Web-Based Tool Aids Diagnosis of Headache Disorders

A computer algorithm that creates a patient's self-reported history of headache can be an effective resource for clinicians, researchers, and patients.

WASHINGTON, DC—A computer-generated account of a patient's headache history can provide physicians with an accurate and expert report, including a clinical diagnostic impression, according to research presented at the 53rd Annual Scientific Meeting of the American Headache Society.

Robert Cowan, MD, Professor of Neurology and Director of the Headache Program at the Stanford University School of Medicine in California, and colleagues devised a computer algorithm that allows patients to complete a detailed questionnaire on a Web site and report their headache history. "The system produces an expert letter to the patient's physician containing critical points in the history, the pertinent red flags, and a best-fit clinical diagnostic impression based on that history," stated the researchers. The system reminds the patient that a final diagnosis should be made only after an examination by a physician and any appropriate testing.

To evaluate the effectiveness of the decision-tree–based e-tool, Dr. Cowan and Alan Rapoport, MD, Clinical Professor of Neurology, David Geffen School of Medicine, University of California, Los Angeles, uploaded it to a private Web site. Six headache specialists then instructed their next six new patients with primary headaches to visit the Web site after the patients had been seen in consultation. The investigators subsequently compared the clinical diagnostic impressions generated by the e-tool with those made by the headache specialists.

Dr. Cowan's group collected an average of 187 data points from each patient. The range of data points (56 to 347) reflected the dynamic nature of the questionnaire and varying degrees of completion. A total of 36 patients with headache were enrolled in the study; 25 completed the questionnaire. In the initial analysis, the headache specialists diagnosed 18 patients with migraine without aura, six patients with migraine with aura, and one patient with cluster headache.

"Initially, for migraine without aura, the accuracy of the e-tool was 44%," reported the researchers. "For migraine with aura it was 20%, and the algorithm could not yet evaluate cluster headache."

After adjustment of the diagnostic and generative production rules, however, the accuracy rates increased to 94% for migraine without aura and 60% for migraine with aura—largely due to patients not filling out the aura questions, the authors noted. The accuracy rate for migraine versus nonmigraine was 97%. "A sampling of data analysis showed that 50% of patients had sleep issues, 80% had at least one behavioral/psychological issue, and 80% had at least one red flag suggestive of possible secondary headache," the investigators reported.

"This preliminary validation trial demonstrates that a Web-based e-tool can serve as a reliable aid for collection of an accurate history and generation of an expert report, including a clinical diagnostic impression," the researchers stated. "The process is highly dependent on the rules engine and accuracy of patient data entry. Once properly validated and applied on a large scale, this computer-based e-tool should be an effective resource for patients, clinicians, and researchers.

"The next step will be to further refine the rules engine and improve completion rates," the authors continued. "A second validation study will follow. Efforts to provide best-fit therapies based on history in five treatment domains (behavioral medicine, vitamins and supplements, physical therapies, acute care, and prevention) are under way." **NR**

—Colby Stong