



Report of the State Comptroller of Israel | July 2024

Ministry of Health

Stroke – Treatment and Rehabilitation



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Background

A stroke or cerebrovascular event (stroke)¹ occurs due to a blockage of blood supply to a part of the brain or bleeding from a blood vessel in the brain. A stroke results in damage or death of different parts of the brain, potentially causing long-term brain injury, disability, or even death². A stroke can affect various brain areas, leading to a wide range of motor, cognitive, linguistic, emotional, and behavioral impairments. Time is critical for treatment, and providing care within the recommended time window significantly affects the recovery of stroke patients, reducing disability and mortality rates associated with stroke. The medical principle in this context is "time is brain."

In 2020, there were about 18,400 new cases of stroke in Israel. The average age of stroke victims that year was 71.7, while 20% of the cases occurred in individuals under the age of 60. Global statistics from the Western world indicate that one in four people will experience a stroke during their lifetime. While some strokes are mild, many are significantly life-altering. There are three types of strokes: ischemic stroke (the majority of cases, accounting for 68% in 2020), hemorrhagic stroke (a minority of cases, 8%), and transient ischemic attack (TIA) (24%)³.

Stroke has medical implications requiring treatment and rehabilitation, as well as additional consequences such as loss of work capacity, loss of independence, a burden on the family, and more. Some of these consequences lead to ongoing costs, contributing to the economic burden on the healthcare system and other systems, such as the National Insurance Institute. Possible treatments for a stroke include, among others, administration of the thrombolytic drug TPA intravenously (TPA-IV)⁴, catheterization of brain blood vessels, and other treatments (conservative) during general hospitalization, such as administering medication to regulate blood pressure. After hospital treatment, patients are referred to a rehabilitation process, either in an inpatient facility or in the community. Rehabilitation focuses on treating stroke victims whose functioning has deteriorated or been impaired by the disease to improve motor, cognitive, sensory, linguistic, and emotional functions and to restore them, as much as possible, to an independent and active lifestyle.

1 CVA – Cerebrovascular Accident or Stroke.

2 According to the CDC (Center for Disease Control and Prevention).

3 Ischemic stroke (obstructive): blood flow to the brain is interrupted due to a blood clot blocking an artery; hemorrhagic stroke (bleeding): a blood vessel in the brain leaks or ruptures, and the accumulated blood presses on brain cells, causing damage; transient ischemic attack (TIA): blood supply to the brain is temporarily interrupted due to a blockage in a blood vessel, which resolves spontaneously.

4 Intravenous drug treatment that dissolves the clot in the blocked blood vessel, thereby restoring blood flow to the brain tissue.



Key Figures

18,373 stroke cases

reported in Israel in 2020. By 2030, about 30,000 cases are expected. It is estimated that 100,000 stroke cases occur annually in Israel, 5.5-fold of reported cases⁵

71.7

the average age of stroke victims in Israel in 2020, compared to 75 in the United States and 74 in Britain

the second cause of mortality

stroke is the second leading cause of death worldwide

NIS 2.3 billion

according to estimates, the total direct and indirect costs of stroke in Israel⁶

46.5%

in 2021, about 8,300 stroke victims in Israel did not reach hospitals by ambulance but rather by private means, potentially delaying their arrival, causing additional health, psychological, and indirect (e.g., financial) damages and reducing their chances of recovery

about 50%

in 2020, around 9,000 stroke victims in Israel were not admitted to a neurology or neurosurgery department, particularly not to dedicated stroke units. The European Stroke Organization's target for 2030 is for 90% of stroke victims to be admitted to specialized stroke units

only 25 neurologists specializing in stroke

in 2024, there are fewer neurologists available in hospitals than recommended by the Neurology Evaluation Committee – 39 neurologists – a shortfall of 36%

about only 50%

out of 11 centers performing thrombectomy, only a few were available to conduct procedures outside regular operating hours on certain days in March and May 2023, necessitating the transfer of stroke patients to another hospital for brain thrombectomy⁷

⁵ An assessment by the Israeli Stroke Society, which operates under the Neurological Association of the Israel Medical Association. The Israeli Stroke Society advises the Ministry of Health and publishes position papers that assist in establishing guidelines and professional standards regarding stroke.

⁶ An economic assessment by the Neeman Association for Stroke Survivors from September 2021, which addressed costs in 2018.

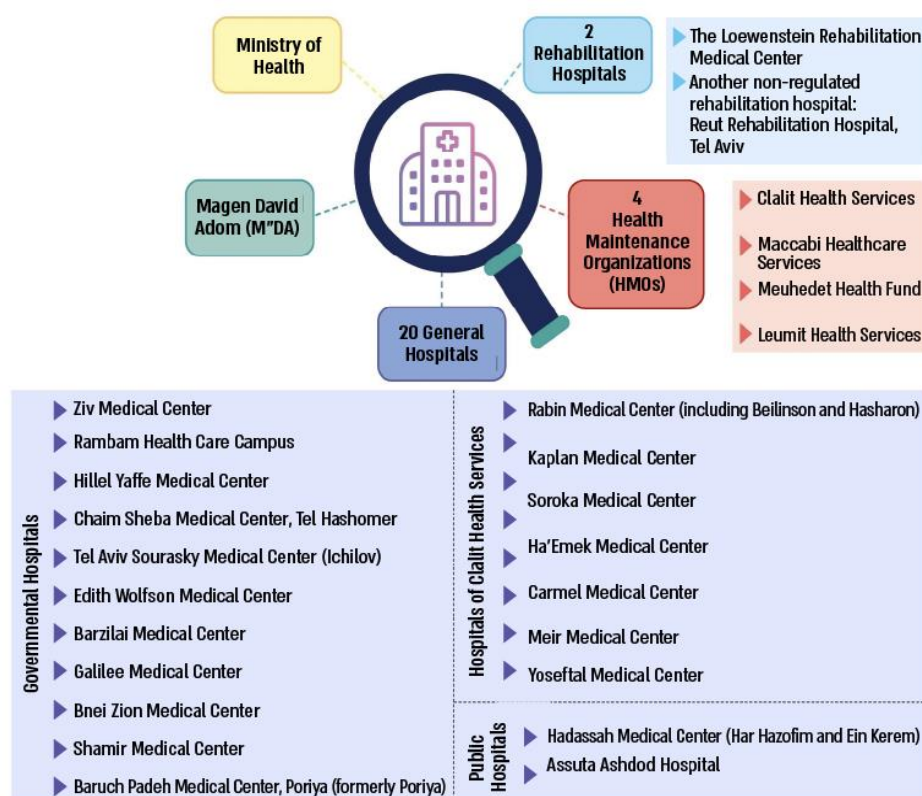
⁷ For three days in March 2023 and seven days in May 2023.



about 50%	about 39%	about 20%	11.6 days
in 2019–2021, some stroke patients requiring thrombectomy who were transferred from non-thrombectomy hospitals to thrombectomy-capable hospitals (248 in 2019, 222 in 2020, and 200 in 2021) did not undergo the procedure, some of them missed the "time window" in which it was feasible	in 2020, about 4,830 stroke victims out of 12,450 who were potential candidates for rehabilitation did not receive rehabilitation services after discharge from general hospitalization	the stroke patients rate in 2023 who waited over a week to be transferred from general hospitalization to rehabilitation hospitalization	the average waiting days for community rehabilitation in 2020

Audit Actions

From February to October 2023, the State Comptroller's Office examined the treatment and rehabilitation of stroke patients, including the national plan for the treatment and prevention of stroke damage; stroke beds and stroke units in hospitals; types of treatments tailored for stroke patients; resource management within the thrombectomy system – thrombectomy and neuro-interventionist hospitals; the transfer of stroke patients between hospitals for thrombectomy; the rehabilitation of stroke patients; and psychological and social support for stroke victims. The audit was conducted in the following entities.



Public participation processes were conducted as part of the audit, including ten individual interviews and four focus groups with 25 adults. The participants included individuals who had suffered a stroke, most between 2020 and 2023, or their immediate family members who accompanied them during the event. The public participation process was intended to gather the participants' perspectives on stroke treatment and subsequent rehabilitation. The participants represented all regions of Israel. The stroke victims, who exhibited varying levels of functionality, were treated in general-government hospitals, public hospitals, and hospitals operated by Clalit Health Services.

Additionally, the audit team reviewed about 90 sample files of stroke patients hospitalized in neurology and internal medicine departments at two hospitals (Clalit's Beilinson Hospital and the public Assuta Ashdod Hospital) in 2022–2023.



Key Findings



The National Program for the Treatment and Prevention of Stroke Damage – in 2014, the Ministry of Health developed a national program for the treatment and prevention of stroke damage (the National Program), which guided the operation of the healthcare system. The audit raised that the Ministry had neither established timeline for implementing the National Program for the years following 2016 nor defined updated goals and additional evaluation metrics for the participating entities. Although the Ministry of Health designated this as a national program, given its impact on a large population (about 18,000 individuals annually) and despite the Ministry's recognition of the need to update the baseline budget by an additional NIS 14.4 million (beyond a one-time allocation of NIS 60.2 million in 2014), the Ministry lacks comprehensive data on the full scope of its budgetary investment in the program. From 2015 to 2023, the Ministry's available data indicate that NIS 2.5 million was funded for 2022–2023 only and that NIS 6.3 million were funded in 2016–2022. The funding for the National Stroke Program came from the Ministry of Health's regular annual budget, with no designated budget line within the Ministry's budget to ensure a fixed annual allocation for the program's implementation. Due to the lack of comprehensive data on the Ministry's investment in the program, it cannot assess its outputs relative to its cost or the estimated direct and indirect costs of stroke-related consequences in Israel, valued at about NIS 2.3 billion in 2018. Furthermore, the Ministry cannot evaluate whether the budget allocated to the program is adequate to meet its needs, whether the program's benefits reflect an efficient use of resources, whether there is overfunding, or, conversely if a higher allocation is required to optimize the program entirely.



Stroke Beds and Stroke Units – optimal care for stroke patients is provided in general hospitals with dedicated beds for stroke patients (stroke beds), particularly when organized into stroke units. The audit raised that the Ministry of Health's data on stroke beds, their distribution across hospitals, and the existence of stroke units are incomplete and inconsistent with hospital-reported data. For example, stroke units exist in Sheba, Rambam, and Beilinson hospitals, yet they are not listed in the Ministry of Health's records. Conversely, according to the Ministry's data, there is a stroke unit in Shamir Hospital, although none actually exists. This discrepancy undermines the Ministry's ability to evaluate hospitals' capacity to provide adequate care for stroke patients. Additionally, it was found that six general hospitals (Bnei Zion, Meir, Kaplan, Carmel, HaEmek, and Yoseftal) lack stroke beds altogether; five of these are Clalit Health Services hospitals. Although the Ministry planned for stroke units to exist in all 20 hospitals reviewed, as of July 2023, they were operational in only 13 hospitals. In 2020, about 50% of stroke patients were hospitalized in departments not designated for stroke treatment; 39% of



them were admitted to internal medicine departments⁸, where care is less suitable for stroke patients compared to neurological or neurosurgical departments. These figures do not align with the European Stroke Organization's target, which at the time of the audit required 80% of stroke patients to be admitted to stroke units⁹. It should be noted that the target for 2030 is for 90% of stroke patients to be hospitalized in dedicated stroke units¹⁰.

📌 The Importance of Immediate Ambulance Transport to the Hospital – as of 2021, nearly half (46.5%; about 8,300) of stroke victims arrived at hospitals independently rather than by ambulance, which may delay arrival, cause health, psychological, and indirect (e.g., financial) harm, and reduce their chances of recovery. In 2020, a higher rate of Jewish patients arrived at hospitals by ambulance compared to Arab patients: 57% versus 36%, respectively. Additionally, older individuals were more likely to come by ambulance than younger individuals. For example, 69% of victims aged 80 and above arrived by ambulance, compared to 50% of those aged 60–79 and about 38% of those under 60.

📌 Administration of Intravenous Thrombolytic Therapy (TPA) – TPA is a medical treatment used in ischemic stroke when applicable. This therapy restores blood flow to brain tissue, significantly reducing mortality rates and lowering the risk of disability and impairment among stroke victims. According to the position paper of the Israel Stroke Society (ISS)¹¹, TPA administration is suitable for 25% of ischemic stroke patients. In 2021, all 17 audited hospitals (excluding data from Shamir and Hillel Yaffe) administered TPA in fewer than 25% of cases, except for Ziv Hospital. There was considerable variation between hospitals in the patient rate receiving TPA, ranging from only 5.8% of stroke cases at Bnei Zion Medical Center (the lowest) to 30.4% at Ziv Medical Center (the highest).

📌 Management of Thrombectomy Resources – Thrombectomy Centers and Specialists

- **Distribution of Thrombectomy Centers and Specialists** – the Ministry of Health has not established standards for the required ratio of thrombectomy centers to population size or the ratio of thrombectomy specialists to population size. Additionally, the Ministry does not manage an online dashboard consolidating real-time information on the availability of thrombectomy specialists. As a result,

8 Ministry of Health, National Center for Disease Control, National Stroke Registry in Israel – Report for 2020 (May 2022).

9 The Israeli Stroke Society (ISS) and the Neurological Association, Stroke Units in Israel – 2020.

10 European Stroke Organization website.

11 ISS operates under the Neurological Association of the Israel Medical Association (IMA) and advises the Ministry of Health. It also publishes position papers that aid in establishing guidelines and professional standards regarding stroke care.



ambulances and hospitals transferring stroke patients for thrombectomy procedures do not have up-to-date or immediate information about which hospitals have available thrombectomy specialists.

- **Availability of Thrombectomy Specialists During Regular and Off-Hours (afternoons/evenings/weekends/holidays) and Their Distribution Across Districts** – when thrombectomy specialists are absent, the availability of thrombectomy procedures decreases significantly. In six of the 11 thrombectomy centers, only one specialist is available. If that specialist is lacking, the hospital cannot perform thrombectomy procedures. This applies to Rambam, Nahariya, Poriya, Soroka, Barzilai (all in peripheral areas), and Hadassah Ein Kerem. In March 2023, six (Soroka, Barzilai, Rambam, Nahariya, Poriya, and Ichilov) of the 11 thrombectomy centers had days with no available thrombectomy specialists during off-hours. By May 2023, this had expanded to eight hospitals, including Hadassah Ein Kerem and Beilinson. The southern district has the lowest availability of thrombectomy specialists during off-hours. In March 2023, there were 11 days when no thrombectomy specialist was available after regular hours, and in May 2023, this number increased to 14 days.
- **Management and Supervision of Thrombectomy Resources** – unlike other countries that have mechanisms to regulate patient transfers between hospitals for thrombectomy procedures, Israel's healthcare system has no such mechanisms. In 2021, the Ministry of Health's Director-General decided to establish and develop a national control center for thrombectomy resources. Like the national control center, the Ministry operates for emergency departments in hospitals; this center was also intended to manage all thrombectomy resources, both centers, and specialists, and provide a real-time dashboard displaying availability. Such a system would streamline transferring stroke patients between hospitals and maximize the use of existing resources for thrombectomy procedures. However, the Director-General's decision has not been implemented, nor has the national control center been established as of the end of the audit period.


Transfer of Stroke Patients Between Hospitals for Thrombectomy


- **Developing an Overview of Transfers Between Hospitals** – the Stroke Registry at the Ministry of Health holds raw data on the number of stroke patients transferred to other hospitals and the duration of these transfers. However, it lacks the comprehensive information required to establish an efficient resource management mechanism. For example, it does not have data on the total number of patients, those requiring transfer for thrombectomy, the number of failed attempts to coordinate transfer, the rate of thrombectomies carried out on transferred patients, the time elapsed from transfer initiation to procedure, the distance between the transferring and receiving hospitals, ambulance wait times for transfer, thrombectomy outcomes, reasons why transferred patients did not



undergo a procedure and other information that may be critical for developing an effective management system.

- **Data on Transfers of Stroke Patients Designated for Thrombectomy** – about half of the stroke patients transferred from non-thrombectomy hospitals to thrombectomy hospitals (248 in 2019, 222 in 2020, and 200 in 2021) did not undergo thrombectomy. This was primarily due to missing the "time window" to enable the procedure, which is no later than six to eight hours after the onset of stroke symptoms. In 2019–2021, the median transfer time from the emergency department of a non-thrombectomy hospital to a thrombectomy hospital ranged from 174 minutes in 2019 and 2020 to 192 minutes in 2021. These times exceed the recommended 120 minutes outlined by the Israeli Stroke Society by 45% and 60%, respectively. As for the total time from arrival at the emergency department of a non-thrombectomy hospital to the actual thrombectomy procedure, the median duration was 270 minutes (4.5 hours), 120 minutes longer than the time required for patients who arrived directly at a thrombectomy hospital in each of these three years.

 **The Transfer of Imaging Scans Between Hospitals for Thrombectomy Decisions** – despite the need raised by the national councils¹² with the Ministry of Health in 2014 and the recommendations of the Israeli Stroke Association in 2021 to share imaging scans among all hospitals using dedicated interfaces for the hospitals' digital imaging archives, only some of these interfaces currently exist. As a result, not all hospitals can access imaging scans from other hospitals. Physicians transfer imaging scans without proper interfaces through alternative methods, such as messaging apps like WhatsApp. However, this transfer method compromises image quality and could lead to incorrect medical decisions. For example, a decision might be made to transfer a stroke patient for thrombectomy, but further imaging at the receiving hospital could reveal that the patient was never suitable for the procedure.

 **The Stroke Victims Rate Receiving Rehabilitation After Discharge from General Hospitalization** – in 2020, about 39% (4,830) of the 12,450 stroke victims eligible for rehabilitation (out of 18,373 stroke cases that year) did not receive any rehabilitation services following discharge from general hospitalization. Only about 61% (7,620) received rehabilitation services in rehabilitation institutions (inpatient), in the community, or both. Lack of access to rehabilitation services reduces the likelihood of stroke victims returning to an active and healthy lifestyle and achieving optimal functioning while increasing their risk of mortality.

12 The national councils are professional, multidisciplinary bodies that advise the Director-General of the Ministry of Health, each within its area of expertise in various fields of medicine. The councils mentioned above are the National Council for Logistics in the Health System and the National Council for Imaging.



Rehabilitation During Hospitalization in General Hospitals

- Staffing Standards for Paramedical Professions in Neurology Departments and Provision of Paramedical Treatments During General Hospitalization** – the audit found that, among the 20 audited general hospitals, six hospitals do not allocate positions in their neurology departments for three essential paramedical professions physiotherapy, occupational therapy, and speech therapy, necessary for the rehabilitation of stroke victims (Shamir, Bnei Zion, Barzilai, Nahariya, Beilinson, and Yoseftal) which does not have a neurology department, with stroke victims admitted to the internal medicine department. Seven hospitals allocate positions in their neurology departments for only one or two of the three paramedical professions (Wolfson, Kaplan, Ziv, Ichilov, Sheba, HaEmek, and Poriya). Seven hospitals allocate positions for all three professions (Assuta Ashdod, Hadassah, Meir, Carmel, Soroka, Hillel Yaffe, and Rambam). Additionally, four of the 20 audited general hospitals (Barzilai, Rambam, Soroka, and Yoseftal) which does not have a neurology department do not provide rehabilitation treatment for stroke victims in any paramedical profession during general hospitalization. One hospital (Wolfson) does not offer two types of paramedical treatments. Three hospitals (Ichilov, Ziv, and Sheba) do not provide one of the three types of treatments. These gaps hinder the ability of neurology departments to deliver necessary services to stroke victims, potentially impairing their rehabilitation and increasing the risk of physical, cognitive, and emotional damage.
- Psychological Support for Stroke Victims** – 11 of the 20 audited hospitals (Ichilov, Assuta Ashdod, Bnei Zion, Shamir, Barzilai, Galilee Medical Center, Soroka, Poriya, Sheba, Wolfson, and Yoseftal) do not provide psychological support by a psychologist.
- Assistance from Social Workers for Hospitalized Stroke Victims to Maximize Their Rights** – five of the 20 audited hospitals (Wolfson, Sheba, Rambam, Ichilov, and Poriya) provide guidance and assistance regarding entitled rights to only some stroke patients before discharge.




Medical Specialists in Rehabilitation and Geriatrics and Functional Assessment for Stroke Victims – only four of the 20 audited hospitals (Poriya, Sheba, Nahariya, and Ichilov) conducted functional assessments for stroke victims during hospitalization to recommend rehabilitation by a geriatric or rehabilitation physician, subject to Ministry of Health guidelines. Regarding rehabilitation specialists, as of 2021, there were 204 registered specialists in rehabilitation, though about 400 are needed nationwide. The national shortage of rehabilitation and geriatric specialists, combined with the lack of work force head count standard in general hospitalization departments, hinders the ability to perform functional assessments for all stroke victims under guidelines.



Consolidation of Information Regarding Hospitals' Rehabilitation Recommendations for Stroke Patients

– the Stroke Registry collects data on every stroke patient who receives rehabilitation treatment, both during hospitalization and in the community. However, it lacks information on the rehabilitation recommendations provided to patients upon discharge from general hospitalization, specifically whether rehabilitation was recommended in an inpatient setting or within the community, as well as the specific focus areas. Under these circumstances, the Ministry of Health has data only on those who received rehabilitation but does not have data on all stroke victims who required rehabilitation, the recommended rehabilitation framework for each of them (inpatient or community), and the types of rehabilitation treatments they needed. Consequently, it cannot present a comprehensive overview of the needs of patients requiring rehabilitation or analyze the actions it should address them. This indicates insufficient monitoring, supervision, and control over this area.

 **Waiting Time for Rehabilitation After General Hospitalization** – the Ministry of Health does not monitor waiting times between the decision by a general hospital to transfer a stroke patient to a rehabilitation facility and the actual transfer. A review of sample days in June-August 2023 across 20 hospitals for 117 hospitalized patients raised that 67% of the patients (79 individuals) waited over 48 hours for the transfer, and 20% (24 individuals) waited a week or longer. Delays in initiating the rehabilitation process can adversely affect patients' recovery prospects.

Rehabilitation Frameworks for Stroke Patients After Hospital Discharge

- **Evaluating the Quality of Rehabilitation for Stroke Patients** – although rehabilitation is critical for stroke patients to regain as much normalcy and routine as possible, and despite the Ministry of Health defining rehabilitation as a significant and integral part of patient care, directly influencing improvements in motor and cognitive function, and establishing a quality metric reflecting the rate of functional assessments conducted upon admission to and discharge from rehabilitation facilities, the Ministry has not determined that the effectiveness of the rehabilitation process itself should be evaluated. This includes a failure to define methods for assessing the efficiency of rehabilitation systems and the impact of rehabilitation activities performed at various facilities on patients' functional improvement. Furthermore, the Ministry lacks data that could provide a basis for assessing the effectiveness of the rehabilitation framework.
- **The National Plan for Stroke Rehabilitation and Setting a Target for the Number of Rehabilitation Beds** – in 2021, the overall number of rehabilitation beds in Israel (for stroke patients and other conditions) was 0.3 beds per 1,000 population, compared to an OECD average of 0.5 beds. This places Israel 11th among the 23 OECD countries included in the comparison (out of 31-member states). Of all rehabilitation beds in Israel, 2,100 are suitable for stroke



rehabilitation. Since 2014, when the national program was formulated, and as of the end of the audit, the Ministry of Health has neither established an action plan for stroke rehabilitation nor determined how many rehabilitation beds are required based on population size. As a result, the rehabilitation system operates without a structured plan, defined goals to guide its activities, knowledge of future needs for rehabilitation beds, or proper planning of resources, including specialized personnel and necessary budgets. Additionally, there are disparities in the ratio of rehabilitation beds to stroke patients across regions: the Central District has the highest ratio, with 0.196 beds per stroke patient, while the Jerusalem and Judea & Samaria District has the lowest ratio among the six districts, with only 0.035 beds per stroke patient.

- **Waiting Time from Hospital Discharge to Receiving Community-Based Rehabilitation** – the Ministry of Health's guideline is to transfer the patient to a rehabilitation framework without delay to ensure continuous and immediate rehabilitation. However, in 2020, the average waiting time for community-based rehabilitation (home hospitalization, day rehabilitation hospitalization, or paramedical treatments in the community) was 11.6 days, similar across the four HMOs (health maintenance organizations). It was also found that the upper quartile waiting time was 15–17 days across all HMOs¹³. This waiting time, which delays the start of community rehabilitation, can result in patients missing the optimal rehabilitation window, seeking private rehabilitation services at their own expense, or foregoing rehabilitation altogether, thereby harming their physical and mental health.







Admission to the Emergency Department in Hospitals – Stroke Coordinators – it should be noted that in all 20 audited general hospitals, a dedicated staff member was appointed for stroke management in the emergency department. This individual supervises the efficient and rapid admission of stroke patients and their transfer for further diagnosis and treatment.

13 In other words, 25% of patients waited more than 15–17 days to receive community-based rehabilitation, divided among the four health funds.



Key Recommendations

-  Given the severe implications of stroke, both in terms of the health and quality of life of stroke patients and the broader economic consequences of this condition, as well as the projected increase in the number of stroke cases, it is recommended that the Ministry of Health concentrates the budgetary data of the national program. This would enable an assessment of performance vis-à-vis planning. Furthermore, it is recommended that the Ministry establish timelines for program implementation and define updated goals and evaluation metrics for the program's participating entities.
-  It is recommended that the Ministry of Health consolidate complete and accurate data regarding stroke beds and hospital stroke units. Additionally, the Ministry, in collaboration with hospitals, should examine why certain hospitals still lack stroke beds and units. This includes assessing the necessary infrastructure, ensuring that all hospitals establish stroke units, and addressing the shortage of beds, as outlined in the Ministry's 2014 national program.
-  It is recommended that the Ministry of Health investigate why nearly half of the public does not arrive at hospitals via ambulance and raise awareness about appropriate transportation methods among various populations and age groups; this, among other objectives, is to improve adherence to the critical time window for treating stroke patients. Additionally, the Ministry should address the issue of covering transportation costs for individuals showing signs of stroke who are ultimately not hospitalized. This should be evaluated vis-à-vis the potential health, psychological, and indirect damages to the stroke victim and their family, as well as the costs incurred due to delayed hospital arrival stemming from the decision not to use an ambulance.
-  It is recommended that the Ministry of Health define appropriate standards for the ratio between thrombectomy centers and the number of thrombectomy specialists relative to the population size they serve, considering the geographic distribution of the population and its distance from the centers. The Ministry should ensure adherence to these standards and continue encouraging specialization in thrombectomy, particularly in peripheral areas. It is also recommended that the Ministry establish a national control and management center to enable centralized supervision of thrombectomy resources nationwide and ensure their availability at all times and in every district. Such a center could provide real-time information on the availability of thrombectomy facilities and specialists, efficiently identifying suitable hospitals and physicians. Furthermore, it is recommended that the Ministry set timelines for advancing this initiative, establish specific goals for each area, define potential funding sources, and outline the necessary steps to secure them. These measures save critical time in transferring stroke patients for thrombectomy and prevent delays that could affect their medical condition. Additionally, it is recommended that the Ministry define interfaces for transferring or viewing imaging test results between hospitals,



set a maximum timeframe for ambulances to arrive at hospitals for patient transfers, and monitor its implementation.



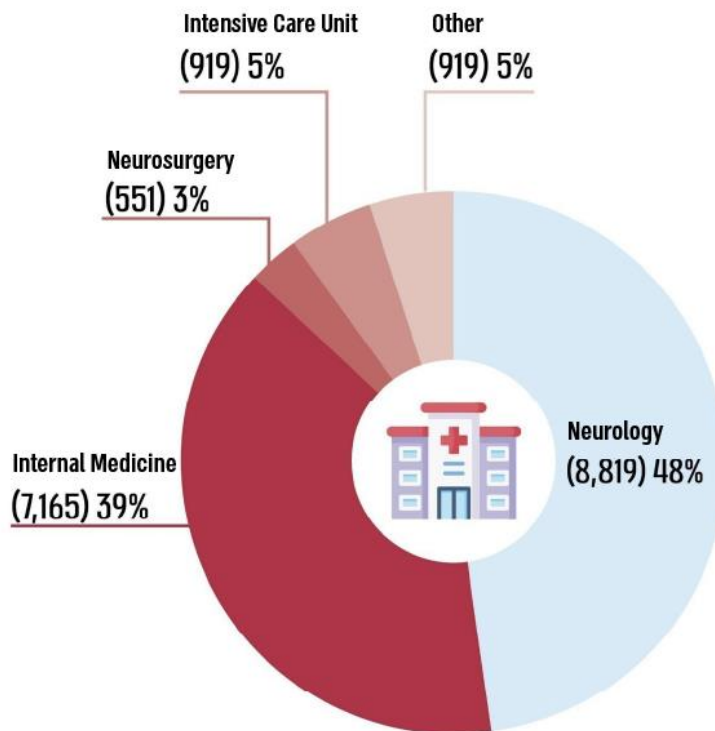
It is recommended that the Ministry of Health examine why over one-third of stroke patients eligible for rehabilitation did not receive rehabilitation following their discharge from general hospitalization and expand the proportion of those receiving such care. This is essential to improve the chances of stroke patients returning to an active, healthy lifestyle and optimal functionality while reducing their risk of mortality. It is further recommended that the Ministry map the need for allied health professionals essential to rehabilitation across all hospitals and develop a multi-year plan to fill gaps in these services. The Ministry should ensure that general hospitals inform all patients and their families about their rehabilitation rights and direct them to the appropriate services for assistance. Additionally, the Ministry should devise a plan to address shortages in specialist rehabilitation and geriatric physicians. It is also recommended that the Ministry instruct hospitals to code rehabilitation recommendations for stroke patients according to fields defined by the Ministry. This will enable data analysis, identification of gaps in rehabilitation services, verification that rehabilitation is provided to all in need, and evaluation of the effectiveness of the rehabilitation process.



It is recommended that the Ministry of Health examine the delays in transferring stroke patients from general hospitals to inpatient rehabilitation facilities in each district. The Ministry should also assess whether the existing supply of rehabilitation beds meets the patients' needs and finalize a national plan for rehabilitation beds overall, alongside the specific plan for stroke rehabilitation, emphasizing districts where the ratio of rehabilitation beds to stroke patients is particularly low. This recommendation is even more important due to the increased demand for rehabilitation services for the injured from the "Iron Swords" war. It is further recommended that the Ministry develop a metric for evaluating the effectiveness of rehabilitation. This metric should include tools to assess the efficiency and quality of rehabilitation services provided in hospitals and the community, as well as to evaluate the quality of treatments and their suitability to patients' needs for improving their condition. A well-designed rehabilitation metric could reflect the effectiveness of rehabilitation efforts, and when these efforts are optimal, the need for additional rehabilitation services may be reduced.



The Departments Where Stroke Patients Were Hospitalized and Their Numbers, 2020



According to data from the National Stroke Registry in Israel, as processed by the State Comptroller's Office.

The chart indicates that about 50% of stroke patients were hospitalized in departments not designated for treating stroke patients. Specifically, 39% were admitted to internal medicine departments, where the care provided is less suited to stroke patients compared to treatment in neurology or neurosurgery departments. This is despite the European Stroke Organization's target, as of the audit period, for 80% of stroke patients to be hospitalized in dedicated stroke units, with a goal of 90% set for 2030.



Summary

Stroke is the second leading cause of death worldwide. It can damage various areas of the brain, causing a wide range of motor, cognitive, linguistic, emotional, and behavioral impairments, potentially leading to disability or even death. In 2020, about 18,400 new stroke cases were reported in Israel; however, estimates suggest there are around 100,000 strokes annually, over five times the number of reported cases. The direct and indirect costs of stroke-related consequences in Israel were estimated at NIS 2.3 billion per year as of 2018. Timely treatment for stroke victims is critical, as treatment within the required time window significantly reduces disability and mortality rates and improves recovery outcomes.

The report identified deficiencies concerning the optimal care required for stroke patients, including the hospitalization of patients in departments not dedicated to stroke care, partly because stroke treatment is not within the specialization of the attending staff, particularly physicians and nursing teams; the absence of a mechanism within the Ministry of Health for efficient and centralized management of the thrombectomy system, which can result in patients requiring brain thrombectomy either not receiving the procedure or losing critical time in finding an available thrombectomy hospital, thus risking deterioration in their condition; stroke victims not receiving the complete rehabilitation services they need during general hospitalization, and the rehabilitation services available to them lacking sufficient accessibility and availability, particularly in regions where the ratio of rehabilitation beds to stroke patients is lower than elsewhere. Additionally, the Ministry does not evaluate the effectiveness of the overall rehabilitation system for stroke victims.

The number of stroke cases is projected to increase significantly in the coming decades due to demographic changes in population size and composition, particularly the anticipated growth in the age group 65 and older (from about 18,400 cases in 2020 to 30,000 in 2030, a 1.7-fold increase). This contrasts with the projected 1.2-fold population growth of 18 and above. Estimates indicate that one in four people worldwide will experience a stroke of some severity during their lifetime. Therefore, it is crucial to promote the prevention of strokes and for the Ministry of Health to increase awareness of stroke identification and ensure rapid hospital arrival, enabling victims to receive the appropriate and optimal treatment within the critical time frame and in dedicated stroke care units. Furthermore, the Ministry should expand the distribution and availability of thrombectomy services to provide optimal coverage nationwide. Additionally, ensuring effective rehabilitation services is essential to help stroke victims regain independent functionality and improve their quality of life and that of their families.

