Open Forum Infectious Diseases

MAJOR ARTICLE

Implementing a Rapid Antiretroviral Therapy Program Using Starter Packs for Emergency Department Patients Diagnosed With HIV Infection

Douglas A. E. White,[1] Montana Jewett,[1] Molly Burns,[1] Ashley Godoy,[1] Kellie Basham,[1] Omobolaji Makinde,[1] and Erik Anderson[1]

[1]Emergency Medicine, Alameda Health System, Oakland, California, USA

Background. Emergency departments (ED) have been identified as essential partners in the national plan to end the HIV epidemic. The initiation of rapid antiretroviral therapy (ART) may be an important strategy to minimize the treatment barriers faced by many ED patients diagnosed with HIV.

Methods. We describe the implementation and outcomes of a protocol to provide rapid ART by using starter packs for eligible ED patients testing HIV antigen/antibody (Ag/Ab) reactive. Eligible patients were not pregnant, were unlikely to have a false-positive Ag/Ab test result, were discharged home, were ART naive, had acceptable liver and renal function, lacked symptoms of an opportunistic infection, and were judged to be a good candidate.

Results. During the 1-year study period, 10 606 HIV tests were performed, and 106 patients were HIV Ag/Ab reactive and assessed for ED rapid ART eligibility. Thirty-one patients (29.2%) were eligible for ED rapid ART; 26 (24.5%) were offered it; and 25 accepted and were provided starter packs for an overall ED rapid ART treatment rate of 23.6%. Two patients receiving ED rapid ART were confirmed to be HIV negative. Patients provided ED rapid ART were more likely to follow up by 30 days (82.6% vs 50.0%, $P = .01$) than patients not provided ED rapid ART. The 6-month incidence of immune reconstitution inflammatory syndrome was 4.3% among the 23 patients who were HIV positive and receiving ED rapid ART.

Conclusions. The initiation of ED rapid ART for patients testing HIV Ag/Ab reactive is feasible, well accepted, and safe and may be an important facilitator of linkage to care.

Keywords. antiretroviral therapy; emergency department; HIV screening; rapid antiretroviral therapy.

Emergency departments (EDs) have been identified as essential partners in the strategic plan to end the HIV epidemic in the United States [1]. EDs are uniquely positioned to identify and treat people with HIV who otherwise might remain undiagnosed and to reengage patients who are aware of their HIV-positive status but not in care [2, 3].

Rapid initiation of antiretroviral therapy (ART; defined as ART initiation as soon as possible after diagnosis) is a key strategy to end the HIV epidemic [4–6]. Early initiation of ART has been shown to improve linkage to care and retention in care, reduce time to viral suppression, decrease viral transmission, and improve morbidity and mortality for people with HIV [4, 5].

Experience with initiating rapid ART in ED patients testing HIV positive, however, is limited, and little is known about the feasibility, acceptability, and impact that such a process may have on care cascade metrics, such as linkage to care, retention in care, ART prescriptions, and viral suppression [7].

In July 2021, we implemented a comprehensive program designed to improve rates of ART initiation and linkage to care for ED patients diagnosed with HIV, built on a preexisting opt-out HIV screening program. A key element of this new program is the initiation of ED-based rapid ART using starter packs for eligible patients with a reactive HIV antigen/antibody (Ag/Ab) test.

The purpose of this study is to describe the implementation and report the outcomes of the ED rapid ART program.

METHODS

Study Population

This implementation study was conducted at the EDs of Highland Hospital and San Leandro Hospital, part of the Alameda Health System (AHS). The Highland Hospital ED has an annual census of 70 000 visits, is staffed with a 4-year emergency medicine residency program, and is a level 1 trauma center and a public safety net hospital. The San Leandro Hospital ED is located in a community-based hospital with an annual census of 36 000 visits.

Received 27 February 2023; editorial decision 24 May 2023; accepted 26 May 2023; published online 2 June 2023

Correspondence: Douglas A. E. White, MD, Emergency Medicine, Alameda Health System, 1411 East 31st St, Oakland, CA 94941 (dwhite@alamedahealthsystem.org).

Open Forum Infectious Diseases®

https://doi.org/10.1093/ofid/ofad292

Both EDs provide care to a diverse patient population, including large numbers of underrepresented minorities.

Study Design

This was a retrospective evaluation of the ED rapid ART program. We report the outcomes for the first 12 months of the program (1 July 2021–30 June 2022). Follow-up data were collected through 31 August 2022, allowing evaluation of up to 60 days for ART and linkage-to-care measures. We adhered to the Standards for Reporting Implementation Studies in our research methods and reporting [8].

Patient Consent Statement

The institutional review board at the AHS approved the study with a waiver of written informed consent.

Preexisting ED HIV Screening Program

Opt-out HIV screening utilizing an electronic health system algorithm has been integrated into our standard ED processes at Highland Hospital since 1 March 2017 and at San Leandro Hospital since 28 September 2019. Adult patients undergoing blood testing as part of their care are eligible for annual HIV screening unless they are identified as HIV positive or recently tested (within the past 12 months). The Abbott Architect (Abbott Diagnostics) fourth-generation HIV Ag/Ab test is used for screening. All reactive screening tests are considered preliminary HIV positive and confirmed with HIV 1 or 2 antibody differentiation assays and HIV-1 RNA tests. When possible, reactive HIV Ag/Ab tests are disclosed to patients while they are in the ED by either emergency physicians or, for those who are discharged prior to notification, ED-based navigators via phone or in person according to established protocols. Because reactive HIV Ag/Ab tests with a signal-to-cutoff value <1.58 have a very low probability of being confirmed positive, preliminary results with values below this threshold are disclosed as likely false positive, with additional disclosure and linkage to care performed if confirmed HIV positive [9]. The HIV screening program completes approximately 10 000 screening tests annually with a baseline prevalence of 0.36% for new HIV diagnoses [10].

ED Rapid ART Program Implementation

Implementation of the ED rapid ART program was supported by a grant from the California Department of Public Health and administered by 1 clinical operations lead (D. A. E. W.) and 2 full-time ED-based HIV navigators. The clinical operations lead was responsible for the program's design, implementation, safety, and budget and for oversight of the navigator staff. He was accessible for phone consultation 24 hours a day, 7 days per week, and provided guidance with protocol adherence and clinical care. The 2 HIV navigators (available Monday–Friday, 9 AM–5 PM) aided with linkage, result disclosure, counseling, ART eligibility evaluations, case management, and data collection and entry. They participated in planning and evaluation meetings as well as staff trainings for physicians and ancillary staff.

The ED rapid ART policy and procedures were developed by the clinical operations lead and informed by (1) consultation with physicians with experience providing rapid HIV treatment, (2) recommendations published by the East Bay Getting to Zero collaborative, and (3) discussions at the collaborative's Equity Data-to-Care Meeting held 11 March 2021. At this meeting, improving linkage to care and treatment for ED patients living with HIV were highlighted as a priority intervention in Alameda County's 5-year strategic plan to help end the HIV epidemic [11].

The draft ED rapid ART policy and procedures were then discussed and refined after feedback from the AHS chair of HIV services, the director of pharmacy, and an ED and HIV clinical pharmacist, over a series of 2 web-based meetings. A single agent for ED rapid ART was agreed on to simplify the process, minimize prescribing errors, and maximize emergency physician buy-in. The ART medication for ED prescribing was chosen after polling HIV physicians in our referral network and asking them to choose their first- and second-line medications for ART initiation, using the case scenario of a treatment-naive patient referred from the ED for care. Biktarvy (bictegravir, emtricitabine, tenofovir alafenamide) was most often recommended, barring a few specific contraindications, with most citing the ease of use (1 pill, once a day), low side effect profile, and low resistance profiles to justify their choice.

It was decided that, to circumvent anticipated challenges with prescribing ART (insurance barriers, after-hours prescribing when the pharmacy was closed), ART starter packs should be provided. We agreed that 14 days of ART would bridge the gap from the ED visit to the first appointment, allowing for delays to care, missed appointments, or challenges enrolling in insurance, without a lapse in treatment. The clinical pharmacists felt that limiting starter packs to 14 days was also safe and unlikely to contribute to resistance in the event that a patient was lost to follow-up or noncompliant.

An exemption from the AHS Pharmacy and Therapeutics Committee was requested and approved on 28 June 2021 to allow the use of Biktarvy starter packs donated by Gilead Sciences. A Gilead therapeutic specialist provided 24 seven-tablet bottles to the clinical operations lead on an as-needed basis. Starter packs were kept in a cabinet in the emergency physician workroom, which was accessible by a code combination lock. As requested by the Pharmacy and Therapeutics Committee, a written log with patient information and medication lot numbers was maintained for all prescriptions.

HIV navigators were trained by the clinical operations lead in the safety, efficacy, and eligibility for ART, with specific instruction on the indications and contraindications for

Biktarvy. Simulated patient disclosures and discussions pertaining to initiating ART—including motivational interviewing techniques, case discussions, and clinical questions—were incorporated into weekly team meetings.

Patients with a first-time reactive HIV Ag/Ab test and those testing positive who were previously diagnosed with HIV but not currently taking ART were eligible for ED rapid ART if they met the following criteria: were ART naive, did not have evidence of an opportunistic infection (OI; eg, cryptococcal meningitis, tuberculosis, pneumocystis pneumonia, cytomegalovirus retinitis, disseminated mycobacterium avium complex), had liver function tests <5 times the upper limit of normal, were not pregnant, had an estimated glomerular filtration rate >30 mL/min, had a low posttest probability of a false-positive screening test result (signal to cutoff ≥1.58), and were discharged from the ED [9].

We developed a 7-item yes/no rapid ART eligibility checklist that emergency physicians could embed into their progress notes to facilitate prescribing ART (Supplementary Material). The checklist included clinical triggers that would guide emergency physicians to consider that a major OI might exist, thus precluding immediate ART. Examples included cough/shortness of breath > 1 week and respirations > 30 (pneumocystis pneumonia, tuberculosis); headache, visual loss, diplopia, weakness, gait instability, confusion, and seizure (cryptococcal meningitis, toxoplasmosis, tuberculosis meningitis, or cytomegalovirus retinitis); and weight loss in the past month (mycobacterium avium complex). In the absence of other criteria making a patient ineligible, physicians could use their clinical discretion if they felt that a patient was a poor candidate for rapid ART (compliance concerns, unstable mental illness, drug use, prior false-positive HIV test result). Supporting documents, including disclosure and rapid ART treatment guides, were developed and made accessible through electronic links in the electronic health system or as hard copies in the charting room.

Eligible patients were offered immediate rapid ART, and 14-day ART starter packs were provided free of charge to accepting patients. Eligible patients could receive starter packs at any point before their scheduled appointment with an HIV provider, preferably during their ED visit or at a convenient time after ED discharge from ED HIV screening program staff. For ineligible patients, ART was initiated after consultation by the infectious disease specialist (admitted patients) or by the outpatient follow-up clinic provider.

Partnering clinics agreed to expedite HIV appointments and to accept referrals for ED patients with a preliminary HIV diagnosis (reactive HIV Ag/Ab test and pending confirmation with HIV antibody differentiation assays and HIV-1 RNA viral load tests). The linkage process was the same for patients newly diagnosed with HIV positivity, as well as those with a previous HIV diagnosis who were not currently taking ART, and did not differ whether patients were provided ED rapid ART or not. ED-based HIV navigators supported all patients (via phone, text, or in person on hospital grounds), including arranging ride shares, until it was confirmed that they arrived at their first HIV clinic appointment, at which time the responsibility of ongoing case management was transferred to the referral clinic.

Emergency physicians were notified of the rapid ART program during web-based staff meetings and residency education sessions. A 15-minute presentation (Microsoft PowerPoint) was created by the clinical operations lead and shared with all clinical providers on Google Drive. Monthly email reminders were sent between July 2021 and September 2021 and thereafter at 6-month intervals outlining the components of the ED rapid ART program with links to the presentation. Last, in partnership with the chair of HIV medicine, the clinical operations lead participated in grand rounds for the Department of Internal Medicine on 27 August 2021, discussing same-day treatment and follow-up for the newly diagnosed person with HIV.

Effectiveness Analysis

Data were collected as a routine part of the HIV screening program's evaluation and quality control monitoring and included demographics (age, race/ethnicity, gender, payor information), laboratory data (HIV Ag/Ab, HIV-1/2 antibody differentiation assay, and HIV-1 RNA results), clinical data (HIV risk factor, substance use, disposition, eligibility for ED rapid ART), and HIV clinic follow-up data. These data were abstracted from the electronic health record and from patient care interactions with navigator staff during counseling and follow-up interviews. For all patients provided ED rapid ART, the clinical lead reviewed hospital discharge summaries for up to 6 months for the identification of OIs (pneumocystis pneumonia, cryptococcal meningitis, disseminated mycobacterium avium complex, tuberculosis, cytomegalovirus retinitis) and immune reconstitution inflammatory syndrome (IRIS). We collected and managed data using electronic data capture tools (REDCap) hosted at the AHS [12].

HIV navigators examined the ED electronic health record and the laboratory system and classified each patient with a reactive HIV Ag/Ab test as follows: new HIV positive (acute or chronic), HIV negative (false positive), previous HIV positive (not currently taking ART), or previous HIV positive (currently taking ART). Ambiguous chart elements were reviewed by all study investigators and adjudicated by consensus. Patients categorized as previous HIV positive (currently taking ART) were ineligible for ED rapid ART and therefore excluded from analysis.

The date of ED HIV diagnosis was defined as the date when the ED reactive HIV Ag/Ab test was performed. The date of the first clinic visit was defined as the first clinic visit attended with

a provider specializing in HIV care. The date of ART initiation was defined as the date when ART was provided to the patient. The modes of ART delivery were categorized as follows:

ED rapid ART: defined as the initiation of ART utilizing a 14-day ART starter pack given to a patient with (1) a preliminary new HIV diagnosis based on a first-time reactive HIV Ag/Ab test and before the results of HIV confirmatory tests were available or (2) a previous HIV diagnosis who was treatment naive.

Non-ED ART: defined as ART prescribed by a referral provider or inpatient treatment team.

Outcomes

The primary effectiveness outcome measure was the proportion of ED patients testing positive for HIV infection who received ED rapid ART. Secondary outcome measures were the time from ED HIV diagnosis to the initiation of ED rapid ART, the proportion of patients who received ED rapid ART who attended a first clinic visit, and the median time from diagnosis to visit. Comparisons were made between ED patients who received ED rapid ART and those who did not and between ED patients who had a new HIV diagnosis and those who had a previous HIV diagnosis but were not taking ART. The overall safety of ED rapid ART was determined by the 6-month incidence of IRIS for patients provided ED rapid ART.

Data Analysis

Statistical analyses were performed on deidentified data with Stata (version 14; StataCorp). Descriptive statistics were computed for all variables. Continuous variables were reported as medians and means and categorical variables as proportions and 95% CIs, where appropriate. Bivariate statistical tests, including the Wilcoxon rank sum test, chi-square test, or Fisher exact test, were used to compare variables.

RESULTS

The study flow diagram is shown in Figure 1. During the study period, 15 980 patients were eligible for HIV screening, and 10 606 HIV tests were performed: 10 441 were HIV Ag/Ab nonreactive and 165 were HIV Ag/Ab reactive. Of the 165 patients with a reactive HIV Ag/Ab test, 59 had a previous HIV diagnosis and were currently taking ART, leaving 106 patients who were assessed for ED rapid ART eligibility: 49 who had a preliminary new HIV diagnosis and 57 who had a previous HIV diagnosis but were not currently taking ART. Of the 49 patients with a preliminary new HIV diagnosis, 36 (73.5%) were verified to be HIV positive and 13 (26.5%) were HIV negative (false-positive HIV Ag/Ab test result) after confirmatory testing.

Of the 106 patients assessed for ED rapid ART eligibility, 31 (29.2%) were eligible and 75 (70.8%) were ineligible. Of the 31 who were eligible, 26 were offered ED rapid ART, and 25 accepted and were provided it, for an overall treatment rate of 23.6%.

The characteristics of patients evaluated for ED rapid ART are shown in Table 1. Of the 106 patients assessed for ED rapid ART eligibility, 36 (34%) were newly diagnosed with HIV (6 acute, 30 chronic); 57 (54%) were previously diagnosed with HIV and not currently taking ART; and 13 (12%) were later determined to have a false-positive HIV Ag/Ab test result and were HIV negative. The mean age was 40.8 years, 53% were Black, 23% were Hispanic/Latinx, 76% were male, 15% used injection drugs, 27% used methamphetamines, 73% had Medicaid, and 36% were admitted to the hospital.

Rates of eligibility, acceptance, and receipt of ED rapid ART are shown in Table 2. Patients who had a previous HIV diagnosis and were not currently taking ART (n = 57) were ineligible for ED rapid ART 89% of the time (n = 51), most often because of prior ART use (n = 48, 94.1%). Patients newly diagnosed with HIV (n = 36) were ineligible for ED rapid ART 36% of the time (n = 13), most often because they were being admitted to the hospital (n = 11, 84.6%). Why 5 patients who were eligible for ED rapid ART were not offered treatment is not known. The rate of ED rapid ART receipt was 55.6% (20/36) for newly diagnosed patients, as opposed to 5.3% (3/57) for previously diagnosed patients ($P < .001$).

Of the 13 patients with a preliminary new HIV diagnosis who were later determined to be HIV negative (false-positive HIV Ag/Ab test result), most (n = 11, 84.6%) were ineligible for ED rapid HIV. Physician discretion (n = 8, 72.7%) was the most often cited reason: each of the 8 patients lacked significant HIV risk, and all had a prior false-positive HIV test result on record. Of the 2 ED patients who were HIV negative but were eligible for and received ED rapid ART based on a reactive HIV Ag/Ab test, one discontinued his ART after 10 days and the other was lost to follow-up.

Table 3 shows the time to ART initiation and the time to first clinic appointment for the 93 patients with confirmed HIV positivity who were evaluated for ED rapid ART (either a new HIV diagnosis [n = 36] or a previous HIV diagnosis without current ART [n = 57]). Of the 93 confirmed HIV-positive cases, 40 (43.0%) received any ART within 60 days of ED diagnosis (ED rapid ART or non-ED ART). The median time to initiation was 0 days (IQR, 0–1) for ED rapid ART and 6 days (IQR, 3–11) for non-ED ART. The overall 30-day attendance at the first clinic visit was 58.0% (54/93). When compared with patients not provided ED rapid ART, patients receiving it were more likely to follow up by 30 days (19/23 [82.6%] vs 35/70 [50%], $P = .01$) and 60 days (19/23 [82.6%] vs 41/70 [58.6%], $P = .04$). The median time to attendance at the first clinic visit was 8 days (IQR, 3–11) for patients receiving ED rapid ART, as opposed to 13 days (IQR, 8–43) for those not receiving it. The 4 patients who received ED rapid ART but did not attend a first clinic visit within 60 days are considered lost to

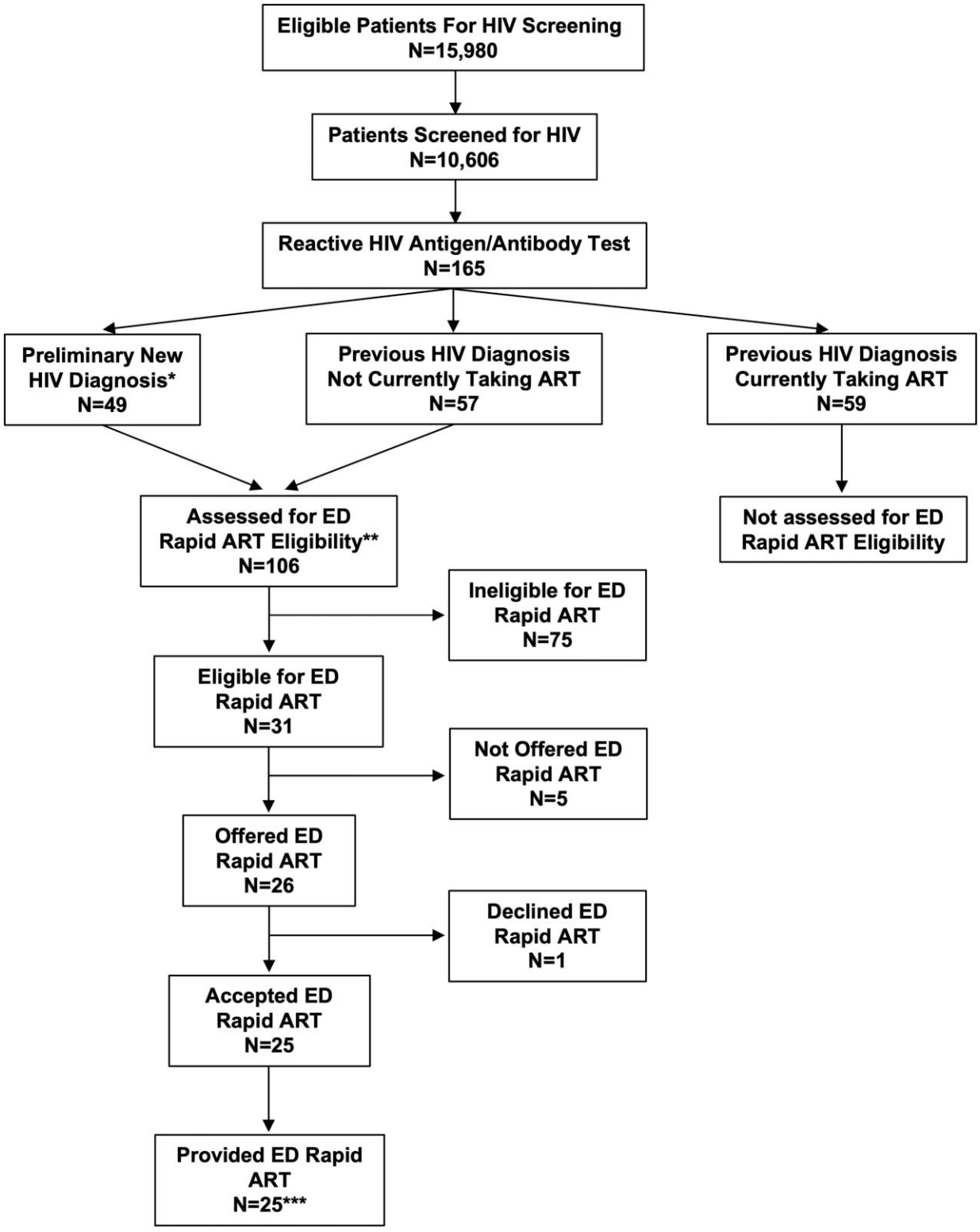

Figure 1. Flow diagram of emergency department patients evaluated for rapid antiretroviral therapy, 1 July 2021 to 30 June 2022. ART, antiretroviral therapy; ED, emergency department.

*Preliminary New HIV Diagnosis: Defined as a person with a first-time reactive HIV antigen/antibody test, pending confirmation with HIV 1-2 antibody differentiation assay and HIV-1 RNA tests. Of the 49 patients with a preliminary new HIV diagnosis, 36 were ultimately confirmed to be HIV positive and 13 were confirmed to be HIV negative.

**Patients were eligible for ED Rapid ART if they met all the following criteria: were ART naïve, did not have clinical evidence of an opportunistic infection, had liver function tests <5 times the upper limit of normal, had an HIV antigen/antibody signal-to-cutoff value ≥1.58, had an estimated glomerular filtration rate >30 ml/minute, were not pregnant, were discharged from the ED, and the physician agreed that rapid ART was appropriate.

***Two of the 25 patients provided ED Rapid ART were later confirmed to be HIV negative.

Table 1. Characteristics of 106 ED Patients With Reactive HIV Ag/Ab Tests Evaluated for Rapid ART

	Patients With Reactive HIV Ag/Ab Test, No. (%)			
	Overall[a] (N = 106)	Confirmed New HIV Diagnosis (n = 36)	Previous HIV Diagnosis, Not Taking ART (n = 57)	Confirmed HIV Negative (False Positive) (n = 13)
Age, y, mean ± SD	40.8 ± 11.9	36.0 ± 10.4	44.2 ± 11.6	38.7 ± 12.4
Race/ethnicity				
Black/African American	56 (52.8)	22 (61.1)	30 (52.6)	4 (30.8)
Hispanic/Latinx	24 (22.6)	11 (30.6)	10 (17.5)	3 (23.1)
White	16 (15.1)	2 (5.6)	10 (17.5)	4 (30.8)
Asian	6 (5.7)	0	5 (8.8)	1 (7.7)
American Indian/Alaskan Native	1 (0.9)	1 (2.8)	0	0
Native Hawaiian/Pacific Islander	0	0	0	0
Other	3 (2.8)	0	2 (3.5)	1 (7.7)
Gender identity				
Male	80 (75.5)	29 (80.6)	45 (78.9)	6 (46.1)
Female	22 (20.1)	5 (13.9)	10 (17.5)	7 (53.8)
Transgender	4 (3.7)	2 (5.6)	2 (3.5)	0
Substance use				
Injection drug use	16 (15.1)	5 (13.9)	10 (17.5)	1 (7.7)
Alcohol	14 (13.2)	4 (11.1)	8 (14.0)	2 (15.4)
Methamphetamine	29 (27.4)	6 (16.7)	22 (38.6)	1 (7.7)
Opioids	7 (6.6)	0	6 (10.5)	1 (7.7)
Cocaine	9 (8.4)	4 (11.1)	5 (8.7)	0
Other	10 (9.4)	5 (5.6)	5 (8.8)	0
Payor				
Private	3 (2.8)	0	0	3 (23.1)
Medicaid	77 (72.6)	29 (80.6)	40 (70.2)	8 (61.5)
Medicare	8 (7.5)	0	7 (12.3)	1 (7.7)
Self-pay	5 (4.7)	3 (8.3)	2 (3.5)	0
Other	12 (11.3)	4 (11.1)	8 (14.0)	0
Disposition				
Admission	38 (35.8)	11 (30.6)	25 (43.9)	2 (15.4)
Home	58 (54.7)	23 (63.9)	25 (43.9)	10 (76.9)
Transfer	1 (0.9)	0	0	1 (7.7)
Jail	4 (3.8)	2 (5.6)	2 (3.5)	0
Psychiatric transfer	5 (4.7)	0	5 (8.8)	0

Abbreviations: Ag/Ab, antigen/antibody; ART, antiretroviral therapy; ED, emergency department.

[a]Excludes 59 patients with a reactive HIV Ag/Ab test who were previously diagnosed with HIV and currently taking ART.

follow-up. All 6 patients with acute HIV attended their first clinic appointment.

The 6-month incidence of IRIS was 4.3% (95% CI, .11%–23.0%) among the 23 patients who were HIV positive and receiving ED rapid ART. This occurred in 1 patient who was hospitalized 2 weeks after being newly diagnosed with HIV, started ED rapid ART, and was discharged home after an evaluation for 5 days of flu-like symptoms. During a 5-week hospitalization, the patient was diagnosed with AIDS (CD4 count, 44 cells/mm^3), cryptococcal meningitis, and cytomegalovirus retinitis, which were complicated by IRIS, for which ART was temporarily discontinued. Both OIs were clinically occult at the time of his earlier ED visit. Only 1 other patient was admitted to the hospital in the 6-month follow-up for reasons unrelated to his HIV infection.

DISCUSSION

This report describes the implementation and outcomes of an innovative protocol designed to provide immediate ART using starter packs for eligible ED patients testing HIV Ag/Ab positive—a protocol overseen and executed entirely by emergency physicians.

In 2016, Jacobson et al published the results of a pilot program evaluating the feasibility of empiric rapid ART for ED patients with acute HIV infection, in which 10 patients were prescribed ART under the guidance of HIV specialists and 8 followed up for care [7]. Other models, such as a program pioneered by the San Francisco Department of Public Health and administered by a multidisciplinary team of HIV treatment specialists, offers rapid ART to patients at diagnosis throughout the city, including patients identified through ED testing

Table 2. Eligibility, Acceptance, and Receipt of ED Rapid ART for 106 Patients With Reactive HIV Ag/Ab Tests

	Patients With Reactive HIV Ag/Ab Test, No. (%)			
ED Rapid ART	Overall[a] (N = 106)	Confirmed New HIV Diagnosis (n = 36)	Previous HIV Diagnosis, Not Taking ART (n = 57)	Confirmed HIV Negative (False Positive) (n = 13)
Eligible[b]	31 (29.2)	23 (63.9)	6 (10.5)	2 (15.4)
Ineligible[c]	75 (70.8)	13 (36.1)	51 (89.5)	11 (84.6)
Physician discretion	9 (12.0)	1 (7.7)	0	8 (72.7)
7-Item eligibility checklist	66 (88.0)	12 (92.3)	51 (100.0)	3 (27.3)
Previous ART use	48 (64.0)	…	48 (94.1)	…
Hospital admission	38 (50.7)	11 (84.6)	25 (49.0)	2 (18.2)
Liver function test > 5× ULN	1 (1.3)	1 (7.7)	0 (0.0)	0
eGFR > 30 mL/min	2 (2.7)	0	2 (3.9)	0
Concern for OI	7 (9.3)	3 (23.1)	4 (7.8)	0
Pregnant	0	0	0	0
Signal to cutoff < 1.58	2 (2.7)	0	0	2 (18.2)
Offered	26 (24.5)	21 (58.3)	3 (5.3)	2 (15.4)
Accepted	25 (23.6)	20 (55.6)	3 (5.3)	2 (15.4)
Provided	25 (23.6)	20 (55.6)	3 (5.3)	2 (15.4)

Abbreviations: Ag/Ab, antigen/antibody; ART, antiretroviral therapy; ED, emergency department; eGFR, estimated glomerular filtration rate; OI, opportunistic infection; ULN, upper limit of normal.

[a]Excludes 59 patients with a reactive HIV Ag/Ab test who were previously diagnosed with HIV and currently taking ART.

[b]Patients were eligible for ED rapid ART if they met all of the following criteria: ART naive, did not have clinical evidence of an OI, had liver function tests <5 times the ULN, had an HIV Ag/Ab signal-to-cutoff value ≥1.58, had an eGFR >30 mL/min, were not pregnant, were discharged from the ED, and the physician agreed that rapid ART was appropriate.

[c]A 7-item rapid ART eligibility checklist was utilized by emergency physicians to facilitate prescribing ART (Supplementary Material). Patients were ineligible for ED rapid ART if ≥1 checklist criteria were met. In the absence of eligibility checklist criteria, physicians could also use their discretion if they felt that a patient was a poor candidate for rapid ART (compliance concerns, unstable mental illness, drug use, prior false-positive HIV test result).

[13, 14]. Our program is unique in that emergency physicians provided rapid ART for patients with a preliminary new HIV diagnosis (which included patients later confirmed to have acute and chronic infections and those who were HIV negative) as well as those with a previous HIV diagnosis who were treatment naive. The protocol was developed with strict exclusion criteria by using an embedded electronic health record checklist to maximize the safety of emergency physician–administered ART: a design that aimed to facilitate availability 24 hours a day without reliance on specialty consultation.

We show that it is feasible for emergency physicians to follow an institution-specific protocol, with guidance from a peer colleague and navigators, to integrate rapid ART delivery into an ED that supports HIV screening. Our results demonstrate that 30% of ED patients with a reactive HIV Ag/Ab test (who were not previously diagnosed and not currently taking ART) were eligible for rapid ART according to the specifics of our protocol. When eligible (n = 23), the majority of patients were offered rapid ART (91%), accepted it (87%), were given it (87%), and followed up in clinic (83%).

The majority of ED patients with a reactive HIV Ag/Ab test, however, were ineligible for ED rapid ART according to our protocol guidelines. Patients with a previous HIV diagnosis who were not currently taking ART represented >50% of patients assessed for ED rapid ART eligibility, and nearly 90% of them were ineligible, with most being ineligible due to previous ART use and/or hospital admission. Just over one-third of the 36 patients with a reactive HIV Ag/Ab test confirming a new HIV diagnosis were ineligible for ED rapid ART, with hospital admission and/or physician discretion being the most common reason for ineligibility. Excluding hospitalized patients and those with prior ART use was a purposeful protocol decision, made in consultation with regional HIV specialists. Because treatment-experienced patients may be at higher risk for the development of ART resistance, our experts recommended referral to an HIV specialist to evaluate a patient's ART history, treatment failures, and available genotypes, prior to the prescription of therapy. For hospitalized patients, we had concerns about patients with a high likelihood of OIs starting ART and about potential medication interactions in patients receiving critical treatments, such as intravenous antibiotics for sepsis. We found, however, that for these 2 groups who were excluded from ED rapid ART, ED linkage teams can still play an important role in a patient's care.

For patients admitted to the hospital, deferring ED rapid ART initiation is a reasonable practice, and inpatient clinical teams can leverage this opportunity to comprehensively engage with a patient's acute and chronic medical conditions, as well as one's social barriers to care. Many hospitalized patients with newly diagnosed HIV or untreated HIV will need consultation by infectious disease specialists who can provide guidance on the need to rule out OIs and the early and safe introduction of ART. Barriers with linkage to outpatient appointments can also be completed prior to discharge, including assessment of

Table 3. Initiation of ART and Linkage to Care for 93 ED Patients Testing HIV Ag/Ab Reactive Who Were Confirmed HIV Positive

	ED Patients Confirmed HIV Positive, No. (%) or Median (IQR)			
	All[a] (n = 93)	Provided ED Rapid ART (n = 23)	Not Provided ED Rapid ART (n = 70)	*P* Value[b]
ART initiated				
Within 7 d	33 (35.5)	22 (95.6)	11 (15.7)	<.001
Within 30 d	39 (41.9)	23 (100)	16 (22.9)	<.001
Within 60 d	40 (43.0)	23 (100)	17 (24.3)	<.001
Time to ART initiation, d	2 (0–6)	0 (0–1)	6 (3–11)	<.001
Attended first clinic visit				
Within 7 d	19 (35.8)	9 (39.1)	10 (14.3)	.01
Within 30 d	54 (58.0)	19 (82.6)	35 (50.0)	.01
Within 60 d	60 (64.5)	19 (82.6)	41 (58.6)	.04
Time to first clinic visit, d	10 (7–20)	8 (3–11)	13 (8–43)	.01

Abbreviations: Ag/Ab, antigen/antibody; ART, antiretroviral therapy; ED, emergency department.

[a]Includes patients with a new HIV diagnosis (n = 36) and those with a previous HIV diagnosis not currently taking ART (n = 57) and excludes patients with a reactive HIV Ag/Ab test who were later determined to be HIV negative (n = 13).

[b]All comparisons are between ED rapid ART provided and not provided.

social needs, such as housing and the treatment of comorbid illnesses, as well as substance use and mental health needs. ED teams engaging with rapid ART programs can work with inpatient teams to facilitate early initiation of these services and can assist with outpatient follow-up after hospital discharge.

In this study, over half the patients assessed for ED rapid ART eligibility were previously diagnosed with HIV and not currently taking ART; of these, nearly 90% reported prior ART use, many of whom were discharged from the ED. Not restarting ART among this cohort of ED patients may be an important missed opportunity for reengaging them to care and closing existing gaps in the HIV care continuum [15]. Future ED rapid ART treatment protocols should consider strategies to facilitate restarting ART among treatment-exposed patients who are out of care, including straightforward algorithms and real-time access to specialist consultation to assist in the safe reinitiation of treatment. For patients with prior ART use, clinic-based protocols may be adapted for ED use in which a reinforced regimen is empirically started and coupled with viral resistance testing. However, this approach would be complicated and could hinder successful treatment [16, 17].

We recognize that ED rapid ART is one component of a bundle of interventions that may contribute to successful engagement in care. These interventions include timely access to specialty care and streamlined appointment scheduling, as well as the support of dedicated navigators who can counsel, assist with insurance enrollment, arrange transportation, and help address patient-specific barriers (eg, language fluency, homelessness, and substance use). Our preliminary data do show, importantly, that patients receiving ED rapid ART were more likely to attend a first clinic appointment than those who did not receive ED rapid ART. As this was a descriptive report of a clinical intervention, we did not control for factors potentially associated with linkage to care, such as whether an HIV diagnosis was new or whether a patient was enrolled in primary care. We believe, however, that receiving ED rapid ART can act as a stimulus for promoting outpatient clinic adherence, especially for ED patients with a first-time reactive HIV Ag/Ab test. We have observed that when ART is made immediately available, patients gain a sense of control, feel supported, and understand that HIV is managed by taking a daily medication.

Rapid ART using a protocol developed by a multidisciplinary team of local content experts, integrated into standard ED workflows, and carried out by emergency physicians appears safe. The 6-month incidence of IRIS of 4.3%—which occurred in 1 of the 23 patients who were HIV positive and receiving ED rapid ART—is similar to the published incidence of IRIS, which can range from 7.6% to 13%, depending on patient factors such as degree of immunosuppression at the time of ART initiation [18–20]. Because we determined the incidence of IRIS by reviewing 6-month hospital discharge summaries among a small sample of ED patients provided rapid ART, the true incidence may be greater than what we report, as less clinically severe IRIS cases would have been missed, such as those managed in the outpatient setting. Although the patient who was diagnosed with OIs and IRIS several weeks after starting ED rapid ART ultimately did well, this outcome highlights the importance of close follow-up for all ED patients who start ART—with a specific reminder that ED patients treated with ART who have evidence of advanced disease, based on clinical findings (wasting, thrush) or laboratory results (CD4 < 200 cells/mm^3), need to be counseled on the risk and symptoms of IRIS.

There are several limitations of this study. First, we chose to use 2-week starter packs of ART, given free to the patient and made available through a Gilead-sponsored provider assistance program. The use of streamlined medication delivery, limited to 1 agent and given as a starter pack free of charge, undoubtedly facilitated patient and provider uptake. Starter packs, however, may not be possible in many EDs, and hospital policies often prohibit using industry-supplied medications. These results may therefore not be generalizable to ED rapid ART programs with different protocols, such as those providing standard pharmacy prescriptions that require outpatient pickup, insurance authorization, and patient copayments.

Our study does not evaluate the patient perspective. A qualitative evaluation of the patient experience with being offered and provided ED rapid ART should be performed to understand how this intervention is received and whether it acts as a facilitator of ART uptake and clinic follow-up. Although we report on the number of patients provided immediate ART,

we did not evaluate adherence to therapy in terms of compliance. Additionally, patients testing HIV Ag/Ab positive were disproportionately male, though our gender and demographic profiles are reflective of recent US HIV epidemiology [15].

We do not know the relative influence that ED rapid ART has on patient-centered outcomes, such as time to first appointment, longitudinal engagement in care, time to viral suppression, and sustained viral suppression, as compared with other interventions or patient-specific factors. Longitudinal trials, ideally randomizing patients to ED rapid ART vs standard referral, are necessary before widespread recommendations can be made.

In conclusion, we demonstrate that the initiation of rapid ART for ED patients with HIV infection is feasible, well accepted, and safe and may be an important facilitator of linkage to care.

Supplementary Data

Supplementary materials are available at *Open Forum Infectious Diseases* online. Consisting of data provided by the authors to benefit the reader, the posted materials are not copyedited and are the sole responsibility of the authors, so questions or comments should be addressed to the corresponding author.

Notes

Acknowledgments. We thank the members of the East Bay Getting to Zero Collaborative, including Drs Sophy Wong, Sami Lubega, and Sunny Lai, who provided expert guidance and unwavering support of this project. Data not publicly available.

Financial support. This work was supported by the California Department of Public Health, Office of AIDS, Strategic Rapid Antiretroviral Therapy Grant (RFA 21-10043) to D. A. E. W., K. B., A.G., M.B., and M. J.

Potential conflicts of interest. D. A. E. W., K. B., A.G., and O. M. report receiving support from FOCUS (Gilead Sciences) to assist with HIV screening and prevention services. All other authors report no potential conflicts.

References

1. Olatosi B, Siddiqi KA, Conserve DF. Towards ending the human immunodeficiency virus epidemic in the US: state of human immunodeficiency virus screening during physician and emergency department visits, 2009 to 2014. Medicine (Baltimore) **2020**; 99:e18525.
2. Jacobson K, Ramos M. California Department of Public Health. **2022**. Available at: https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/DCL-Opt-Out-ED-HIV-HCV-and-Syphilis-Screening.pdf. Accessed 3 January 2023.
3. Rothman RE, Lyons MS, Haukoos JS. Uncovering HIV infection in the emergency department: a broader perspective. Acad Emerg Med **2007**; 14:653–57.
4. O'Shea JG, Gallini JW, Cui X, Moanna A, Marconi VC. Rapid antiretroviral therapy program: development and evaluation at a Veterans Affairs Medical Center in the southern United States. AIDS Patient Care STDS **2022**; 36:219–25.
5. Mateo-Urdiales A, Johnson S, Smith R, Nachega JB, Eshun-Wilson I. Rapid initiation of antiretroviral therapy for people living with HIV. Cochrane Database Syst Rev **2019**; 6:CD012962.
6. Fauci AS, Redfield RR, Sigounas G, Weahkee MD, Giroir BP. Ending the HIV epidemic. JAMA **2019**; 321:844–45.
7. Jacobson KR, Arora S, Walsh KB, et al. High feasibility of empiric HIV treatment for patients with suspected acute HIV in an emergency department. J Acquir Immune Defic Syndromes **2016**; 72:242–45.
8. Pinnock H, Barwick M, Carpenter CR, et al. Standards for reporting implementation studies (StaRI) statement. BMJ **2017**; 356:i6795.
9. White DAE, Anderson ES, Basham K, et al. Clinical utility of the signal-to-cutoff ratio of reactive HIV antigen/antibody screening tests in guiding emergency physician management. J Acquir Immune Defic Syndromes **2022**; 89:332–9.
10. White DAE, Todorovic T, Petti ML, Ellis KH, Anderson ES. A comparative effectiveness study of two nontargeted HIV and hepatitis C virus screening algorithms in an urban emergency department. Ann Emerg Med **2018**; 72:438–48.
11. Wong S. Clinical protocol: rapid ART. Clinical essentials: HIV testing, rapid ART, PEP, PrEP, 2021. Available at: http://paetc.wpengine.com/wp-content/uploads/2021/02/PAETC_HIVEssentialsAndQuickClinicalGuides_26pgs_Updated_2.14.20.pdf. Accessed 4 January 2021.
12. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)—a metadata-driven methodology and workflow process for providing translational research informatics support. J Biomed Inform **2009**; 42:377–81.
13. Bacon OML, Coffey SC, Hsu LC, Chin JCS, Havlir DV, Buchbinder SP. Development of a citywide rapid antiretroviral therapy initiative in San Francisco. Am J Prev Med **2021**; 61:S47–54.
14. Pilcher CD, Ospina-Norvell C, Dasgupta A, et al. The effect of same-day observed initiation of antiretroviral therapy on HIV viral load and treatment outcomes in a US public health setting. J Acquir Immune Defic Syndr **2017**; 74:44–51.
15. Centers for Disease Control and Prevention. Monitoring selected national HIV prevention and care objectives by using HIV surveillance data—United States and 6 dependent areas, 2020. *HIV Surveillance Supplemental Report* **2022**\; 27. Revised edition. Available at: http://www.cdc.gov/hiv/library/reports/hiv-surveillance.html. Accessed 2 February 2023.
16. San Francisco General Hospital "rapid" antiretroviral therapy standard operating procedures. **2020**. Available at: https://hividgm.ucsf.edu/sites/hiv.ucsf.edu/files/2020-03/SFGH%20RAPID%20protocol%20rev%201.29%20changes%20accepted.pdf. Accessed 2 February 2023.
17. Getting to Zero San Francisco. Rapid ART: immediate ART initiation at HIV diagnosis and re-engagement in care, 2023. Available at: https://gettingtozerosf.org/rapid-provider-detailing-brochure-rapid-art-immediate-art-initiation-upon-hiv-diagnosis. Accessed 3 January 2023.
18. Murdoch DM, Venter WD, Feldman C, Van Rie A. Incidence and risk factors for the immune reconstitution inflammatory syndrome in HIV patients in South Africa: a prospective study. AIDS **2008**; 22:601–10.
19. Müller M, Wandel S, Colebunders R, et al. Immune reconstitution inflammatory syndrome in patients starting antiretroviral therapy for HIV infection: a systematic review and meta-analysis. Lancet Infect Dis **2010**; 10:251–61.
20. Grant PM, Komarow L, Andersen J, et al. Risk factor analyses for immune reconstitution inflammatory syndrome in a randomized study of early vs deferred ART during an opportunistic infection. PLoS One **2010**; 5:e11416.