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An estimated 5 million patients globally benefit every day from our innovative technologies and services in the areas of diagnostic and therapeutic imaging, laboratory diagnostics, and molecular medicine, as well as digital health and enterprise services.

We are a leading medical technology company with over 120 years of experience and 18,000 patents globally. Through the dedication of more than 50,000 colleagues in 75 countries, we will continue to innovate and shape the future of healthcare.

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References:
Summary
Serology testing is important to aid the rule-in or rule-out of syphilis and can include both treponemal and nonTreponemal assays. Differences in performance and sensitivity among assays exist and should be considered when implementing a syphilis testing algorithm.

Introduction
Syphilis is a bacterial disease resulting from infection with Treponema pallidum (subspecies pallidum). The course of untreated infection is shown in Figure 1. Testing is typically done for pregnant women and those at risk for or suspected of exposure. The bacterium cannot be cultured using routine microbiology techniques; serology assays provide the primary means of testing and diagnosis.

Serology testing for syphilis
Serology testing for syphilis involves two different types of antibody-detection assays: treponemal and nonTreponemal. Treponemal tests identify antibody to specific bacterial antigens such as Tp15, Tp17, and Tp47. NonTreponemal assays recognize antibody that results from exposure to lipoidal material released from damaged cells. Nontreponemal assays are reactive but the nontreponemal is not diagnostic. One concern with reverse testing is the possibility that infectious agent may become nondetectable with resolution of infection. Importantly, up to 30 percent of untreated late-latent infections may also become nondetectable with nontreponemal assays but remain detectable with treponemal assays. Other causes of membrane damage such as autoimmune disease can stimulate production of nonTreponemal antibody. For this reason the specificity of nonTreponemal assays for syphilis is relatively low compared to that of treponemal assays.

Advantages of a reverse algorithm
An example of a reverse-testing algorithm is shown in Figure 2. The advantages can include detection of early infections, automated workflows, and objective results reporting. Many countries have moved primarily to reverse testing, and some identify it as the preferred approach (specifically using an assay capable of detecting both IgM and IgG), although traditional testing is still relatively common. One concern with reverse testing is the management of discordant results, where the initial treponemal assay is reactive but the nonTreponemal is nonreactive. Resolution is important, as this could indicate early infection or late latent infection in need of treatment, previously treated infection, or a false-positive result. Both the CDC and IUSTI recommend an alternate treponemal test to aid resolution of discordant results with reverse testing.

Many of the newer automated assays offer higher sensitivity compared to some of the older, manual treponemal assays.

Comparative performance among syphilis assays
While studies suggest most commercially available syphilis assays generally perform well, design differences inherent in the various test methodologies can lead to performance disparities. An example is differential treponemal assay sensitivity when using an alternate treponemal assay to confirm a discordant result. One study showed the ADVIA Centaur® Syphilis assay (an automated treponemal assay) detecting an early (IgM-positive) infection missed by both a manual treponemal test and the nontreponemal test.

Summary
Syphilis serology is important for testing of at-risk populations. Advantages of a reverse-testing algorithm using a sensitive, automated treponemal assay include improved clinical detection and enhanced workflow. Assay sensitivity and specificity are important, and variability has been observed among commercially available testing options.