

LaJoie AS, McCabe SJ, Thomas B, Edgell SE. Determining the Sensitivity and Specificity of Common Diagnostic Tests for Carpal Tunnel Syndrome Using Latent Class Analysis. *Plast Reconstr Surg*. 2005;116(2):502-507.

This article addresses the lack of a standard to determine the accuracy of a new test for many medical conditions, particularly carpal tunnel syndrome. Nerve conduction velocity testing was used in the past as the standard, but was later found to be imperfect, providing low estimates for sensitivity and specificity, especially for Tinel's sign. LaJoie et al. claim that the use of latent class analysis can be applied to make up for the lack of a standard reference to compare to and determine the sensitivity and specificity of the diagnostic tests for carpal tunnel syndrome. The purpose of this study was to apply latent class analysis to quantify the accuracy rates of the nerve conduction velocity test, Tinel's sign, and Phalen's test.

This study used a latent class analysis study design for diagnosis, in which the results of Tinel's sign, Phalen's test, and the nerve conduction velocity test were abstracted for each patient (n=81). Inclusion criteria required the patients had previously undergone nerve conduction studies for evaluation of peripheral nerve symptoms, including pain, numbness, and tingling into the hands and wrist, bilaterally within a three-week time frame. Tinel's sign was scored positive if tapping on the median nerve produced tingling in the median nerve distribution. Phalen's test was scored positive if wrist flexion produced numbness or tingling in the median nerve distribution within sixty seconds. The nerve conduction velocity test was considered abnormal if indicated by the electrophysiologist who performed the test. Sensitivity, specificity, and prevalence of the disease were estimated using a latent class analysis program, TAGS (Test Accuracy in the Absence of a Gold Standard).

Sensitivity scores were 0.97%, 0.93%, and 0.92% for Tinel's sign, Phalen's test, and the nerve conduction velocity test, respectively. Specificity scores were 0.91%, 0.88%, and 0.87% for Tinel's sign, Phalen's test, and the nerve conduction velocity test, respectively. A 95% confidence interval (CI) was provided by the TAGS program. As determined by a confirmation analysis using LATENT1, the probability of having carpal tunnel syndrome if all three diagnostic tests were negative, positive, if only Phalen's test was negative, and if only the nerve conduction velocity test was negative were determined. The probabilities were 0.0003, 0.9991, 0.9310, and 0.9182, respectively.

As the study design was previously reported, the level of evidence was determined with the *AAOS Levels of Evidence for Primary Research Question*. This article tests previously developed diagnostic criteria on consecutive patients, therefore its level of evidence has been determined to be a Level 1.

The sensitivity and specificity of these three diagnostic tests still require further research, but are still valuable tools for clinicians diagnosing carpal tunnel syndrome. The values of the diagnostic tests make it easy to explain to a patient that they may be likely or unlikely to have carpal tunnel syndrome, as would the tell-tale signs and symptoms of the syndrome also. The consequences of the diagnostic tests to the patient would simply be letting them know whether they have carpal tunnel syndrome and what their treatment goals should include.