

Automated Syphilis Electronic Laboratory Processing

Effectively and Accurately Identifying Priority Syphilis Cases

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Overview

Florida Department of Health (Florida Health) created an effective algorithm to automate syphilis laboratory result processing and would like to share it with other jurisdictions to improve case assignment accuracy and prioritization. This tool outlines key steps and some key considerations for jurisdictions looking to adopt the algorithm.

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Background

Florida Health's original system for syphilis laboratory processing was inefficient:

1. It had a reactor grid that improperly assigned many laboratory results that were non-cases (due to biological false positives and serofasting patients) for investigation.
2. It had many steps that required human initiation and management, including determining which test results represented a case that required follow-up. Some test results, including those that were duplicative or discordant, required secondary/supervisory case review.

To improve efficiency of processing their syphilis lab results, Florida Health developed and automated a new algorithm that allows priority results to be more easily identified and assigned for investigation and follow-up.

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New Algorithm

Florida Health developed a new automatic algorithm to improve the process. The algorithm needed to address both the reactor grid and the steps that required human input.

The algorithm development was an iterative process that took a number of years. The final result is a three-step process:

1. Update the profile and match to an individual (bundle non-treponemal and treponemal labs).
2. Apply algorithm in processing test results:
 - Test results are either potential cases, likely biological false positive (BFP), or non-cases.
 - Filters out biological false positives and serofasting¹ or persons in the process of seroreverting.² Automation closes BFP and non-cases.
 - Assigns remaining cases to staff for investigation.
3. Provide treponemal-only test results.
 - Individuals would ideally have both a non-treponemal and a treponemal test. If there is only a treponemal test, the case is “held” for a specified length of time to determine if a non-treponemal test was done. For people of childbearing capacity and age, the test is only held for 24 hours before determining whether to send it to the field. For those who are not people of childbearing age, the test is held for 72 hours.

¹ Individuals who do not have adequate decreases in their titers following treatment are considered to be serofasting.

² Individuals whose test results change from a positive to negative results following treatment are considered to be seroreversed.

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Impact

Impact of the new algorithm:

1. The level of specificity has tripled.
2. Positive predictive value has doubled.
3. Saves more 11,000 hours of work per year (the equivalent of over five full-time employees).

The initial results of the algorithm are very promising and a full evaluation is planned for 2023.

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Implementing the Algorithm

Adopting this algorithm may benefit jurisdictions that experience any of the following:

1. High volume of tests for an individual infection. Florida had an average 2.4 tests per person (quantitative and qualitative non-treponemal tests and a treponemal test).
2. Reactor grid is inefficient and/or missing cases. Florida disease investigators were doing a lot of work without much payoff, as Florida's original reactor grid had approximately eight non-cases for every case that was reported (positive predictive value of 15.5%).
3. A need to:
 - Filter out results that are more likely to be actual cases.
 - Prioritize cases.
 - Have a process more aligned to the syphilis case definition.

Florida Health faced some challenges while implementing the new algorithm. Other jurisdictions that adopt and implement the algorithm should be aware of these potential barriers:

1. Name matching. If an individual has multiple tests completed with variation in their names, there will be difficulty in matching their lab results together.
2. Negative labs being left in the holding table. The holding table is a place where electronic laboratory results are received by the program before inclusion within surveillance system and algorithm processing.
3. Bundling treponemal and non-treponemal tests and quantitative and qualitative results for smoother algorithm processing.

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Next Steps

Do you think your jurisdiction would benefit from an updated syphilis algorithm? The Florida Health team would like to support other jurisdictions interested in implementing their algorithm.

The algorithm can be adapted for your jurisdiction's needs. A similar algorithm can be used for laboratory processing and case determination for many infectious diseases, including syphilis, gonorrhea, chlamydia, hepatitis, or HIV.

For additional information, reach out to DCHP.STD.Feedback@flhealth.gov.