Late Presentation Persists Under UTT in South Africa: a National Cohort Study

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BACKGROUND

- South Africa implemented Universal Test-and-Treat (UTT) in September 2016, extending eligibility for antiretroviral therapy to all people regardless of CD4.
- The **impact of UTT will be limited if people continue to seek care at low CD4 counts**.

NATIONAL LABORATORY COHORT

- We analyzed the **complete laboratory records of South Africa's public sector HIV program** maintained by South Africa's National Health Laboratory Service (NHLS).
- Data included all CD4 counts, HIV viral loads, and ART-workup labs (ALT/HG/CRT), April 2004 - March 2018, except for labs in KwaZulu-Natal prior to 2010.
- **We constructed a national HIV cohort** through novel record linkage of routine laboratory data, enabling **longitudinal follow-up of all patients in South Africa's public-sector HIV program**.
- The linkage attained 93.7% sensitivity and 98.6% positive predictive value relative to manually-coded data. For details: https://doi.org/10.1101/450304.

ANALYSIS

- For each patient, we defined **"CD4 at presentation"** as first CD4 count in the database and **"CD4 at ART start"** as first CD4 within 90 days of an ART workup.
- We assessed the distribution of CD4 counts at presentation and at ART start in 2015 (pre-UTT) and 2017 (post-UTT), and assessed features of the distributions (e.g. median) over the study period.
- We estimated numbers of patients entering care and starting ART (as proxied by viral load or ART workup) over time, stratified by CD4 count, and evaluated the impact of ART eligibility expansions (from <200 to <350, to <500, and to UTT) on these trends.

Under UTT, **most patients still present with CD4<350**. The impact of UTT on ART uptake is limited by late presentation in South Africa.

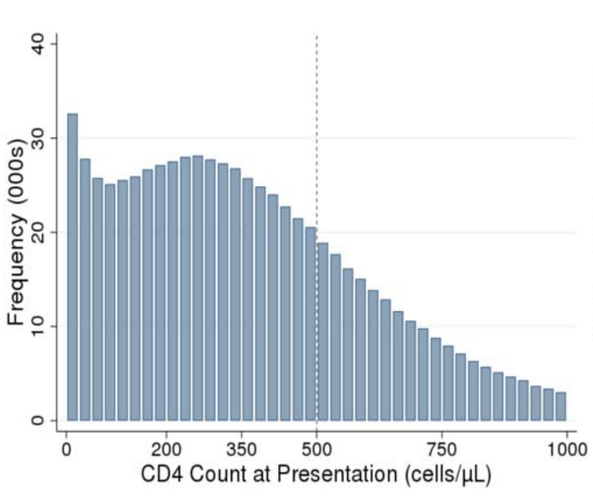

Figure 1. Distribution of CD4 counts among patients presenting for care in 2017.

Vertical line denotes prior 500-cell threshold.

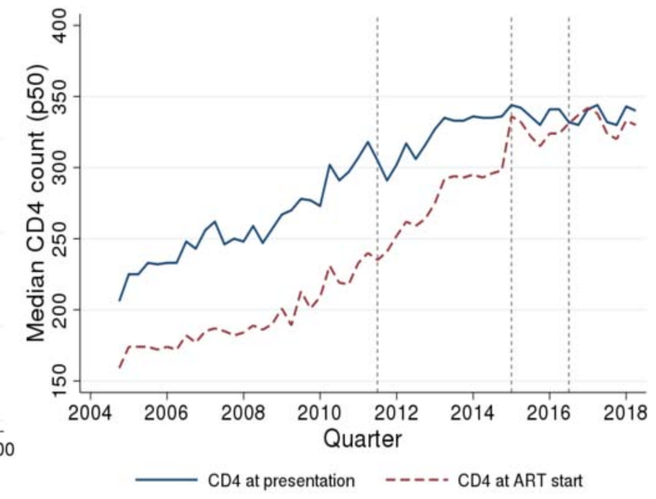

Figure 2. Median CD4 at presentation (solid blue) and ART start (dashed red) 2004-2018

Vertical lines denote dates of ART eligibility expansions, to CD4<350 (Aug 2011), CD4<500 (Jan 2015) and UTT (Sept 2016).

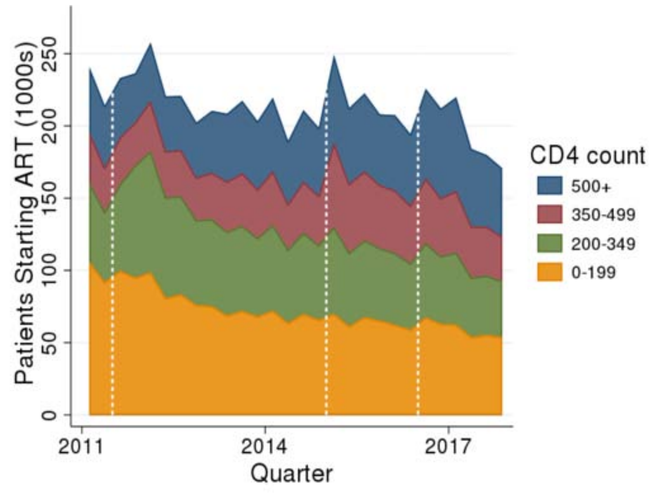

Figure 3. Estimated number of patients starting ART by CD4 count, 2011-2018.

Vertical lines denote dates of ART eligibility expansions, to CD4<350 (Aug 2011), CD4<500 (Jan 2015) and UTT (Sept 2016).

RESULTS

- **Cohort Size.** 12 million patients had a first CD4 count through March 2018. Numbers seeking care did not increase with UTT.
- **Distribution of first CD4 counts did not change with UTT**. In 2017, 48.2% of patients presented with CD4 >350 cells/mm3, and just 29.3% presented with CD4 counts >500 (newly-eligible with UTT) (**Figure 1**). The shares were nearly identical in 2015 (pre-UTT): 48.3% >350 and 28.8% >500.
- **Convergence of "CD4 at presentation" and "CD4 at ART start".** Median CD4 at presentation increased from 2005 to 2015, but plateaued thereafter, reaching only 337 in 2017 (**Figure 2**). With ART eligibility expansions, the gap between median CD4 at presentation and at ART start narrowed, disappearing under UTT (**Figure 2**).
- **Late presentation limits impact of UTT on ART uptake.** ART eligibility expansions led to short-run increases in numbers starting ART, however these gains were short-lived. With each expansion, ART uptake increased primarily for patients with newly-eligible CD4 counts (**Figure 3**). UTT extended eligibility to patients with CD4 > 500. However, because most patients present with low CD4 counts (**Figure 1**), the impact of UTT on numbers starting ART was modest (**Figure 3**).