Predictors for high viraemia among the treatment naïve HIV population in the United Kingdom

Alison Brown, Adamma Aghaizu, Gary Murphy and Valerie Delpech

Public Health England

Background

Viral load is established as the key predictor for sexual HIV transmission[1]. Identification of untreated HIV patients newly diagnosed, and those accessing care, with elevated viral loads may inform prevention initiatives. We:

- Describe the distribution of viral load among the treatment naïve HIV population accessing care
- Identify the predictors of high viraemia among the untreated population
- Discuss the public health implications

Table 1: viraemia distribution between treated and treatment naïve patients

	Treated	Treatment naive
Number of patients	56,200	8,500
Median viral load (mL)	39 copies/mL	10,494 copies/mL
Interquartile range (mL)	IQR 39-49	1,600-42,223

Definition of elevated viral load

Methods

Comprehensive national surveillance data were used to identify treatment-naïve newly diagnosed adults and adults accessing HIV care in the UK in 2010.

Data collected included:

- Demographic including age group and population group
- Treatment start date and current treatment status
- CD4 count at diagnosis, and most recent CD4 count and viral load.

Patients were categorised as to whether they were diagnosed during or before 2010.

Among those newly diagnosed during 2010, patients were further subdivided by:

- Recently/not recently infected at diagnosis in 2010 (through application of RITA[2])
- Late/very late diagnosed during 2010 (CD4 count <350/<200 cells)
- Other (diagnosed in 2010, but neither diagnosed late nor RITA tested)

The distribution of viral load was described for both the treated and untreated population. Elevated viraemia was defined as having a viral load greater than the upper quartile of the untreated population, around >40,000 copies/m L (Table 1).

Results

Study population

In 2010, 68,600 adults were newly diagnosed and/or accessed HIV care in the UK. Of these, 12,400 (18%) were untreated, of whom 1,500 received ART before 2010. Overall, 8,500 (12%) were treatment naïve with viraemia information available. Patients with viral load data had the same characteristics as with these data missing.

Patients with elevated viraemia

In 2010, 25% of treatment naïve population had viral loads greater than 40,000 copies and were defined as having elevated viraemia. Among newly diagnosed patients, 36% (875/2,337) had elevated viraemia compared to 22% (1,324/6,039) among those diagnosed before 2010..

While the proportion of patients with elevated viraemia was higher among those newly diagnosed, in terms of absolute numbers, the majority of people with elevated viraemia were among those diagnosed before 2010 and accessing care.

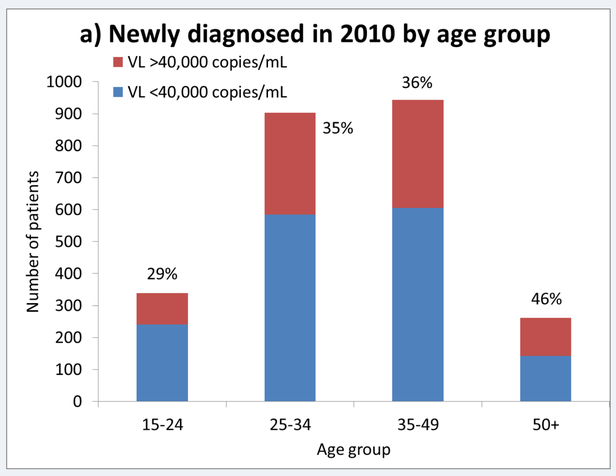
Among both groups, the proportion of patients with elevated viraemia significantly increased with age, and decreased with CD4 count (Figure 1a,d,c and f and Table 2). Also MSM and white heterosexual men were significantly more likely to have elevated viraemia compared with black African women (Figure1b,e and Table 2).

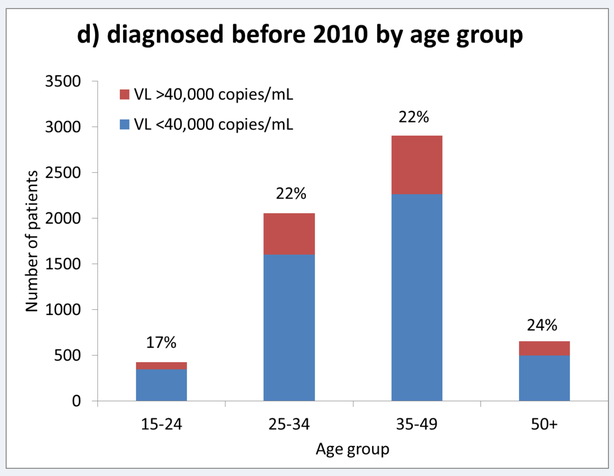
Multivariate analysis demonstrated that patients recently infected at diagnosis had a 1.5 fold risk of elevated viraemia compared to those not recently infected. Also compared to the latter, patients diagnosed late and very late had 2-fold and almost 6-fold risk of elevated viraemia respectively (Figure 1c and Table 2).

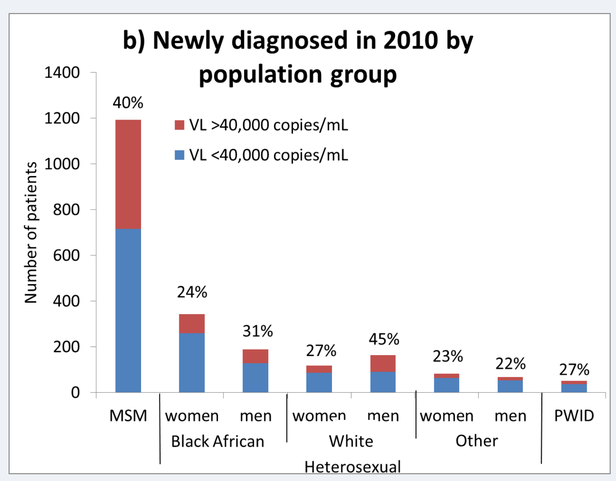
Table 2: Predictors for high viraemia, multivariate analysis

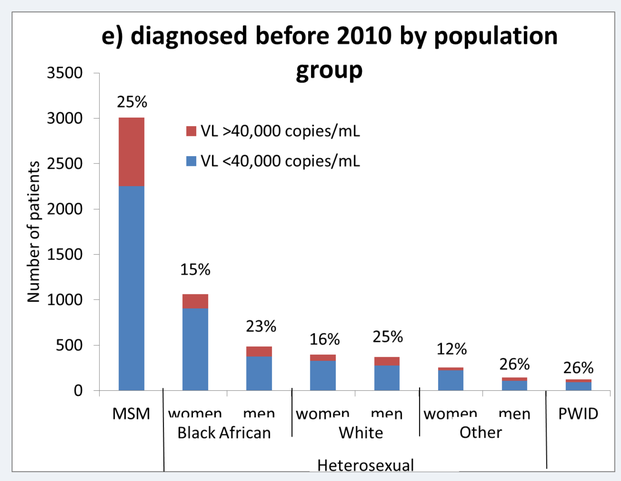
Variable			Diagnosed in 2010		Diagnosed <2010	
			Elevated viraemia	Adjusted odds ratio	Elevated viraemia	Adjusted odds ratio
Age group	15-24 years		29%	1	17%	1
	25-34 years		35%	1.3 (1.0-1.7)	22%	1.3 (1.0-1.7)
	35-49 years		36%	1.4 (1.0-1.8)	22%	1.3 (1.0-1.8)
	>50 years		46%	1.8 (1.3-2.6)	24%	1.4 (1.0-1.9)
Risk group	MSM		40%	2.6 (1.9-3.4)	25%	2.2 (1.8-2.6)
	Heterosexual: Black African	Men	24%	1.2 (0.8-1.8)	23%	1.8 (1.4-2.3)
		Women	24%	1	15%	1
	Heterosexual: White	Men	45%	2.8 (1.9-4.3)	25%	2.1 (1.5-2.8)
		Women	27%	1.4 (0.9-2.4)	16%	1.2 (0.9-1.7)
	Heterosexual: Other	Men	23%	0.8 (0.4-1.6)	26%	2.1 (1.4-3.2)
		Women	22%	0.9 (0.5-1.8)	12%	0.8 (0.5-1.2)
	People injecting drugs		27%	1.3 (0.7-2.6)	26%	1.8 (1.2-2.9)
	Other		42%	2.4 (1.6-3.5)	18%	1.4 (0.9-2.1)
Diagnosis status	Recently infected		41%	1.5 (1.1-2.1)		
	Not-recently infected		29%	1		
	Not RITA tested		30%	1.0 (0.8-1.2)		
	Late (CD4 200-349)		44%	2.0 (1.5-2.6)		
	Very late (CD4 <200)		67%	5.7 (3.9-8.6)		-
CD4 count	<200				50%	3.0 (2.1-4.3)
	201-349				33%	1.4 (1.2-1.7)
	350-499				27%	1
	>500				15%	0.5 (0.4-0.5)

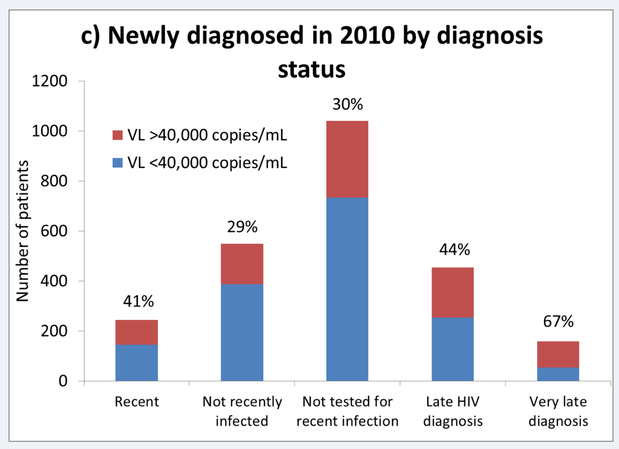
Figure 1 (a-f) number and proportion of patients with elevated viraemia

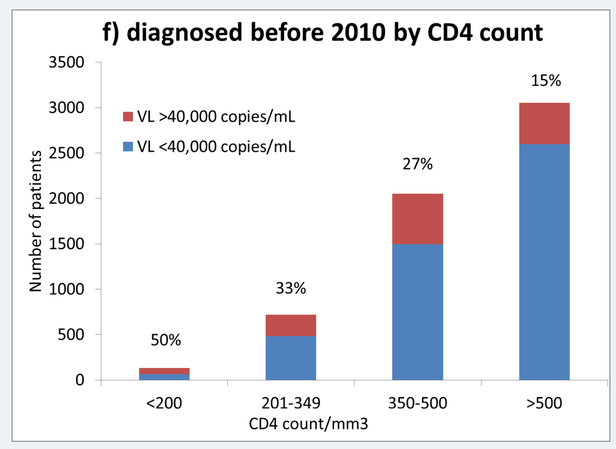












Conclusions

Predictors of high viraemia provide a useful tool to inform HIV prevention. Prompt ART initiation is critical for all those with CD4 count <350 cells/mm3 not only for clinical purposes but also because this group are at greater risk of passing on their infection. Those diagnosed late (CD4 <350cells/mm3) and very late (CD4<200 cells/mm3) constitute 20% and 30% respectively of the 6000 patients newly diagnosed annually.

Treatment naïve older patients, MSM and heterosexual white men are particularly at risk of having viral loads >40,000 copies/mL. The elevated viraemia among those recently diagnosed demonstrates the importance of rapid partner notification.

In 2011, only 13% of diagnosed patients with CD4 counts <350 were not receiving ART, and half of these received ART within the next 6 months. The strong association of viraemia with CD4 count therefore suggests that the undiagnosed population may have a much higher viral load distribution compared to the treatment naïve diagnosed population. This illustrates the importance of the promotion of HIV testing programmes.

References: 1 Cohen MS,. *N Engl J Med.* 2011; **365**:493-505, 2 HPA. HIV in the United Kingdom: 2011 Report. November 2011.

For further information contact: alison.brown@phe.gov.uk