

### Cost-effective Evaluation of Heart Murmurs in Children

Many if not all children have cardiac murmurs. The vast majority of these murmurs are clinically benign and are appropriately followed up by the patient's primary care physician without noninvasive testing or consultation from a specialist. However, in those cases where the differentiation between an innocent and pathological murmur is not obvious, physician and parental concern and anxiety may be high. The question of how to best initially evaluate these cardiac murmurs that are not clearly benign, yet are not associated with definite historical or physical findings consistent with heart disease, remains.

Previous studies in this patient population have shown that noninvasive assessment of these murmurs, particularly by echocardiography and chest radiography, does not significantly improve the ability to differentiate pathological cardiac lesions from innocent murmurs when compared with clinical evaluation alone by an experienced pediatric cardiologist.<sup>1-4</sup> Nevertheless, many cardiac murmurs in children are still initially being evaluated by echocardiography.

In 1994, we reviewed data from 106 patients referred to our institution for initial evaluation of a murmur of uncertain cause by echocardiography and data from 106 consecutive patients referred for initial evaluation of murmur by consultation. In the former group, only four patients had murmurs resulting from a structural lesion that required subsequent evaluation by the referring physician or cardiologist. In the consultation group, only 12 echocardiograms were ultimately undertaken because of an inconclusive examination, four of which demonstrated structural lesions requiring reevaluation.

An analysis of clinical outcomes and cost was performed. The clinical outcome results confirmed previous publications' conclusions that trained pediatric cardiologists are able to accurately diagnose innocent murmurs without the need of an echocardiogram, and only infrequently do they obtain them. In addition, echocardiograms ordered to initially evaluate murmurs of questionable significance infrequently detected significant pathological abnormalities. The cost analysis revealed that it was 2.5 to 3 times more costly to obtain an echocardiogram first for evaluation than to first obtain a consultation, even after accounting for the 12 echocardiograms eventually ordered by the consultants.

Without going into a formal economic analysis of cost assessment, it appears clear that it is much less expensive to refer children who have cardiac murmurs of questionable significance for initial evaluation by a pediatric cardiologist than for an initial echocardiogram.

Besides the economic benefit, we believe that initial referral for consultation enhances the overall care of the patient and improves patient satisfaction for several reasons. The cardiologist can immediately discuss the findings and their significance as well as answer any questions that the patient and parents may have. Also, direct discussion with the cardiologist appears to strengthen the confidence level that the family has in their primary care physician regarding the diagnosis and treatment or follow-up plan. While we cannot guarantee that all patients will be satisfied by a clinical visit without echocardiographic confirmation of an innocent murmur, we have not had any patients at our institution in this patient population who were referred back for an echocardiogram. Hence, we continue to recommend this referral pattern in patients with cardiac murmurs of uncertain significance.

Jeffrey A. Wong, MD  
Richard A. Meyer, MD  
Children's Hospital Medical Center  
Cincinnati, Ohio

1. Newberger J, Rosenthal A, Williams RG, Fellows K, Miettinen O. Noninvasive tests in the initial evaluation of heart murmurs in children. *N Engl J Med*. 1983;308:61-64.
2. Smythe J, Teixeira OHP, Vlad P, Demers PP, Feldman W. Initial evaluation of heart murmurs: are laboratory tests necessary? *Pediatrics*. 1990;86:497-500.
3. Geva T, Hegesh J, Frand M. Reappraisal of the approach to the child with heart murmurs: is echocardiography mandatory? *Int J Cardiol*. 1988;19:107-113.
4. Danford D, Nasir A, Gumbiner C. Cost assessment of the evaluation of heart murmurs in children. *Pediatrics*. 1993;91:365-368.

**Editor's Note:** You may wish to check out the cost of pediatric echocardiograms at your local institution; it is often higher than what is charged for adult echocardiograms. At my institution, the charge is over \$1000, and I believe that the authors are correct in that a pediatric cardiology visit is cheaper and saves some unnecessary echocardiograms.

Marjorie A. Bowman, MD, MPA

### Comments of a Consultant to Primary Care Physicians

Medical care can be enhanced if the consultant communicates back to the referring physician. Patients and physicians also benefit when the referring physician communicates with the consultant. Despite such "motherhood and apple pie" truths, consultants are often, even usually, uncer-