and rapid antibody testing was performed in 1,389 (16.4%) inpatients, resulting in 6 (0.4% of all tests) newly identified HIV infections (5/6 were admitted through the ED). Among 27,893 ED patients, rapid antibody testing was performed in 88 (0.3%), with 7 (8.0% of all tests) new HIV infections identified. HIV diagnoses in the ED were more likely to be men who have sex with men (MSM) ( $p=0.029$ ) and tended to have AIDS-related opportunistic infections ( $p=0.103$ ) when compared to HIV diagnoses among inpatients. While 85% of the 150 physicians who completed the survey were aware of the HIV opt-out screening program, 44% of physicians felt that they did not have adequate time to consent patients for the program, and only 30% agreed that a physician is best-suited to consent patients. In conclusion, the yield of opt-out HIV rapid antibody screening in inpatients was comparable to the national HIV prevalence average. However, uptake of screening was markedly limited in this setting where opt-out screening was delivered by physicians during routine care, with limited time resources being the major barrier.

### Keywords

HIV testing; routine; HIV surveillance; Emergency Department; healthcare setting

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## INTRODUCTION

In contrast to HIV testing targeted to high risk groups (e.g. sexually active MSM and substance users), which results in substantially higher proportions of HIV diagnoses (Hoenigl et al., 2016; Hoenigl et al., 2015; Hoenigl, Chaillon, Morris, & Little, 2016; Hoenigl, Graff-Zivin, & Little, 2016), universal (i.e., opt-out) HIV screening in ambulatory care, emergency department (ED), and inpatient settings may reach populations who may not perceive themselves to be at risk or are otherwise less likely to participate in HIV testing (Haukoos et al., 2010; Jain et al., 2008).

The objective of this study was to evaluate an opt-out inpatient HIV screening program administered with admission orders written by physician housestaff. These data were compared to the number of HIV tests and diagnoses as part of physician-ordered HIV testing (based on signs and symptoms) in the ED.

## METHODS

### Inpatient opt-out screening and ED testing

The opt-out inpatient HIV screening program was conducted between October 2008 and October 2009. Opt-out HIV screening orders were automatically included in the electronic medical record admission orders to be authorized by the admitting physician. Patients 13 to 64 years of age who were admitted to the 386-bed University of California San Diego teaching hospital were considered eligible after excluding the following groups: i) persons known to be HIV infected, ii) women admitted to the obstetrics service (where universal

HIV screening is already routine), iii) patients incapable of giving consent, or iv) persons who self-reported a negative HIV test within the past year. Admitting physicians were provided with extensive training materials regarding this program, including a laminated card to read to patients that explained the opt-out plan for HIV testing. Opt-out screening on whole blood was performed using the OraQuick® Advance Rapid HIV-1/2 Antibody test (OraSure Technologies, Inc., Bethlehem, PA) within 24 hours of admission. Reactive OraQuick rapid tests (RTs) were confirmed using enzyme immunoassay testing. Newly diagnosed HIV infected patients were provided post-test counseling and linkage to primary HIV care.

In the ED HIV testing was offered using a physician-directed diagnostic approach based on HIV signs and symptoms and/or high HIV risk exposure. After verbal consent was obtained by the medical staff, testing on whole blood was performed with OraQuick® RT (available around the clock in the ED). Confirmatory tests as described above were performed in persons with positive RT.

### Surveys

To describe the predictors of acceptance or refusal of HIV opt-out inpatient testing, surveys were offered to a convenience sample of i) admitted patients, 18–64 years of age who reported that they had been offered HIV testing upon admission over a 3-month period (written survey), and ii) housestaff medical providers (online survey following completion of the study), to assess perceptions of the HIV testing program, understanding of current HIV testing guidelines and barriers to inpatient HIV testing. The surveys consisted of both, 5 point Likert-scale and multiple choice questions.

### Statistical analysis

Logistic regression analysis was conducted using SPSS software, v16 (SPSS Inc., Chicago, IL, USA) for significant ( $p < 0.05$ ) univariate predictors for opting-out of the inpatient HIV screening program. The UCSD Human Research Protections Program approved all proportions of the study protocol, consent, and all study related procedures.

## RESULTS

### Inpatient opt-out HIV screening

During the study, 11,398 adolescent and adult patients between the age of 13 and 64 years were admitted. Out of those, 8488 (74%) patients were eligible for the opt-out HIV screening program. The opt-out HIV screening program was offered to 3017/8488 patients (36%), and 1537/8488 (18%) patients accepted HIV screening (i.e. 50.3% of those who were offered HIV testing, the remaining 49.7% were reported to have opted out). Of the 1537 patients who accepted screening, 1389 (90%) patients had a HIV RT, representing 16.4% of eligible candidates for opt-out screening, while testing was not performed in the remaining 148 patients (main reasons: patient was discharged or unavailable for phlebotomy). Reasons for not offering opt-out HIV screening to 5471 patients (64%) were incapacity of opting-out ( $n=1799$ , 31%), and self-report of a negative HIV test within the past year or unknown reasons ( $n=3672$ , 69%). Demographic characteristics of eligible patients and the subset that

consented to HIV screening are depicted in Table 1. Of those who underwent HIV screening 14% were uninsured, 4.9% homeless, and 4.9% were currently incarcerated.

Six of the 1389 patients who underwent screening were newly identified with HIV infection, representing a prevalence of 0.43% (95% CI, 0.15–0.94). Five of the 6 patients were admitted through the ED but did not undergo ED HIV testing. The most common HIV risk exposure for these six individuals was male to female sexual intercourse (n=5), followed by prior injection drug use (n=3, all three also reported male to female sexual contact). HIV care was established in 5/6 diagnoses.

Predictors of accepting HIV screening (*vs.* opting out) in the inpatient setting in multivariate analysis are shown in Table 2.

### ED physician-directed HIV testing

The UCSD ED evaluated 32,007 patients during the study period with 87% (N=27,893 patients) between 13 to 64 years of age. There were 88 (0.3%) that were consented to undergo symptom-driven HIV testing with an unknown number who were offered HIV testing and declined. Demographics are depicted in Table 1. Seven of the 88 patients were newly identified with HIV infection (HIV prevalence 8%, 95% CI 3.3–15.7%). HIV infection was significantly more likely among those tested in the ED compared to opt-out inpatient testing ( $P<0.001$ ). Compared to those diagnosed with inpatient screening, HIV diagnoses in the ED were more likely to be sexually active MSM ( $p=0.029$ ) and tended to have AIDS-related opportunistic infections ( $p=0.103$ ) when compared to HIV diagnoses in inpatients.

### Patient and Provider Surveys

Table 3 displays results of the inpatient and provider surveys. Out of 576 inpatients that were screened for the survey on the day after admission, 64 (11%) recalled being offered a HIV test on admission and were therefore eligible for the survey. Forty-nine of these 64 patients consented to be surveyed. The overwhelming majority (96%) of the patients surveyed noted comfort in being asked by their physician to undergo opt-out HIV RT. Although 29% of patients (n=14) reported one or more risk factor(s) for HIV, only 1/14 (7%) agreed with the statement “I believe that I have risk factors for HIV infection”.

Out of 267 house staff physicians that were offered participation in the survey, 150 physicians (56%) completed the survey. Most physicians (85%) were aware that the HIV opt-out screening program was in place during the study period. Thirty-six percent of physicians did not believe that the admitting physician should be responsible for HIV screening. When asked who would be best-suited to consent patients, 30% favored a physician, while 35% favored a floor nurse, 11% an admission clerk, and 23% a physician extender (i.e. physician assistant or nurse practitioner).

## DISCUSSION

We evaluated opt-out inpatient HIV screening and compared the number of HIV tests and diagnoses to physician-directed HIV testing in the ED. Two major findings are evident. First,

opt-out inpatient HIV screening was associated with markedly lower per test positivity rates when compared to targeted testing in the ED, and these newly HIV diagnosed patients were not typically tested through physician-directed testing in the ED. Second, uptake of screening was limited when physicians were responsible for opt-out screening during routine care, with limited time resources seemingly the major barrier.

The strength of our study was the ability to compare the HIV testing uptake and prevalence in concurrently administered opt-out inpatient and targeted physician-directed ED testing programs. The prevalence of HIV in those who underwent opt-out inpatient HIV screening was 0.4%, comparable to the estimated U.S. adult HIV prevalence and slightly higher than rates recently observed in opt-out screening programs in the United Kingdom and Singapore (Chua et al., 2012; Rayment et al., 2012), but significantly lower compared to the 8% observed among those undergoing targeted HIV testing in the ED in this study ( $p < 0.001$ ). While studies indicate that costs per HIV diagnosis and per transmission averted may be markedly higher in opt-out routine screening strategies compared to targeted testing (Gomez-Ayerbe et al., 2014), routine testing may identify more HIV infections, by identifying individuals who do not fulfill criteria for targeted testing (Felsen et al., 2015; Merchant et al., 2008; Oster et al., 2016). This was also shown in our study where opt-out inpatient screening identified 5 persons newly HIV diagnosed who had been admitted through the ED and had not received HIV screening.

In our program, opt-out screening was delivered by physicians during routine care, which may explain the low uptake of inpatient screening in this study and (Schnall, Clark, Olender, & Sperling, 2013).

To increase the uptake of routine HIV testing more extensive focus, training and support for staff and providers may be required. Future studies should evaluate whether uptake of inpatient HIV screening may be improved when taken out of the hands of physicians who are providing routine care and given into the hand of staff who routinely obtain consent for care.

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**Table 1**

Demographic Characteristics of the Study Population.

Demographic Characteristics	Admitted Patients		Underwent HIV Screening		p-value if <0.05 (Chi-squared or Student's T-test)
	UCSD Inpatients	UCSD Emergency Department (ED) Patients	UCSD Inpatients	UCSD Emergency Department (ED) Patients	
Number	11,398	27,893	1,389	88	-
Median Age (years)	44	46	41	46	<0.001
Sex					
Female	36.4%	44.9%	39.2%	28.1%	0.025
Male	63.6%	55.1%	60.8%	71.9%	
Race/Ethnicity					
White	60.5%	54.1%	49.2%	50.0%	n.s.
Black	8.9%	19.5%	19.7%	15.9%	0.046
Hispanic	26.5%	18.6%	25.6%	17.0%	n.s.
Asian	3.8%	3.5%	4.9%	2.4%	n.s.
Other	0.3%	4.3%	0.7%	14.6%	n.s.

**Table 2**

Multivariable Model of Predictive Factors for accepting Inpatient HIV Screening (vs. opting out).

<b>Factor</b>	<b>Odds Ratio (95% confidence interval)</b>
<b>Age (per year)</b>	1.010 (1.005, 1.015)
<b>Sex</b>	
<i>Female</i>	Reference
<i>Male</i>	0.867 (0.769, 0.979)
<b>Race/Ethnicity *</b>	
<i>White</i>	Reference
<i>Hispanic</i>	0.379 (0.314, 0.459)
<i>Black, non-Hispanic</i>	2.636 (2.180, 3.187)
<b>Homelessness</b>	
<i>No</i>	Reference
<i>Yes</i>	0.382 (0.280, 0.522)
<b>Current Incarceration</b>	
<i>No</i>	Reference
<i>Yes</i>	0.529 (0.393, 0.711)
<b>Admission Medical Service *</b>	
<i>Medicine<sup>#</sup></i>	Reference
<i>Surgery<sup>‡</sup></i>	0.063 (0.049, 0.079)
<i>Neurology/Psychiatry</i>	18.035 (14.203, 22.901)

\* Other Race/Ethnicity (Asian or Pacific Islander, Native American or Eskimo, Other, or Unknown) and Other Admit Medical Service (Radiology, Unknown) not included in final regression models

# Medicine: Family Medicine, Internal Medicine including Cardiology, ICU, Hospitalist, and Pulmonary/Vascular Teams

‡ Surgery: General Surgery and Surgical Subspecialties (ENT, Urology, Ophthalmology, Plastics, Cardiothoracic, Orthopedic, Neurosurgery, Transplant, and Burn Unit)



**Table 3**

Survey questions and answers of the inpatients and provider survey (5 point Linkert Scale).

<b>Inpatient Survey</b>	<b>Disagree (1–2) n (%)</b>	<b>Neither (3) n (%)</b>	<b>Agree (4–5) n (%)</b>
My doctor explained which patients should be screened for HIV according to national public health guidelines.	26 (53)	5 (10)	18 (37)
My doctor explained that there would be counseling, education, and treatment programs available if my HIV test was positive.	25 (51)	6 (12)	18 (37)
My doctor explained to me that my HIV test would be strictly confidential	10 (20)	3 (6)	36 (73)
My doctor explained to me that the HIV test was free.	7 (14)	0	42 (86)
I felt I had enough time to ask my physician questions about the HIV test.	13 (27)	6 (12)	30 (61)
My doctor made me feel uncomfortable by asking me to get an HIV test.	47 (96)	1 (2)	1 (2)
I felt uncomfortable talking to my doctor about HIV testing because I did not have enough privacy.	47 (96)	2 (4)	0
<b>Provider Survey</b>	<b>Disagree/Never (1–2) n (%)</b>	<b>Neither/Sometimes (3) n (%)</b>	<b>Agree/Always (4–5) n (%)</b>
I believe that all people in the general public aged 18–64 should be screened for HIV regardless of known risk factors	40 (27)	15 (10)	94 (63)
I believe that hospitalization is a good time to screen patients for HIV regardless of known risk factors	23 (15)	21 (14)	105 (71)
I feel the education I received prepared me to discuss HIV testing with patients	31 (21)	34 (23)	39 (26)
I feel I had adequate time to screen for HIV at admission	66 (44)	36 (24)	48 (32)
I remember to obtain informed consent for HIV screening at time of admission	49 (33)	45 (30)	55 (37)
How often did you choose “unable to consent” in admit order-set when the patient was consentable, but you did not ask for consent for some reason?	39 (26)	58 (39)	53 (36)