

Nucleic acid and antigen detection tests for leptospirosis: a systematic review and meta-analysis of diagnostic test accuracy

Background:

Early diagnosis of leptospirosis may contribute to the effectiveness of antimicrobial therapy and early outbreak recognition. Nucleic acid and antigen detection tests have the potential for early diagnosis of leptospirosis. This systematic review assesses the diagnostic test accuracy (DTA) of nucleic acid and antigen detection tests for the diagnosis of human leptospirosis.

Methods:

We searched 16 databases from inception to September 2016. DTA studies in patients suspected of systemic leptospirosis were included. As reference standards, we considered microscopic agglutination test alone or in a composite reference standard with culturing or other serological tests. Risk of bias assessment was done using the QUADAS-2 tool.

Results:

35 studies evaluating 8 index tests comprising 4481 participants were included. Risk of bias of the reference test was generally considered high. We conducted meta-analyses for PCR and real-time PCR on blood products. The pooled sensitivity of PCR was 74% (CI 40 to 93) and the pooled specificity was 96% (CI 74 to 99) using the bivariate model. For real-time PCR, we estimated a summary ROC curve using the HSROC model. The median specificity of real-time PCR was 91.5%. To illustrate, a point on the curve with 90% specificity has a sensitivity of 46% (CI 25 to 68).

Conclusions:

Review findings should be interpreted with caution, considering the low quality of studies and significant unexplained heterogeneity. Current evidence suggests that the specificity of both PCR and real-time PCR are generally high, but their sensitivities are moderate to poor. The accuracy of a positive or negative test result of PCR and real-time PCR will depend on the prior probability of leptospirosis.