Outcome After Stroke in Patients Discharged to Independent Living

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In a prospective, population-based study, we evaluated rehabilitation outcome, place of residence, and functional ability 3, 6, and 12 months after stroke onset in 129 consecutive patients discharged from the hospital to independent living, either in their own homes or in an old people's home. The study group comprised 50% of all patients admitted for acute stroke between February 1, 1986, and January 31, 1987. Of the 129 patients, 125 returned to their own homes and four moved into an old people's home. Once they returned home, only minor changes occurred in the patients' place of residence or functional capacity. The majority of the patients (90%) were still living in their own homes after 12 months; 99% could walk independently indoors, 92–95% could climb a staircase, and 90% could manage their daily hygiene. Eight patients (6%) died during follow-up, and one fourth of the patients were hospitalized again. The average number of days of rehospitalization during the 12 months was 23. Our study may serve as a guide to the planning of stroke programs and to a more effective and efficient use of available health resources. (Stroke 1990;21:236–240)

Stroke patients constitute an increasing challenge to the health care system due to their large number, their marked degree of disability, and their high consumption of bed and health care resources. Information from population-based studies relating the use of resources to the quality of health achieved during the entire treatment period will contribute to solutions for the increasing stroke problem.

There have been few population-based investigations on the long-term outcome of stroke patients and their impact on society. Little information has been collected about the functional ability and life situation of stroke patients discharged from an acute-care hospital directly back to their own homes. Therefore, we undertook this population-based study to evaluate the rehabilitative and physical outcome during the first year after a stroke in consecutive patients who were discharged from an acute-care hospital to independent living.

Subjects and Methods

As of December 31, 1986, the Lund catchment area had a population of 153,211; 12% were ≥65 and 3% were ≥80 years old. University Hospital is the only hospital within the area.

Patients sustaining strokes and living in the Lund catchment area are usually referred to the Neurology Department of University Hospital. A few patients with subarachnoid hemorrhage or intracerebral hemorrhage are treated in the Department of Neurosurgery. We excluded these patients from our study together with those few who developed stroke as inpatients on a general medical ward and those who did not seek medical care for their stroke. Our investigation concerns all consecutive stroke patients from the Lund catchment area who, after acute treatment in the Department of Neurology, were discharged directly to independent living in their own homes or in an old people's home without further institutionalized rehabilitation. All other surviving stroke patients were referred to a geriatric hospital or a nursing home for secondary institutionalized rehabilitation.

Between February 1, 1986, and January 31, 1987, 258 patients with stroke were admitted to the Department of Neurology; 234 patients (91%, 117 men and 117 women) came from their own homes, 21 (8%) came from old people's homes, and three (1%) came from nursing homes. Most of the patients (87%) had first strokes; 13% were admitted for recurrent stroke.

Stoke was defined according to World Health Organization criteria as a vascular lesion of the brain resulting in a neurologic deficit persisting for ≥24 hours or resulting in death of the individual. This definition includes patients with minor stroke (reversible ischemic neurologic deficit) but excludes...
TABLE 1. Age, Sex, and Living Arrangements Before Stroke in 129 Patients Discharged Directly From Neurology Department to Independent Living

<table>
<thead>
<tr>
<th></th>
<th>Men (n = 70)</th>
<th>Women (n = 59)</th>
<th>Total (n = 129)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (mean±SD yr)</td>
<td>70±10</td>
<td>70±16</td>
<td>70±12</td>
</tr>
<tr>
<td>Living arrangement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With someone</td>
<td>63</td>
<td>30</td>
<td>93</td>
</tr>
<tr>
<td>Alone</td>
<td>7</td>
<td>29</td>
<td>36</td>
</tr>
</tbody>
</table>

Those with transient ischemic attacks. The same neurologist with a special interest in stroke determined the diagnosis of each patient. In classifying the strokes by type, all clinical and laboratory information such as computed tomography (CT), angiography, noninvasive tests, two-dimensional echocardiography, cerebrospinal fluid analysis, and autopsy findings were used. A diagnosis of cardiac embolism was based on the establishment of a likely cardiac source of emboli together with the absence of intracerebral hematoma on CT, the indication of large-vessel disease by angiography and noninvasive tests, or the presence of a lacunar infarct determined by clinical and CT features. Atherothrombotic infarction was diagnosed by CT or when no cardiac source of emboli was present. When supporting laboratory data were not available, the diagnosis of cardiac embolism versus atherothrombotic infarction relied mainly on the recognition of a cardiac source of emboli. Unspecified stroke was diagnosed on the basis of clinical symptoms and the absence of a likely cardiac source of emboli in patients in whom CT was not performed. The diagnosis of intracerebral hemorrhage was verified by CT or at autopsy.

After acute treatment, 129 of the 234 patients who came from their own homes were discharged directly to independent living. The sex, age, and living arrangements of these patients before the stroke are given in Table 1. The number of patients, their ages, and the diagnostic verification of the types of stroke are given in Table 2. Patients with unspecified stroke were older than those with other types of stroke, and none had CT for diagnosis.

The functional ability of these 129 patients living independently was assessed 3, 6, and 12 months after their stroke. All were interviewed by telephone concerning their present place of residence, their ability to walk (with or without aids) indoors and outdoors, their ability to climb stairs, and whether they visited friends. The patients were also interviewed concerning their capacity to manage their daily hygiene (independently, with assistance, or not at all) and were questioned about their utilization of domestic help for cooking and cleaning and whether they were living with someone.

Approval from the patients and the Medical Ethical Committee of the University of Lund was obtained.

Results

During acute treatment, 60 of the 129 patients (47%) had total or nearly complete remission of their neurologic deficits within 1–3 weeks, whereas the other 69 patients (53%) were discharged with more severe residual effects. Mean±SD hospitalization time was 12±8 (range 1–47) days (mean 12 [range 1–47] days for those returning to their own homes and 13 [range 3–36] days for those moving into an old people’s home).

During follow-up, there was little change in the patients’ place of residence. At 3, 6, and 12 months 94%, 92%, and 88%, respectively, of the patients were still in their own homes (Figure 1). A majority (72%) had been living with someone (Table 1); more women than men had lived alone. The patients who

TABLE 2. Age, Stroke Type, and Stroke Severity of 129 Patients Discharged Directly From Neurology Department to Independent Living

<table>
<thead>
<tr>
<th>Severity</th>
<th>Patients</th>
<th>Diagnostic verification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)*</td>
<td>Age (mean±SD)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major stroke</td>
<td>69 (53)</td>
<td>72±14</td>
</tr>
<tr>
<td>Minor stroke</td>
<td>60 (47)</td>
<td>68±12</td>
</tr>
<tr>
<td>Type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cardiac embolism</td>
<td>26 (20)</td>
<td>73±11</td>
</tr>
<tr>
<td>Atherothrombotic infarction</td>
<td>76 (59)</td>
<td>67±14</td>
</tr>
<tr>
<td>Unspecified stroke</td>
<td>23 (18)</td>
<td>79±7</td>
</tr>
<tr>
<td>Intracerebral hemorrhage</td>
<td>4 (3)</td>
<td>68±18</td>
</tr>
<tr>
<td>Occurrence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>First stroke</td>
<td>112 (87)</td>
<td>69±13</td>
</tr>
<tr>
<td>Recurrent stroke</td>
<td>17 (13)</td>
<td>75±9</td>
</tr>
<tr>
<td>Total</td>
<td>129 (100)</td>
<td>70±1</td>
</tr>
</tbody>
</table>

*% of total patients.
†% of patients in that category.
moved into an old people's home stayed there throughout follow-up. Rehospitalization rate was low. Of the 129 patients, 33 were temporarily readmitted to the acute-care hospital during follow-up. Their mean±SD accumulated rehospitalization time was 23±31 days.

Mortality increased with time. By 3, 6, and 12 months three, four, and eight patients, respectively, had died. The 1-year case-fatality rate (6%) was less than that in the general population >65 years old during 1986 (9%).

The functional ability of the 129 patients is shown in Figures 2–5. At 3, 6, and 12 months most patients (95%, 95%, and 89%, respectively) were able to walk indoors either independently or using walking aids (Figure 2); 24%, 24%, and 23%, respectively, of the patients used walking aids at all times. The walking aids used were predominantly canes but in a few cases were quatrupeds. Wheelchairs were used by

four, three, and seven patients at 3, 6, and 12 months, respectively, mostly among those at the old people's home. A vast majority of the patients (88%, 85%, and 81%) were able to manage their daily hygiene at 3, 6, and 12 months, respectively (data not shown). The patients' abilities to walk outdoors, climb stairs, and visit friends are shown in Figures 3–5, respectively.

Figure 6 shows the walking abilities for those patients living in their own homes. The vast majority (99%, 100%, and 98%) could walk indoors independently with or without walking aids at 3, 6, and 12 months, respectively. A wheelchair was used by only one patient at 3 months, by no patient at 6 months, and by two patients at 12 months. Stairs could be
climbed by 92%, 95%, and 93% of the patients at 3, 6, and 12 months, respectively. Despite being able to walk indoors and to climb stairs, 18%, 19%, and 16% of the patients living in their own homes did not go outdoors independently at 3, 6, and 12 months, respectively. However, at all times during follow-up at least 90% of them visited friends with or without the help of others. During follow-up, approximately 90% of the patients living in their own homes were able to attend to their daily hygiene independently (data not shown). Twenty-eight patients (22%) living in their own homes needed domestic help at some time during follow-up (data not shown); 18 had required domestic help before their stroke.

**Discussion**

The relation between the quality of health achieved and the consumption of resources is of special interest in the treatment of major diseases such as stroke and prompted our study. The severity of the disease and the age of the patient were important factors in his ability to return home directly. Patients returning home were younger than those discharged to secondary rehabilitation (70 vs. 78 years, respectively) and they were less likely to have had a major stroke (53% vs. 97%, respectively); 95% of the patients with a minor stroke returned home.

Our results illustrate that a mild clinical course in our group of stroke patients who returned home directly created only a minor impact on society. Once home, very few changes in place of residence and functional capacity occurred during the first 12 months after the stroke. Rehospitalization rate was low (26%), and the average number of days of rehospitalization was 23. After 12 months, most patients (90%) were still living in their own homes. The case–fatality rate was low (6%), less than that in the general population of that area >65 years old.

For most patients, their stroke resulted in no persisting severe impairment of function. Only a few patients (between three and seven) needed a wheelchair during the first 12 months, and most of these patients were living in an old people’s home. Almost all patients (approximately 90%) were able to walk indoors and to climb stairs independently. However, almost 20% of the patients did not go outdoors independently. This finding of a decreased degree of socialization outside the house despite good physical restoration agrees with the findings of Labi et al.11

The minor use of domestic help during follow-up
reinforces the picture of a mild course in this group of stroke patients; however, most of these patients lived with someone upon returning home.

Population-based studies of long-term stroke survivors have been performed.35–9 Although most studies describe all survivors, the common inference is that many enjoy a good clinical course. Strand et al,7 Skilbeck et al,12 and Stevens et al9 found that approximately 80% of all stroke survivors were able to walk independently within 6–12 months and that a low proportion (15–22%) lived in institutions 1 year after the stroke. Most reports agree7,12,13 that most of the physical recovery occurs within the first 3–6 months, which is also consistent with our findings. As a complement to earlier studies on stroke outcome focusing on the benefit of stroke units,5,7,9 our purpose was also to get a full picture of the clinical course of selected patients discharged directly to independent living as a guide to the allocation of resources and to the planning of stroke programs. Additional knowledge of the outcome of patients referred to other institutions for secondary rehabilitation will also increase our understanding of this problem.

In anticipation of the expected increase in the number of stroke patients, it would seem appropriate to deal with the entire treatment chain, that is, the acute-care hospital, institutional rehabilitation, and rehabilitation at home. With the increasing development of primary health and home care systems, the future structure of rehabilitation service for stroke patients will presumably be altered, with more patients returning directly home. Guidance from studies on outcome and cost-efficiency could contribute to a more effective and efficient use of available health resources.

References

KEY WORDS • cerebrovascular disorders • rehabilitation
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