HIV incidence estimates, introducing the Limiting Antigen Avidity EIA to existing HIV surveillance in Kiev City, Ukraine: 2013-2014

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INTRODUCTION

- Estimating HIV incidence enables current transmission patterns to be ascertained, highlighting populations at greatest risk, and guiding prevention and intervention strategies. However, given the long latency period which characterises HIV disease, this is not easily estimated in practice.
- Serological tests identifying biological markers of recent infection use key components of the antibody response to the virus and, supplemented by clinical evidence of a recent or established infection, are termed the Recent Infection Testing Algorithm (RITA). Unlike cohort studies, RITA requires a sample of serum taken at the time of HIV diagnosis, without the need for follow-up.
- Ukraine has one of the highest HIV diagnosis rates in Europe at 37.1 per 100,000 population. 'Hidden epidemics' make appropriate targeted public health interventions problematic and, with a shift in HIV risk from persons who inject drugs (PWID) to sexual transmission, particularly heterosexual contact, there is a need to identify and characterise recent HIV infections to better inform policy.
- We sought to estimate HIV incidence and highlight characteristics of persons at greatest risk of HIV in the Ukraine capital, Kiev, using published methodologies.

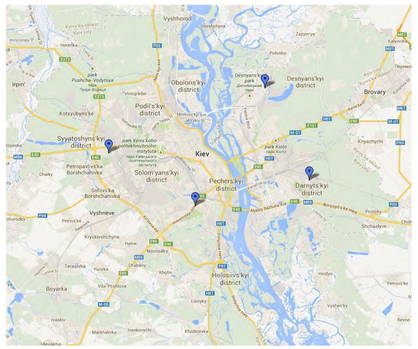


Figure 1: Testing sites in the city of Kiev.

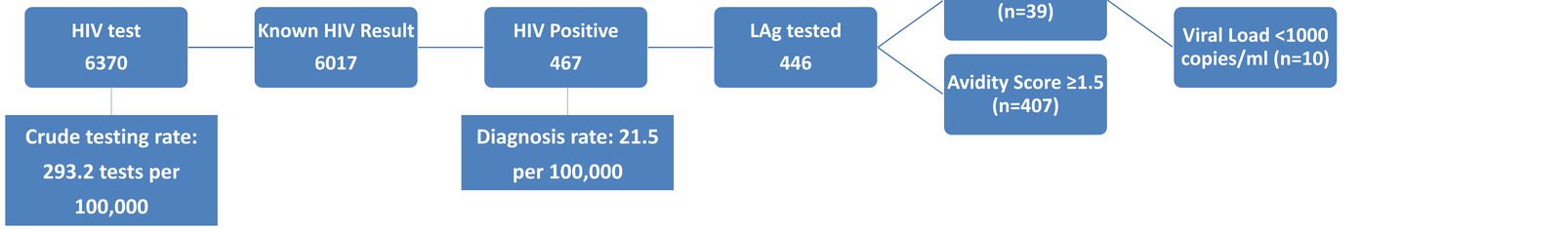
METHODS

- All adults presenting for an HIV test at the 4 main testing facilities (collectively known as the Kiev City AIDS Centre, figure 1) between April 1st 2013 and March 31st 2014 were eligible.
- A short anonymous questionnaire regarding residence, probable route of exposure, reason for test and testing history was completed by the clinic attendee using a handheld electronic tablet.
- Residual samples from persons with a confirmed new diagnosis were tested for evidence of recent infection using the limiting antigen (LAg) avidity EIA assay.
- Using logistic regression models we examined factors associated with testing recent.
- HIV incidence was estimated using the stratified extrapolation method. The true number of recent infections is estimated using the observed number of recent infections and the probability of presenting for an HIV test and being classified as recent.
- Samples with an optical density of <1.5 (mean duration of recent infection 130 days, 95% CI: 118-142) were deemed to be recently-infected, and those with a viral load <1000 copies/ml were classified as longstanding.
- A correction factor of 3.7%, known as the false recent rate, was applied to the incidence formula derived from the fraction of persons who remain non-reactive and under the threshold for >1 year.

$$True\ Recent = {Observed\ Recent}/{Probability\ of\ testing\ and\ being\ classified\ as\ recent}$$

RESULTS

Flow of data from presenting for an HIV test to being classified as a recent infection.



- We detected higher proportions of recent infections among younger adults, men, MSM, and those resident in Kiev City.
- Adjusting for all variables in a multivariable logistic regression model indicated that the only independent predictor for being recently infected was probable route of exposure, with MSM more likely to present with a recent infection compared with persons reporting heterosexual contact [Odds Ratio 8.86; 95% CI 2.65-29.60].
- HIV incidence in Kiev City was estimated to be 9.5 per 100,000 population, corresponding to 206 new HIV infections.
- Although a higher proportion of recent infections was identified among persons 16-25 years, incidence estimates were highest among those aged 26-30 years (41.0 per 100,000).
- Using published population estimates for MSM, incidence was estimated to be between 2076.3 and 6229.0 per 100,000 MSM.

	Newly Diagnosed N (%)		Samples available for LAg test	Recent Infection N (%)		Population	Number of estimated new HIV infections †† (95% CI)		Incidence Rate (95% CI) †	
Total	467	7.8	446	29	6.5	2,172,400	206	175-251	**9.5**	**8.1-11.6**
Age (years)										
16-25	64	4.6	61	8	13	484,400	82	69-100	**16.9**	**14.2-20.6**
26-30	120	7.1	115	10	8.7	212,340	87	74-107	**41.0**	**34.8-50.4**
31-35	154	11.2	144	8	5.6	178,000	44	37-54	**24.7**	**20.8-30.3**
≥36	129	8.3	126	3	2.4	1,297,300	0		**0**	
Sex										
Male	303	9.4	288	23	8.0	990,400	172	145-209	**17.4**	**14.6-21.1**
Female	164	5.9	158	6	3.8	1,182,300	40	34-49	**3.4**	**2.9-4.1**
Probable Route of Infection										
PWID	178	17.1	170	4	2.4	23,400 ¥	0	0	**0**	
MSM	46	24.1	43	14	32.6	2970 ‡	185	156-227	**6229.0**	**5252.5-7643.1**
						8910 ‡‡			**2076.3**	**1750.8-2547.7**
Heterosexual Contact	236	4.9	226	10	4.4	≠	20	17-24	≠	≠

Table 1. Characteristics of persons newly diagnosed with HIV, proportion identified as recently infected using the LAg Avidity EIA, and incidence estimates for Kiev City, Ukraine, April 2013 – March 2014.

Source: State Statistics Service of Ukraine. Ukraine Census .
† per 100,000 population
†† Adjusted for viral load and 3.7% FRR.
≠ Population level data not available
¥ Based on MARP estimates by AIDS Alliance
‡ Derived from the European MSM internet survey (EMIS), where an estimated 0.3% of the male population are MSM
‡‡ Based on MARP estimates by AIDS Alliance, where an estimated 0.9% of the male population are MSM.

CONCLUSION

We estimate HIV incidence in Kiev April 2013- March 2014 to be 9.5 per 100,00, corresponding to 206 new HIV infections in the sampled population during that period, of whom only 29 were diagnosed. This study speaks to the need for targeted testing given that most newly infected individuals are still undiagnosed, who may well be participating in high-risk behaviour. Furthermore, this knowledge base will better enable targeted public health action, health promotion work, laying a foundation to enable local and national guidelines to be developed, and to support work being conducted by government and non-government organisations.

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