HIV Self-Testing Acceptability among Injured Persons Seeking Emergency Care in Nairobi, Kenya

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Research Article

Abstract

Emergency Department-based HIV self-testing (ED-HIVST) could increase HIV testing services to under-reached key groups. Injury patients presenting to the Kenyatta National Hospital Accident and Emergency Department were enrolled from March-May 2021. Likert item data on HIVST assessing domains of general acceptability, personal acceptability, and acceptability to distribute to social and/or sexual networks were collected. Ordinal regression was performed yielding adjusted odds ratios (aOR) to identify characteristics associated with high HIVST acceptability across domains. Of 600 participants, 88.7% were male, and the median age was 29. Half reported having primary care providers (PCPs) and 86.2% reported prior HIV testing. For each Likert item, an average of 63.5% of participants reported they "Agree Completely" with positive statements about ED-HIVST in general, for themselves, and for others. In adjusted analysis for general acceptability, those < 25 (aOR = 1.67, 95%CI:1.36−2.08) and with prior HIV testing (aOR = 1.68, 95%CI:1.27−2.21) had greater odds of agreeing completely. For personal acceptability, those with a PCP (aOR = 3.31, 95%CI:2.72−4.03) and prior HIV testing (aOR = 1.83, 95%CI:1.41−2.38) had greater odds of agreeing completely. For distribution acceptability, participants with a PCP (aOR = 2.42, 95%CI:2.01−2.92) and prior HIV testing (aOR = 1.79, 95%CI: 1.38−2.33) had greater odds of agreeing completely. ED-HIVST is perceived as highly acceptable, and young people with prior testing and PCPs had significantly greater favorability. These data provide a foundation for ED-HIVST program development in Kenya.

Introduction

Globally, it is estimated that one in eight people living with HIV (PLHIV) are unaware of their status (1). In Kenya, young people contribute to over half of the national HIV incidence, with fewer men than women seeking conventional HIV testing services (HTS) (2). There continues to be a need to improve HTS delivery to under-tested groups using acceptable and feasible approaches (3, 4).

HIV self-testing (HIVST) is an innovative approach, endorsed by the World Health Organization (WHO), to increase HIV testing in low and middle-income countries (LMICs) (5, 6). HIVST can empower individuals to decide the setting and circumstances by which they test (7). HIVST has been found to be feasible in African countries, such as Kenya (8). In Africa, young adults in particular have demonstrated high uptake and favorable experiences with HIVST (9, 10). Additionally, data from Africa show that men have a desire for HIVST access and use (11, 12). The Kenyan Ministry of Health (MOH) supports HIVST distribution in both the private and public sector, particularly for key groups that have not been well engaged with standard HTS approaches (13).

Emergency departments (EDs) are an underutilized point of contact for many individuals who may also have high risk for HIV acquisition (14). The Centers for Disease Control and Prevention (CDC) have identified EDs as key settings for HIV testing and linkage to care globally (15). Data from LMIC demonstrate a median visitation rate of 30,000 patients per year per emergency care facility with patients having a median age of 35 years and the majority being men seeking care for injuries (16). This profile

suggests that EDs in LMICs may be impactful venues to leverage HIVST programs. In Kenya, ED-based HIV-testing data has shown prevalence of infection from 11.4 to 22.7%, higher than the disease prevalence among the general population (17, 18). The provision of HIVST kits from EDs in high-income settings has been shown to be acceptable to patients and successful in increasing HIV testing but data from populations in Africa at high risk for HIV have not been established (6, 19). To address that gap in the evidence the current study evaluated the acceptability of HIVST programs among persons with injuries seeking emergency care in Nairobi, Kenya.

Methods

Study Design, Setting, and Population

The current study is an *a priori* exploratory secondary analysis of data from a prospective evaluation of the delivery of standard HTS to injured persons seeking emergency care at Kenyatta National Hospital (KNH) (18). KNH, located in Nairobi, is the largest public health center in Kenya. The facility maintains an A&ED (Accident and Emergency Department) that provides uninterrupted care access and specialty services. Within the KNH A&ED, clinical staff dedicated to Voluntary Counseling and Testing (VCT) services for HIV offer free HTS available at all times. HTS at KNH are supported by the Kenyan MOH and follow national reporting procedures and linkage to care, through which anyone diagnosed with HIV is offered follow-up treatment services at a national comprehensive care center (20).

All adult patients (≥ 18 years of age) who presented for A&ED injury care to KNH were eligible for recruitment. Enrollment was carried out between 1 March and 25 May 2021. Patients known to be pregnant, prisoners of the state, and those unable to provide informed consent were excluded. Additionally, participants lacking psychometric Likert data from the study survey were excluded from this analysis. Injury designation was based on the standardized triage classification used in the study setting, by clinical staff who were independent of the research personnel (21). The study was approved by the KNH ethics and research committee (P29/01/202) and the Rhode Island Hospital Institutional Review Board (1501033-3). The Strengthening the Reporting of Observational Studies in Epidemiology guidelines were followed (22).

Data Collection and Management

Trained study personnel were present in the A&ED 24-hours a day during the enrollment period to screen, consent, and collect standardized data using digital databases (23). Data included information on sociodemographic characteristics, past medical history, previous health behaviors pertaining to HIV testing and prevention, use of alcohol, and psychometric Likert data on ED-based HIVST programming. The psychometric questionnaire was developed based on the Health Promotion Model (HPM). A HPM was utilized as it frames understanding of attitudes on health-related decisions by taking into account aspects of lifestyles, psychological health, and socio-cultural environment, factors with contextual importance around HTS and HIVST (24). The psychometric questionnaire was comprised of Likert items with a five-point scale representing levels of agreement: "do not agree at all", "agree a little", "agree

somewhat", "agree a lot", and "agree completely". The Likert items were informed by prior literature on HIVST (25, 26), translated into Kiswahili, and piloted for understandability and reproducibility in the study setting. The eleven Likert items assessed three domains of acceptability for ED-based HIVST delivery: 1) acceptability of HIVST distribution in the A&ED ("general acceptability", three items), 2) acceptability for personal use of HIVST from the A&ED ("personal acceptability", four items), and 3) acceptability of HIVST distribution to/from social or sexual network members ("distribution acceptability", four items) (Supplement 1).

Statistical Analysis

Data analysis was completed using STATA version 16.0 (College Station, USA). The primary objective in the current analysis was to assess factors associated with acceptability for ED-based HIVST programming across the three pre-defined domains. Population characteristics of the are described and summarized. The Likert item data were summarized nonparametrically using medians and inter-quartile ranges (IQRs). The component Likert items were aggregated to create a single outcome metric for each of the three domains of interest for which they comprised, to strengthen the evidence for each domain (41) (Supplement 1). Response distributions were analyzed and presented with frequency proportions by item and domains. Ordinal logistic regression models were run for each of the three scale domains to yield unadjusted odds ratios with associated 95% confidence intervals (CIs) and p-values, assessing the odds of reporting "agree completely" compared to the reference group. The ordinal regressions were used to quantify magnitude of effect on change in agreement across the response scale based on predictors of interest. Multivariate ordinal logistic regression models yielding adjusted odds ratios (aOR) were created for each of the three domains. Predictor variables were chosen a *priori* based on prior literature (27, 28, 29, 30) and based on univariate analysis for those variables with p values < 0.05 (data not shown). All predictor variables— sex, age, relationship status, educational attainment, previous HIV testing, HIV testing in the last 6 months, established primary care provider (PCP), and reported alcohol use—were included in the multivariable model.

Results

Populations Characteristics

Of 1,282 injury patients screened in the ED setting, 600 met inclusion for the *a priori* HIVST acceptability analysis (Fig. 1). The majority of participants (88.7%) were male, with a median age of 29 years (IQR: 25, 37 years). Nearly one-half (46.4%) reported being married and just over half (55.0%) reported having an established PCP. While 86.2% had been tested for HIV at least once previously, only 40.5% reported HIV testing within the preceding six months, with 1.8% of included participants self-identifying as PLHIV. The most common forms of injury were road traffic accidents (51.9%), and 42.1% had been transferred from another health facility. The median time from injury to presentation was 12.5 hours (IQR: 5.0, 24.5 hours) and the median time of ED care duration was 4.2 hours (IQR: 2.5, 6.0 hours) (Table I).

HIV Self-Test Acceptability

Figure 2 illustrates the response distributions for each item within the three domains of interest. For Domain 1 (General Acceptability), an average of 57.2% of participants selected "Agree Completely" for each of the three component items, with 55.7% for Q1, 58.0% for Q2 and 58.0% for Q3. This domain had the greatest variance of the three domains, with greater than 10% responding 'Do not agree at all' for each of the three questions (Fig. 2). Unadjusted ordinal regression outputs are shown in Table II. The multivariable analysis found that there was a higher odds of selecting 'Agree Completely' with general HIVST delivery from the ED for those who had previously been tested for HIV (aOR = 1.67 95% CI: 1.27–2.21), those who were 25 years and younger (aOR = 1.68 CI: 95% 1.36–2.08) and those who had a PCP (aOR = 1.24 95% CI: 1.03–1.52). Conversely, those who had a relationship status of single had a lower likelihood of responding with favorable general acceptability for HIVST delivery from the ED for (aOR = 0.79 95% CI: 0.65–0.96) (Table III).

For Domain 2 (Personal Acceptability), an average of 67.2% of participants selected 'Agree Completely' with each Likert item, with 63.3% for Q1, 65.5% for Q2, 68.3% for Q3 and 71.8% for Q4. The only response distributions above 10%, other than for 'Agree Completely', were for 'Agree a Lot' for Q1 and Q2 and 'Agree Somewhat' for Q3. In the multivariable analysis, there was a higher odds of complete acceptability of HIVST delivery from the ED for self-use among those who had previously been tested for HIV (aOR = 1.83 95% CI: 1.41–2.38), males (aOR = 1.47 95% CI: 1.12–1.93), and those with a PCP (aOR = 3.31 95% CI: 2.72–4.03). For those who reported alcohol use (aOR = 0.81 95% CI: 0.68–0.97) and those with a secondary school education (aOR = 0.76 95% CI: 0.62–0.93) there was a lower likelihood of participants agreeing completely with HIVST delivery from the ED for self-use (Table III).

For Domain 3 (Distribution acceptability to/from social or sexual networks), an average of 66.0% of participants selected 'Agree Completely' with each item (63.7% for Q1, 68.5% for Q2, 65.2% for Q3 and 69.3% for Q4). Over 10% of participants responded 'Do not Agree at all' for Q1 and Q3 (Fig. 2). There was a higher odds of reporting 'Agree Completely' for Distribution Acceptability in participants who had previously been tested for HIV (aOR = 1.79 95% CI: 1.38–2.33), males (aOR = 1.32 95% CI: 1.00-1.73) and those with a PCP (aOR = 2.42 95% CI: 2.01–2.92). Among participants that reported alcohol use, there was a reduced likelihood for reporting favorable acceptability for HIVST delivery from the ED for network distribution and use (aOR = 0.82 95% CI: 0.69–0.97). A reduced odds of selecting 'Agree Completely' was also present among those with a secondary school education (aOR = 0.80 95% CI: 0.66–0.97) (Table III).

Discussion

Progress has been made in controlling the HIV epidemic; however, there exist persistent inequities in HTS in Africa (32). HIVST programming from emergency care settings may represent an approach to help address this challenge. In the current analysis across all domains and their component items, the majority of participants responded favorably to potential HIVST availability in the ED setting. These data suggest that emergency care patients in Kenya would be receptive to HIVST access, and such

programming may serve to increase HTS and subsequent identification of PLHIV. However, additional research involving healthcare provider perspectives and systems level evaluation are needed to inform the feasibility of HIVST implementation.

Although the majority of patient respondents reported the highest level of agreement for HIVST acceptability, several factors were significantly associated with levels of agreement, representing potential barriers or facilitators to acceptability. Specifically, greater ED-HIVST acceptability was observed across all three domains for those who reported having a PCP and those that had been previously tested for HIV. As well, there were domain specific predictors for increased likelihood of reported acceptability, which included for General Acceptability (Domain 1) being younger and for Personal Acceptability (Domain 2) being male. These data indicate that patients in ED settings who are more engaged in health care may be more likely to favorably perceive ED-HIVST, as well as those that have been shown to test less frequently and account for incident cases in Kenya, men and younger adults, respectively (2). The impact of these findings is two-fold. For those who are less engaged with primary care and existing HIV services, especially young men, there is room for increased education about the risk for HIV and the importance of regular HIV testing (38, 39), and increased accessibility of HIVST as a convenient and destigmatizing option for HIV testing (40, 41). For those who are likely to engage in HIVST as a regular testing mechanism, HIVST could help meet Kenyan national HIV testing guidelines which call for annual testing in the general population while helping reduce the burden on national health systems (20).

While existing data on the acceptability of HIVST in African ED settings is limited, HIVST has previously been shown to be a mechanism for increasing testing among populations not well engaged in testing programming and is recommended by the WHO (6). In the present data approximately one in every eight respondents reported never before testing for HIV, which is consistent with predominately male populations which have been shown to be disengaged with standard HTS (2). As the current analysis indicates that HIVST is perceived as acceptable in the emergency care population, there is potential to increase testing if implemented among these demographic groups that have been historically difficult to access. Previous work has also suggested expanding HIVST distribution by allowing individuals to distribute HIVST kits to social and/or sexual networks which could magnify distribution and testing impacts (11). We found that distribution of HIVST from the ED for use within social or sexual networks was acceptable, and further research is needed to evaluate implementation and minimize the adverse risks of such dissemination.

Additionally, while our data point to high potential acceptability of HIVST among emergency care populations in Kenya, other studies of HIVST in African settings have reported barriers to success such as cost, user error and linkage to treatment (33, 34). The current study did not examine the reasons for perceived acceptability or specific barriers from the emergency care setting; therefore, evaluation of these aspects will be key in any ED-based HIVST programming to ensure best practices regarding target populations, logistics of distribution, mechanisms for confirmatory testing and linkage to care.

HIVST programming has the potential to offload human resources, mitigate distribution access inequities, lower stigmatizing experiences, and increase the number of tests performed (33, 34). While the COVID-19 pandemic continues and individuals are presenting for emergency care for injury and health concern, the ongoing HIV epidemic must not be neglected (35, 36). Our study suggests that ED-HIVST may be an acceptable approach to reduce resource needs for HTS and help identify undiagnosed HIV in populations as they seek emergency care, particularly when unable to access other testing services due to pandemic related restrictions and treatment limitations.

Limitations

The current exploratory analysis does have limitations. The study took place in a large, urban health center in Kenya, where HIV counselling and care is relatively accessible to those who engage in HTS. Given this, the findings may not generalizable to less well-resourced settings, however as HIVST empowers individual test recipients the resource barriers could be overcome with self-test programming. The Likert scale may have allowed for acquiescence bias or habituation bias, but the consistency in response distributions within domains for the component Likert items in conjunction with the large sample size make this less likely (37). There were some missing psychometric data from the primary study population, which could have introduced error; however, the missingness was minimal (< 8%), and is therefore not likely to substantially impact the findings. Additionally, although ordinal analyses provide information on trends within the response scales utilized, the nature of the statistical approach does not allow the identification shifts in response likelihoods between individual levels of agreement, which could be important for the assessments with more divergent response distributions to better understand aspects of perceived acceptability for ED-based HIVST delivery. Finally, while current data report on perceived acceptability, additional research is needed assessing patient uptake of HIVST in emergency care settings, as well as perceived barriers and facilitators to implementation of HIVST.

Conclusion

The current exploratory data indicate the potential for high acceptability by patients for potential uptake of HIVST in an ED setting in Kenya, particularly among patients with prior engagement in healthcare but also among those who have been identified as persons within demographics deemed important in epidemic control programming. The findings are in agreement with WHO guidelines recommending the delivery of HIVST to increase testing and identification of PLHIV and provide data that can be used to inform further research and programmatic design. Specifically, future research on HIVST in emergency care venues should consider population characteristics, as well as information on systems aspects, health practitioner perspectives, and patient uptake in order to inform implementation strategies.

Declarations

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Conflicts of Interest: The authors have no relevant financial or non-financial interests to disclose.

Ethical Approval: This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the KNH ethics and research committee (P29/01/202) and the Rhode Island Hospital Institutional Review Board (1501033-3).

Consent to Participate: Informed consent was obtained from all included participants.

Consent for Publication: No identifying data or photographs are included in the article.

Availability of Data and Material: Data is available on request

Code Availability: Code is available on request

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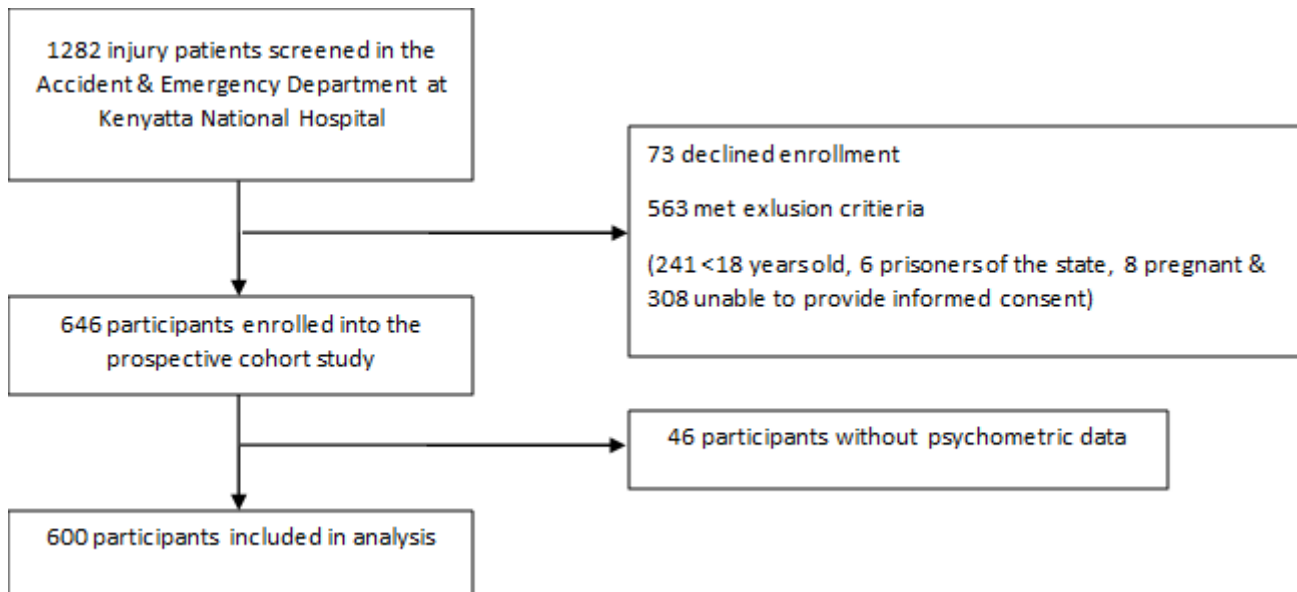
Figures

Figure 1

Study Screening and Enrollment Flowchart

Domain	Likert Item*	Median (IQR)	Response Frequency n (%)				
			1 (Do not agree at all)	2 (Agree a little)	3 (Agree somewhat)	4 (Agree a lot)	5 (Agree completely)
1. General Acceptability	Q1	5 (3-5)	74 (12.3%)	48 (8.0%)	70 (11.7%)	74 (12.3%)	334 (55.7%)
	Q2	5 (3-5)	74 (12.3%)	35 (5.8%)	66 (11.0%)	77 (12.8%)	348 (58.0%)
	Q3	5 (3-5)	80 (13.3%)	39 (6.5%)	63 (10.5%)	70 (11.7%)	348 (58.0%)
2. Personal Acceptability	Q1	5 (3-5)	57 (9.5%)	38 (6.3%)	59 (9.8%)	66 (11.0%)	380 (63.3%)
	Q2	5 (4-5)	51 (8.5%)	34 (5.7%)	56 (9.3%)	66 (11.0%)	393 (65.5%)
	Q3	5 (4-5)	41 (6.8%)	27 (4.5%)	63 (10.5%)	59 (9.8%)	410 (68.3%)
	Q4	5 (4-5)	38 (6.3%)	36 (6.0%)	47 (7.8%)	48 (8.0%)	431 (71.8%)
3. Distribution Acceptability	Q1	5 (3-5)	64 (10.7%)	41 (6.8%)	60 (10.0%)	53 (8.8%)	382 (63.7%)
	Q2	5 (4-5)	51 (8.5%)	26 (4.3%)	51 (8.5%)	61 (10.2%)	411 (68.5%)
	Q3	5 (3-5)	62 (10.3%)	41 (6.8%)	53 (8.8%)	53 (8.8%)	391 (65.2%)
	Q4	5 (4-5)	53 (8.8%)	29 (4.8%)	51 (8.5%)	51 (8.5%)	416 (69.3%)

Density Scale Lesser   Greater

* Full text Likert items provided in Supplement 1

Figure 2

Response Distributions Stratified by Domain and Likert Item

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Supplements.docx