The Use of a Rapid Syphilis Test with Specimens from an HIV Cluster Investigation in Rural West Virginia

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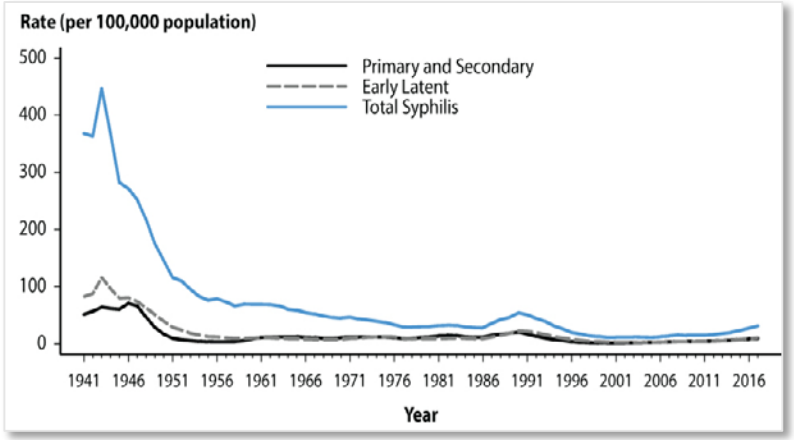
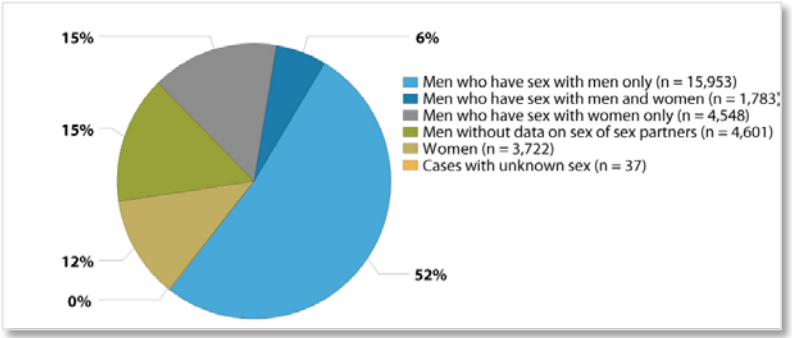
Syphilis in the United States

Syphilis – Rates of reported cases by stage of infection, U.S., 1941-2017



Distribution of primary and secondary syphilis by sex and sexual behavior, U.S., 2017



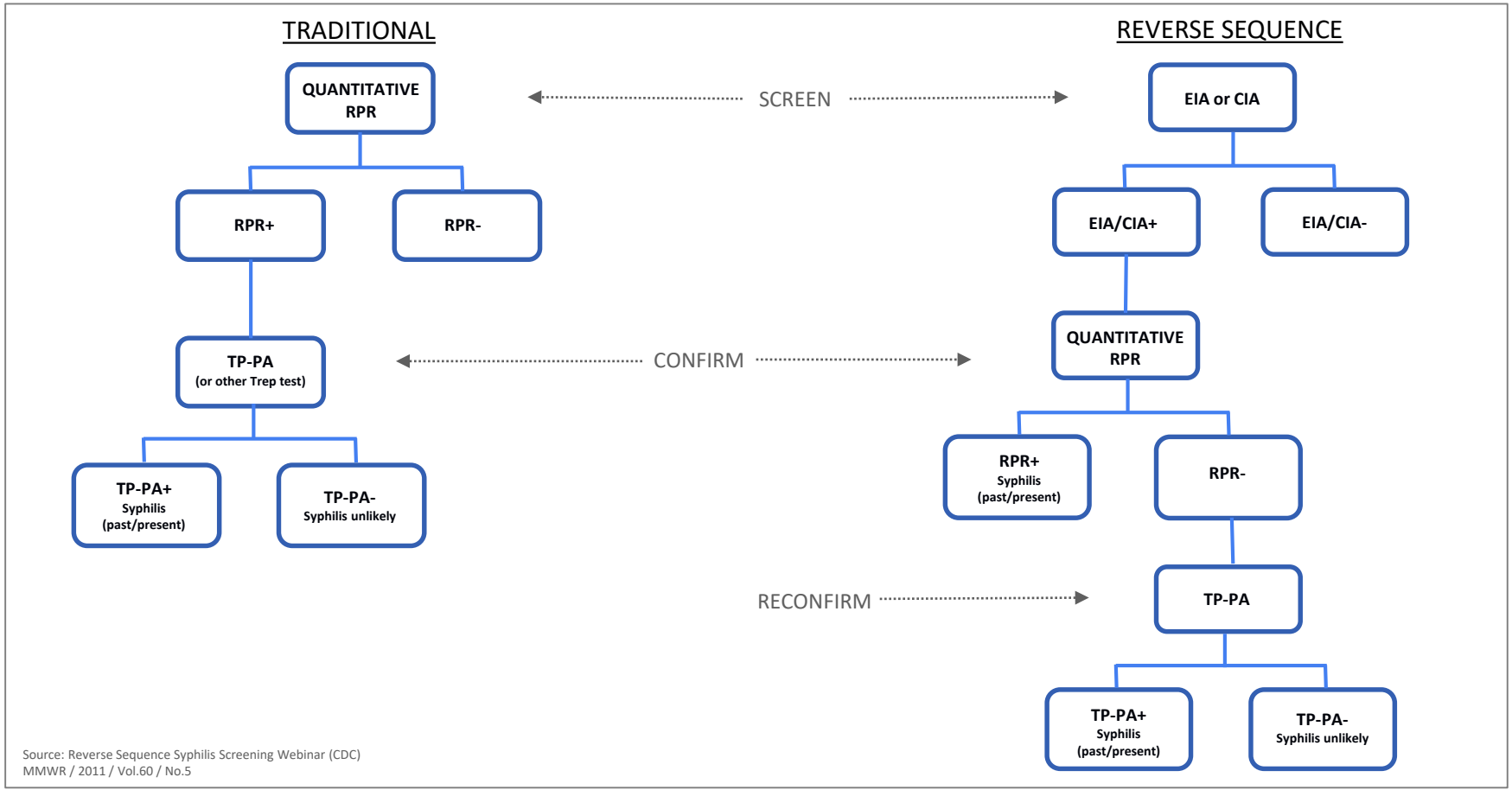
- Syphilis is a sexually transmitted infection that can progress to primary, secondary, latent (early, late) and tertiary stages if left untreated
- The total number of reported primary and secondary syphilis cases increased 10.5% from 2016 to 2017
  - Men ↑9.0%
  - Women ↑21.1%

Sexually Transmitted Disease Surveillance, 2017, CDC
https://www.cdc.gov/std/stats17/fignatpro.htm#syph

Diagnosis of Syphilis

- Causative agent: bacterial spirochete *Treponema pallidum* subsp *pallidum*
- Clinical history/evaluation
  - Primary syphilis: ulcers, chancres at the infection site
  - Secondary syphilis: skin rash, mucocutaneous lesions, lymphadenopathy
  - Latent: lack of clinical manifestations
  - Tertiary: cardiac, gummatous lesions, tabes dorsalis, general paresis
  - Neurosyphilis, ocular and otic symptoms
- Direct detection – focus on *T. pallidum*
  - Dark field microscopy
  - Polymerase chain reaction (PCR) / Nucleic acid amplification test (NAAT) - investigational
- Indirect detection – focus on humoral immune responses to *T.pallidum*
  - Nontreponemal assays
    - Detects antibodies targeting lipoidal antigens from damaged host cells and *T.pallidum T.pallidum* cell wall, host immune responses
    - Rapid plasma regain (RPR), Venereal Disease Research Laboratory (VDRL), automated instruments
  - Treponemal assays
    - Detects antibodies specific to *T.pallidum*
    - *Treponema pallidum* particle agglutination assay (TP-PA), Trep-Sure enzyme immunoassay (EIA), chemiluminescence immunoassays (CIA), automated EIA/CIA

Current algorithms



Source: Reverse Sequence Syphilis Screening Webinar (CDC)
MMWR / 2011 / Vol.60 / No.5

Rapid Syphilis Test

- Simple – minimal training
- Portable – not limited to laboratory setting
- Quick turnaround - Prevent loss to follow-up and facilitate immediate linkage to care/treatment
- Cost-effective

- Syphilis Health Check
  - Qualitative lateral flow immunochromatogaphic assay
  - The only FDA-cleared and CLIA-waived rapid syphilis test in the U.S.
  - Relatively new test (2011)
  - A need for improved understanding of test performance in various stages of syphilis, in context of co-infections (e.g. HIV), special and/or high risk populations

https://www.trinitybiotech.com/products/syphilis-health-check-3/

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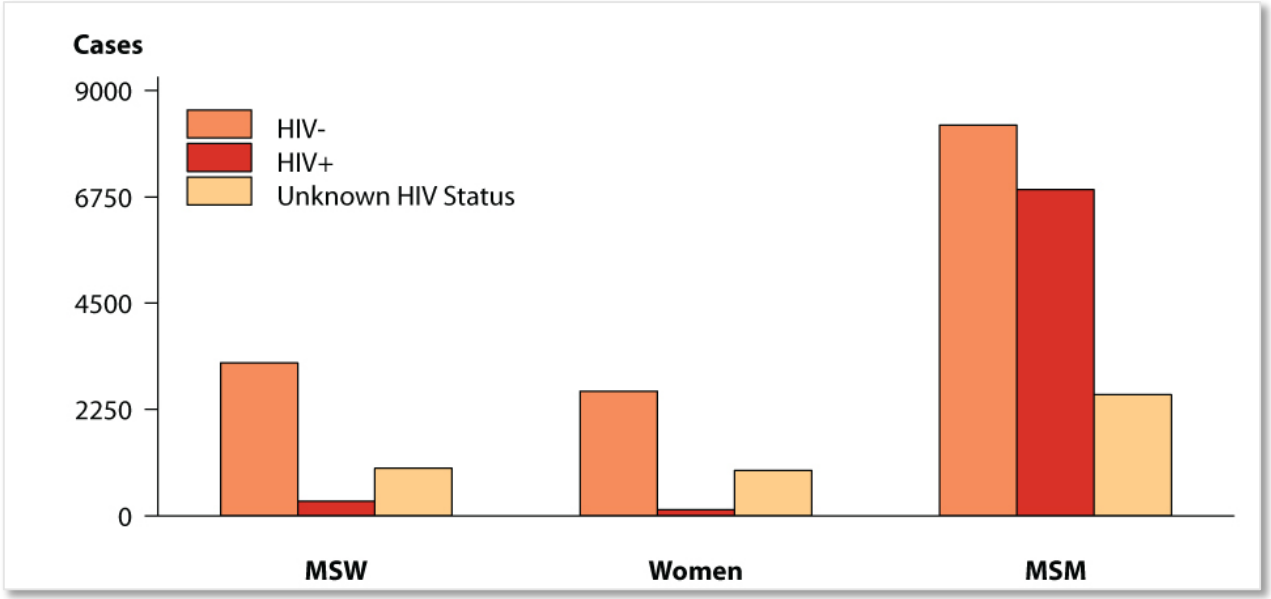
Syphilis and HIV co-infection

Reported cases of primary and secondary syphilis by sex, sexual behavior, and HIV status, U.S. 2017



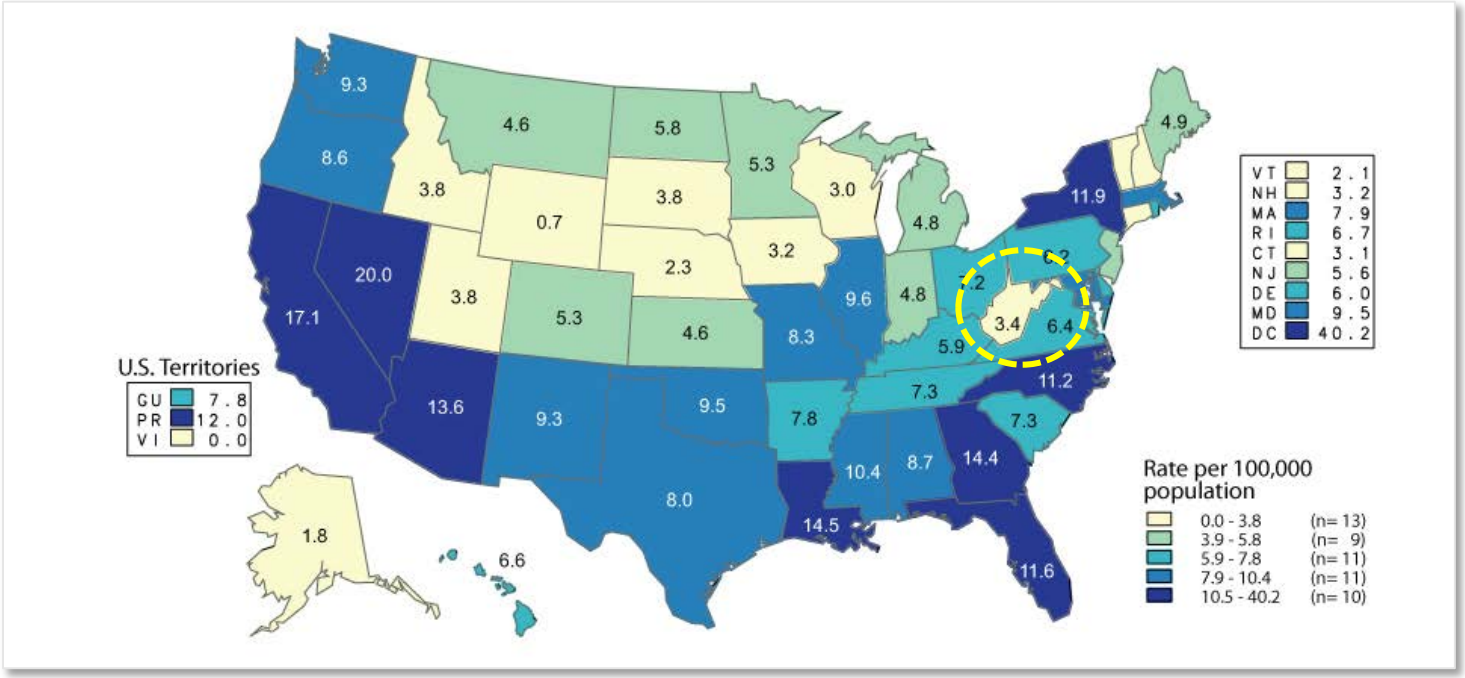
- High rate of HIV co-infection, particularly among MSM
- Among P&S syphilis cases with known HIV status:
  45.5% of MSM were HIV+ | 8.8% of MSW were HIV+ | 4.5% of women were HIV+

Sexually Transmitted Disease Surveillance, 2017, CDC; https://www.cdc.gov/std/stats17/fignatpro.htm#syph

HIV Cluster Investigation in W. Virginia

BACKGROUND

Rates of reported primary and secondary syphilis cases by state, United States and outlying areas, 2017



Sexually Transmitted Disease Surveillance, 2017, CDC
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HIV Cluster Investigation in W. Virginia

BACKGROUND

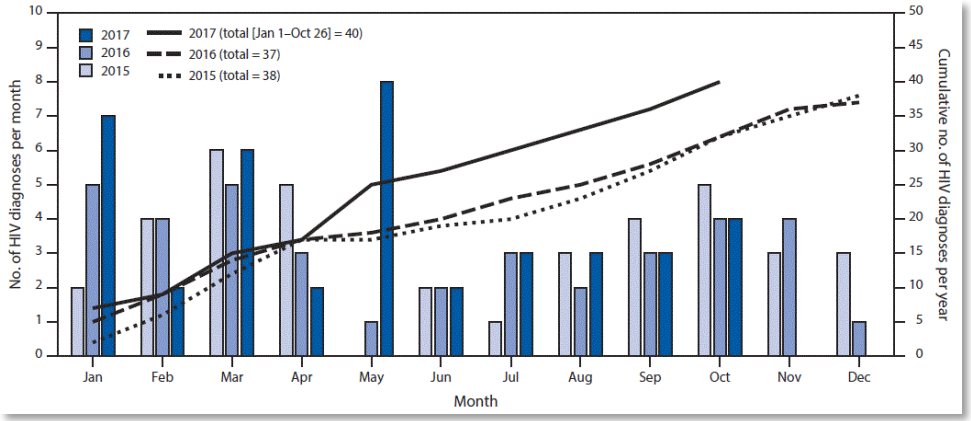
Jan-Jul 2017
- **10 HIV+** cases in **3 counties**
- Injection drug use (IDU) area

Jul 2017
- 9/10 HIV+ cases were MSM
  - 2/9 HIV+ MSM were IDU
- 5/10 HIV/syphilis+
- 3/10 HIV/Hep B+
- 2/10 HIV/Hep C+

Sep 2017
- Contact tracing included **15 counties**

Oct 2017
- **47 HIV+** cases
  - 87% male
  - 55% 20-29 yrs
  - 62% MSM
  - 11% IDU

HIV cluster by county, W. Virginia, 2017



Number of HIV diagnoses/month and cumulative number of diagnoses/year in 15 W. Virginia counties, 2015-2017

Evans ME, Labuda SM, Hogan V, et al. *Notes from the Field*: HIV Infection Investigation in a Rural Area — West Virginia, 2017. MMWR Morb Mortal Wkly Rep 2018;67:257–258. DOI: http://dx.doi.org/10.15585/mmwr.mm6708a6

Study Objectives

- Evaluate performance of rapid syphilis test in a high risk population
- Comparative assessment with traditional lab-based syphilis diagnostic serology tests

Methods

27 Residual serum specimens

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RPR

INNO-LIA

TP-PA

SHC

Trep-Sure

Methods

- Specimen details blinded
- Manual RPR testing performed in W. Virginia; results blinded

27 Residual serum specimens

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RPR

INNO-LIA

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Results

Diagnostic Test	Non-reactive	Reactive
 SHC	27/27	0/27
 RPR	27/27	0/27
 TP-PA	27/27	0/27
 Trep-Sure	27/27	0/27
 INNO-LIA	27/27	0/27

Unblinded W. Virginia data:

Non-reactive: 27/27

Reactive: 0/27

27 contacts from HIV+ confirmed cases

Conclusions and Future Directions

- 100% specificity for Syphilis Health Check
  - All 27 residual serum specimens were non-reactive
  - No false positives
- Test sensitivity could not be evaluated
- Results in agreement with RPR results performed by W. Virginia W. Virginia Department of Health and Human Resources, Office of Laboratory Services
- Syphilis Health Check results in agreement with standard laboratory-based treponemal assays
- Findings may broaden understanding of rapid syphilis test performance in the context of outbreaks
- Evaluate performance using larger specimen set, as available
  - Determine correlations, if any, between rapid syphilis test results and co-infection(s) with HIV and other STIs

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