Factors differentiating False Positive and Acute Positive Equivocal Fourth Generation HIV serum test results at the Tampa General Hospital Emergency Department

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Title
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Objective
We aim to identify criteria that help resolve equivocal HIV results during an ED encounter. In 2016, Tampa General Hospital implemented non-targeted HIV 4th generation serum screening in the ED based on 2006 CDC revised guidelines. Designed for outpatient settings, this algorithm is suboptimal in high pretest probability patients who may have acute HIV. We found that 10% of reactive HIV screening tests are equivocal (HIV Ab-Ag Screen Reactive, HIV1/2 Ab negative). These patients have identical lab results during the clinical encounter but may represent disparate clinical populations. False positive patients may undergo undue stress; acute positive patients may miss critical medical interventions. Differentiating these populations will help scale up HIV testing to other ED's.

Methods
We did a retrospective chart review of patients presented to the TGH ED and screened for HIV from May 2016 to June 2022 with the 4th generation HIV Ab/Ag Abbott Alinity test. Patients with an equivocal result were included in this analysis. We performed keyword searches to look for established HIV risk factors and presence of other variables known to generate p24 Ag reactivity (e.g. immune and rheumatological disease). We examined past medical history and primary final diagnoses for the ED encounter that the HIV test took place and coded presence of potential explanatory variables. Information obtained included sexual history, homelessness, and immunological histories. We then performed statistical testing for the proportion of patients with versus without each factor between acute positive and false positive patients.

Results
107,714 patients were tested for HIV using the 4th generation FOCUS General Ag/Ab test from May 2016 to June 2022. Of 1,844 patients who tested positive for HIV, 245 patients were equivocal; this analysis examines 167 of those results. 132 patients were false positive and 35 were acute positive. Factors that had significant differences between the two groups included MSM, multiple sexual partners, fever greater than 100F, and cancer/tumor history, previous STI history.

Conclusions
The most differentiating factors between HIV acute and false positives were MSM status, history of multiple sexual partners, fever greater than 100F, cancer. The current CDC algorithm and available testing technology limits scale up of ED based HIV screening but clinical phenotypes may help differentiate lab results. This univariate analysis will be followed with multivariable regression to understand how these risk factors contribute to a false or acute positive lab signatures. Current HIV testing methods in the ED could improve on specificity as the false positive rate is still high. This study shows the need for a rapid nucleic acid amplification based test that is robust and rapidly deployable in the ED.