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.[1-4] 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.

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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.

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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-

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List of New Patients With Referral Source and Information Received*

Diagnosis	No. of Patients	Referral Source			Information Received Before Visit	
		PC	Spec	Self	No	Yes
Movement disorders	30	12	15	3	20	10
Neuropathy, multiple sclerosis, or tumor	14	7	1	6	12	2
Seizures or dizziness, childhood disorders	11	5	5	1	9	2
Headache and pain	10	2	6	2	7	3
Alzheimer disease, CVA, psychiatric illness	9	8	0	1	7	2
Total	**74**	**34**	**27**	**13**	**55**	**19**

**PC indicates primary care physician; Spec, specialist; Self, self-referral; and CVA, cerebrovascular accident.*

tain about what the referring physician thinks. Theoretically a consultant can call the referring physician before a patient is seen, but that is unusual. A few patients choose not to inform their physician of a planned visit to a consultant and occasionally patients request that the referring physician *never* be informed of the visit. For all these reasons, as well as the surprisingly rapid changes in just who is considered the primary care physician, communication in both directions is often less than ideal. Primary care physicians may also vary in whether they feel they should telephone or write the consultant; particularly if they feel that such a visit, as requested by the patient, is unnecessary. Some patients say they intend to return to their local physicians even while they are searching for an ideal, but hypothetical, alternative.

The actions of consultant physicians vary from an obsessive need to send a letter to someone, preferably to another physician, to a conscious or unconscious desire to "take over" what they might call the "principal care" role. With or without the intention to assume the role of a traditional primary care physician, specialists occasionally do serve in such a role. For all these reasons, specific data regarding patient and physician preferences about communications is suspect, as is the data that follows. Does the referring physician usually inform the consultant of questions or opinions before the patient is seen?

For 6 weeks the referral pattern to the private practice of 1 academic neurologist who specializes in movement disorders was prospectively studied. The 6 weeks included 2 brief out-of-town trips by the specialist, but was not a time of transiently smaller or transiently enlarged clinical duties, as happens in a university center when "on service." The percentage of patients with a referral letter, a brief note to the consultant, or a telephone call from the referring physician seemed typical of any similar 6-week period. There were only 2 telephone calls from referring physicians, both regarding patients who were considered to be important citizens. It is probable that some referring physicians did call the consultant's secretary; however, I lack that data.

As is seen in the **Table**, over 50% of the time no referral letter, telephone call, or "curbside consult" preceded the arrival of the patient. Many patients expected such a letter to be present, and were always reassured that it was probably sent; occasionally it had been. In more than a few cases, it was significant that prior data were not available; for example, when seeing a patient with little medical knowledge and a complex chronic problem. In fact, so rarely is a good referral letter available when a consultation is performed that the consultant may assume the family physician doesn't care, is too busy to read a consultation report, or perhaps most likely of all, doesn't know of the visit of the patient. So why should consultants write the referring physician?

Six patients did specifically ask that no letter be sent to their physician. Two other patients said they were not planning to return to their referring physicians, 1 of whom had sent a very helpful summary of the case.

My conclusion is that, at least for this 1 consultant in a university setting, more often than not no referral information is sent by referring physicians. We can all do better in this day of fax machines and voice mail.

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Promoting the Use of Advance Directives: An Empirical Study

In the recent article "Promoting the Use of Advance Directives: An Empirical Study," Richter et al[1] found that structured discussion with patients and follow-up mailings substantially increased the use of advance directives. Based on our work, we stress the importance of the structured discussion in achieving desired results.

In our study, we tested whether education could increase completion of advance directives. Four groups of patients (n=20 in each group), aged 18 years and older, were randomly selected to receive either: (1) a distribution of advance directives at the office visit, (2) a distribution of advance directives plus patient-directed information emphasizing the importance of advance directives at the office visit, (3) a mailing of advance directives with patient-directed information, or (4) no intervention. Discussion with

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