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Entry of the Hearing Impaired into the Health Care System

Kathleen Yaremchuk, MD,* Jonathan Schmidt, MD,† and Linda Dickson, MA‡

The current system of referral of patients complaining of hearing loss usually requires a dual appointment with otolaryngology and audiology. Most of these patients have sensorineural hearing loss for which there is rarely surgical or medical treatment. This study tests the hypothesis that these patients would receive appropriate treatment and that health care dollars would be saved if an audiological assessment could identify those patients who require medical or surgical care. One hundred consecutive patients whose sole complaint was hearing loss were evaluated using audiograms and "hearing abilities questionnaires" by five audiologists using subjective and objective criteria to determine the need for referral to otolaryngology. Audiologists determined the need for referral with an accuracy of 55% and 72% utilizing subjective and objective criteria, respectively. The questionnaire was found to be of little value. Audiologists may be able to function as the entry point into the health care system for patients complaining of hearing loss. We are encouraged by the results of this preliminary study, but improvement in the system by which audiologists detect disease is necessary. (Henry Ford Hosp Med J 1990;38:13-5)

The United States National Center for Health Statistics estimates that 16.2 million US citizens have significant hearing loss. It is also estimated that less than one-third of these have sought assistance through physicians, audiologists, or hearing aid dealers. Only 5% to 10% of hearing impaired individuals have conditions that would respond to medical intervention (1). The remainder suffer from sensorineural hearing loss and could gain improvement in hearing through the use of a hearing aid or other type of assistive listening device.

Hearing loss in the elderly leads to decreased interpersonal communication with family, friends, and often the medical profession. Such individuals become unable to participate in decision-making processes which results in a loss of autonomy. Depression and alienation are common in patients with hearing loss. Accelerated dementia and cognitive declines have been described in patients who have hearing loss with Alzheimer disease when compared to patients with Alzheimer disease alone (2).

Primary care physicians for years have referred to specialists those patients suspected of having hearing loss based on individualized screening criteria, eg, reported symptoms or the inability to hear a whisper or a watch tick. With the increased use of digital watches, a widely accepted screening device is not often available.

Patients are often slow to seek help because of the emotional factors associated with hearing loss. Ours is a youth-oriented culture and hearing loss is associated with old age and physical decline. Deafness is often regarded as being synonymous with stupidity and consequently many elderly resist the suggestion that anything is wrong with their hearing (3).

The current system of referral in our institution for patients complaining of hearing loss is a dual appointment with otolaryngology and audiology. The majority of these patients have sensorineural hearing loss with a normal otologic examination and are not amenable to surgical or medical intervention.

We report a study designed to test the hypothesis that an appropriate level of care as well as financial savings might result if the audiologist were the point of entry into the health care system for patients whose only complaint is hearing loss.

Health care resources are limited and even declining compared to the increasing number of patients. Health care costs are currently 11% of the US gross national product (4). Industry, government, and the medical profession are anxious to develop ways to limit expenditures while simultaneously providing all needed health care. Accordingly, practice guidelines should be developed to limit referral to otolaryngologists only to those patients requiring their particular skills.

An accurate self-assessment screening tool should be a useful adjunct to the physical examination for primary care physicians to evaluate patients (5). The cost involved for a questionnaire is negligible.
Methods and Materials

The study group was composed of 100 consecutive patients presenting to the Henry Ford Hospital Fairlane Center Otolaryngology Clinic with the complaint of hearing loss. The study group included 44 males and 56 females, with ages ranging from 13 to 87 years (mean 58.8 years, standard deviation 17.4 years) (Figure).

Each patient was asked to complete a “hearing abilities questionnaire” (Table 1). The eight questions were simplified from High et al’s (6) hearing handicap scale.

The patient was examined by an otolaryngologist who was asked to determine whether the patient’s condition would require medical or surgical intervention. This decision was not communicated to the audiologist or noted in the medical record.

Each patient was then tested by an audiologist for pure tone and air and bone conduction using a MAICO-24 B audiometer, calibrated to the American National Standards Institute 1969 standards. Impedance audiometry was also performed using American Electromedias 83. All audiologists held American Speech and Hearing Association (ASHA) certification or were in a clinical fellowship year under the supervision of a certified ASHA audiologist.

All five staff audiologists were asked, on the basis of the audiograms, if otolaryngology referral was necessary. They first answered the question based on their personal working criteria and then according to the Federal Drug Administration guidelines which require hearing aid dispensers to advise prospective hearing aid users whenever consultation with a licensed physician is indicated (7) (Table 2). The five audiologists were asked to make two determinations about each of the 100 patients, thus generating 1,000 data points.

Statistical analysis was performed by a multivariate stepwise discriminate analysis. Patient responses to the questionnaire and the presence of hearing loss based on audiometric testing were compared. The appropriateness of the audiologists’ determinations was analyzed by the procedure of ratio estimation utilizing all data generated.

Separate statistics were maintained for the audiologist determinations based on subjective or objective criteria. The judgment of the otolaryngologists as to the need for referral was considered the “gold standard.” Determination by both the audiologist and the otolaryngologist that referral was necessary was considered a true positive. Referral by the audiologist which the otolaryngologist considered unnecessary was a false positive. Determination by both that referral was not in order was a true negative. Last, failure to refer a patient who should have been seen by the otolaryngologist was a false negative.

Sensitivity is the proportion of patients who needed referral and received it. Specificity is the proportion of patients not in need of referral who did not receive it. The positive predictive value is the proportion of times the audiologist’s referral was correct, compared to the total number of referrals. The negative predictive value is the proportion of times the audiologist’s decision not to refer was correct compared to the total number of nonreferrals.

Results

Nineteen of the 100 patients were found to need referral for reasons ranging from bilateral cholesteatoma to cerumen impactions (Table 3).

Fourteen of the 100 patients did not receive referrals which were warranted according to the otolaryngologist (Table 4).

The results for the subjective and objective criteria are presented in Tables 5 and 6.

Discussion

The false-positive rates (34.2% and 15.6%, subjective and objective criteria, respectively) must be kept to a minimum to optimize the economic value of the system. These patients who represent unnecessary referrals to otolaryngology were primarily those whose hearing asymmetry was either relatively mild or occurred at other than primary speech thresholds.

Of most concern are the false negatives. These patients with otologic disease would not have been referred for further evaluation if the proposed screening system had been in effect. The seriousness of this error is underscored by the fact that otologic disease may be ultimately fatal, eg, through complications such as brain abscess. Not only would the patient be poorly served by failure to refer, but the cost in terms of subsequent health care expenditures and liability could be significant. Fortunately, the
high negative predictive values of 81% and 84% (subjective and objective criteria, respectively) indicate that this category was kept to a minimum, and disease was missed in very few patients. Evaluation of these cases revealed that the audiologists had failed to cause audiometric abnormalities (eg, incomplete cerumen impaction). Utilizing subjective or objective criteria had failed to cause audiometric abnormalities (eg, incomplete cerumen impaction). This particular questionnaire is considered a poor tool for use by primary care physicians for referral of patients. Failure to provide instructions with the questionnaire may have increased the problem. For example, patients with congenital hearing loss, being relatively well adapted to the deficit, may not have considered themselves handicapped.

When the self-assessment questionnaire responses were compared to the individual’s audiogram, there was little correlation. This particular questionnaire is considered a poor tool for use by primary care physicians for referral of patients. Failure to provide instructions with the questionnaire may have increased the problem. For example, patients with congenital hearing loss, being relatively well adapted to the deficit, may not have considered themselves handicapped.

Approximately 60% of the nearly 10,000 new patients annually referred to the Otolaryngology clinic at Henry Ford Hospital have hearing loss as their chief complaint. If these patients were first “screened” by an audiologist, approximately 68% would not have required consultation with an otolaryngologist. A prepaid health care system would save physician fees while simultaneously improving access to the otolaryngologists for other patients. With a routine new patient office visit charge of $70, the potential savings is $285,000 annually.

Successful implementation of such a program requires strict protocols to insure that patients are evaluated and referred appropriately. In an era of increasing expectations for quality health care with decreasing reimbursement levels, cost effectiveness must not be minimized. The false-positive and false-negative rates should improve if the audiologist were to perform otoscopic and audiometric examinations when determining the need for patient referral to otolaryngology. We are currently evaluating this procedure in our practice.

References