Improving HIV Screening and Receipt of Results by Nurse-Initiated Streamlined Counseling and Rapid Testing

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BACKGROUND: HIV testing is cost-effective in unselected general medical populations, yet testing rates among those at risk remain low, even among those with regular primary care. HIV rapid testing is effective in many healthcare settings, but scant research has been done within primary care settings or within the US Department of Veteran's Affairs Healthcare System.

OBJECTIVES: We evaluated three methods proven effective in other diseases/settings: nurse standing orders for testing, streamlined counseling, and HIV rapid testing.

DESIGN: Randomized, controlled trial with three intervention models: model A (traditional counseling/testing); model B (nurse-initiated screening, traditional counseling/testing); model C (nurse-initiated screening, streamlined counseling/rapid testing).

PARTICIPANTS: Two hundred fifty-one patients with primary/urgent care appointments in two VA clinics in the same city (one large urban hospital, one freestanding outpatient clinic in a high HIV prevalence area).

MEASUREMENTS: Rates of HIV testing and receipt of results; sexual risk reduction; HIV knowledge improvement.

RESULTS: Testing rates were 40.2% (model A), 84.5% (model B), and 89.3% (model C; $p < .01$). Test result receipt rates were 14.6% (model A), 31.0% (model B), 79.8% (model C; all $p < .01$). Sexual risk reduction and knowledge improvement did not differ significantly between counseling methods.

CONCLUSIONS: Streamlined counseling with rapid testing significantly increased testing and receipt rates over current practice without changes in risk behavior or posttest knowledge. Increased testing and receipt of results could lead to earlier disease identification, increased treatment, and reduced morbidity/mortality.

Policymakers should consider streamlined counseling/rapid testing when implementing routine HIV testing into primary/urgent care.

KEY WORDS: nurse-initiated HIV screening; HIV rapid testing; streamlined counseling.

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INTRODUCTION

The availability of effective antiretroviral therapy has transformed HIV into a treatable chronic disease, dramatically reducing the death rate and increasing those living with HIV¹. Much of the HIV mortality burden is attributed to late entry into treatment, often due to late identification of infected individuals^{2,3}. Many of these patients have multiple contacts with the medical system in the years leading to their eventual diagnosis⁴. Positivity rates among previously untested patients likely exceed established cost-effectiveness thresholds of 0.3%⁵. This has led the Centers for Disease Control and Prevention (CDC) to call for routine HIV testing to all patients who present for general medical care⁶. Integrating HIV screening and testing into primary or urgent care remains an open question, however. Screening and testing rates in such settings are low^{7,8}. Testing barriers have included patient's inability to return for posttest counseling and results, provider time constraints, and competing provider priorities^{9,10}.

To address these barriers, same-day HIV rapid testing, streamlined counseling, and nurse-initiated screening have all been proposed as remedies to increase screening in general medical and urgent care settings¹¹. Rapid testing avoids the need to return for results, streamlined counseling reduces time burdens, and nurse-initiated screening (sometimes called "standing orders") systematizes testing into primary prevention priorities. Rapid testing has been widely applied in non-primary care settings and is acceptable to patients and providers^{12,13}. Streamlining counseling processes may reduce the time that clinicians spend on pre and posttest counseling from 20 or 30 to as little as 2 or 3 minutes^{14,15}, although there

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are potential adverse effects on posttest knowledge. Indeed, the CDC has recommended elimination of written consent to reduce counseling burdens. Finally, routinizing the offer of many preventive care processes through nurse standing orders has increased receipt rates¹⁶. There are few if any data evaluating the effects of these interventions in HIV testing, however, in primary care settings or elsewhere.

The VA was chosen to implement this intervention because the electronic medical record and quality improvement infrastructure allows for easy implementation and evaluation of these strategies. Moreover, previous studies have shown HIV positivity rates in VA samples to exceed those of the general medical population¹⁷.

METHODS

Design and Setting

We implemented a 2-site, 3-arm randomized control trial, at 2 VA sites in Southern California. Both were primary care clinics with urgent care components. One was an academically affiliated hospital, the other a freestanding outpatient clinic serving many indigent and homeless veterans.

Recruitment

Recruiters approached patients in the waiting room of targeted clinics. Patients were eligible if they met all of the following criteria: (1) age between 18 and 65; (2) unaware of their HIV status; (3) no HIV test, past year; (4) appointment with a provider in the target clinic that day; (5) English proficiency; and (6) competence to consent. Recruiters approached 2,384 patients, 406 of whom agreed to participate (17% recruitment rate). After excluding 155 for non-eligibility, 251 were enrolled. After providing written consent, participants were surveyed about HIV risk factors and other predictors of testing as well as knowledge of HIV test characteristics and prevention (Fig. 1).

Interventions

Patients were randomized to 1 of 3 models of routine HIV testing:

Model A: Traditional HIV counseling/testing

In this control arm, study recruiters advised patients to discuss their need for an HIV test with their physician. Physicians were then responsible for ensuring patients received a test, usually by referring them to an HIV counselor using traditional methods. On average, it took 20 minutes per patient to administer the current VA-mandated pretest counseling elements. These elements are included in Appendix 1 and are similar but not identical to CDC recommendations¹⁸.

Testing was administered through usual clinical laboratory mechanisms and included enzyme-linked immunosorbent assay testing followed by Western blot confirmation. This 'traditional' method of HIV testing requires a 2-visit process, the first for blood draw and the second to inform patients of results.

Model B: Nurse-initiated screening + traditional counseling/testing

In this arm, nurses initiated an HIV screening protocol rooted in previously successful systematized preventive screening methods¹⁹. Rather than awaiting physician orders, nurses entered HIV testing orders into a patient's electronic medical record and directed patients to the laboratory for venipuncture. Again, patients had to return for results.

Model C: Nurse-initiated screening + streamlined counseling/rapid testing

As in model B, nurses entered test orders into the computerized record. In this model, however, nurses initiated streamlined counseling and administered rapid testing. The streamlined procedure covered all federal HIV counseling elements but at a more superficial level. They were available

*Usual Care

**Nurse-based Screening

***Nurse-based Screening + Streamlined Counseling/Rapid Testing

Figure 1. Participant recruitment, group assignment, and study participation.

to nurses on a computer screen which they resolved as each counseling element was discussed. Streamlined pretest counseling took an average of 7 minutes to complete. The nurses, who had been previously trained in the use of rapid testing (OraQuick® rapid test; Orasure Technologies), obtained an oral swab and asked patients to return to the clinic testing area when the physician visit was completed. Results were available approximately 20 minutes later and transmitted to the patient with streamlined posttest counseling if negative, lasting an average of 2 minutes. Previous trials have yielded testing sensitivity and specificity of 99.6% and 100%, respectively²⁰. Indeterminate tests were treated as positives. Patients with positive results were immediately referred to the facility's HIV clinic for posttest counseling and confirmatory tests and given follow-up appointments.

Data Sources

Data were obtained from two sources: a patient-based survey and a patient's electronic medical record. Pre-intervention surveys included patients' demographic characteristics (i.e., age, race/ethnicity, education, employment status, current income and sexual preference, as well as patients' Knowledge Attitudes Beliefs and Behaviors information regarding HIV knowledge/risk factors²¹). The 13 knowledge-based questions were true/false and were combined to create a pre-post composite variable. Five questions assessing sexual risk were an amalgam of both yes/no and categorical responses.

Surveys were administered both pre- and post-intervention to gauge knowledge retention and continued sexual risk between traditional and streamlined counseling. Approximately 4 weeks after recruitment, patients were recontacted by telephone to complete post-intervention surveys. In addition to pre-survey items, post-surveys included questions about knowledge and HIV testing acceptability. The data obtained assessed sexual risk and whether streamlined counseling did no worse than traditional counseling regarding HIV knowledge and risk factors. Our pre-intervention response rate was 99.6% (1 pre-survey excluded due to illegible coding). Post-survey response was 80% (152 completed versus 189 eligible) for our hospital clinic and 63% (39 completed versus 62 eligible) for our downtown site.

To confirm testing status, receipt of results, comorbidity, and sexual risk, we also extracted patient data from the VA Computerized Patient Record System and from pre/post-survey responses. We extracted data on diagnoses of depression, post-traumatic stress disorder, anxiety, schizophrenia, tuberculosis, sexually transmitted diseases (STDs), illicit drug use, and lifetime homelessness. Data were extracted using ICD-9 codes and progress note reviews 2 years pre-enrollment. Testing and receipt rates were evaluated 90 days post-enrollment.

Statistical Analysis

We performed 4 logistic regression analyses in which the dependent variables included indicators of: HIV testing, receipt of results, sexual risk reduction, and HIV knowledge improvement. The unit of analysis was the patient. Independent variables included: (1) demographic characteristics (i.e., age, race/ethnicity, employment status, education, income, sexual preference); (2) HIV risk factors and comorbidities; (3) baseline sexual risk (computed as the percentage of risk behaviors

derived from patient responses to five questions assessing pre-intervention risk behaviors); (4) baseline HIV knowledge (computed as the percentage of correct responses to thirteen HIV knowledge questions); (5) number of primary care visits, infectious disease, general medicine or urgent care clinics 90 days post-enrollment (for receipt rates only); (6) a categorical variable indicating our 3 study arms. All analyses were conducted using SAS, version 9.0 (SAS Inc., Cary, NC, USA). We initially computed the odds ratios of HIV testing, receipt of test results, sexual risk reduction, and HIV knowledge improvement between study arms, adjusted for all other independent variables and intra-site clustering. For ease of interpretation, we decided to report adjusted relative risks instead of adjusted odds ratios, though both methods yielded similar results.

RESULTS

A total of 251 people were enrolled. One hundred eighty-nine were enrolled at our hospital site (62 randomized to model A, 64 to model B, 63 to model C); 62 were enrolled at our freestanding clinic (21 randomized to model A, 20 to model B, 21 to model C). Population characteristics are in Tables 1 and 2. There were no significant differences in the distribution of demographic characteristics, comorbidities, risk factors, baseline sexual risk, and baseline HIV knowledge across models. When comparing patient characteristics between sites, patients at the freestanding clinic were younger and more likely to be white. When comparing characteristics across models, patients in model A had significantly higher prevalence of mental disorders. One participant was screened as preliminary HIV-positive; following our protocols, the Chief of Infectious Disease was notified immediately, and the patient was provided the appropriate follow-up care.

Testing and Receipt of Results

Unadjusted testing rates were 40.2% for model A, 84.5% for model B, and 89.3% for model C ($p=.01$). Unadjusted receipt rates of results were 14.6% for model A, 31.0% for model B, and 79.8% for model C ($p=.01$).

Tables 3 and 4 present adjusted risk ratios and 95% confidence intervals for testing and receipt of results.

Model B patients were more likely to be tested compared to model A patients (RR=2.14; CI=1.62–2.82) as were those in model C (RR=2.26; 1.7–3.0) when compared to A. There was no significant difference in testing rate between models B and C (RR=1.07; 0.95–1.21). We found no significant associations between demographics, risk factors, comorbidities, and HIV testing.

Model B patients were more likely to receive test results than those in model A (RR=2.06; 1.1–3.7). This effect was more pronounced in patients assigned to model C as compared to model A (RR=5.2; 3.1–8.9) and model B (RR=2.55; 1.82–3.58).

Posttest Knowledge and Risk

A total of 191 (76%) patients completed post-intervention surveys (58 patients—model A; 65—model B; 68—model C). Unadjusted percentages of those whose HIV risk knowledge improved or remained the same were 24.1% (model A), 29.2%

Table 1. Characteristics of the Study Population by Site

	Overall	Comparison by site	
		Hospital-based clinic	Freestanding downtown clinic
Number	251	189	62
Age (mean±SD)*	49±10	53±9	50±10
Race/ethnicity (%)*			
White	(32)	13	27
African American	(43)	54	46
Hispanic	17	16	17
Asian	3	5	3
Native American	1	3	2
Others	4	8	5
Education (%)			
<High school	5	5	5
High school graduate	23	31	25
Some college	49	48	48
College graduate	23	15	21
Employed (%)	35	30	34
Income (%)			
<10K	32	39	34
10–29K	30	34	31
30–49K	12	16	13
50–80K	6	3	6
Missing	20	8	17
Homeless (%)‡	32	39	34
Mental disorders (depression, post-traumatic stress disorder, anxiety, schizophrenia) (%)†	50	55	51
Hepatitis C (%)	17	15	16
Drug use (%)	29	31	30
Sexual preference (%)			
Heterosexual	92	86	90
Gay/lesbian/bisexual/others	8	15	10
Baseline sexual risk score (mean±SD)§	0.4±0.3	0.4±0.3	0.4±0.3
Baseline HIV knowledge score ^{//} (mean±SD)	0.9±0.2	0.9±0.1	0.9±0.2
Visits to VA within 60 days post-enrollment (%)			
0	73	76	73
1 or more	28	24	27

*Indicates that the distribution of the variable was significantly different between the two facilities ($p<.05$).

†Indicates that the distribution of the variable was significantly different among the three models ($p<.05$).

‡Homeless at least once, lifetime

§Sexual risk score is a 5-question composite of both 'yes/no' and categorical responses to sexual-risk questions.

//HIV knowledge score is a 13-question 'true/false' composite.

(model B), and 27.9% (model C) (chi-square test, $p=.81$). Unadjusted percentages of patients whose sexual risk decreased post-intervention were 36.2% (model A), 55.4% (model B), and 48.5% (model C; chi-square test, $p=.10$). Table 2 presents the adjusted changes in knowledge and HIV risk. There was no significant differences between the interventional models on these outcomes.

DISCUSSION

Nurse-initiated screening increased HIV testing and result receipt rates significantly when compared to physician-initiated screening, and the replacement of traditional counseling and testing by the combination of streamlined counseling with

rapid testing significantly increased both testing and result receipt rates. Moreover, there was no difference in patient knowledge or risk behavior between these three testing methods.

Table 2. Characteristics of the Study Population by Model

	Overall	Comparison by Model		
		Usual Care (A)	Nurse-Based Screening (B)	Nurse-Based Screening + Streamlined Counseling/ Rapid Testing (C)
Number	251	83	84	84
Age (mean±SD)*	49±10	50±9	49±10	50±11
Race/ethnicity (%)*				
White	(32)	33	26	23
African American	(43)	38	48	52
Hispanic	17	20	16	26
Asian	3	1	2	6
Native American	1	2	2	0
Others	4	6	6	4
Education (%)				
<High school	5	4	7	4
High school graduate	23	27	23	26
Some college	49	50	48	49
College graduate	23	20	23	21
Employed (%)	35	38	68	31
Income (%)				
<10K	32	40	32	30
10–29K	30	28	31	35
30–49K	12	13	12	13
50–80K	6	2	5	10
Missing	20	17	20	13
Homeless (%)‡	32	36		32
Mental disorders (depression, post-traumatic stress disorder, anxiety, schizophrenia) (%)†	50	62	48	44
Hepatitis C (%)	17	7	6	11
Drug use (%)	29	12	16	19
Sexual preference (%)				
Heterosexual	92	90	92	89
Gay/lesbian/bisexual/others	8	10	8	11
Baseline sexual risk score (mean±SD)§	0.4±0.3	0.3±0.3	0.4±0.3	0.4±0.3
Baseline HIV knowledge score (mean±SD)	0.9±0.2	0.9±0.2	0.9±0.2	0.9±0.2
Visits to VA within 60 days post-enrollment (%)				
0	73	78	74	68
1 or more	28	22	26	32

*Indicates that the distribution of the variable was significantly different between the two facilities ($p<.05$).

†Indicates that the distribution of the variable was significantly different among the three models ($p<.05$).

‡Homeless at least once, lifetime

§Sexual risk score is a 5-question composite of both 'yes/no' and categorical responses to sexual-risk questions.

//HIV knowledge score is a 13-question 'true/false' composite.

Table 3. Adjusted Risk Ratios (and Confidence Intervals) on HIV Testing, Receipt of Results

Independent Variables	Testing	Receipt of Results
Age		
18–40 yr (reference)		
41–50 yr	1.02 (0.79, 1.31)	0.93 (0.62, 1.40)
51–65 yr	1.03 (0.83, 1.28)	0.66 (0.46, 0.94)*
Race/ethnicity		
White (reference)		
African American	1.19 (0.98, 1.46)	1.33 (0.93, 1.89)
Hispanic	1.29 (1.01, 1.66)	1.32 (0.84, 2.11)
Asian/Native American/others	1.13 (0.86, 1.47)	1.10 (0.72, 1.70)
Education		
High school(reference)		
Some college	0.97 (0.82, 1.14)	1.02 (0.75, 1.40)
College graduate	0.95 (0.76, 1.20)	1.15 (0.77, 1.71)
Employment		
No (reference)		
Yes	0.98 (0.83, 1.15)	0.79 (0.59, 1.08)
Income		
<10K (reference)		
10–29K	1.02 (0.84, 1.22)	0.88 (0.62, 1.25)
30–49K	1.02 (0.80, 1.30)	1.03 (0.66, 1.61)
50–80K	0.87 (0.61, 1.23)	0.95 (0.56, 1.62)
Homeless [‡]		
No (reference)		
Yes	0.97 (0.81, 1.16)	0.86 (0.59, 1.24)
Mental disorders (depression, post-traumatic stress disorder, anxiety, schizophrenia)		
No (reference)		
Yes	1.06 (0.91, 1.22)	0.90 (0.68, 1.18)
Hepatitis C		
No (reference)		
Yes	1.18 (0.86, 1.62)	2.20 (1.14, 4.25)*
Drug use		
No (reference)		
Yes	0.85 (0.65, 1.11)	0.70 (0.37, 1.32)
Sexual preference		
Heterosexual (reference)		
Gay/lesbian/bisexual	1.44 (0.73, 2.79)	1.53 (0.44, 5.24)
Baseline sexual risk [§]	0.81 (0.60, 1.09)	0.76 (0.46, 1.23)
Baseline HIV knowledge ^{//}	1.38 (0.83, 2.27)	1.41 (0.47, 4.21)
No. of visits to VA within 60 days after enrollment	n/a	1.02 (0.90, 1.16)
Model		
B vs A	2.14 (1.62, 2.82)*	2.06 (1.13, 3.77)*
C vs A	2.26 (1.71, 3.00)*	5.27 (3.11, 8.90)*
C vs B	1.07 (0.95, 1.21)	2.55 (1.82, 3.58)*

The dependent variables (i.e., HIV testing, receipt of test results, reduction in sexual risk and HIV knowledge improvement) were regressed against the independent variables (i.e., age, race,...., number of visits to VA, and model). Model A = usual care; Model B = nurse-based screening; Model C = nurse-based screening + streamlined counseling/rapid testing

* $P < .05$

[‡]Homeless at least once, lifetime

[§]Sexual risk score is a 5-question composite of both 'yes/no' and categorical responses to sexual-risk questions.

^{//}HIV knowledge score is a 13-question 'true/false' composite.

Why have general medical and urgent care clinics failed to institute more effective HIV screening programs? One reason is the difficulty in getting providers to prioritize preventive care in the context of other patient needs²². Nurses perform many tasks, particularly educational ones, as well as physicians^{23,24}, assigning the responsibility for routine preventive care to nurses has been successful in a number of conditions^{25,26}.

Nurse-initiated screening systematizes the testing offer and costs less than relying on physicians. We found no previous evidence that the effectiveness of this type of nurse-initiated protocol has been studied in HIV testing, but our study shows that HIV screening is no exception.

Current counseling methods are likely part of the problem. Studies have noted that current procedures are protracted,

Table 4. Adjusted Risk Ratios (and Confidence Intervals) on Reduction in Sexual Risk, Improvement in HIV Knowledge

Independent variables	Reduction in sexual risk	Improvement in HIV knowledge
Age		
18–40 yr (reference)		
41–50 yr	1.01 (0.70, 1.48)	0.73 (0.46, 1.16)
51–65 yr	0.96 (0.67, 1.37)	0.92 (0.57, 1.46)
Race/ethnicity		
White (reference)		
African American	1.16 (0.75, 1.81)	0.76 (0.56, 1.02)
Hispanic	1.48 (0.94, 2.33)	0.79 (0.52, 1.19)
Asian/Native American/others	1.87 (1.14, 3.06)*	0.58 (0.33, 1.00)
Education		
High school (reference)		
Some college	1.49 (1.03, 2.14)	1.34 (0.98, 1.84)
College graduate	1.22 (0.79, 1.87)	1.51 (1.04, 2.18)*
Employment		
No (reference)		
Yes	1.41 (1.06, 1.89)*	1.19 (0.87, 1.62)
Income		
<10K (reference)		
10–29K	1.44 (0.86, 2.42)	1.01 (0.68, 1.49)
30–49K	1.21 (0.69, 2.11)	1.20 (0.77, 1.85)
50–80K	1.37 (0.74, 2.52)	0.95 (0.51, 1.79)
Homeless [‡]		
No (reference)		
Yes	1.30 (0.91, 1.84)	1.39 (1.03, 1.88)*
Mental disorders (depression, post-traumatic stress disorder, anxiety, schizophrenia)		
No (reference)		
Yes	0.80 (0.58, 1.10)	0.80 (0.59, 1.06)
Hepatitis C		
No (reference)		
Yes	0.63 (0.30, 1.31)	0.86 (0.52, 1.44)
Drug use		
No (reference)		
Yes	1.04 (0.58, 1.89)	1.63 (1.08, 2.49)*
Sexual preference		
Heterosexual (reference)		
Gay/lesbian/bisexual	0.54 (0.26, 1.14)	1.98 (0.85, 4.62)
Baseline sexual risk [§]	6.50 (4.11, 10.29)*	1.29 (0.77, 2.14)
Baseline HIV knowledge ^{//}	1.11 (0.36, 3.35)	0.12 (0.05, 0.26)
No. of visits to VA within 60 days after enrollment	n/a	n/a
Model		
B vs A	1.33 (0.91, 1.93)	1.16 (0.82, 1.66)
C vs A	1.32 (0.94, 1.86)	1.31 (0.91, 1.89)
C vs B	1.00 (0.71, 1.41)	1.13 (0.85, 1.52)

The dependent variables (i.e., HIV testing, receipt of test results, reduction in sexual risk and HIV knowledge improvement) were regressed against the independent variables (i.e., age, race,...., number of visits to VA, and model). Model A = usual care; Model B = nurse-based screening; Model C = nurse-based screening + streamlined counseling/rapid testing

* $P < .05$

[‡]Homeless at least once, lifetime

[§]Sexual risk score is a 5-question composite of both 'yes/no' and categorical responses to sexual-risk questions

^{//}HIV knowledge score is a 13-question 'true/false' composite

both for patients and providers. Critics cite the time and expertise needed for obtaining mandated consent and counseling²⁷. This burden has been used as a partial explanation regarding the relatively low overall testing rates nationwide²⁸. Previous research on alternative streamlined counseling methods have yielded promising results. Spielberg et al.²⁹ found that although study participants agreed that face-to-face posttest counseling is optimal for receiving results, many expressed eagerness for more convenient options. CDC guidelines have previously recommended a 2-session interactive approach to counseling^{30–32}. Because traditional test results are unavailable same day, pre and posttest counseling are often separated by weeks. Each of the two counseling sessions requires an average of 15–25 minutes (30–50 minutes total)²⁷ and many do not return for results³³. Several expert bodies have recommended greater flexibility regarding counseling procedures^{34,35}. Streamlined counseling with rapid testing appears to be effective in increasing testing and result receipt rates.

Our findings were not a complete surprise; rapid testing has been previously shown to be successful in a variety of settings, though ours is the first study in the primary care venue that is impacted so strongly by recent CDC recommendations. Previous research has shown that rapid testing increases posttest counseling rates in STD clinics and emergency departments and is acceptable to patients. For example, Kassler et al.³⁵ found that rapid testing resulted in a 210% increase in receipt of posttest counseling for uninfected patients and a 23% increase for infected patients in STD clinics. Of those previously tested, 88% responded that they preferred rapid testing. Kroc et al.³⁶ found that rapid testing in emergency departments improves the rate of HIV test result receipt from 18% to 98% compared to standard testing. Rapid testing resulted in savings of \$11 per test in both anonymous and STD clinics and reduced costs per infection detected to \$601 from \$1,124^{35,37}.

It was somewhat surprising that decreasing counseling time did not decrease HIV-related knowledge nor result in any differences in risk behavior. This is particularly interesting, as there were large differences in result receipt rates across the study arms, and previous studies have shown that receipt of results is associated with improvement in risk behavior³⁸. Moreover, a number of randomized trials have shown that prevention counseling can be effective in limiting high-risk behaviors and the onset of new STDs³⁹. One possible reason for this absence of a finding is that our study was not powered to detect small differences in these secondary outcomes. Another is that both traditional and streamlined counseling may not be as effective as previously thought. In any case, studies have shown little difference in counseling outcomes between rapid and traditional testing-based protocols³⁸.

Two demographic findings are noteworthy; participants older than 50 years of age were less likely to receive test results compared to those younger than 40, and participants with hepatitis C were more likely to receive results compared to those without hepatitis C. One explanation regarding age differences and result receipt rates could be that younger people are more sexually active and more motivated to know their HIV status. Regarding the link between receipt of results and hepatitis C, it is likely that those diagnosed with hepatitis C have significantly more encounters with the VA, translating into increased opportunities to receive results. The associations between age, hepatitis C status, and receipt of test results were consistent across all models.

LIMITATIONS

The study design did have some limitations⁴⁰. First, our low acceptance rate across all study arms (17%) limits generalizability. We believe that much of the reason for this low rate was the lengthy research consent requirements. Our conclusions are best interpreted as generalizable to those who are interested enough in HIV screening to sign a research consent form, a subset of all to whom the interventional package might someday apply. It is likely that if we had recruited more patients who were less motivated, the streamlined counseling/rapid testing intervention would have been even more dominant, as it requires the least patient time investment. Rapid testing and nurse-based screening have been well accepted in non-research settings¹¹, and future implementation studies should evaluate acceptance rates absent these requirements. Another limitation regarding generalizability is our intervention setting. VA patients are more likely to be minorities, poorer, and older, although some of these subpopulations are perhaps the most important targets for routinizing HIV screening efforts. The VA is a particularly fertile ground for testing quality improvement efforts like these with its universal electronic medical record and institutionalized performance measurement system and, as such, may represent the future of many delivery systems.

Other design and analytic considerations limit our findings. There were modest differences in follow-up rates between study arms, though it is unlikely that these differences would have changed our conclusions with regard to the follow-up secondary outcomes of change in risk behavior and knowledge, especially given our limited ability to detect small differences in these outcomes. Also, like in most interventions attempting to replicate *usual care* models, model A participants likely received more counseling and testing than average simply because they were urged to by recruiters. However, any resultant bias should be toward the null. Finally, we were unable to adjust for within-site physician clustering because we did not have access to these data. However, the intervention for 2 of 3 arms was nurse-based, so physician-based clustering likely did not play a strong role in these comparisons. It is unlikely that physician clustering would explain the large difference between the physician and nurse arms with regard to screening and testing rates.

CONCLUSION

The recently released CDC recommendation for adopting routine HIV testing⁶ poses significant implementation challenges. Our study points the way toward a novel process for HIV screening in primary and urgent care that may significantly increase testing rates and, more importantly, receipt of results. Routinizing HIV counseling and testing in the setting of treatment availability has the potential to identify and place into care many of the approximately 300,000 Americans who are unaware of their HIV-positive status, which, as research has proven, works to mitigate the further spread of the HIV/AIDS epidemic.

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REFERENCES

1. Palella FJ Jr, Deloria-Knoll M, Chmiel JS, et al. Survival benefit of initiating antiretroviral therapy in HIV-infected persons in different CD4+ cell strata. *Ann Intern Med*. 2003;138(8):680-681.
2. Anastos K, et al. Women's interagency HIV study collaborative study group: risk of progression to AIDS and death in women infected with HIV-1 initiating highly active antiretroviral treatment at different stages of disease. *Arch Intern Med*. 2002;162(17):1973-1980.
3. Centers for Disease Control (US). HIV and AIDS—United States, 1981–2001. *MMWR*. 2001;50:430-434.
4. Gandhi NR, et al. Delayed presentation for HIV care among veterans: an opportunity for intervention. (Annual meeting, 13th Conference on Retrovirus and Opportunistic Infections, Denver, 2006).
5. Sanders GD, Bayoumi AM, Sundaram V, et al. Cost-effectiveness of screening for HIV in the era of highly active antiretroviral therapy. *N Engl J Med*. 2005;352:570-85.
6. Centers for Disease Control (US). Revised recommendations for HIV testing of adults, adolescents, and pregnant women in health-care settings. *MMRW*. 2006;55(14):1-17.
7. Simmons E, Roberts M, Ma M, et al. Routine testing for HIV in the United States: the intersection between recommendations and practices. *AIDS Patient Care STDS*. 2006;20(2):79-83.
8. Wenrich MD, Carline JD, Curtis JR, et al. Patient report of HIV risk screening by primary care physicians. *Am J Prev Med*. 1996;12(2):116-122.
9. Spielberg F, Branson BM, Goldbaum GM, et al. Overcoming barriers to HIV testing: preferences for new strategies among clients of a needle exchange, a sexually transmitted disease clinic, and sex venues for men who have sex with men. *JAIDS*. 2003;32(3):318-327.
10. Melnyk KAM. Barriers: a critical review of recent literature. *Nurs Res*. 1998;37:196-201.
11. Centers for Disease Control (US). Revised guidelines for HIV counseling, testing, and referral. *MMWR*. 2001;50(19):1-57.
12. Rothman RE, Lyons MS, Haukoos JS. Preventive care in the emergency department: should emergency departments conduct routine HIV screening? A systematic review. *Acad Emerg Med*. 2003;10(3):278-285.
13. Kelen GD, Shahan JB, Quinn TC. Emergency department-based HIV screening and counseling: experience with rapid and standard serologic testing. *Ann Intern Med*. 1999;33:147-55.
14. Centers for Disease Control (US). Technical guidance on HIV counseling. *MMWR*. 1993;42(2):5-9.
15. Centers for Disease Control (US). HIV counseling, testing and referral standards and Guidelines. Atlanta, GA: US Department of Health and Human Services, Public Health Service.
16. Rhew DC, Goetz MB, Shekelle PG. Evaluating quality indicators for patients with community-acquired pneumonia. *Jt Comm J Qual Improv*. 2001;27(11):575-590.
17. Phillips BR, Li Backus, JP Halloran, et al. Caring for veterans with HIV disease. Fiscal Year 2002 Report, Center for Quality Management in Public Health, Public Health Strategic Health Care Group, Department of Veterans Affairs, March, 2003.
18. US Department of Veterans Affairs, Public Law 100-322, Section 124: Testing for HIV (Human Immunodeficiency Virus) and Informed Consent. 1988.
19. Robson J, Boomla K, Fitzpatrick S, et al. Using nurses for preventive activities with computer assisted follow-up: a randomized controlled trial. *BMJ*. 1989;298:433-436.
20. Centers for Disease Control (US). Notice to readers: approval of a new rapid test for HIV antibody. *MMWR*. 2002;51(46):1051-1052.
21. Gerbert B, Bronstone A, McPhee S, et al. Development and testing of an HIV-risk screening instrument for use in health care settings. *Am J Prev Med*. 1998;15:103-113.
22. Mirand AL, Beehler GP, Kuo CL, et al. Explaining the de-prioritization of primary prevention: physicians' perceptions of their role in the delivery of primary care. *BMC Public Health*. 2003;3:15.
23. Tudor-Hart J. Practice nurses: an underused resource. *BMJ*. 1985;290:1162-1163.
24. Spitzer WO, Sackett DL, Sibley JC, et al. The Burlington randomized trial of the nurse practitioner. *N Engl J Med*. 1974;290:251-256.
25. Gonzalez JJ, Ranney J, West J. Nurse-initiated health promotion prompting system in an internal medicine residents' clinic. *South Med J*. 1989;82:3.
26. Stone EG, Morton SC, Hulscher ME, et al. Interventions that increase use of adult immunization and cancer screening services: a meta-analysis. *Ann Intern Med*. 2002;136:641-651.
27. Centers for Disease Control (US). HIV counseling, testing and referral standards and guidelines. Atlanta, GA: US Department of Health and Human Services, Public Health Service, 1994:1-15.
28. Centers for Disease Control (US). Advancing HIV prevention. Interim Technical Guidance for Selected Interventions. Atlanta, GA: US Department of Health and Human Services, Public Health Service. 2003.
29. Spielberg F, Kurth A, Gorbach PM, et al. Moving from apprehension to action: HIV counseling and testing preferences in three at-risk populations. *AIDS Educ Prev*. 2001;13(6):524-540.
30. Center for Disease Control (US). Current trends: additional recommendations to reduce sexual and drug abuse-related transmission of human T-lymphotropic virus type III/lymphadenopathy-associated virus. *MMWR*. 1986;3:152-155.
31. Centers for Disease Control (US). Perspectives in disease prevention and health promotion: public health service guidelines for counseling and antibody testing to prevent HIV infection and AIDS. *MMWR*. 1987;36:509-515.
32. Centers for Disease Control (US). Guidelines for national human immunodeficiency virus case surveillance, including monitoring for human immunodeficiency virus infection and acquired immunodeficiency syndrome. *MMWR*. 1999;48:131-28.
33. Molitor F, Bell RA, Truax SR. Predictors of failure to return for HIV test result and counseling by test site type. *AIDS Educ Prev*. 1999;11(1):1-13.
34. Josefson D. Rapid HIV testing urged in the United States. *BMJ*. 1998;316:1037.
35. Kassler WJ, Dillon BA, Haley C, et al. On-site, rapid HIV testing with same-day results and counseling. *AIDS*. 1997;8:1045-1051.
36. Kroc K, Kendrick S, Withum D, et al. Rapid HIV testing in an emergency department. Available at: <http://www.cdc.gov/hiv/topics/testing/resources/abstracts/rt-emergency.htm> Accessed September 12, 2006.
37. Farnham PG, Gorsky RD, Holtgrave DR, et al. Counseling and testing for HIV prevention: costs, effects, and cost-effectiveness of more rapid screening tests. *Public Health Rep*. 1996;111:44-53.
38. Metcalf CA, Douglas JM, Malotte CK, Cross H, Dillon BA, Paul SM, et al. Relative efficacy of prevention counseling with rapid and standard HIV testing: a randomized controlled trial (RESPECT-2). *STDS*. 2005;32:130-138.
39. Kamb ML, Fishbein M, Douglas JM, et al. Efficacy of risk-reduction counseling to prevent human immunodeficiency virus and sexually

transmitted diseases: a randomized controlled trial. *JAMA*. 1998;280:1161–1167.

40. Sanders GD, Anaya H, Asch S, et al. Cost effectiveness of rapid HIV testing with streamlined counseling [abstract]. Proceedings of the 4th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Sydney, Australia; July 22–25, 2008.

APPENDIX 1: 2007 UNITED STATES DEPARTMENT OF VETERAN'S AFFAIRS FEDERALLY MANDATED PRE-HIV COUNSELING ELEMENTS

The meaning, sensitivity and specificity of the HIV tests.

The potential social ramifications of a positive test result.

Policies and guidelines for confidentiality of the test results.

Policy on non-discrimination in health care services for patients with HIV infection and the health care services available in the VA.

Policy and guidelines on disclosure to public health authorities.

Policy on disclosure to spouse and/or sexual partner.

Measures to be taken for prevention of HIV transmission.

Information relative to authorized disclosures, either with or without consent of HIV test or treatment records.

APPENDIX 2: COMPOSITE VARIABLE: HIV KNOWLEDGE

1. One can get HIV by having sexual intercourse with an infected person without using a condom.
2. One can get HIV by sharing drug needles with an infected person.
3. An HIV-infected woman can infect her unborn child.
4. One is not likely to get HIV using public facilities, such as buses and telephones.

5. One is not likely to get HIV by kissing an HIV-infected person on the cheek.
6. Not only homosexuals need to worry about contracting AIDS.
7. People who are HIV-positive are easy to pick out of a crowd even if they have not developed AIDS.
8. One is not likely to get HIV by attending school with an HIV-infected person.
9. HIV-infected individuals could look and feel fine and be unaware that they could still spread the disease.
10. AIDS is not just a gay man's disease.
11. Women are not at very low risk of getting HIV.
12. One is not likely to get HIV using public toilets.
13. One is not likely to get HIV from an animal or mosquito bite.

APPENDIX 3: COMPOSITE VARIABLE: SEXUAL RISK

1. What are your chances of getting infected with HIV?
2. With how many casual sex partners have you engaged in high-risk sex?
3. Have you had sex with this casual partner within the past 12 months?
4. During the last 12 months, with how many people have you had sexual intercourse?
5. Have you engaged in any of the following behaviors in the past 12 months?

Had sex with a partner who at the time was any of the following: another man (for male respondents), a man who has had sex with other men (for female respondents), a person who has injected non-prescription drugs, a person who has tested HIV-positive for HIV/AIDS?

OR:

Have you used any of the following substances in the past 12 months: injected non-prescription drugs, or used marijuana, cocaine, or hallucinogens (e.g., LSD mushrooms)?