Current Concepts of Cerebrovascular Disease—Stroke

Stroke Rehabilitation

Outcome Studies and Guidelines for Alternative Levels of Care

JOEL S. FEIGENSON, M.D.

"Every year, nearly 400,000 people in the United States become stroke victims. Approximately 40% of these die within a month and at least two-thirds of those who survive have some degree of permanent disability. At the present time, the population of this country includes two and a half million disabled survivors of stroke. The economic toll of this disease, considering both the cost of care and the loss of earnings, is estimated to be nine and a half billion dollars annually."

BECAUSE STROKE is a major cause of disabling illness in this country, most physicians are aware of current developments in stroke prophylaxis, diagnosis and management. Few physicians, however, are aware of how much can be done to treat residual stroke-induced disabilities or of the various alternatives for the delivery of care following stroke.

Outcome Studies for Patients With Fixed Neurological Deficits After Stroke

Acute Care Hospitals. Howard1 has conclusively shown that a specially staffed, disability oriented stroke unit within the confines of a general hospital can significantly decrease mortality and morbidity and improve functional outcome. In his series of over 1,300 patients, all admitted to the stroke unit within the first few days after the onset of stroke symptoms, the average length of hospitalization was only 28 days: 50% of the group returned home with the help of community agencies, 30% were referred to nursing homes or extended care facilities, and 20% expired. Many of the patients discharged home have maintained gains after discharge. The American Heart Association subsequently endorsed the concept of the acute care stroke unit and has drawn guidelines for developing and running this type of service.2 Stroke units usually can be developed at no additional cost to patients, hospitals, or third party carriers.

Rehabilitation Centers. Patients with severe residual deficits who cannot be sent home from the acute care hospital are frequently referred to regional rehabilitation centers for more intensive therapy. On the basis of Howard's demographic and outcome data, it was estimated that 3 patients per 1,000 population per year would be referred to a regional rehabilitation center in the New Bedford, Massachusetts area. In a series of 248 patients with severe stroke deficits (average age 67, range 17 through 98 years) admitted without preselection to our regional rehabilitation center stroke unit in White Plains, New York, we showed that 80% of these patients were able to return home after an average stay of only 43 days. At discharge 85% were ambulatory, and 56% were able to perform their own self-care activities without assistance. All of these 248 patients would have been sent to nursing homes if they had not been admitted to our stroke unit. The fact that 190 of the 248 patients went back into the community suggested that a regional stroke rehabilitation unit could conceivably "salvage" up to 80% of stroke patients referred from acute care general hospitals to nursing homes for long-term care. Two subsequent studies confirmed these data, and other large rehabilitation centers are now achieving comparable results. Guidelines for developing and running a disability oriented stroke unit within a regional rehabilitation center have been published elsewhere.

Even in rehabilitation centers specializing in the treatment of functional disabilities, patients with stroke are more likely to improve if placed on a disability oriented unit than if they are admitted to mixed disability units which are scattered throughout the hospital.

Our outcome data on over 800 patients show that age up to the ninth decade, sex, the presence of aphasia or sensory loss, or the presence of complicating medical illnesses do not adversely affect the outcome in such areas as the ability to walk, self-care activities, discharge disposition, or length of stay. Severe cognitive and perceptual problems, such as denial, neglect, visual inattention, and apraxia, do affect outcome adversely, but even patients with these deficits can make significant gains if their problems are adequately identified and treated. Severe weakness, poor motivation, and a delay of more than 30 days between the onset of the stroke symptoms and admission to a regional stroke rehabilitation unit also affect outcome adversely.

Patients who cannot walk, who are incontinent, or who are so confused or perceptually unaware that they cannot be left unattended usually cannot be managed...
CURRENT CONCEPTS OF CBVD—STROKE/Feigenson

TABLE 1 Variables Used to Construct a Medical Model to Predict Outcome After Stroke (841 Patients)

<table>
<thead>
<tr>
<th>Independent variables (predictors)</th>
<th>Dependent variables (outcome measures)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>ADL status (activities of daily living)</td>
</tr>
<tr>
<td>Sex</td>
<td>Independent</td>
</tr>
<tr>
<td>Ethnic origin</td>
<td>Requires supervision but no assistance</td>
</tr>
<tr>
<td>Diagnosis (etiology of stroke)</td>
<td>Needs aid with dressing/hygiene/feeding</td>
</tr>
<tr>
<td>Type of hospital providing initial care</td>
<td>Needs aid with bowel/bladder routines</td>
</tr>
<tr>
<td>Associated medical conditions</td>
<td>Needs aid with everything</td>
</tr>
<tr>
<td>Initial diagnostic evaluation</td>
<td>Ambulation status</td>
</tr>
<tr>
<td>Onset to admission interval</td>
<td>Walks with no aids</td>
</tr>
<tr>
<td>Type of hospital insurance</td>
<td>Walks with aids</td>
</tr>
<tr>
<td>Perceptual dysfunction</td>
<td>Cannot walk</td>
</tr>
<tr>
<td>Organic mental syndrome</td>
<td></td>
</tr>
<tr>
<td>Motivation</td>
<td></td>
</tr>
<tr>
<td>Dysphasia</td>
<td>Length of stay</td>
</tr>
<tr>
<td>Severity of weakness (mild/moderate/severe)</td>
<td></td>
</tr>
<tr>
<td>Homonymous hemianopsia</td>
<td></td>
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<tr>
<td>Ophthalmoplegia</td>
<td></td>
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<tr>
<td>Dysphagia</td>
<td></td>
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<tr>
<td>Dysarthria</td>
<td></td>
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<tr>
<td>Ataxia</td>
<td></td>
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<tr>
<td>Hemisensory loss</td>
<td></td>
</tr>
<tr>
<td>Hyperreflexia</td>
<td></td>
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<tr>
<td>Long tract signs</td>
<td></td>
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<tr>
<td>Upper/lower extremity spasticity</td>
<td></td>
</tr>
<tr>
<td>Upper/lower extremity flaccidity</td>
<td></td>
</tr>
<tr>
<td>Subluxation of shoulder (with/without pain)</td>
<td></td>
</tr>
</tbody>
</table>

in a home setting and constitute the group most frequently referred to nursing homes after treatment in a regional stroke rehabilitation unit.

Attempts to establish a medical model to predict outcome have so far been unsuccessful, although a number of workers have used very sophisticated mathematical techniques to address this problem. Our own attempt to use multivariate analysis to predict outcome in a group of 841 patients has suggested that medical and physical variables alone are not adequate and that socioeconomic variables must be included in any comprehensive analysis which is designed to predict eventual functional outcome (tables 1 and 2). Other data showed the feasibility of merging medical and functionally oriented data bases to predict outcome.

The National Stroke Data Base of the NINCDS has recently been established to develop a comprehensive outcome model.

Cost for Initial Care. The average hospital cost of initial care for a person suffering an acute cerebral infarction in 1977 ranged from $13,052 to $19,285 per patient hospitalized in acute care hospitals in New York City and then referred to a stroke rehabilitation unit for short-term treatment. While the cost for rehabilitation was high at about $6,000 to $8,000 per patient, it seemed justified because most of the patients referred to the stroke unit would otherwise have required long-term institutional care at costs

TABLE 2 Results of Multivariate Analysis Used to Construct a Medical Model to Predict Outcome After Stroke (841 Patients)

<table>
<thead>
<tr>
<th>Home/not home</th>
<th>ADL*</th>
<th>Ambulation</th>
<th>Length of stay</th>
</tr>
</thead>
<tbody>
<tr>
<td>The mathematical model improved predictability by only 13%</td>
<td>The mathematical model improved predictability by only 20%</td>
<td>The mathematical model improved predictability by only 18%</td>
<td>The mathematical model improved predictability by only 19%</td>
</tr>
</tbody>
</table>

This analysis demonstrates that even a sophisticated medical model does not greatly improve ability to predict outcome after stroke. Practical experience with over 1,400 patients suggests that inclusion of more socioeconomic variables would be necessary to enhance predictability.

*Activities of daily living.
ranging from $18,000 to $36,000 per year. Also, most of the patients who were "rehabilitated" and sent home remained in the community for one to three years. Other studies have shown that the mean survival time after stroke may exceed 7 years. Thus, although it is expensive to provide rehabilitation services for patients with persistent stroke deficits, the data suggest that long-term costs for not providing this type of care may actually be higher.

It is now clear that rehabilitation is an effective method of improving functional outcome, returning patients to the community, and minimizing eventual health care costs. Preliminary studies have shown that many patients maintain their gains and remain in a home setting. The studies also suggest that these patients are reasonably satisfied with their quality of life. 13-18

Most patients with fixed neurological deficits after stroke have persistent functional disabilities which require further treatment after discharge from the acute care or regional rehabilitation center. What types of care are available, and how does the physician select an appropriate follow-up facility?

Alternatives for Health Care Delivery

Most planners endorse the concept that the health care delivery system should be stratified so that each patient can enter the system at a level appropriate to his needs. By offering alternative levels of care, effective treatment may benefit the patient, his family, and society at the lowest possible cost.

Patients with stroke may enter this system at any of the following levels of care: 1) acute care in a general hospital, 2) rehabilitative care in a general hospital, 3) rehabilitative care in a regional rehabilitation facility, 4) long-term care in a health-related facility, skilled nursing facility, or chronic disease hospital, 5) home care provided through local hospitals, various agencies, and private individuals, 6) day care, 7) day hospital care, 8) limited outpatient care in the rehabilitation department of an acute care hospital or a regional rehabilitation hospital, and 9) stroke clubs.

Data outlining expected outcomes and costs for patients entering the first three levels of care have already been presented. There is an astonishing lack of information about outcome or cost for the other levels of treatment, although these health care alternatives are widely used in the long-term management of patients with fixed deficits after stroke. Without data on effectiveness, benefit, or cost for the last 5 levels of care listed, it is difficult to develop entry level criteria, guidelines for services provided, or methods for evaluating outcome comparable with the standards which already exist at the local, state, or federal levels for regulation of care in acute care/rehabilitation hospitals and in skilled nursing facilities.

Since there are major differences in the type, intensity, and duration of services provided in care levels 5 through 9 and since not all services are covered by health care insurance, it is prudent to describe what can be expected from "typical" programs.

Home Care refers to independent or hospital-based programs which bring patients to the hospital for care or send personnel out to the patient's home to render care (the visiting nurse services fall into this category). Depending on the region the home health care team may consist of doctors, nurses, physical therapists; occupational therapists, speech therapists, homemakers, and social workers. Transportation to and from the hospital is usually not included. Patients must have relatively severe ongoing medical and physical needs to quality for these services, and their own physicians must prescribe treatment, although the duration, intensity, and type of care rendered is frequently determined by the agency itself and not by the referring physician. Treatment tends to be specific for the deficit and frequently fails to emphasize methods for resocialization or improving over-all quality of life. These services are usually covered by third party carriers, although there are exceptions. For example, many carriers will not pay for occupational therapy.

Recently, there has been a rapid increase in the number of non-hospital based, privately owned home care agencies which will send staff into the home to render care. To improve the quality of care by these agencies, state or local regulations may require them to be licensed.

Day Care Programs usually serve people with stable deficits who are able to get to and from the meeting place, providing their own transportation. Their primary purpose is resocialization, and patients may attend sessions up to 5 days a week, several hours a day. Day care programs are staffed by volunteers or by a small number of paid staff. No formal therapy is provided. There may be a nominal charge to cover costs, but these costs are usually not reimbursed by third party carriers. Referral may be self-initiated, and all handicapped individuals may attend sessions. Specific orders from the patient's physician are not required. A typical daily program might consist of arts and crafts, games, discussions, group exercises, and perhaps a meal provided by the patients themselves.

Day Hospital Programs offer intensive multi-disciplinary team rehabilitation as well as ongoing medical supervision by a physician who works with the day hospital team. Beds are provided for patients who cannot function on an ambulatory or wheelchair level for the full duration of the program. In addition to physicians and nurses, day hospitals must also provide physical therapy, occupational therapy, speech therapy, skilled rehabilitation nursing, and social services. Programs are prescribed by either the referring physician or the day hospital physician. To qualify for admission to these programs, patients must require at least 2 of the covered services in addition to regular medical supervision. Most successful programs provide transportation to and from the day hospital as well as lunch. Third party carriers may reimburse on a clinic rate or may reimburse for individual services actually rendered. Transportation is usually not covered by these carriers. Patients frequently come 2 or 3 days per week, although some may come for a full 5-day
program, and they may remain in the program as long as they continue to make functional gains.

Programs usually start about 10 o'clock in the morning and run to 3 or 4 o'clock in the afternoon. Maintenance therapy is not considered to be a reimbursable cost, even though it is clearly necessary to help patients maintain gains achieved through inpatient and out-patient therapy. A daily program may consist of at least 2 of the covered services in addition to a meal (provided by the day hospital), medical supervision, and resocialization activities. The day hospital is thus an alternative to prolonged inpatient hospitalization and to routine outpatient programs.

**Limited Out-Patient Treatment** is designed for patients who do not require the type of intensive care offered by home care or by the day hospital. These patients may be best managed in the regular out-patient clinics at acute care or rehabilitation centers where either the referring physician or the hospital-based physician directs care. Patients with gait abnormalities may thus attend physical therapy sessions, patients with perceptual deficits may attend occupational therapy sessions, or aphasic patients may attend speech therapy sessions. An individual who requires more than one service is best served in a day hospital program where it is easier to coordinate multiple therapeutic programs.

Third party reimbursement varies greatly with respect to services covered. Patients should be advised to check their hospital coverage carefully before embarking on a long course of out-patient therapy.

**Stroke Clubs** are comprised of "stroke victims" and their families. The primary purpose is to provide a common forum where members can share their experiences, discuss common problems and their solutions, listen to invited lecturers, or just pass the time in various social activities. Meetings are usually held monthly. Health care professionals may advise these groups but usually do not run them. Third party carriers do not reimburse for stroke club activities although local Heart Associations may provide assistance. Stroke clubs thus complement home care, day care, day hospital, and outpatient department care.

**Recommendations**

Stroke rehabilitation could "salvage" up to 80% of those patients who are now referred to nursing homes for post-stroke care. Rehabilitation is an effective way of treating physical disability, even in an elderly population with severe neurological, functional, linguistic, and perceptual dysfunction. Available information suggests that rehabilitation is also cost effective.

Early institution of rehabilitation in an acute care hospital with a disability oriented stroke unit can significantly decrease morbidity and mortality while improving functional outcome. Patients in hospitals without this type of unit, who do not make enough progress in an acute care hospital rendering multidisciplinary care or who have very sophisticated rehabilitation needs, should be transferred without delay to a regional rehabilitation center for further care. The rehabilitation care rendered in skilled nursing homes, extended care facilities, and most chronic disease hospitals cannot match the care rendered at regional rehabilitation centers. Therefore, patients with residual stroke deficits should not be referred to these facilities prematurely if they can be sent to a regional rehabilitation center.

After discharge many patients still have severe residual deficits requiring multidisciplinary care and regular medical supervision. These services can be provided at a day hospital or by local home care programs. Patients needing less care can be best managed with limited outpatient care. Many patients also benefit from the programs offered at day care centers and stroke clubs, even though these groups emphasize resocialization rather than formal therapy. By providing comprehensive care from the onset of the stroke through long-term follow-up, physicians can maintain their patients at the highest possible functional level while simultaneously holding down the high cost of long-term institutional care.

**References**

1. **Toole J:** Diagnosis and Management of Stroke. Dallas, American Heart Association, 1979
2. **Howard BE:** Practical Approach to Care of the Acute Stroke Patient in a Community Hospital Setting. New Bedford, Massachusetts, St. Lukes Hospital, 1974
3. **American Heart Association:** Stroke Program Guide. Dallas, 1978
8. **Feigenson JS, Gitlow HS, Greenberg SD:** Disability oriented rehabilitation unit — a major factor predicting stroke outcome. Stroke 10: 5-8, 1979
12. **Feigenson JS, Feigenson WD, Gitlow HS, McCarthy ML, Greenberg SD:** Outcome and cost for stroke patients in academic and community hospitals: comparison of 2 groups referred to a regional rehabilitation center. JAMA 240: 1878-1880, 1978
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