ORIGINAL ARTICLE

Hospital Disposition After Stroke in a National Survey of Acute Cerebrovascular Diseases in Israel

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ABSTRACT. Treger I, Ring H, Schwartz R, Tsabari R, Bornstein NM, Tanne D; for the National Acute Stroke Israeli Survey Group. Hospital disposition after stroke in a national survey of acute cerebrovascular diseases in Israel. Arch Phys Med Rehabil 2008;89:435-40.

Objective: To investigate predictive factors for disposition after acute stroke.

Design: A nationwide survey (2004 National Acute Stroke Israeli Survey).

Setting: All 28 primary general medical centers operating in Israel.

Participants: Acute stroke patients (n=1583) admitted during February and March 2004 and discharged from the primary hospital.

Interventions: Data collected on baseline characteristics, stroke presentation, type and severity, in-hospital investigation and complications, discharge disability, acute hospital disposition, and mortality follow-up.

Main Outcome Measure: Hospital disposition to home, acute rehabilitation, or nursing facility.

Results: Among patients, 58.9% (n=932) were discharged home, 33.7% (n=534) to rehabilitation departments, and only 7.4% (n=117) to nursing facilities. Admission neurologic status was a good predictor of hospital disposition. Patients with severe strokes were mostly discharged to rehabilitation facilities. Patients with significant functional decline before the index stroke, resulting from a previous stroke or another cause, were sent to inpatient rehabilitation less frequently. Disability level at discharge from acute hospitalization had high predictive value in hospital disposition after stroke. In the northern region of Israel, a higher proportion of patients were sent home and a lower proportion to rehabilitation and nursing facilities, probably because of lower availability of rehabilitation care in this region of Israel.

Conclusions: This nationwide survey shows that most stroke survivors in Israel are discharged home from the acute primary hospital. Good functional status before the index stroke is an important predictor for being sent to acute inpatient rehabilitation. Severity of neurologic impairment and level of disability after the stroke at discharge from the primary hospital are strong predictors for disposition after stroke in Israel. Our data may be useful in discharge planning for stroke patients by policy-makers and health care providers in Israel.

Key Words: Health care surveys; Rehabilitation; Stroke; Treatment outcome.

STROKE REMAINS A MAJOR health care problem and a leading cause of functional impairments, with 20% of survivors requiring institutional care after 3 months and 15% to 30% being permanently disabled.[1] In Israel,[2] as in the United States and most European countries, most persons suffering acute stroke are admitted to acute hospitals for accurate diagnosis and immediate treatment.[3] After the acute treatment period, the patient can be discharged to an inpatient rehabilitation institution, to home with or without involvement into outpatient rehabilitation program, or to a nursing facility.[4,5] Awareness is increasing regarding the importance of the shortening of primary hospitalization and provision of integrated long-term care to promote rehabilitation and to reduce costs.[6] It is therefore very important, for the planning of the subacute care after stroke, to identify significant factors influencing the decision of poststroke disposition.[7,8] In Israel, some nursing homes accept patients, usually geriatric, for rehabilitation treatment after stroke. The permanent staff is usually composed of allied medical professionals and medical input is not always physiatric. There is no formal accreditation procedure at present and regulations are under discussion of the National Rehabilitation Council, counseling the Israeli Ministry of Health in these matters.

Different factors have been discussed in the literature as predictive for the place of patient's discharge after acute hospitalization: patient's wish,[9] neurologic status at admission to acute hospital,[4,10,11] patient's age, length of stay (LOS) in the hospital, upper-extremity weakness and language ability,[5] discharge functional status according to the FIM instrument or other scales,[12] incontinence, use of gastric tube, and intellectual dysfunction.[13]

The present study involved a comprehensive national survey of all acute cerebrovascular events hospitalized in all Israel's medical centers during a 2-month period in 2004.[14] These data can be helpful in the development of guidelines for efficient discharge planning of stroke patients after acute care hospitalization.

METHODS

This study is based on a national survey of all consecutive hospitalized patients with acute cerebrovascular disease hospitalized in all Israel's medical centers during February and March 2004, known as the National Acute Stroke Israeli Survey−2004 (NASIS). The study methodology has been described previously.[14] Similar surveys for a 2-month period are planned every 3 years in order to assess trends over time, while reducing costs compared with an ongoing national registry. In

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brief, the study included all patients with acute stroke or transient ischemic attack (TIA) who were 18 years of age or older, hospitalized throughout all 28 medical centers in Israel (N=2174). A coordinating physician was selected in each hospital that was responsible for data collection throughout hospital wards using a standardized comprehensive questionnaire. Data were collected prospectively.

Cerebrovascular events were reported in accordance with the medical report on discharge from the hospital. Ischemic stroke and intracerebral hemorrhage (ICH) were differentiated by findings from brain imaging computerized tomography (CT) or magnetic resonance imaging (MRI). Cases of subarachnoid hemorrhage and cerebral venous thrombosis were not included in the current survey. Whenever the coordinating physician raised doubt regarding diagnosis, a central adjudication committee made the final decision. Neurologic deficits were determined according to the National Institute of Health Stroke Scale (NIHSS) score[15,16] and disability using the Modified Rankin Scale (MRS).[17,18] Mortality was assessed by means of matching patients' files with national mortality data. For our purposes, patients admitted for a TIA (n=380) were excluded, as well as patients dying in hospital (n=162) and those with missing data on hospital disposition (n=56); thus the final study cohort included 1583.

Statistical Analysis

Age-adjusted analyses were performed to test for associations between disposition site and each of the individual patient characteristics. Differences in age-adjusted rates were compared by using the Cochran-Mantel-Haenszel chi-square test for categoric variables. Variables associated with hospital disposition in age-adjusted analyses and known to be associated with disposition were considered for multivariate analysis. Multinomial logit models were used to identify the variables associated with disposition to rehabilitation or nursing facilities, using discharge to home as the reference.[19] Multinomial logit models are used when the dependent variable in question is nominal, that is, a set of categories such as home, rehabilitation, or nursing home. The NIHSS and MRS were analyzed as indicator categoric variables, in separate models due to the high colinearity between these variables. Finally a sensitivity analysis was conducted, excluding patients with severe handicap (MRS score, 4–5) prior to the index stroke. Results are expressed in terms of risk ratio (RR) and 95% confidence interval (CI). All analyses were performed using SAS software.[a]

RESULTS

During the survey period 1583 patients admitted to a general hospital were diagnosed as suffering from a cerebrovascular event.

Most of the patients (58.9% [n=932]) were discharged to their home, 33.7% (n=534) to rehabilitation departments, and only 7.4% (n=117) were discharged to nursing facilities. Patients discharged to nursing facilities were on average older (age, 80.1±9.2y) than those discharged to rehabilitation (age, 72.4±11.5y), or home (age, 69.0±12.5y). Adjusting for differences in age, patients with atrial fibrillation, prior stroke, dementia, or known malignancy, as well as those with severe disability before the index stroke, were discharged more to nursing facilities and less to home (table 1).

Table 1: Baseline Characteristics Adjusted for Age by Hospital Disposition

Characteristics	Home (n=932)	Rehabilitation (n=534)	Nursing (n=117)	*P*
Age (y)	69.0±12.5	72.4±11.5	80.1±9.2	<.001
Female sex	57.3	53.4	57.3	.17
Hypertension	77.1	75.8	75.9	.03
Diabetes	39.9	41.3	48.4	.78
Current smoking	18.3	18.5	14.4	.17
Atrial fibrillation	13.0	19.0	20.9	.003
Congestive heart failure	10.9	12.4	16.0	.45
Past myocardial infarction	15.9	20.2	21.5	.10
Angina	17.4	17.1	25.5	.88
CABG and PCI	13.2	11.0	6.5	.11
Past stroke	28.3	28.8	43.2	.003
Dementia	6.1	5.6	28.4	<.001
Malignancy	6.7	7.8	15.3	.01
Prior disability				<.001
MRS score 0–1	71.3	64.7	28.6	
MRS score 2–3	20.5	26.8	22.7	
MRS score 4–5	7.6	8.1	41.2	

NOTE. Values are mean ± standard deviation (SD) or percent.
Abbreviations: CABG, coronary artery bypass graft; PCI, percutaneous coronary intervention.

Impairment Level

As expected, admission NIHSS was found to be a good predictor of hospital disposition (table 2). Most patients with mild neurologic impairments (NIHSS score <5) were discharged home (81%), 18% to rehabilitation, and only 0.4% to nursing facilities. Among patients with NIHSS scores between 6 and 10, 45% were sent home, 50% to rehabilitation, and 5% to nursing facility. Most patients with severe strokes (NIHSS scores, 11–15) were discharged to rehabilitation wards (48%), 30% to home, and only 22% to nursing facility. Patients with very severe strokes (NIHSS score >16) were also mostly discharged to inpatient rehabilitation (50%), less (37%) to nursing facility, and 13% to home.

In-Hospital Factors

Most patients discharged home had no in-hospital medical complications. Neurologic, cardiac complications, infections, bleeding, and pressure ulcers were more frequent in patients discharged to nursing facilities. Patients that were discharged to nursing facilities were ventilated during acute hospitalization significantly more often than other groups of patients. Relevant diagnostic investigations such as carotid duplex and different types of vascular imaging were performed less frequently in patients discharged to nursing facilities.

Length of Stay

The overall LOS in the primary hospital was found to be 8.7±13.5 days with a median of 6 and 25th and 75th percentile range of 3 to 10 days. Patients sent to a nursing home were hospitalized at the primary hospital for a longer time than patients discharged to rehabilitation or home. Median LOS was 4 days (25th to 75th percentile range, 3–7d) for those discharged home, 8 days (25th and 75th percentile range, 5–13d) to rehabilitation ward, and 13 days (25th and 75th percentile range, 6–24d) to nursing facility ($P<.001$).

Disability Level

As expected, a patient's discharge functional status was a particularly important factor for post-hospitalization disposition. More than half (57%) of severely disabled (MRS score,