

Why We Need Incidence Estimates and What We Do While Waiting for Them

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Incidence ...

- Is the number or proportion of new HIV infections in a particular population in a defined time period
- May be expressed as an absolute number of new cases, as a proportion of the at-risk population who became newly infected or as a rate – must be expressed in terms of a specific time period, e.g., a year
- Examples: “129 incident cases among 2500 people in Cohort A in 2005,” “5.2% annual incidence in 2005,” or “5.16 per 100 person-years”

Incidence ...

- Adds critical information to understanding where the epidemic is right now – How many new infections are happening? Where? In what populations?
- Some call it a “gold standard” in evaluating effectiveness of prevention strategies and interventions
- Theoretically, would include the entire population of interest, e.g., whole country, all women, African American MSM, etc.

However, incidence

- Can be directly measured in relatively small, defined populations (like a cohort study or clinical trial) where everyone can be tested at the beginning and at the end of a period, or regularly
- **Must usually be estimated rather than directly measured at the population, community, state or national level (basically because not everyone gets tested regularly)**

And estimation has been difficult!

- An early method was **back calculation**, using the number of AIDS cases and the knowledge of the average time from HIV infection to AIDS to estimate how many HIV infections must have occurred in what year. Problems arose when definition of AIDS changed and when the “incubation period” changed with effective treatment
- For an excellent presentation of this, see Lee and Mckenna, “Monitoring the Incidence of HIV Infection in the United States,” *Public Health Reports*, 2007 Supplement 1, 122:72-79.

Estimating incidence

- **Data synthesis** is another approach, combining data from defined cohort studies, estimated sizes of populations at risk, and the relationship between incidence and prevalence
- This is basically the method behind the CDC's estimate of 40,000 new infections a year in the US ... the same since 1994

New technology and new methods

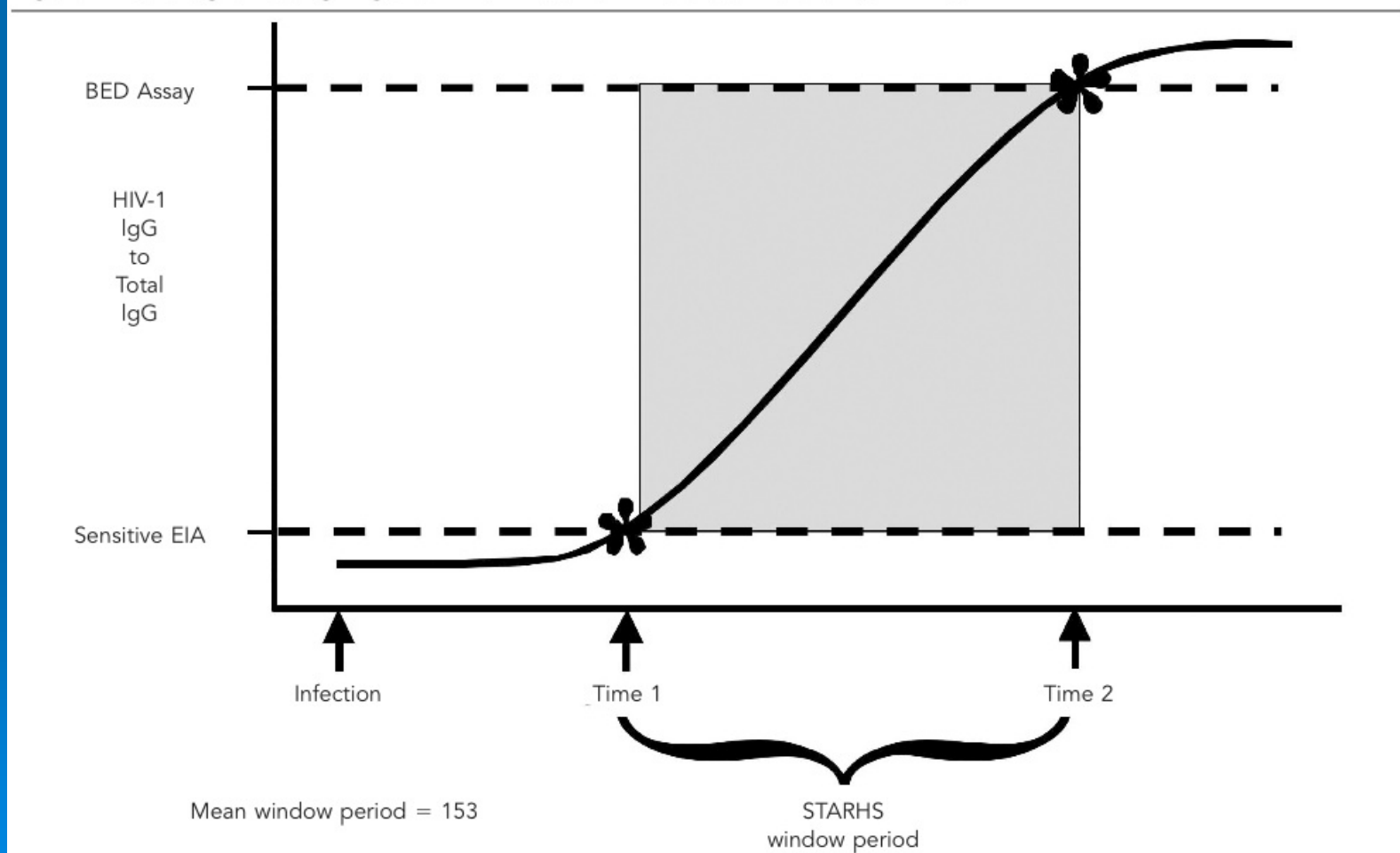
- “Snapshot estimator” approach uses instead biological markers of HIV progression to categorize diagnosed infections as “recent” or “longstanding”
- Based on knowing the time it takes on average to pass key transition points (such as from HIV infection to antibody positive), can calculate the number of new infections that must occur to result in the number of people observed to be in the “recent” category
- Detuned assay and the STAHRs approach has turned out to be the best of the markers tested

New Incidence Surveillance and Estimation System

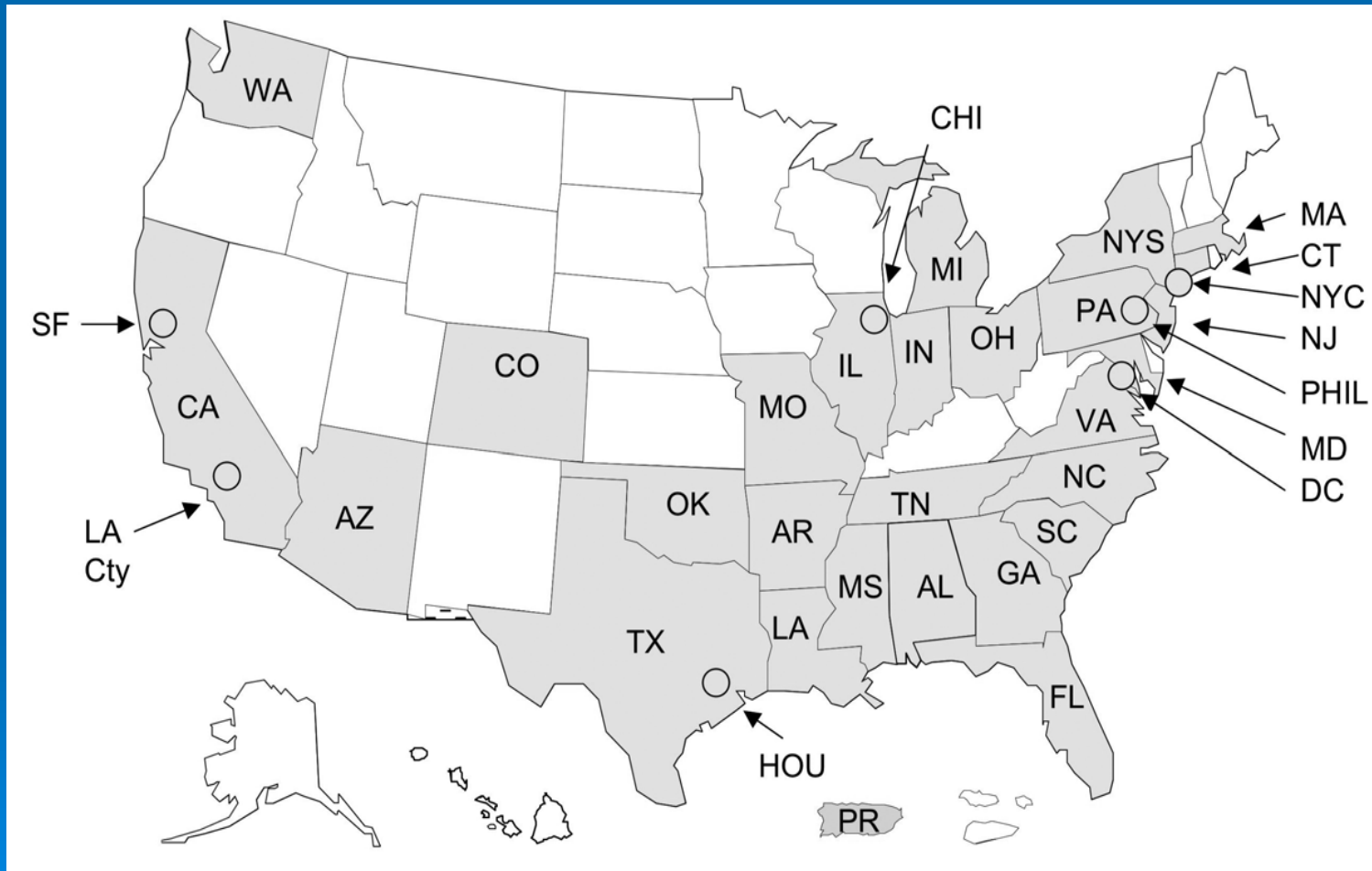
- CDC convened and consulted experts
- Developed a new detuned assay, “BED”
- Decided to based the new system on the current HIV case-report-based surveillance system with some additional information (esp. testing history)
- Piloted the system, then funded it in 34 states and other jurisdictions, of “moderate-to-high-morbidity” (covering approx. 85%)
- First national estimates based on this system currently under peer-review, hopefully out soon

Serologic Testing Algorithm for Recent HIV Seroconversion (STARHS)

Figure 1. Serologic Testing Algorithm for Recent HIV Seroconversion (STARHS)



34 jurisdictions implementing HIV incidence surveillance, August 2005



Other key points

- Based on direct measurement of as many as possible newly reported HIV infections (excluding those from those diagnosed with AIDS at same time, already treated, already reported before, etc.)
- Based on the existing HIV reporting system and will need that to be fully mature before incidence estimates are optimal
- However, many new cases will not have an available specimen and/or complete data
- In any event, only those new cases who get tested have a chance to be included!

So, the devil will be in the details (of the estimate process and its assumptions)

- Each case will be weighted proportionately to what it is estimated to represent among the WHOLE of new infections
- The initial estimate will be a new baseline, and will be national in scope without many breakdowns. It will take at least 3 years to begin to assess trends, and at least that long to have breakdowns we want by populations, states and other jurisdictions
- This is complicated and I/we can point you to how to figure out the details if interested
- **Bottom line:** We will have a better estimate than the “eternal 40,000,” but it will still be an estimate

In the meantime

- We can get a lot of information from the surveillance reports, if we read them correctly and carefully
- The 38 states and jurisdictions with complete HIV reporting are actually fairly representative of the country:
 - Alabama, Alaska, Arkansas, Colorado, Florida, Idaho
 - Indiana, Iowa, Kansas, Louisiana, Michigan, Minnesota
 - Mississippi, Missouri, Nebraska
 - Nevada, New York, New Jersey, New Mexico
 - North Carolina, North Dakota, Ohio, Oklahoma
 - South Carolina, South Dakota, Tennessee, Texas
 - Utah, Virginia, West Virginia, Wisconsin, Wyoming
 - Puerto Rico, USVI

Highlights

- African Americans and gay and bisexual men of all races continue to be most severely affected
- Estimated total HIV infections in the 38 jurisdictions remained stable, with modest increases among MSM, decreases among IDU, women and especially children
- In all states, newly diagnosed AIDS cases stable between 2002 through 2006, while deaths decreased, meaning more people living with AIDS

Conclusions

- We don't yet have a good new estimate of the annual incidence of HIV in the U.S.
- Preliminary evidence points to that number being significantly higher than the old 40,000 estimate, but not necessarily rising
- Whatever it is, it is too high and there is no evidence that it is declining!
- We are as a nation still not doing nearly enough effective prevention to end this epidemic.