

A Program for Correction of Ear Perforations in Navajo Indian Children

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HEALTH PROBLEMS IN MEDICALLY UNDERSERVED populations sometimes are considered to be consequences of the lack of modern medical care, and their solution is expected if such care is provided. However, modern medical care does not always solve the problems at which it is directed, and often it is not as simple to provide as anticipated. Two general explanations for these difficulties may be (a) the difficulty of altering cultural factors that underlie and affect disease incidence and treatment and (b) the failure to recognize the need for complex technology, resources, and personnel to support modern medical practice.

McDermott and associates (1) commented on the varying levels of success achieved in a health care program on the Navajo Reservation in the 1950s in which modern medicine was applied to 19th century health problems. One of their conclusions was that greater success could be expected from efforts directed at problems that are remediable through technological intervention than at problems that require altering the physical and cultural environment.

But, even technological interventions have failed in primitive settings when their support requirements have not been met. In such circumstances, the technically skilled physician has been considered a sufficient resource to accomplish the intended medical care. When the essential supporting services were taken for granted or not recognized, the result has been frustration for the well-intentioned medical personnel and failure of the "mission" to accomplish its goals.

Our report concerns the planning and execution of a program designed to affect sequelae of chronic otitis media in Navajo Indians through ear surgery, a technological intervention. Middle-ear disease with tympanic membrane perforation is a common con-

dition among the Navajos of the southwestern United States (2, 3). No accurate data are available concerning incidence and prevalence of chronic otitis in this population in past years. However, the clinical impression of physicians working on the reservation is that the problem has diminished only slowly, despite longstanding and extensive efforts to improve the treatment of upper respiratory disease in children. An important implication of tympanic membrane perforation is its association with hearing loss and, in turn, with poor language development (4). Because many Indian children learn English as a second language when they enter school, it is important to correct perforations and to restore hearing in young children.

Background

Medical care of Navajo Indians is a responsibility of the Public Health Service's Indian Health Service (IHS). The Navajo Reservation is divided into eight Medical Service Units, each providing comprehensive medical care for the Indians within its boundaries. Six IHS hospitals provide inpatient services for the eight service units. One of these hospitals, Tuba City, serves about 25,000 patients from the

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western Navajo and western Hopi Reservations. These reservations, approximately 20,769 kilometers or 8,000 square miles, are sparsely settled and have no major health care facilities other than those of the IHS.

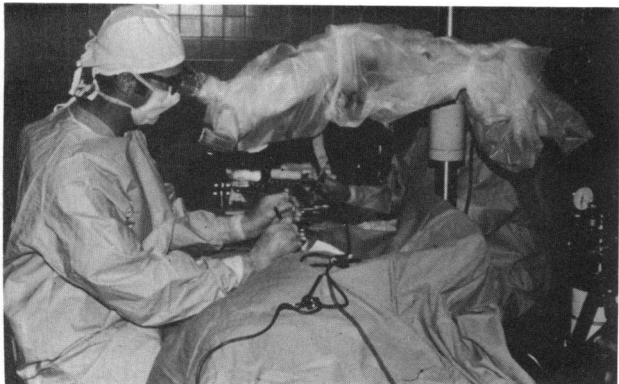
The Tuba City Hospital has 75 beds, 15 bassinets, and a staff of 12 specialists in general surgery, pediatrics, internal medicine, and obstetrics. Otologic specialty services are not available at the hospital; they are obtained at two Indian Medical Centers in New Mexico. One center is in Gallup, 290 kilometers or 180 miles away from Tuba City, and the other is in Albuquerque, about 483 kilometers or 300 miles away.

The Problem and Approaches to Solution

In a 1972-73 survey conducted by the University of Colorado, 252 children with unilateral and 70 with bilateral tympanic membrane perforations were seen among 6,525 students screened in the area served by the Tuba City Hospital. Most of the children with perforations had a hearing loss of 20-30 dB or greater in the affected ears. The opinion of the otolaryngologists assessing these conditions was that the therapeutic procedure of choice for a majority of these children was tympanoplasty—surgical reconstruction by application of a fascial graft from the temporalis muscle to the perforated ear drum. However, the Tuba City Hospital was not able to provide tympanoplasties, primarily because it had no staff otolaryngologist. Only one otolaryngologist was available to the entire Navajo and Hopi Reservation areas, with a population of approximately 140,000.

Several solutions were tried. First, an otolaryngologist visited the hospital on a scheduled basis. Under this program, only 20 patients were operated on during a 1-year period. Often patients did not appear at the scheduled time of the otolaryngolo-

Dr. Rodney Hawk, using an operating microscope, performs a tympanoplasty at the Tuba City Hospital



The Tuba City Boarding School provides a pleasant atmosphere for convalescing post-operative patients

gist's visit. Also, when the hospital operating room personnel were assisting with tympanoplasties, other needed surgery had to be postponed—the hospital had only one anesthetist, one scrub nurse, and one circulating nurse.

A second approach toward solving the tympanoplasty problem was sending children to other, larger hospitals. But, only 20 children received operations between July 1973 and May 1974 at hospitals in Gallup and Albuquerque. Under this arrangement, the cost per tympanoplasty in Albuquerque was between \$800 and \$1,000. Additional problems associated with hospitalization at a distant site were the emotional upsets of children separated from their families and the difficulty in obtaining postoperative clinical followup.

The third approach was to cover small perforations with cigarette paper and to administer antibiotics, topically and systemically. This approach was effective in certain cases, but it was not applicable for the majority of the perforations.

Because all three approaches proved inadequate to correct the large numbers of chronic tympanic membrane perforations, the following approach—the use of support resources—was tried.

Support Resources

In this approach, tympanoplasty was considered a technological intervention that was likely to succeed in correcting a large number of middle-ear perforations but one that required extensive resources for its accomplishment. The plan for this approach concerned acquisition and organization of the resources to support a large number of tympanoplasties at the Tuba City Hospital.

Six elements of the plan were important for its success: (a) summertime scheduling, (b) separation of the tympanoplasty program from other hospital functions, (c) use of available community resources, (d) pre-admission preparation of patients, (e) scheduling to maximize use of surgical personnel and

facilities, and (f) orientation and accommodations for volunteer staff.

Summertime scheduling. The tympanoplasty program was scheduled in the summer because of the low occupancy of beds in the hospital pediatric ward at that time; volunteer physicians and nurses were available because of vacations; and housing was available for volunteer staff and preoperative and convalescent patients because of unoccupied teachers' quarters and pupil dormitories in the Bureau of Indian Affairs (BIA) and public schools.

Separation from other hospital activities. Because the resources of the Tuba City Hospital were required primarily to meet day-to-day service commitments, the ear surgery program was planned to place as little extra burden as possible on existing hospital resources. One of two operating rooms at the hospital was assigned exclusively for ear surgery and staffed independently with volunteers—a board certified otolaryngologist, a senior otolaryngology resident, an otological surgical technician, a circulating nurse, an anesthesiologist, and a recovery room nurse. Provisions were made to employ extra nurses on the pediatric service to care for tympanoplasty patients. Disposable operating room drapes and supplies were used wherever possible. Records of the operations were dictated onsite and periodically sent to Pittsburgh where they were transcribed. Extra persons were employed to contact and transport patients and to manage the records of the tympanoplasty patients.

Use of community resources. The proposed program was discussed with the members of the Tuba City Service Unit Health Board and their approval was obtained. The ENT Department of the Gallup Indian Hospital loaned operating room equipment, and the University of Colorado Otitis Media Program made available a special trailer for audiologic testing and two trained otologic technicians. The BIA boarding school provided dormitory space, recreational facilities, all meals, and round-the-clock dormitory supervision by adults for all pediatric patients. Furnished apartments were rented from both BIA and the Tuba City public schools for the summer volunteers.

Pre-admission preparation. Potential candidates for tympanoplasty were identified from among students found to have perforated tympanic membranes by the University of Colorado Otitis Media Project

in 1972–73. Two months before the starting date of the project, patients were evaluated and, when suitable, assigned tentative dates for surgery. Patients whose parents refused operation were removed from the list and new patients substituted. Patients were overscheduled in anticipation that some would fail to appear for surgery. Most of the families were contacted again at home shortly before the scheduled date of surgery. Transportation to and from Tuba City Hospital was provided for patients needing it.

Maximum use of personnel and facilities. The boarding school housing allowed children to be brought from their distant homes several days preoperatively so that a reservoir of several children was available for hospitalization if scheduled patients did not show up. Another pool of patients existed among those residing near the hospital who could fill openings in the operating schedule on short notice. Thus, it was planned to use the operating time and facilities to full capacity.

One day after their operations, the patients were discharged to the boarding school, where they usually stayed for 1 week before returning to their homes. This arrangement minimized hospitalization and still allowed close observation during the first few postoperative days.

Orientation and accommodations for volunteers. Fifteen professional staff members of the University Health Center of Pittsburgh volunteered for the program. Each served approximately 2 weeks—only the surgical director and one nurse served the entire 9 weeks, and both received salaries. Because satisfaction of the volunteers was important for a successful program, efforts were made to prepare them for the experience and to make their stay pleasant. Before leaving Pittsburgh, the volunteers attended an orientation meeting at which the surgical director discussed the program objectives and the conditions under which the work would be carried out. They were given an extensive amount of literature concerning the history and culture of the Navajos, the programs of the Indian Health Service, and the natural attractions of the northern Arizona area. At Tuba City, the volunteers and their families occupied attractive, fully furnished living quarters, and they had unlimited use of rented automobiles for leisure-time activities.

Results

The program was conducted for 9 weeks, 5 days a week, with the exception of July 4, for a total of 44

operating days. Of 168 patients placed on the tentative operating schedule, 107 received operations, and the remainder either refused surgery or failed to report as scheduled. A total of 132 procedures were performed—100 tympanoplasties, 24 tympanomastoidectomies, 4 radical mastoidectomies, 2 myringotomies, 1 tympanotomy, and 1 fascial nerve decompression.

When patients failed to keep their appointments for surgery, the surgical schedule was maintained by substituting children living in the local area or in the boarding school "preoperative pool." At no time was surgery canceled because of lack of pediatric beds. Also, it was not necessary to augment the pediatric ward nursing staff as had been anticipated. Care of the tympanoplasty patients was absorbed into the workload of the regular pediatric nursing staff without excessive hardship. Hospital stay was kept under 2 days by use of the local boarding school facilities for convalescence.

The total dollar cost of the program was \$28,000. Most of this was spent to reimburse volunteer physicians and nurses for their travel and living expenses. In-kind contributions were made by the Tuba City Service Unit in the form of hospital and field health services, the Bureau of Indian Affairs in the form of boarding school housing of patients, the Gallup Hospital Otolaryngology Department in the loan of equipment, and the Colorado program in the loan of the audiologic trailer and technicians.

Overall acceptance of the program by patients and their parents was favorable. As the program progressed, several people who had heard of the project by word of mouth presented themselves for evaluation. The professional volunteers also judged the program favorably, and most announced their intention to return the following year. The workload of the Tuba City Hospital was not markedly increased by the ear surgery project and the hospital and volunteer staffs functioned together amicably and effectively.

In October 1974, 75 percent of the operated patients were given a 3-month postoperative evaluation. Further evaluations have been made at 6 and 12 months postoperatively and will be the subject of another report.

Discussion

The success of the program in achieving its immediate goals appears to support the thesis that technological intervention can provide a successful solution for certain kinds of problems of medically underserved populations if supporting resources are

provided. Similar success has been reported in an intensive dental program conducted by the University of California at Los Angeles (U.C.L.A.) Dental School on the Whiteriver Apache Reservation (5).

Both the current program and the U.C.L.A. dental project were conducted where the technological intervention was directed at conditions recognized by the populations as diseases (dental caries and perforated tympanic membranes). Similar procedures had been performed previously on people in the Tuba City and Whiteriver areas, although on a more limited scale, and beneficial results from this intervention were generally recognized. Thus, in the Tuba City program no effort was needed to make the population aware of ear perforations as a disease for which there was a treatment; the positive attitude of the population was an important factor in the success of the program.

In both the Tuba City and Whiteriver areas a well-developed and effectively functioning system of primary medical care was already in existence, and it provided an infrastructure of case identification and medical care to which a technological intervention could be added.

Although the Tuba City tympanoplasty project did not require any major alteration of the physical and cultural environment of the Navajo patients, the long-term solutions of problems associated with chronic otitis media will require alterations. Non-recurrence of perforation in operated ears, improvement in school performance of operated children, and reduction in new cases of otitis media and consequent tympanic membrane perforation require changes in physical living conditions, lifestyle, and personal values concerning importance of disease and medical treatment. Analyses of these factors are in progress and considered vital in evaluating the ultimate success or failure of tympanoplasty and in establishing protocol for further programs to prevent and correct tympanic membrane perforations in Tuba City area residents.

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