Stroke Surveillance: The Concept of Stroke Team in Diagnosis, Treatment and Prevention

BY NEMAT O. BORHANI, M.D.

Abstract:
The Stroke Project in the Sacramento Medical Center has had two primary objectives. These were: (1) to create an atmosphere of stroke awareness by continuous feedback of relevant and reliable information to physicians who care for stroke patients, and (2) to introduce the concept of the stroke team in daily care of the stroke patient in the hospital and beyond.

During a period of two years 171 stroke patients were admitted to the Project. The system devised provided a useful tool in planning objectively the appropriate course of action in patient education and training programs.

Introduction

Injured brain cells, unlike those of other organs, cannot regenerate. It is logical, therefore, that the main thrust of a community stroke control program should be primary prevention. Emphasis on primary prevention should not, however, detract our attention from many important and hitherto neglected aspects of secondary prevention programs aimed at controlling mortality and morbidity from stroke. It is important, for example, to bear in mind that considerable benefit can be provided the stroke patient by a well-planned and orderly executed comprehensive medical treatment, which may avert further brain damage; and by a coordinated rehabilitation and follow-up service program, which may assist the patient in overcoming his handicap and adjusting to his environment. It is the purpose of this communication to report on a program which has focused on this issue by introducing the concept of stroke team in the care of the stroke patient and by utilizing computer facilities in providing adequate surveillance and follow-up programs.

During the past two years, a pilot program on surveillance and retrieval of basic information concerned with the characteristics, methods of diagnosis, treatment, rehabilitation and follow-up of stroke patients has been in operation at the University of California-Davis (UCD) School of Medicine Hospital Facility in Sacramento, California (The UCD-Sacramento Medical Center). Two basic concepts constituted the main premise in planning and conducting the Stroke Project in the Sacramento Medical Center. These were: (1) to create an atmosphere of stroke awareness by continuous feedback of relevant and reliable information to physicians who care for stroke patients, and (2) to introduce the concept of stroke team in daily care of the stroke patient in the hospital and beyond.

Methods

Collection and Retrieval of Information

Based on the results of previous work by other investigators,* a standardized, precoded form was developed for systematic collection of needed information. The project personnel received extensive training in the use of the form. All collected information was verified by an independent observer, and edited for completeness and accuracy. The data were then punched into standard IBM cards and transferred to magnetic tape for computer analysis. A special computer program was developed for analysis of the data and retrieval of information. This computer program had two parts, one dealing with the preliminary and descriptive information on symptoms, and physical signs of the patient (Part 1), and the other dealing with final diagnosis, anatomical area of involvement, method of treatment, and outcome (Part 2).

Stroke Team

The main professional staff of the program included a team comprising a neurologist, an epidemiologist, a stroke nurse and a physical therapist. The supporting staff included statistical clerk, computer programmer, and secretaries. The emphasis of the program in terms of providing daily care for stroke patient was on coordinated teamwork for the benefit of the patient, and therefore a highly coordinated effort

*Drake W: Personal communication, 1972.
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began soon after admission of the patient to the hospital. The stroke nurse and physical therapist on the staff of the project were responsible to locate the stroke patient immediately after his admission and determine whether or not the case should be included in the program, the only criterion for exclusion being neurological disorders other than cerebrovascular disease. As soon as the patient was identified, members of the team reviewed his condition and discussed the case among themselves and with the member of the family to develop immediate and long-term plans of care. The neurologist on the team completed his initial work-up according to a standard protocol. Similarly, the nurse and physical therapist evaluated the patient's history, symptoms and signs, using the standardized form. All information collected within the first 24 hours of admission was then reviewed and edited by an independent observer and keypunched and transferred to computer for analysis. The members of the team were instructed to discuss each individual case with the patient's family, the house staff, the floor nurse and the attending physician. With complete cooperation and collaboration of all parties concerned, a comprehensive plan of action would be formulated for implementation.

The needs of the patient in terms of his potential goals for treatment, requirement for special equipment, need for social and other rehabilitation services, plans for discharge and follow-up were all discussed and an appropriate plan of action developed for implementation. As soon as the general condition of the patient was evaluated and an overall plan of action formulated, the members of the stroke team followed the patient regularly and frequently to ensure the implementation of every phase of plan of action thus developed. This was done without interfering with the work of other hospital staff. At all times both the patient and his family were provided assistance and counseling and were involved in the team's effort on behalf of the patient. The members of the team acted also as the "patient's advocate" by encouraging conscientious and comprehensive nursing care and by implementing recommendations for rehabilitation, as soon as feasible and safe.

As soon as the patient's condition had stabilized, and the physician deemed it appropriate, the members of the team instituted range-of-motion and positioning exercises. They provided any equipment (heel pads, splints, wedges, etc.) necessary for the patient's proper management, seeing to it that this equipment was used properly and preventive techniques were carried out. Members of the team taught the patient transfer techniques, bed activities and ambulation. They were fully aware of the fact that one of their most important tasks was to set appropriate standards for the care of the stroke patient by examples of their action and concern. They provided guidance and assistance in the care of the stroke patient and followed through on all aspects of the plan for care of that particular patient. At the time of discharge, they evaluated the patient thoroughly and determined the disposition and made convenient schedules for clinic visits. Figure 1 presents, in summary form, the concept of comprehensive care for the stroke patient as was developed in this Program.

Results

During a period of two years a total of 171 stroke cases was admitted into this Program. All patients were ascertained by members of the stroke team. Table 1 presents age and sex distribution of these patients.

Part 1 of the computer program developed for this study enabled the Program staff to identify the stroke mechanism by analyzing the distribution of a

TABLE 1

Frequency Distribution of 171 Stroke Cases by Age and Sex

<table>
<thead>
<tr>
<th>Age (yr)</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>All ages</td>
<td>108 (63.2%)</td>
<td>63 (36.8%)</td>
<td>171</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Less than 45</td>
<td>6</td>
<td>2</td>
<td>8</td>
<td>4.7</td>
<td></td>
</tr>
<tr>
<td>45-54</td>
<td>16</td>
<td>11</td>
<td>27</td>
<td>15.8</td>
<td></td>
</tr>
<tr>
<td>55-64</td>
<td>28</td>
<td>12</td>
<td>40</td>
<td>23.4</td>
<td></td>
</tr>
<tr>
<td>65-74</td>
<td>36</td>
<td>10</td>
<td>46</td>
<td>26.9</td>
<td></td>
</tr>
<tr>
<td>75 and over</td>
<td>22</td>
<td>28</td>
<td>50</td>
<td>29.2</td>
<td></td>
</tr>
</tbody>
</table>
TABLE 2

Frequency Distribution of Final Stroke Diagnoses by Primary Diagnosis at the Time of Admission

<table>
<thead>
<tr>
<th>Final stroke category</th>
<th>SAH</th>
<th>C.H.</th>
<th>Thromboembolism</th>
<th>TIA</th>
<th>Others*</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subarachnoid hemorrhage</td>
<td>11</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>Cerebral hemorrhage</td>
<td></td>
<td>14</td>
<td></td>
<td></td>
<td>2</td>
<td>16</td>
</tr>
<tr>
<td>Thromboembolism</td>
<td></td>
<td></td>
<td>92</td>
<td></td>
<td>14</td>
<td>106</td>
</tr>
<tr>
<td>TIA</td>
<td></td>
<td></td>
<td></td>
<td>13</td>
<td></td>
<td>13</td>
</tr>
<tr>
<td>Others†</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Total</td>
<td>11</td>
<td>14</td>
<td>106</td>
<td>13</td>
<td>40</td>
<td>171</td>
</tr>
</tbody>
</table>

*Includes four cases who did not have primary diagnoses related to the circulatory system.
†Includes ill-defined diagnoses.
‡Primary diagnosis different from stroke mechanism in 9.9% of cases.

series of complaint clusters. It produced clusters of all symptoms and complaints by first identifying the most salient cluster of complaints and then determining in sequence all the subsequent clusters until the Program exhausted all available data. Based on this analysis, a total of five complaint clusters was identified, relating to each of the respective anatomical structures of the circulatory system of the brain; these were called stroke dimensions. The cluster of complaints related to these dimensions has proved to be reliable and reproducible, with a correlation coefficient of \( r = 0.93 \). Table 2 presents the correlation of the initial determination of stroke mechanism (primary diagnosis) on 171 cases of stroke, as determined by the members of stroke team on admission and the final clinical diagnosis made after all laboratory and angiographical examinations were performed.

It can be seen that only 9.9% of the patients ended up with a final diagnosis different from the initial determination of stroke mechanism reported by the computer output. In a majority of the cases, the two determinations correspond very well, as can be seen diagonally in the table. Overall agreement on determination of stroke dimension between computer printout and final clinical diagnosis was 73%. The predictive value, calculated on the basis of 171 cases studied thus far, is 97% with a sensitivity of 76% and specificity of 67%. This system provided us an opportunity to have immediate access for retrieval of important information on the patient, for patient management and research. The system also provided a useful tool in planning objectively the appropriate course of action in patient education and in-training programs. We found the utilization of this system of great assistance in bedside teaching. It encourages comprehensive clinical work-up of the patient in a problem-solving manner, necessitating the taking of a good medical history and performing a complete physical examination on all stroke patients.

The greatest asset of the stroke team concept and the computer system described above has been the creation of an atmosphere of stroke awareness in the hospital. By working closely together and in a highly coordinated manner, the members of the stroke team have de-emphasized the artificial separation that has existed between acute nursing care and long-term rehabilitative care of stroke patients for so long. Also the immediate access to retrievable information on the patient has encouraged physicians and other health personnel to coordinate their efforts on behalf of the patient. It also has enabled them to judge more accurately than before the progress of their patient. The teamwork concept, employed during the past two years, in the care of the stroke patient has proved the thesis that working together in the patient's interest is vital to successful management of the stroke patient.

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