Poster #526

Comparisons of Global HIV Incidence: Longitudinal and Cross-sectional Estimates

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Abstract

Background:
The aim is to determine the effect of methodology on HIV incidence estimates from around the world, comparing cross-sectional vs. longitudinally derived estimates stratified by region, risk factors and year

Method:
A literature review obtained the incidence estimate, geographical location, year, risk group, and method used. Estimates using person-time were converted to percent per year. All incidence values described are in percent per year. Four risk groups were considered: CSW, MSM, drug users, and STD clinic attendees. Five methods were reviewed: STARHS, BED, antibody negative/antigen positive (Ab-/Ag+), estimates from HIV prevalence data, and longitudinal estimation.

Results:
The review identified 377 estimates of HIV incidence within 37 countries from 1985 to 2006 from 144 peer-reviewed journal articles. Of the 381 estimates 235 were from longitudinal cohort studies, 98 were STARHS estimates, 24 were from the BED assay, 12 were Ab-/Ag+ estimates, and 8 were estimates from prevalence data. India, Thailand, Kenya, the UK, the Netherlands, Peru, and the US had more than one type of estimate for each risk group. Estimates from prevalence data were, on average, 52% lower than longitudinal estimates. STARHS estimates were fairly consistent with longitudinal estimates in all countries. Ab-/Ag+ tests resulted in higher HIV incidence in CSW in Thailand than longitudinal estimates (25.4% in 1995 vs. 20.3 % in 1994) but much lower incidence in India among CSW (Ab-/Ag+: 1.5% in 1997 vs. longitudinal: 20.5% and 26.1% in 1995). BED estimates were consistently higher than longitudinal estimates in Thai drug-users (17.3% in 2003 vs. 10.2 % in 2002) and higher among US STD clinic attendees (2.5% in 2004 vs. 0.88% in 2002) and US MSM (3.3% in 2004 vs. 1.9% in 2003).

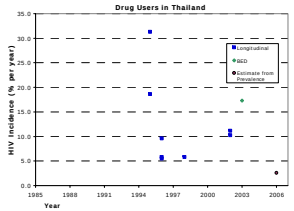
Discussion:
The methodology used affects the incidence estimate. Incidence estimates based on STARHS and those derived from longitudinal cohort studies were similar. The BED assay yielded higher estimates than longitudinal derived data which, in turn, are higher than prevalence based estimates. The Ab-/Ag+ estimates varied in both directions compared to the longitudinally derived data.

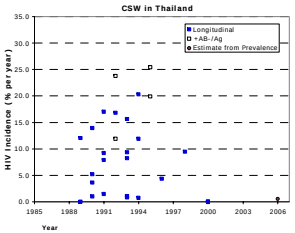
Estimates from Prevalence

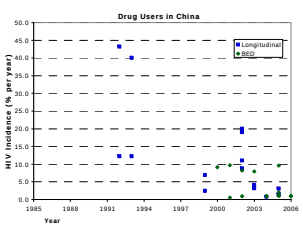
Estimate from Prevalence					Longitudinal Estimate			
Country	Population	Year	Incidence Estimate (% per year)	Reference	Population	Year	Incidence Estimate (% per year)	Reference
Kenya	CSW	2006	1.9	Gouws, E. 2006	CSW	2004	7.7	McClelland, RS. 2006
Thailand	CSW	2006	0.5	Gouws, E. 2006	CSW	2000	0.0	Van Damme, L. 2002
Thailand	DU	2006	2.6	Gouws, E. 2006	DU	2002	11.1	Thaisri, H. 2003
					DU	2002	10.2	Kawichai, S. 2006
Trinidad	STD	1995	3.5	Cleghorn, FR. 1998	STD	1995	6.9	Cleghorn, FR. 1998
Trinidad	STD	1995	4.5	Cleghorn, FR. 1998				

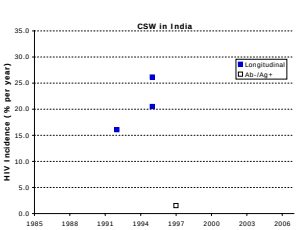
Estimates from prevalence data are, on average, 52% lower than incidence estimates derived from longitudinal cohorts.

References
References are attached below. Estimates are sorted by country, risk group, and method of estimation.









Estimates from BED Assay

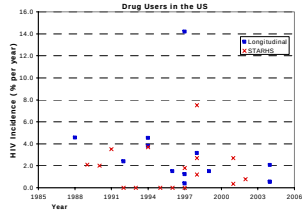
BED					Longitudinal Estimate			
Country	Population	Year	Incidence Estimate (% per year)	Reference	Population	Year	Incidence Estimate (% per year)	Reference
US	MSM	2004	3.3	Truong, HM. 2006	MSM	2002	4.0	CDC, 2004
					MSM	2002	2.4	CDC, 2004
US	STD	2004	2.5	Truong, HM. 2006	STD	2004	4.3*	Truong, HM. 2006
Thailand	DU	2003	17.3	Hu, DJ. 2003	DU	2002	11.1	Thaisri, H. 2003
					DU	2002	10.2	Kawichai, S. 2006
China	DU	2000	9.15	Jiang, Y. 2007				
China	DU	2001	0.57	Jiang, Y. 2007				
China	DU	2001	9.7	Jiang, Y. 2007				
					DU	2002	8.8	Zhang, Y. 2007
China	DU	2002	0.93	Jiang, Y. 2007	DU	2002	11.0	Des Jarlais, DC. 2007
					DU	2002	20.0	Des Jarlais, DC. 2007
China	DU	2002	8.17	Jiang, Y. 2007	DU	2002	20.0	Des Jarlais, DC. 2007
					DU	2002	19.0	Des Jarlais, DC. 2007
China	DU	2003	7.89	Jiang, Y. 2007	DU	2003	3.2	Ruan, Y. 2005
					DU	2003	4.1	Ruan, Y. 2007
China	DU	2004	1.05	Jiang, Y. 2007	DU	2004	0.8	Ruan, Y. 2007
China	DU	2004	0.94	Jiang, Y. 2007				
China	DU	2005	1.12	Jiang, Y. 2007	DU	2005	3.1	Wei, L. 2006
China	DU	2005	1.04	Jiang, Y. 2007				
China	DU	2005	2.07	Jiang, Y. 2007	DU	2005	1.4	Ruan, Y. 2007
China	DU	2005	9.58	Jiang, Y. 2007				
China	DU	2006	1.06	Jiang, Y. 2007				
China	DU	2006	0.9	Jiang, Y. 2007				

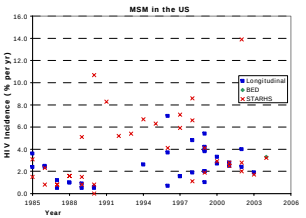
*STARHS estimate

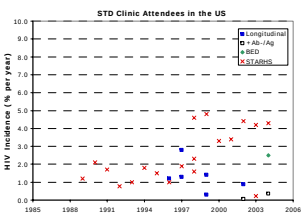
HIV incidence estimates based on the BED assay tend to be higher among Thai drug users and MSM and STD clinic attendees in the US. In China, however, estimates from the BED assay were higher in some instances and lower in others.

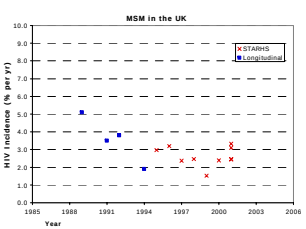
Conclusions

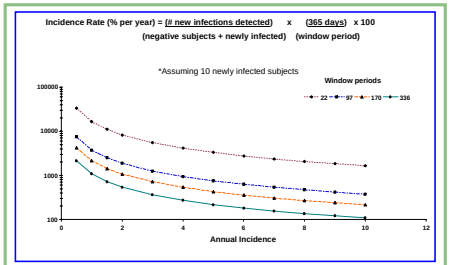
- The method of cross-sectional HIV incidence estimation does impact the estimation of the true incidence
- The STARHS approach was the most concurrent with longitudinal estimates of HIV incidence, however the most common assay used for this algorithm is being phased out of production
- Estimates of incidence from HIV prevalence data were much lower than longitudinal estimates
- The BED assay tended to yield higher incidence estimates, but not consistently so
- The Ab-/Ag+ assays did not have a consistent tendency. It is, however, important to note that these assays have a very small window period which will impact the incidence estimation if the number of sero-negative participants is inadequate











Above is a description of the incidence rate calculation used with a cross-sectional HIV incidence assay. The figure represents the number of negative subjects needed to be tested for a given incidence assuming various window periods (top to bottom: 22 days to 336 days) and a constant number of new infections (n=10).

It is evident that at any given incidence level an assay with a shorter window period will require a larger sample of the population be tested. This also highlights the vast influence the window period of the assay has on the incidence estimate.

Estimates from Ab-/Ag+ Assays

AB-/Ag+					Longitudinal Estimate			
Country	Population	Year	Incidence Estimate (% per year)	Reference	Population	Year	Incidence Estimate (% per year)	Reference
India	CSW	1997	1.5	Bollinger, RC. 1997	CSW	1995	20.5	Mehendale, SM.1995
					CSW	1995	26.1	Mehendale, SM.1996
					STD	1995	10.2	Mehendale, SM. 1995
India	STD	1995	18.6	Brookmeyer, R. 1996	STD	1995	9.2	Brookmeyer, R. 1996
					STD	1995	10.5	Brookmeyer, R. 1996
					STD	1995	10.2	Mehendale, SM.1996
India	STD	1997	9.4	Quinn, TC. 2000				
India	STD	1997	18.5	Quinn, TC. 2000				
Thailand	CSW	1992	11.9	Beyrer, C. 1996				
Thailand	CSW	1992	23.8	Beyrer, C. 1996	CSW	1992	16.8	Kunawararak, P. 1995
Thailand	CSW	1995	19.9	Beyrer, C. 1996				
Thailand	CSW	1995	25.4	Beyrer, C. 1996	CSW	1996	4.31	Kilmarx, PH. 1998
US	MSM	2005	0.2	Stekler, J. 2005	MSM	2003	1.9	Brown, EL. 2006
US	STD	2002	0.05	Pilcher, CD. 2006	STD	2002	0.88	Deren, S. 2004
US	STD	2004	0.36	Patel, P. 2006	STD	2004	4.3*	Truong, HM. 2006
Trinidad	STD	1995	5.0	Cleghorn, FR. 1998	STD	1995	6.9	Cleghorn, FR. 1998

*STARHS Estimate

HIV incidence estimates using the Ab-/Ag+ assays tended to be higher than longitudinal estimates among STD clinic attendees in India but lower than longitudinal estimates among STD clinic attendees and MSM in the US.