

Diagnostic testing for allergies

In 2001, the Institute of Medicine published a report on the state of health care in the United States entitled *Crossing the Quality Chasm: A New Health System for the 21st Century*.¹ In this report, health care experts concluded that the difference between the care our citizens receive and the care they should receive is not a gap; it is a chasm. The report also suggested that health care provision in this country is so bad that the only way to improve it is to completely redesign systems of care at all levels. To create a vision of what health care should look like, 6 goals of treatment were outlined. The goals of the report state that care should be safe, effective, timely, patient centered, efficient, and equitable. Unfortunately, health care today is none of these, making the need for widespread changes more urgent than ever. These concerns are not simply academic. After all, any one of us could be a patient next year.

An example of how clinicians contribute to the problems outlined in the Institute of Medicine report is provided in this issue of the *Annals* in an article by Oppenheimer and Nelson.² In the study described by Oppenheimer and Nelson, allergists were surveyed on their current method of skin testing. This survey was performed after the diagnostic testing and immunotherapy practice parameters were published.³ In addition, both the American Academy of Allergy, Asthma and Immunology and the American College of Allergy, Asthma and Immunology have had courses and have promoted educational efforts to standardize the process and documentation of allergy skin testing. Despite that, allergists continue to perform skin tests and document the results in a highly variable and irreproducible manner. As a result, whenever I hear an assertion that allergists perform skin tests better, I have to wonder "which allergists?" since clearly we do not perform skin tests and interpret the results in any consistent way. Given this variability, it is likely that some allergists don't "do it better" and in some cases they do it quite poorly.

Effective management of allergic diseases depends on making an accurate diagnosis. Although clinicians frequently rely on experience obtained over many years of practice to recognize combinations of signs and symptoms to make a diagnosis, each body of experience necessarily is anecdotal and unique to the individual using it. The result is a tendency for patients with similar clinical presentations to receive different diagnoses and treatment, depending on which physician they happened to see.

One way to reduce this reliance on clinical experience is to augment it with appropriate diagnostic tests.⁴ The purpose of tests is to change the pretest probability that a patient has a certain diagnosis to a posttest probability that is either higher

or lower, depending on the test result. The ratio of the number of patients with a positive test result who have the disease to the number with a positive result without the disease is called the positive likelihood ratio. In the same way, the negative likelihood ratio can be determined for patients with negative test results. The likelihood ratio provides an objective evaluation of the diagnostic performance of a test. When likelihood ratios are available, discussions about whether skin or in vitro tests are more accurate for diagnosing allergies are rendered moot. The best test is the one that has the largest positive or smallest negative likelihood ratio . . . period.

Likelihood ratios have been determined in allergic rhinitis for both types of allergy tests by Gendo and Larson.⁵ Thresholds for treatment of allergic rhinitis using likelihood ratios have also been described.⁶ The assumption of these reports, of course, is that allergy tests are performed in a uniform and reproducible manner so that a single person will have the same test result repeatedly regardless of who performs the test. For newer in vitro tests such as the Pharmacia ImmunoCAP, the presence of internal standards makes the test results reproducible over time and among laboratories.

Skin tests do not fare as well. Oppenheimer and Nelson found that the number of skin tests performed by allergists ranges from 0 to 96. In addition, intradermal tests continue to be performed despite evidence that they add little to the diagnostic accuracy of skin tests.⁷ Their survey documented that at least 6 devices are used with various techniques and in at least two thirds of practices the source of extract is not even documented, making it impossible to interpret the results. It is not even clear whether the results should be reported as 0 to 4+ or millimeters of wheal and erythema. McCann and Ownby⁸ documented that even when all of these variables are controlled for, interpretation of the results are so variable that they become useless for all but the most obviously positive or negative results. This is a sad and embarrassing state of affairs for medical practice in the 21st century.

The tendency of clinicians to make ad hoc diagnoses and treatment recommendations violates all 6 of the goals outlined in the *Crossing the Quality Chasm* report. The fact that the quality of skin test performance and interpretation depends on which clinician performs the test is a clear violation of *equity*. In addition, treatments for patients given the wrong diagnosis are not likely to be *effective* and in some instances may not even be *safe*. Patients could be included in decision making if specific diagnostic criteria for allergic diseases exist; however, experience often dominates, preventing the process from being *patient centered*. *Timely* treatment means that the patients are seen when they want to be seen without

delay and that the effective treatment is provided as soon as possible. When the wrong diagnosis is made and incorrect treatment provided, improvement in the medical condition is delayed while the patient tries the ineffective treatment. This process is costly and *inefficient*. As you can see, the current process for diagnosing and treating allergic diseases violates all 6 of the goals outlined in the Institute of Medicine report.

As we move into the next era of health care provision, we must strive to do better. This means that diagnostic tests such as skin tests must be performed in a standardized and reproducible manner. Without significant changes in current practice, there will almost certainly come a time when standards are imposed on skin testing that we may not approve of. Not only does the future of our specialty depend on this but to do anything less renders the tests unusable and in the end will lead to continued poor outcomes for our patients. They deserve better than that. Instead, we need to work to practice according to the 6 aims, and together we can close the quality chasm.

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