Investigating associations between a new measure of engagement-in-care and clinical outcomes in the UK Collaborative HIV Cohort (UK CHIC) Study

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Background

- Several measures have been proposed for the assessment of engagement in-care (IC)
  - All gaps in care <6 months[1]
  - ≥2 CD4/VL determinations, separated by 90 days, in any calendar year[2]
- Focus on loss-to-follow-up
- Often based on fixed clinic visit schedule
  - may not be responsive to changing status of patients or clinic policy

[1]Yehia BR et al. *AIDS* 2012; 26: 1131-1139; [2]Health Resources Services Administration, 2008

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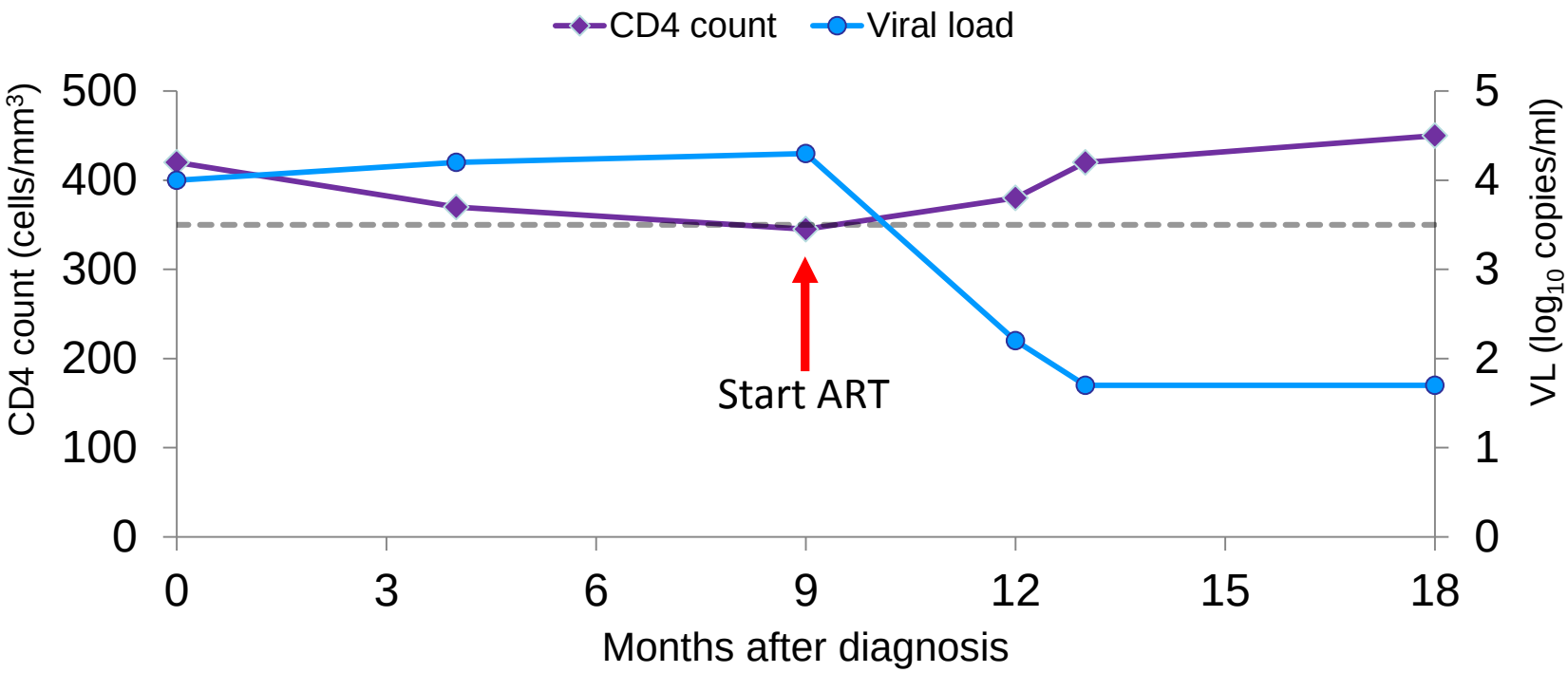
Background



New diagnosis – frequent visits

Stable, off ART – less frequent visits

Start ART – frequent visits

Stable on ART – less frequent visits

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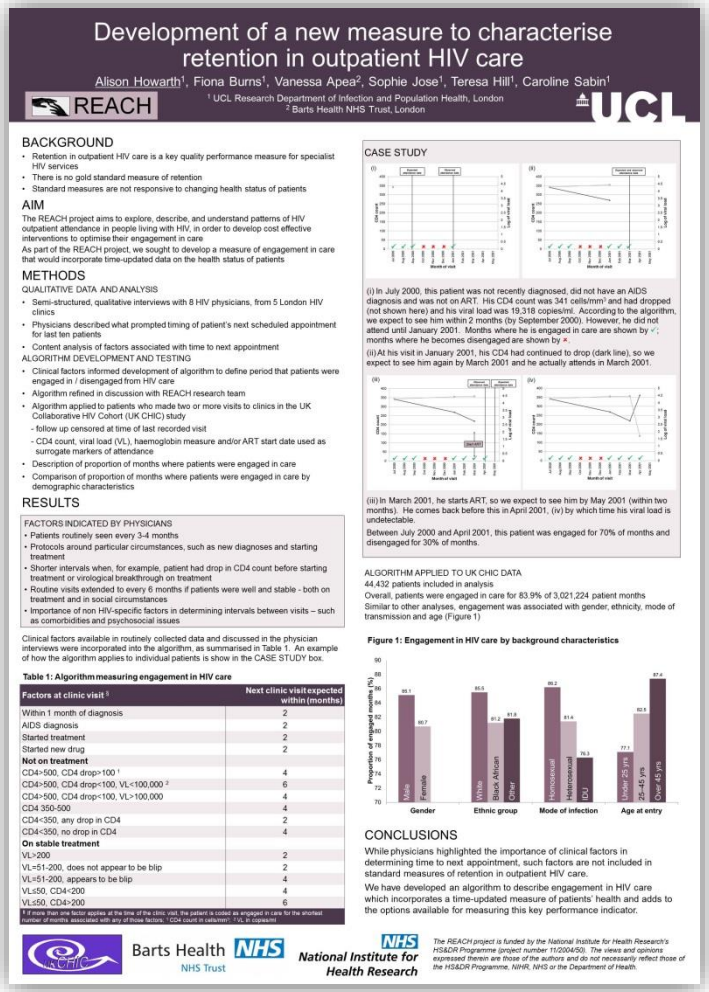
Aim

To describe associations between a new dynamic measure of engagement IC and future mortality

REACH Study, Howarth A et al, poster P171



Development of a new measure to characterise retention in outpatient HIV care

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BACKGROUND

- Retention in outpatient HIV care is a key quality performance measure for specialist HIV services
- There is no gold standard measure of retention
- Standard measures are not responsive to changing health status of patients

AIM

The REACH project aims to explore, describe, and understand patterns of HIV outpatient attendance in people living with HIV, in order to develop cost effective interventions to optimise their engagement in care

As part of the REACH project, we sought to develop a measure of engagement in care that would incorporate time-updated data on the health status of patients

METHODS

QUALITATIVE DATA AND ANALYSIS

- Semi-structured, qualitative interviews with 8 HIV physicians, from 5 London HIV clinics
- Physicians described what prompted timing of patient's next scheduled appointment for last ten patients
- Content analysis of factors associated with time to next appointment

ALGORITHM DEVELOPMENT AND TESTING

- Clinical factors informed development of algorithm to define period that patients were engaged in / disengaged from HIV care
- Algorithm refined in discussion with REACH research team
- Algorithm applied to patients who made two or more visits to clinics in the UK Collaborative HIV Cohort (UK CHIC) study
  - follow up censored at time of last recorded visit
  - CD4 count, viral load (VL), haemoglobin measure and/or ART start date used as surrogate markers of attendance
- Description of proportion of months where patients were engaged in care
- Comparison of proportion of months where patients were engaged in care by demographic characteristics

RESULTS

FACTORS INDICATED BY PHYSICIANS

- Patients routinely seen every 3-4 months
- Protocols around particular circumstances, such as new diagnoses and starting treatment
- Shorter intervals when, for example, patient had drop in CD4 count before starting treatment or virological breakthrough on treatment
- Routine visits extended to every 6 months if patients were well and stable - both on treatment and in social circumstances
- Importance of non HIV-specific factors in determining intervals between visits – such as comorbidities and psychosocial issues

Clinical factors available in routinely collected data and discussed in the physician interviews were incorporated into the algorithm, as summarised in Table 1. An example of how the algorithm applies to individual patients is show in the CASE STUDY box.

Table 1: Algorithm measuring engagement in HIV care

Factors at clinic visit [§]	Next clinic visit expected within (months)
Within 1 month of diagnosis	2
AIDS diagnosis	2
Started treatment	2
Started new drug	2
Not on treatment	
CD4>500, CD4 drop>100 [1]	4
CD4>500, CD4 drop<100, VL<100,000 [2]	6
CD4>500, CD4 drop<100, VL>100,000	4
CD4 350-500	4
CD4<350, any drop in CD4	2
CD4<350, no drop in CD4	4
On stable treatment	
VL>200	2
VL=51-200, does not appear to be blip	2
VL=51-200, appears to be blip	4
VL≤50, CD4<200	4
VL≤50, CD4>200	6

§ If more than one factor applies at the time of the clinic visit the patient is coded as engaged in care for the shortest number of months associated with any of those factors. [1] CD4 count in cells/mm³. [2] VL in copies/ml

CASE STUDY

(i) In July 2000, this patient was not recently diagnosed, did not have an AIDS diagnosis and was not on ART. His CD4 count was 341 cells/mm³ and had dropped (not shown here) and his viral load was 19,318 copies/ml. According to the algorithm, we expect to see him within 2 months (by September 2000). However, he did not attend until January 2001. Months where he is engaged in care are shown by ✓; months where he becomes disengaged are shown by ×.

(ii) At his visit in January 2001, his CD4 had continued to drop (dark line), so we expect to see him again by March 2001 and he actually attends in March 2001.

(iii) In March 2001, he starts ART, so we expect to see him by May 2001 (within two months). He comes back before this in April 2001, (iv) by which time his viral load is undetectable.

Between July 2000 and April 2001, this patient was engaged for 70% of months and disengaged for 30% of months.

ALGORITHM APPLIED TO UK CHIC DATA

44,432 patients included in analysis

Overall, patients were engaged in care for 83.9% of 3,021,224 patient months

Similar to other analyses, engagement was associated with gender, ethnicity, mode of transmission and age (Figure 1)

Figure 1: Engagement in HIV care by background characteristics

CONCLUSIONS

While physicians highlighted the importance of clinical factors in determining time to next appointment, such factors are not included in standard measures of retention in outpatient HIV care.

We have developed an algorithm to describe engagement in HIV care which incorporates a time-updated measure of patients' health and adds to the options available for measuring this key performance indicator.

Barts Health NHS Trust

National Institute for Health Research

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Methods

- **Care visit:** any visit associated with a CD4, viral load (VL), haemoglobin measurement, or ART start date
- Measurements within the same calendar month were assumed to relate to the same index visit
- **Patient eligibility:** >1 care visit between 1/1/2000-1/1/2013, and ≥1 month of follow-up after first care visit

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Methods

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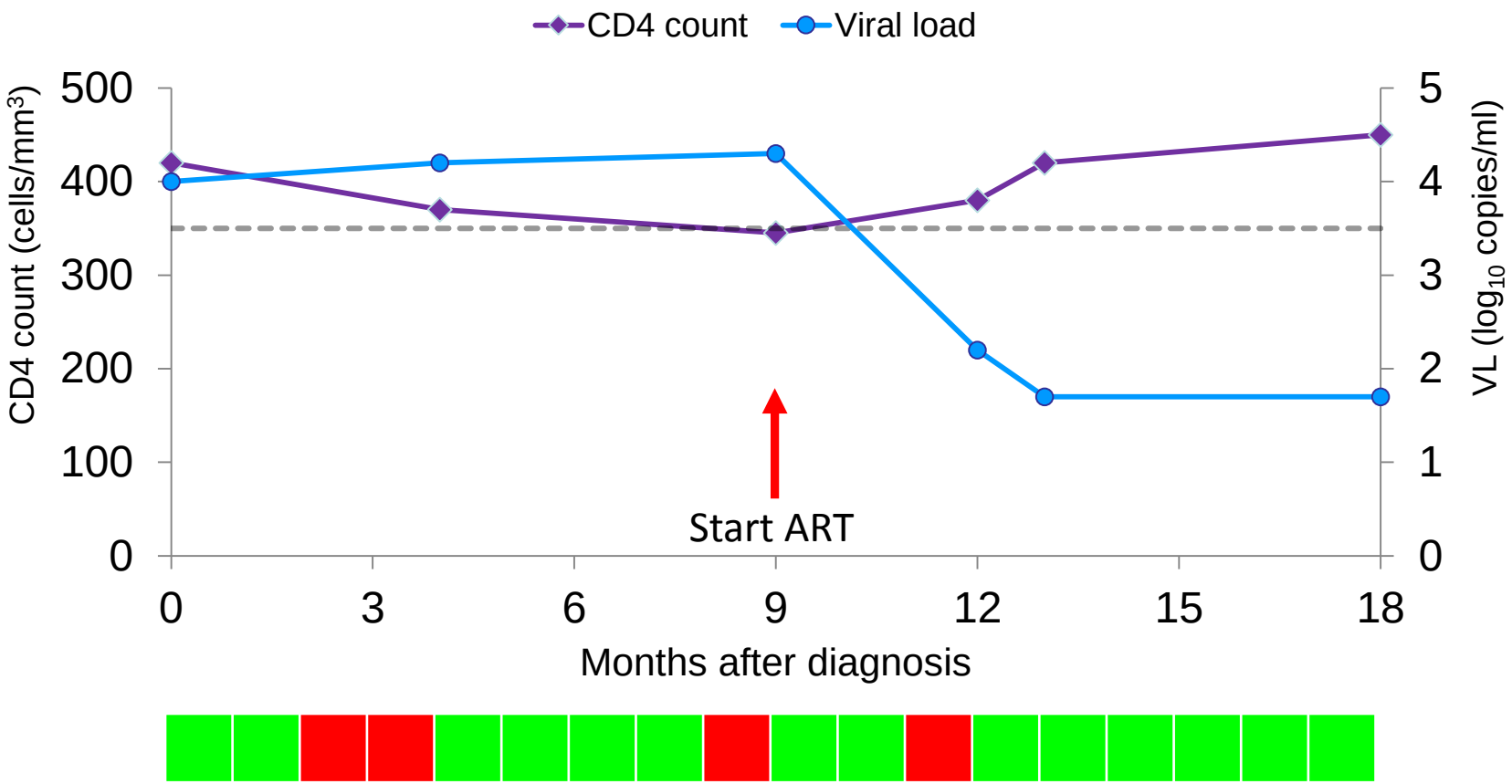
Methods



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Statistical methods

- Cox models assessed association between mortality and:

  a) cumulative proportion of months a person had been IC (%IC)

  - time-updated, lagged by 12 months

  b) cumulative %IC prior to ART in those starting ART

  - restricted to those who had attended clinic for >1 year

- Follow-up censored at last visit or 1/1/2013
- Adjusted for age, year, sex, infection mode, ethnicity and receipt/type of ART
- Also adjusted for latest CD4/VL to investigate whether associations could be explained by poorer responses

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Analysis 1: Characteristics of patients at ART start

		All patients
N		**44,432**
Gender, %	Male	72.2
	Female	27.8
Age (years)	Median (IQR)	36 (30, 42)
Exposure, %	MSM	50.5
	Heterosexual	39.1
	IDU	3.0
	Other/unknown	7.4
Ethnic group, %	White	53.3
	Black African	28.9
	Other	8.7
	Unknown	9.2
CD4 count (cells/mm^3)	Median (IQR)	355 (214, 520)

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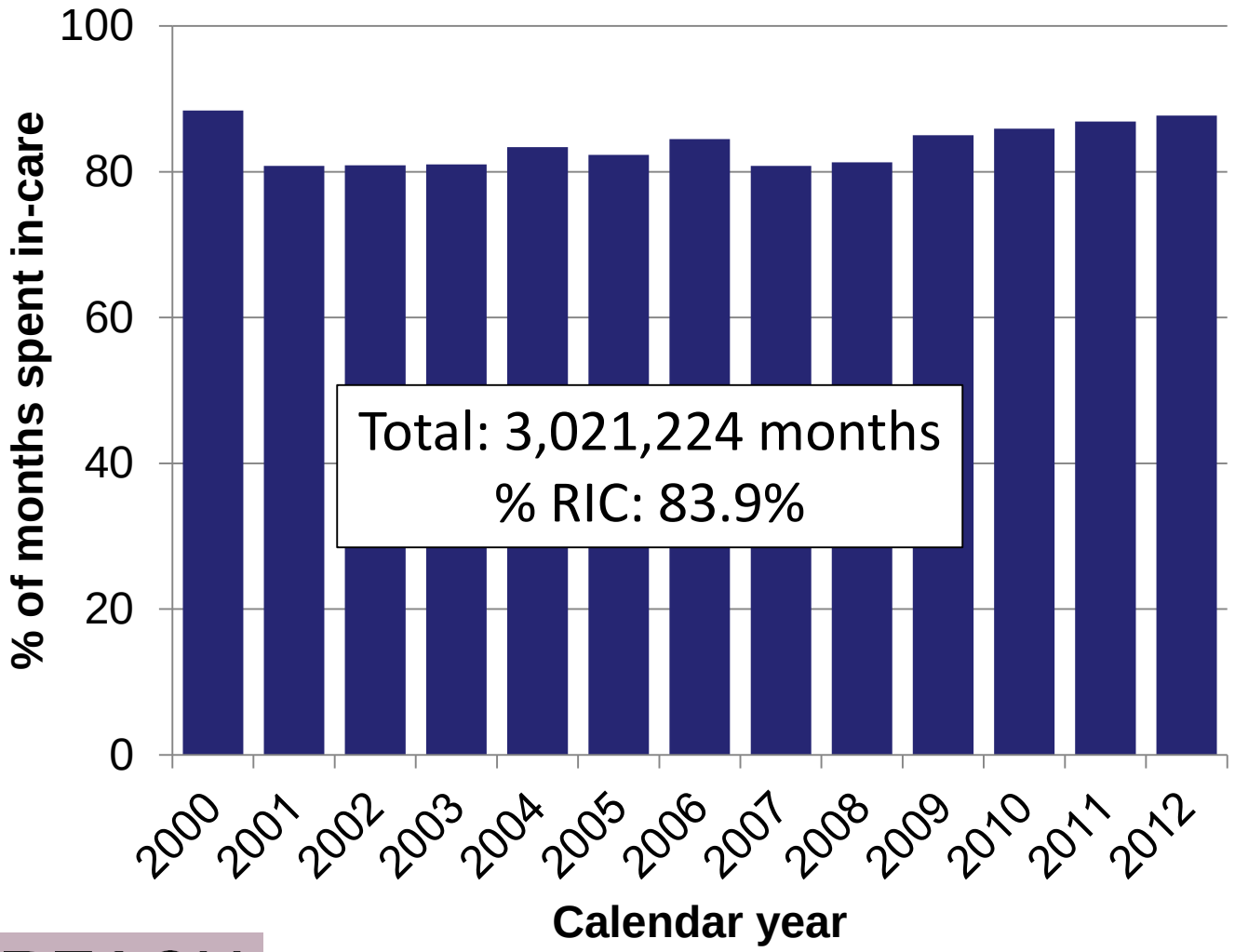
Analysis 1: RIC stratified by calendar year



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Analysis 1: Association between %IC and mortality

	Death
Total number (%)	2279 (5.1%)
Relative hazard [95% CI] /10% higher IC	
No adjustment	0.91 [0.88, 0.95]

*Age, CD4 and year of entry, sex, mode of infection, ethnicity

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Analysis 1: Association between %IC and mortality

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Adjustment for fixed covariates and ART*	0.90 [0.87, 0.93]

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Relative hazard [95% CI] /10% higher IC	
No adjustment	0.91 [0.88, 0.95]
Adjustment for fixed covariates and ART*	0.90 [0.87, 0.93]
CD4 count changes over follow-up	1.00 [0.96, 1.04]

*Age, CD4 and year of entry, sex, mode of infection, ethnicity

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Analysis 2: Characteristics of patients at ART start

		All patients	At ART
N		**44,432**	**8,730**
Gender, %	Male	72.2	78.2
	Female	27.8	21.8
Age (years)	Median (IQR)	36 (30, 42)	37 (32, 43)
Exposure, %	MSM	50.5	62.3
	Heterosexual	39.1	31.1
	IDU	3.0	2.9
	Other/unknown	7.4	3.7
Ethnic group, %	White	53.3	63.4
	Black African	28.9	20.9
	Other	8.7	8.9
	Unknown	9.2	6.8
CD4 count (cells/mm^3)	Median (IQR)	355 (214, 520)	280 (202, 368)

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Analysis 2: Characteristics of patients at ART start, stratified by %IC prior to ART

% months IC prior to ART	% of group	Male	MSM	White	CD4 (cells/mm^3)	Regimen	
						PI	NNRTI
	%	%	%	%	Median	%	%
<50%	14.7	14.7	46.2	53.5	250	32.1	60.8
50-70%	14.2	14.2	59.5	60.9	259	25.3	66.4
70-80%	11.6	11.6	62.8	62.1	280	25.5	67.5
80-90%	18.2	18.2	65.6	64.9	283	26.2	67.1
90-99%	24.0	24.0	66.4	65.6	290	23.0	68.6
100%	17.3	17.3	68.6	70.3	299	21.4	70.0

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100%	17.3	81.0	68.6	70.3	299	21.4	70.0

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Analysis 2: Association between %IC pre-ART and mortality post-ART

	Death
Total number (%)	237 (2.7%)
Relative hazard [95% CI] /10% higher IC	
No adjustment	0.29 [0.18, 0.47]
Adjustment for fixed covariates*,	0.36 [0.21, 0.61]
+ Latest CD4 count and VL	0.74 [0.42, 1.30]

*Age, sex, mode of infection, ethnicity, calendar year, pre-ART CD4 and VL

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Summary and discussion

- Higher engagement in-care is associated with improved clinical outcomes, at least one year into the future as well as among those on ART
- Largely explained by poorer CD4 profiles in those with sub-optimal engagement in-care
- Algorithm provides flexible approach to measuring engagement that can be adapted to the changing status of the patient and to local clinic policies

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Limitations and other issues

- Dates of laboratory markers and ART start dates used as surrogates for clinic visits
  - Do we miss visits without associated laboratory tests?
  - How to deal with repeated measurements within same month?
- Algorithm does not capture additional information that might modify a clinician's decision about timing of next visit (e.g. psycho-social factors)
  - May over-estimate %IC as a result

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Exploring patterns of Retention and Engagement Across specialised Care services for HIV

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