Welcome to Week #9 entitled “Surveillance for HIV/AIDS”. There is only one set of lecture notes this week.

This session is intended to introduce the student to the global HIV/AIDS epidemic. Surveillance on both HIV and AIDS is conducted on county, state, national and global levels. This has produced an extensive amount of data. But remember from the first week, that collecting the data is only one part of surveillance. Data must be analyzed, interpreted, evaluated, fed back to those who need to know and have public health interventions designed from them. HIV/AIDS surveillance also illustrates the different types of surveillance, uses of surveillance and provides opportunities for planning, intervention and evaluation. We will use data on HIV/AIDS this week in order to learn and apply the principles of surveillance from this course. Before you go further, please make sure you have read the Required Readings for this week.

Sources of HIV/AIDS surveillance data are numerous. County and state health departments conduct and report data on HIV and AIDS. The Centers for Disease Control & Prevention have conduct surveillance and produce regular surveillance reports. The WHO/UNAIDS conduct and report data on AIDS on a global scale and produce a global report every two years. We will give a few examples of HIV/AIDS surveillance data to illustrate the different sources of surveillance.

In April 2014, the CDC revised the case definitions for HIV used for surveillance purposes. For persons 18 months or older, there are two means to identify a case: laboratory results or clinical findings. The same criteria are used for infants less than 18 months, if the mother is not HIV+. There are special case definitions for children less than 18 months who were born to an HIV infected mother.
**Slide 5**

**HIV Case Definitions**

**Laboratory Evidence**
- Multi-test algorithm
- 2 different methods/types
  - (+) initial HIV test
  - (+) supplemental test

**Clinical Findings**
- Combination of:
  - Note in medical record by medical provider stating pt. has HIV
  - One of the following:
    - Lab tests + after note written
    - Presumptive evidence of HIV infection

To meet the laboratory based case definition for HIV, a patient must initially test positive for HIV on an antibody or antibody/antigen test. The patient must also test positive on a second supplemental or confirmatory test which uses a different method. The clinical case definition is met if there is a note in the medical record by a physician or other qualified medical provider stating the patient has HIV infection and, one or both of the following: 1) lab tests were drawn after the note was written and were positive or 2) there is presumptive clinical evidence of HIV infection. Examples of presumptive evidence of HIV infection are: the patient is taking HIV antiretroviral therapy or prophylaxis for an opportunistic infection, an otherwise unexplained CD4+ lymphocyte count, or an otherwise unexplained diagnosis of an opportunistic infection. The list of HIV related opportunistic conditions is lengthy and includes diagnoses such as cytomegalovirus disease, histoplasmosis, and toxoplasmosis of the brain. *This list can be found in Appendix A of Supplemental Reading #1.*

**Slide 6**

**HIV Stages**

- **Stage 0** - early
- **Stages 1, 2, 3** - based on CD4+ lymphocyte counts
- **Stage 3** - if diagnosed with opportunistic illness *(unless Stage 0)*
- **Unknown**

Once it is determined that the individual meets the case definition for HIV, they are classified according to stages of infection. These stages were established for the purposes of surveillance and may not be appropriate for patient care, clinical research, or other purposes. Stage 0 is for early HIV infection, defined by a negative or indeterminate HIV test within 6 months preceding a positive result. Stages 1, 2, 3 are based on CD4+ lymphocyte counts. If a stage 3-defining opportunistic illness has been diagnosed, then the stage is 3 regardless of the CD4+ lymphocyte counts unless the patient meets the criteria for Stage 0. Cases may be classified as unknown if information is not available regarding their CD4+ lab values and there is no documentation of a diagnosis of an opportunistic infection.

Because these case definitions were only recently released, the surveillance data we are going to review in this lecture uses the term “AIDS”. In the new case definitions, this is termed “HIV Stage 3”.

**Slide 7**

**AIDS Cases from 1995 to 2014**

<table>
<thead>
<tr>
<th>Single-Year Rate Per 100,000 Population</th>
<th>Rate Per 100,000 Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hillsborough County</td>
<td>State of Florida</td>
</tr>
</tbody>
</table>

This table, from the Florida Department of Health CHARTS program, shows the number of HIV cases per 100,000 population for each year from 1995 to 2014. Rates are provided for Hillsborough County and the State of Florida. The acronym CHARTS stands for “Community Health Assessment Resource Tool Set”.

Slide 8

This table, also from the Florida Department of Health CHARTS program, shows the total deaths from HIV/AIDS per 100,000 population for each year from 1995 to 2014 for Hillsborough County and for the entire State of Florida.

Slide 9

On this slide are two sources for Florida state surveillance on HIV/AIDS. The first is the Florida Department of Health. They conduct a variety of different types of surveillance. This includes HIV/AIDS by county, by ethnicity, by month, by women, by transmission category. The website for the Florida Department of Health’s HIV/AIDS Homepage is: http://www.doh.state.fl.us/Disease_ctrl/aids/index.html. The second source for state data is entitled “Statehealthfacts.org” (and its website has the same name). This website provides state-by-state information in numerous categories. In addition, it compares the HIV/AIDS data per state to the U.S. data as a whole. Let’s look at examples of data from each of these two sites.

One of the benefits of ongoing surveillance is the ability to track trends and determine progress in efforts to prevent the spread of disease. The third link on this page leads to a figure provided by the Florida Department of Health. When comparing HIV incidence rates from 2006-2008 with those from 2010-2012, 33 of the 67 counties in Florida experienced a decrease and the remaining 34 had no significant differences. None of the counties had increases.

Slide 10

Here is an excerpt of data from the Florida Department of Health. This figure depicts HIV Infection Case Rates, by county of residence at the time of diagnosis, Florida, 2014. The numbers on counties are cases reported and the counties are color-coded based on ranges of rate.

The source of these data is: http://www.floridahealth.gov/diseases-and-conditions/aids/surveillance/epi-slide-sets.html

Note: Population data were reported by the Florida CHARTS program as of 4/27/2015. County totals exclude Department of Corrections cases (N=108).

Please note: Most surveillance data have a 1-2 year time lag.
Here is another set of data from the Florida Department of Health. It represents adult HIV infection cases by mode of exposure, reported in the United States and Florida, in 2013 and 2014, respectively. The green colors in the pie chart are the percentage of cases among men who have sex with men (MSM); yellow is heterosexual transmission; blue is injection drug use; pink is MSM who also use injection drugs and black is “other”.

On this slide, again from the Florida Department of Health, two pie charts are displayed. The one on the left depicts cases of HIV infection among adults and the chart on the right, the number of AIDS cases in adults, reported in Florida in 2014. Let’s review some information from the bottom part of this figure. The higher proportion of MSM among HIV infection cases (59%) compared to AIDS cases (45%) is indicative of a possible resurgence of HIV among MSM. This is due to HIV infection cases representing a more recent picture of the epidemic.

For HIV/AIDS, at StateHealthFacts.org, a wealth of information is available. Examples of categories of information include but are not limited to the following:
1) HIV Diagnoses
2) Annual HIV Diagnosis Rate
3) AIDS Diagnoses
4) Annual/Cumulative AIDS Diagnosis Rate
5) Persons Living with HIV
6) Annual Rates of Persons Living with HIV
7) Mortality
8) HIV/AIDS Funding/Testing
9) HIV in Prisons

On the website listed under the categories and subcategories, click on a category, sub-category, or topic to control how much of the Florida profile you would like to view. To see Global Health data as well, cut and paste the link on the bottom right of this slide to your browser:

http://kff.org/globaldata/.
One of the most comprehensive sources of national surveillance data on HIV/AIDS is the Centers for Disease Control & Prevention (CDC). One website contains all of the different types of HIV/AIDS statistics and surveillance data available:  
Another site contains numerous slide sets:  

On the left side of this slide are examples of data categories on HIV/AIDS including:

• HIV Prevalence Estimate
• HIV Incidence Estimate
• Diagnoses of HIV Infection
• Diagnoses of HIV Infection, by Age/Race/Ethnicity/Transmission categories
• HIV Diagnoses, by Top 10 States/Dependent Areas
• Surveillance systems
• Surveillance reports
• Slide sets
• Recommendations & guidelines
• Other resources
• Resource library

The CDC has also added an HIV/AIDS Interactive Atlas, which can be accessed at:  
http://www.cdc.gov/NCHHSTP/Atlas/  
This interactive map allows the user to build queries based on state, year, sex, age, transmission category and race/ethnicity. You are encouraged to go to this website and work with this atlas.

On the right side of this slide are different surveillance resources available, including surveillance systems, reports and slide sets, recommendations and guidelines, other resources and a resource library.

Here is an example of surveillance data provided by the CDC. This is slide #9 from the set entitled, “HIV Surveillance - Epidemiology of HIV Infection (through 2013)”. This graph shows the number and percentage of diagnoses of HIV infection among Adults and Adolescents, in 2013, in the United States and 6 U.S. Dependent areas, according to transmission category.


Of the 47,958 HIV infections diagnosed in 2013 among adults and adolescents, approximately 65% were attributed to male-to-male sexual contact. An additional 3% of diagnosed infections were attributed to male-to-male sexual contact and injection drug use.

Injection drug use accounted for 7% of diagnosed HIV infection, heterosexual contact accounted for 26%. Other
transmission categories accounted for <1% of diagnosed HIV infections.

Because column totals for estimated numbers were calculated independently of the values for the subpopulations, the values in each column may not sum to the column total.

This is slide #5 from the same source as the previous slide (http://www.cdc.gov/hiv/pdf/g-l/cdc-hiv-genepislideseries-2013.pdf). It is titled “Diagnoses of HIV Infection among Adults and Adolescents by Sex and Transmission Category, 2013-United States and 6 Dependent Areas”.

In 2013, among adult and adolescent males diagnosed with HIV infection in the United States and 6 dependent areas, an estimated 81% of infections were attributed to male-to-male sexual contact, 10% to heterosexual contact, 5% to injection drug use, 3% to male-to-male sexual contact and injection drug use, and less than 1% to other transmission categories.

Among adult and adolescent females, 86% of diagnosed HIV infections were attributed to heterosexual contact, 13% were attributed to injection drug use, and 1% to other transmission categories.

Data include persons with a diagnosis of HIV infection regardless of stage of disease at diagnosis. All displayed data are estimates. Estimated numbers resulted from statistical adjustment that accounted for reporting delays and missing transmission category, but not for incomplete reporting.

Heterosexual contact is with a person known to have, or to be at high risk for, HIV infection.

Other transmission categories include hemophilia, blood transfusion, perinatal exposure, and risk factor not reported or not identified.
This is slide #6 from another CDC slide set. This specific set is entitled, “HIV Surveillance- Adolescents and Young Adults, (through 2013)”. It describes the distribution of diagnoses of HIV infection by sex varied with age group at diagnosis in the United States and 6 dependent areas. (Source: http://www.cdc.gov/hiv/pdf/statistics_surveillance_Adolescents.pdf)

In 2013, the distribution of diagnoses of HIV infection by sex varied with age group at diagnosis in the United States and 6 dependent areas. In 2013, females accounted for an estimated 19% of adolescents aged 13 to 19 years diagnosed with HIV infection, compared with 11% of young adults aged 20 to 24 years and 22% of adults aged 25 years and older.

Data include persons with a diagnosis of HIV infection regardless of stage of disease at diagnosis. All displayed data are estimates. Estimated numbers resulted from statistical adjustment that accounted for reporting delays, but not for incomplete reporting. Age group assigned based on age at diagnosis.

This is slide #8 from the CDC slide set entitled, “HIV Surveillance in Women (through 2013)”. This slide presents the estimated rates (per 100,000 population) of diagnoses of HIV infection in 2013 among adult and adolescent black/African American, Hispanic/Latino and white females by region of residence in the United States. Most diagnoses of HIV infection among adult and adolescent females were among those who resided in the Northeast and the South.


The highest rates of diagnoses of HIV infection were among black/African American females in the Northeast (39.8) and in the South (38.9).

The highest rate of diagnoses of HIV infection among Hispanic/Latino females was in the Northeast (16.8).

The highest rate of diagnoses of HIV infection among white females was in the South (2.5).

Data are not shown for Asian, American Indian/Alaska Native and Native Hawaiian/other Pacific Islander females or females of multiple races because the estimated numbers when stratified by region of residence are small.

Regions of residence are defined as follows:

Midwest—Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin

South—Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia

West—Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming

All displayed data are estimates. Estimated numbers resulted from statistical adjustment that accounted for reporting delays, but not for incomplete reporting.

Hispanics/Latinos can be of any race.

On a global scale, there have been recent advances for collecting and maintaining surveillance data on HIV/AIDS. First is United Nations AIDS or UNAIDS. The main link is located on this slide. The World Health Organization has a link to HIV surveillance data. The Pan American Health Organization (or PAHO) collects HIV/AIDS Surveillance data on the Caribbean region. The link to the Kaiser Family Foundation uses the UN AIDS Report to provide detailed data on some of the information from the latest report. Finally, AIDSinfo, part of UNAIDS, contains surveillance data in an interactive format.
Now let’s look at a few examples of what is available on a global scale for HIV/AIDS surveillance data. A summary of surveillance is produced by the Joint United Nations Programs on HIV/AIDS. UNAIDS publishes a new "Report on the Global AIDS epidemic" every two years. The report draws upon and publishes the best available data from countries and provides an overview and commentary on the epidemic and the international response. As of the end of 2014, approximately 36.9 million people (ranging between 34.2 - 41.4 million) were estimated to be living with HIV. This map, from the UNAIDS 2015 Report, shows the global prevalence of HIV in 2014.

Source:

This example is a map depicting a global picture of the estimated deaths in adults and children from AIDS, by region, just in the year 2014, from the UN/AIDS report.

Source:

This is a summary of statistics provided in the same epidemiology slide set as the previous 2 slides. Of the number of 5600 new HIV infections that occurred per day in 2014, the following statements could be made: 1. Cases in Sub-Saharan African account for 66% of new infections. 2. About 600 are in children under the age of 15 years. 3. About 5000 of the new HIV infections are in adults aged 15 years and above of whom approximately 48% are women and 30% are among those aged 15-24 years.

Source:
This table from the UN/AIDS report is entitled “Regional HIV & AIDS Statistics and Features, 2014”. For the 7 regions, information is provided on adults and children living with HIV, adults and children newly infected with HIV, adult prevalence by percent, and adult & child deaths due to AIDS.


This is an interactive map from the AIDSinfo website which allows both global and country views of, people living with HIV, country profiles, new HIV infections, number of AIDS-related deaths and treatment, just to name a few examples. This map is entitled “People Living with HIV (all ages)”. Those with the darkest color indicate greater than 6.6 million persons, second darkest = 2.4-6.6 million, bright red indicates 1.5-2.4 million, pink is less than 1.5 million and there are no data in the gray areas.

Please take a few moments to cut and paste the url into your browser and explore this site. Try looking at graphs as well as maps for a few of the categories.

This is a sample of a graph that can be generated from the AIDSinfo website. This particular graph contains the coverage of people receiving antiretroviral therapy (ART), all ages.

Source: http://aidsinfo.unaids.org/

These data from a global perspective are staggering. The implications for those charged with public health are extensive, and require careful analysis of the data and planning of interventions. Imagine that you are a public health official charged with collecting, analyzing and interpreting surveillance data on HIV/AIDS, with the purposes of feeding this information to those who need to know as well as designing planning for prevention. After just a few examples from this lecture, it is clear that the sources of HIV/AIDS surveillance data are almost overwhelming.
Extra Credit Activity #2

1. Select one data set on HIV/AIDS
2. Select the 5 slides you think most important
3. Design 2 public health prevention strategies

For this reason, I have designed an extra credit activity. It has two purposes. First, to reduce a large data set to a manageable summary. Second, to design planning strategies for prevention of this disease, based on a given set of data. You are to select one data set. I have provided state, national and global data sets. For your selected set, you are to first reduce the set to 5 slides you think are most important and second, formulate two planning strategies based on the data you have selected. This activity is worth up to 2 points to be added to the Assignment portion of your grade. For more instructions on this activity, check the Assignment folder for this week.

This concludes the lecture for Week #9.