Rehabilitation of the communicatively impaired[1]

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The severe communicative impairments that accompany medical conditions can have a profound psychosocial impact on not only the patient but also his or her family, friends, and the medical staff. Recent developments in technology and a change in the philosophy behind rehabilitation have offered greater treatment alternatives. The nature of these communicative disorders as well as methods for assessment and treatment, including the use of augmentative devices, are described and the role of a multidisciplinary approach in both hospital and home care is emphasized.

Index terms: Communication aids for handicapped • Rehabilitation, instrumentation

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Verbal communication is one of the most fundamental of all human abilities.[1] The basic purpose of communication is to transmit one's needs, feelings, and thoughts to others, thereby allowing for a sense of human dignity and control over one's environment.[2] The impairment or interruption of communication that accompanies many serious medical conditions can have a profound impact on the patient as well as on his or her family, friends, the medical staff, and everyone else he or she comes into contact with. When the ability to communicate orally is lost or reduced, the patient is unable to convey his or her thoughts and feelings effectively and often becomes depressed, isolated, and withdrawn, so that interpersonal relationships are inhibited at a time when they are most needed. Ultimately, loss of employment may occur and the patient's ability to

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Table. Options for augmenting oral communication

- Verbal systems (which supplement phonation)
  - Artificial laryngeal devices
    - Application
      - Total laryngectomy
      - Laryngeal trauma
      - Tracheotomized/ventilator dependent
    - Types
      - Cervical
      - Intra-oral
  - VentiVoice pneumatic voice device (Blom-Singer)
    - Application
      - Ventilator-dependent
  - "Talking" tracheotomy tubes
    - Application
      - Ventilator-dependent
    - Types
      - Portex
      - Communitrach
- Non-verbal systems
  - Sign language and gestures
    - Application
      - Hearing-impaired
      - Aphasic (language-impaired)
      - Any other nonvocal patient who has upper extremity use
  - Writing
    - Nonvocal patient who can spell and has upper extremity use
  - Simple communication boards
    - Application
      - Nonvocal patient with some motor ability
    - Types
      - Alphabet
      - Words
      - Pictures
  - Electronic communication systems
    - Application
      - Nonvocal patients; adaptive switches accommodate to extremely limited motor control
    - Types
      - Typed message
      - Synthesized speech
      - Typed message and synthesized speech, often with computer compatability

live independently in the home environment may be threatened. Even when support systems are available for home patient care, inability to communicate adequately will limit the quality of life.

Recently, the number of communicatively impaired patients referred for treatment has increased. There are several reasons for this observation: (*a*) there is a growing sensitivity toward the needs of patients who suffer from even a temporary interruption in communication; (*b*) the goals of treatment have evolved from a narrow concept of merely normalizing speech to a broader one of facilitating the most efficient means of communication, even for patients with declining function; and (*c*) the use of augmentative systems to supplement verbal communication has been made possible by a rapidly expanding technology which offers a wide range of alternatives.

Basic knowledge of the components of normal communication is necessary in order to understand the effects of impairment. Human communication occurs when a message is sent *and* received through a highly organized and rule-

governed symbolic system called language. Verbalization is the preferred method of symbol transmission, although the written word, graphics, signs or gestures, and systems such as Morse code are often employed. Verbalization is produced through a series of rapid and coordinated neuromotor movements of the respiratory, phonatory, resonatory, and articulatory musculature. When speech is significantly impaired, supplementary methods of communication through written, graphic, or signed-gestural codes may be possible.

Etiology

The etiologic bases of medically associated communication impairments can be classified as neurologic, anatomic, or mechanical. Neurologic conditions such as a cerebrovascular accident, head trauma, tumor, infection, or degenerative disease may result in aphasia (impaired comprehension and/or formulation of language), generalized deficits in intellectual functioning, and/or dysarthria (impaired neuromotor control of speech production). In particular, degenerative diseases such as amyotrophic lateral sclerosis, multiple sclerosis, myasthenia gravis, and Guillain-Barré syndrome may result in such severe dysarthria that verbal communication becomes extremely limited or even impossible.

The most significant anatomic bases of impaired communication are those that occur following head and neck surgery, such as total laryngectomy or resection of the tongue, jaw, and/or soft palate. Phonation, resonation, and/or articulation may be impaired depending upon the site and extent of the excision.

Mechanical impairment occurs when the structures which produce speech remain intact, but necessary medical treatment interferes with their function. A primary example of this is a tracheotomy patient who is unable to vocalize, which occurs particularly when there is a need for ventilatory support. Many patients treated in intensive care units and more recently in home settings fall into this category and often experience lengthy and severe restrictions of communication.

Options for treatment

Whenever possible, redevelopment of adequate cognitive, linguistic, and/or motor abilities is a major goal of treatment. The speech-language pathologist can make use of many traditional methods of treatment which are directed toward either improving function or compensating for losses.[3–5] Surgical procedures and/or prosthetic devices are also used sometimes. However, functional verbal communication is not always achieved, particularly when the disorder is severe and underlying medical conditions are irreversible. In addition, even if verbal communication is re-established, there may be a significant interim period during which the patient is non-verbal. Therefore, augmentative means of communication are often advocated for either temporary or permanent use.

Fig. 1. The Expanded Keyboard Memowriter functions as a minitypewriter with limited memory capacity.

Vanderheiden[1] classified several types of augmentative communication systems: signed-gestural language, simple communication aids, and electronic or electromechanical devices (*Table*). Formal signed-language systems are most applicable to the severely hearing-impaired, although simple gestures are more widely applied to other populations as an initial means of establishing

Fig. 2. Synthesized speech devices. The Say-It-All (left) provides limitless speech capacity with a memory component for 128 phrases. The Vocaid (right) provides preselected, common phrases.

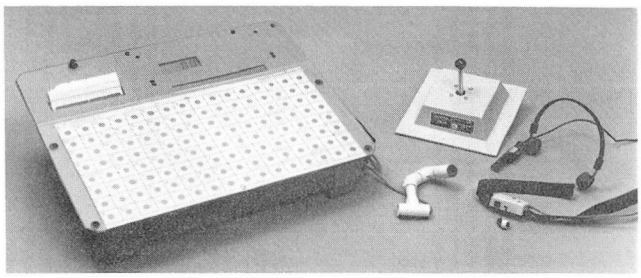

Fig. 3. The Express III computerized speech-graphic communication system allows the physically handicapped to operate by (clockwise from top) a joy stick, optical head pointer, eyebrow switch, or manual control.

basic communication. Simple communication aids can be developed easily and inexpensively using pictures, words, phrases, or the alphabet as stimuli, depending upon the functional level of the patient. Electronic devices provide communication through printed (*Fig. 1*), displayed, or synthetic-speech output (*Fig. 2*); often they are activated by a variety of control interfaces, such as optical head-pointers, joysticks, paddle, or tongue or eyebrow switches (*Fig. 3*). Additional options include artificial laryngeal devices, which have been used by laryngectomy patients for many years (*Fig. 4*).[6] These same devices can be used by other vocally impaired patients (following tracheotomy, for example). The Venti-Voice, recently developed by Blom et al,[7] is a self-activated pneumatic speech device for the ventilator-dependent patient.

Evaluation

As the number of options for augmenting communication has grown, decisions regarding system selection have become more complicated. Coleman et al[8] suggest that the primary goal is to match the system with the communicative needs and situational constraints of the patient, while Hagen[2] has emphasized fitting the communication system to the capabilities of the individual. The capability-need assessment described by Beukelman and Yorkston[9] is one method of ensuring that appropriate decisions are made, involving first of all a full assessment of linguistic, intellectual, motor, and visual-perceptual skills.

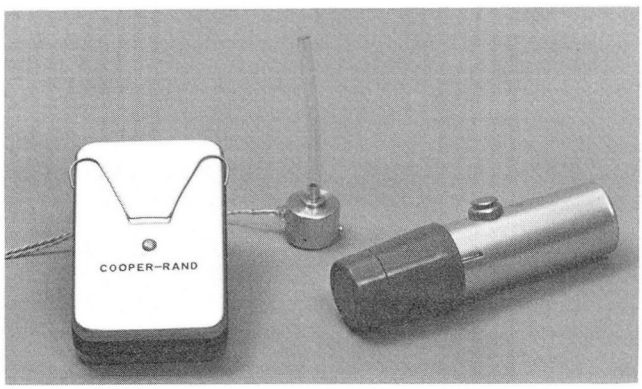

Fig. 4. Electronic artificial laryngeal devices. The Cooper-Rand model (left) is used intraorally while the Servox model (right) is operated by cervical placement.

The speech-language pathologist must answer several questions: (*a*) what are the nature and severity of the disorder? (*b*) is verbal communication currently functional? (*c*) is the patient anticipated to recover, maintain, or experience further loss of verbal-communicative and other skills? and (*d*) what other methods of communication may be used in order to enhance function? A thorough understanding of both the etiologic basis of the disorder and future medical treatment is necessary for planning effective rehabilitative measures. Information about the patient's level of comprehension and formulation of language and his or her ability to produce speech is important, as is knowledge of memory, orientation, and learning ability.

Evaluation of motor and visual-perceptual skills by the occupational therapist is particularly necessary when an augmentative communication system is indicated. Upper-extremity range of motion, strength, gross and fine motor coordination, sensation, functional mobility, and balance must all be considered. Appropriate positioning must be obtained so that the patient remains stable and there is no interference with reflexes or gravity. In addition, proper body positioning leads to optimal manipulation of the system and energy conservation, both of which can contribute to overall effectiveness in use of a communication system. Visual-perceptual skills must also be determined, as they can have a significant impact on decisions regarding nonvocal communication. This information will facilitate the occupational therapist's determination of the adaptations necessary to accommodate the physical limitations in operating a communication device.

Communicative needs should be assessed by the social worker. Knowledge of the patient's values, goals, and attitudes, as well as vocational circumstances and avocational interests, is impor-

tant. The family's relationship with and support of the patient must be understood. It is essential to determine how losses in communication might affect both the patient and family as well as anticipated future communication needs, particularly while the patient is in an acute medical setting and plans are being made for return to the home environment. It is only when the needs of communication are well understood that the best match between patient and system can be made. Counseling of both the patient and family plays a vital role in stimulating acceptance and optimizing utilization of alternative systems of communication in the hospital and home.

Beukelman and Yorkston[9] also emphasized the need to assess the performance of a communication system with regard to rate and accuracy of message transmission, efficiency with a variety of partners, generalization of system use in various environments, and the type and form of message. In order to be effective, a communication system must work with the widest variety of receivers, involve minimal delay or unusual demands on the part of the sender or receiver, and be capable of generating as complex a message as the sender might want to initiate. In addition, it must be flexible enough to meet the growing or declining needs of the patient.[10] In order for this to be accomplished, frequent, ongoing re-evaluation and revision are necessary. At best, it is often not possible to duplicate or even approximate premorbid communication abilities with regard to these factors.

Conclusion

Servicing the needs of the communicatively impaired has become a growing challenge. A multidisciplinary approach involving the patient, physician, speech-language pathologist, occupational therapist, and social worker is necessary in order to ensure that both the temporary and long-term needs of these patients are fulfilled and quality of life is significantly improved.

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References

1. Vanderheiden GC. Augmentative modes of communication for the severely speech- and motor-impaired. Clin Orthop 1980; **140:**70–86.
2. Hagen C. Assistive communication systems for the anarthric and severely dysarthric patient: a rationale for their use and criteria for their selection. Scand J Rehabil Med 1978; **10:** 163–168.
3. Darley FL, Aronson AE, Brown JR. Therapy for motor speech disorders. [In] Motor Speech Disorders. Philadelphia, WB Saunders, 1975, pp 270–287.
4. Johns DF. Clinical Management of Neurogenic Communicative Disorders. Boston, Little, Brown and Company, vol 1, 1978, pp 1–333.
5. Chapey R. Language Intervention Strategies in Adult Aphasia. Baltimore, Williams & Wilkins, vol 1, 1981, pp 105–324.
6. Blom ED. The artificial larynx: types and modifications [In] Keith RL, Darley FL, eds. Laryngectomee Rehabilitation. Houston, College-Hill Press, vol 1, 1979, pp 63–86
7. Blom ED, Singer MI, Harkleroad BA. Self-activated pneumatic voicing system for ventilator dependent patients. Presented at the American Speech and Hearing Association Annual Convention, Toronto, Nov 1982.
8. Coleman CL, Cook AM, Meyers LS. Assessing non-oral clients for assistive communication devices. J Speech Hear Disord 1980; **45:**515–526.
9. Beukelman DR, Yorkston KM. Nonvocal communication: performance evaluation. Arch Phys Med Rehabil 1980; **61:**272–275.
10. Beukelman DR, Yorkston K. Communications options for patients with brain stem lesions. Arch Phys Med Rehabil 1978; **59:**337–340.