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| **Suspect carpal tunnel? Try this. *J Fam Pract*. 2013;62:253-254** |
| **Potential PURL Review Form: Diagnostic test** |
| **SECTION 1: IDENTIFYING INFORMATION** |
| **1.** Citation  | Bilkis S, Loveman DM, Eldridge JA, et al. Modified Phalen’s test as an aid in diagnosing carpal tunnel syndrome. *Arthritis Care Res (Hoboken)*. 2012;64:287-289. |
| **2.** Hypertext link to PDF of full article  | <http://onlinelibrary.wiley.com/doi/10.1002/acr.20664/abstract;jsessionid=C4C22D75B7292D851E8CF4C139C3C9BA.d02t02> |
| **3.** First date published study available to readers  | February 1, 2012 |
| **4.** PubMed ID  | 21972217 |
| **5.** Nominated By  | Jim Stevermer |
| **6.** Institutional Affiliation of Nominator  | University of Missouri |
| **7.** Date Nominated  | August 25, 2012 |
| **8.** Identified Through  | Evidence Updates |
| **9.** PURLS Editor Reviewing Nominated Potential PURL | Kate Rowland |
| **10.** Nomination Decision Date  | August 30, 2012 |
| **11.** Potential PURL Review Form (PPRF) Type  | Diagnostic Test |
| **12.** Other comments, materials or discussion  |   |
| **13.** Assigned Potential PURL Reviewer  | Kohar Jones, MD |
| **14.** Reviewer Affiliation  | University of Chicago |
| **15.** Date Review Due  | October 11, 2012 |
| **16.** Abstract  | **OBJECTIVE:**We developed a modified Phalen’s test (MPT), which uses sensory testing in Phalen’s position, as a diagnostic screening tool for carpal tunnel syndrome (CTS). This study was designed to determine the sensitivity, specificity, and receiver operating characteristic (ROC) curve of the MPT for diagnosis of CTS.**METHODS:**Electrodiagnostic nerve conduction studies (EDS) were used as the gold standard. MPT was performed by a blinded examiner on patients prior to EDS. MPT was recorded as either positive or negative based on the presence or absence of a median nerve sensory deficit while the hand was in Phalen’s position.**RESULTS:**Sixty-six hands were included in this study. Chi-square for the MPT compared to EDS as the gold standard was 41.449 (*P*<0.001), and the validity coefficient (phi) was 0.792 (*P*<0.01). The traditional Phalen’s test (TPT) compared to the EDS demonstrated a chi-square of 15.349 (*P*<0.001) and a phi coefficient of 0.482 (*P*<0.01). ROC curve estimates for the MPT revealed a sensitivity of 84.4% compared to 50% for the TPT. The standard error of the estimate for sensitivity was 3.3% for the MPT and 5.8% for the TPT.**CONCLUSION:**The MPT is a highly useful screening diagnostic tool for CTS. The MPT demonstrates greater accuracy than the TPT for predicting CTS. The MPT also demonstrates greater sensitivity than the TPT in predicting a positive electrodiagnostic test for CTS. |
| **sECTION 2: CRITICAL APPRAISAL OF VALIDITY** |
| **1.** Is the spectrum of severity of patients’ illness comparable to the patient group typically seen by family physicians and other primary care clinicians? | This is a neurology clinic, so the people referred may have had more severe pathology. |
| **2.** Is the proportion of patients with the target illness comparable to the patient group typically seen by family physicians and other primary care clinicians?  | Probably a higher percentage have carpal tunnel syndrome (CTS). |
| **3.** The nature of the test being studied is clearly specified. | Well covered |
| **4.** The test is compared with an appropriate gold standard. | Well covered |
| **5.** Where no gold standard exists, a validated reference standard is used as comparator. | Not applicable |
| **6.** Patients for testing are selected either as a consecutive series or randomly, from a clearly defined study population. | Well covered |
| **7.** The test and gold standard are measured independently (blind) of each other. | Well covered |
| **8.** The test and gold standard are applied as close together in time as possible. | Well covered |
| **9.** Results are reported for all patients that are entered into the study. | Well covered  |
| **10.** A pre-test diagnosis is made and reported. |  |
| **11.** How many patients are included in this study?*Please indicate number of patients included, with inclusion/exclusion criteria used to select them.* | 66 hands of 37 patientsInclusion criterion: above age 18Exclusion criteria: (1) cervical radiculopathy, (2) previous history of stroke, (3) diabetes mellitus, and (4) concomitant neck injury. |
| **12.** What is the prevalence (proportion of people with the disease being tested for) in the population from which patients were selected? | Prevalence: 46/66 hands |
| **13.** What are the main characteristics of the patient population?*Include all relevant characteristics – e.g.* *age, sex, ethnic origin, comorbidity, disease status, community/hospital based* | Adults age 27-88 both male and female presenting to a neurology clinic. |
| **14.** What test is being evaluated in this study?*Consider whether the technology being described is comparable / relevant to the test being considered in the guideline. i.e. make sure the test has not been superseded by later developments.* | Modified phalen’s test (MPT): one minute holding the wrists in a position of fixed flexion, adding the use of monofilament testing (using a Semmes-Weinstein 2.83-unit monofilament) applied to the palmar surface and lateral side of each finger’s distal phalanyx 3 times. MPT considered positive if the subject did not register the touch in any one or more fingers in the median nerve distribution (radial 3.5 fingers on the palmar side). The palmar surface of the fifth finger’s distal phalynx was used as a control. |
| **15.** What is the reference standard with which the test being evaluated is compared?*Indicate whether a gold standard, or if not how this standard was validated.* | Electrodiagnostic study—gold standard—also compared with traditional Phalen’s test. |
| **16.** What is the estimated sensitivity of the test being evaluated? (state 95% CI)Sensitivity = proportion of results in patients with the disease that are correctly identified by the new test. | MPT: 85% sensitivity (vs traditional Phalen’s test 50% sensitivity). |
| **17.** What is the estimated specificity of the test being evaluated? (state 95% CI)Specificity = proportion of results in patients without the disease that are correctly identified by the new test | MPT and Phalen’s both 100% specific |
| **18.** What is the positive predictive value of the test being evaluated?*Positive predictive value = proportion of patients with a positive test result that actually had the disease.* | Calculated: 100% |
| **19.** What is the negative predictive value of the test being evaluated?*Negative predictive value = proportion of patients with a negative test result that actually did not have the disease.* | Calculated: 74% |
| **20.** What are the likelihood ratios for the test being evaluated?*If not quoted in the study, a number of tools are available that simplify calculation of LRs. Please indicate where results are calculated rather than taken from the study.* | Calculated: LR+ infinity; LR- 0.15 |
| **21.** How was this study funded? Does the funding source raise issues of conflict of interest or bias?*List all sources of funding quoted in the article, whether Government, voluntary sector, or industry.* | Not specified |
| **SECTION 3: REVIEW OF SECONDARY LITERATURE** |
| **1.** DynaMed excerpts |   |
| **2.** DynaMed citation/access date | Carpal tunnel syndrome. In: DynaMed [database online]. Available at: www.DynamicMedical.com. Last updated October 8, 2012. Accessed October 9, 2012. |
| **3.** Bottom line recommendation or summary of evidence from DynaMed(1-2 sentences) | Don’t bother with Phalen’s test or monofilament testing—not helpful in diagnosing CTS compared with EDS. |
| **4.** UpToDate excerpts |   |
| **5.** UpToDate citation/access date | Kothari M. Clinical manifestations and diagnosis of carpal tunnel syndrome. In: Basow DS, ed. UpToDate [database online]. Waltham, Mass: UpToDate; 2012. Available at: http://www.uptodate.com. Last updated May 31, 2012. Accessed October 9, 2012. |
| **6.** Bottom line recommendation or summary of evidence from UpToDate(1-2 sentences) | Sensitivity and specificity of provocative tests, including Phalen’s, is moderate at best. |
| **7.** PEPID PCP excerptswww.pepidonline.comusername: fpinauthorpw: pepidpcp | 1. Physical Examination* Tinel’s test:
	+ Tapping median nerve directly over or just proximal to carpal tunnel
	+ Sensitivity = 67%, Specificity = 68%
	+ Very little diagnostic value in CTS
* Phalen’s test
	+ Static wrist flexion for 60 seconds or until symptoms reproduced
	+ Sensitivity = 85%, Specificity = 89%
	+ (citation: Bruske et al. The usefulness of the Phalen test and the Hoffman-Tinel sign in the diagnosis of carpal tunnel syndrome. *Acta Orthopaedica Belgica* 2002;68:141.)
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| **8.** PEPID citation/access data | Haas S, Mohundro B. Carpal tunnel syndrome In: PEPID [database online]. Available at: http://www.pepidonline.com. Last updated July 2012. Accessed October 9, 2012. |
| **9.** PEPID content updating | 1. Do you recommend that PEPID get updated on this topic?Yes, there is important evidence or recommendations that are missingIf yes, which PEPID Topic, Title(s):EBM: Lots of studies of CTS diagnosis not incorporated—a single study from 2002 forms the basis of physical diagnosis—meta-analysis ignored.2. Is there an EBM Inquiry (HelpDesk Answers and Clinical Inquiries) as indicated by the EB icon () that should be updated on the basis of the review?Yes, there is important evidence or recommendations that are missingIf yes, which Evidence Based Inquiry(HelpDesk Answer or Clinical Inquiry), Title(s):What is the best diagnostic approach to paresthesias of the hand?Evidence-Based Answer (Pub 12/2002) |
| **SECTION 4: CONCLUSIONS** |
| **1.** **Validity:** How well does the study minimize sources of internal bias and maximize internal validity? Give one number on a scale of 1 to 7 (1=extremely well; 4=neutral; 7=extremely poorly) | 1  |
| **2.** If 4.1 was coded as 4, 5, 6, or 7, please describe the potential bias and how it could affect the study results. Specifically, what is the likely direction in which potential sources of internal bias might affect the results? |   |
| **3. Relevance:** Are the results of this study generalizable to and relevant to the health care needs of patients cared for by “full scope” family physicians? Give one number on a scale of 1 to 7 (1=extremely well; 4=neutral; 7=extremely poorly) | 4  |
| **4.** If 4.3 was coded as 4, 5, 6, or 7,please provide an explanation. | Tested on patients in a neurology clinic, rather than general outpatient practice—may have higher severity, changing pre-test probability, and increasing specificity of tests. |
| **5. Practice-changing potential:** If the findings of the study are both valid and relevant, does the practice that would be based on these findings represent a change from current practice? Give one number on a scale of 1 to 7 (1=definitely a change from current practice; 4=uncertain; 7=definitely not a change from current practice) | 1  |
| **6.** If 4.5 was coded as 1, 2, 3, or 4, please describe the potential new practice recommendation. Please be specific about what should be done, the target patient population and the expected benefit. |   |
| 1. **Applicability to a Family Medical Care Setting:**

Is the change in practice recommendation something that could be done in a medical care setting by a family physician (office, hospital, nursing home, etc), such as a prescribing a medication, vitamin or herbal remedy; performing or ordering a diagnostic test; performing or referring for a procedure; advising, educating or counseling a patient; or creating a system for implementing an intervention? Give one number on a scale of 1 to 7 (1=definitely could be done in a medical care setting; 4=uncertain; 7=definitely could not be done in a medical care setting) | 3  |
| **8.** If you coded 4.7 as a 4, 5, 6 or 7, please explain.  | Time constraints make it less likely to be done. |
| **9. Immediacy of Implementation:** Are there major barriers to immediate implementation? Would the cost or the potential for reimbursement prohibit implementation in most family medicine practices? Are there regulatory issues that prohibit implementation? Is the service, device, drug or other essentials available on the market?Give one number on a scale of 1 to 7 (1=definitely could be immediately applied; 4=uncertain; 7=definitely could not be immediately applied) | 1  |
| **10.** If you coded 4.9 as 4, 5, 6, or 7, please explain why. | Can buy the Semmes-Weinstein 2.83-unit monofilament online! |
| **11. Clinical meaningful outcomes or patient-oriented outcomes:** Are the outcomes measured in the study clinically meaningful or patient oriented? Give one number on a scale of 1 to 7 (1=definitely clinically meaningful or patient oriented; 4=uncertain; 7=definitely not clinically meaningful or patient oriented) | 1  |
| **12.** If you coded 4.11 as a 4, 5, 6, or 7, please explain why. | Always nice to have a diagnosis. And once the diagnosis is there, it becomes easier to treat. |