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ÖZGÜN ARAŞTIRMA **RESEARCH ARTICLE**

IN HOSPITAL NEUROVASCULAR DISEASE MANAGEMENT IN TURKEY: RATIONALE, HYPOTHESIS, METHODS, AND DESCRIPTIVE CHARACTERISTICS (NÖROTEK: TURKEY NEUROLOGY ONE-DAY STUDY)

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ABSTRACT

INTRODUCTION: Objective data on the profile of acute stroke patients receiving inpatient treatment in Turkey are limited. However, this is essential for optimizing the relevant system of healthcare delivery, including regional acute stroke management. The NoroTek study aimed to collect the characteristics of ischemic stroke, intracerebral hemorrhage and cardiopulmonary arrest patients from a perspective of basic in-hospital quality metrics.
METHODS: NöroTek is a point prevalence study conducted on World Stroke Awareness Day on May 10, 2018 with the participation of 87 centers (16 Hospitals, 26 stroke units and 45 stroke centers) representing 30 health care regions in Turkey. A total of 1802 in-patients (Female: 50.4%; age: 61.4±18.4 years) were included. A form containing about hospital processes, including information on clinical, imaging, treatment and prognosis of the index acute neurovascular event (49 questions in 6 categories on the inclusion day; 52 questions in 7 categories at the time of discharge) was filled.
RESULTS: There were a total of 1070 patients with neurovascular diseases (TIA 3.7%, ischemic stroke 48.4%, intracerebral hemorrhage 7%, cardiopulmonary arrest 0.4% and vegetative status 0.1%) and 732 (40.4%) with other neurological disease. Two-thirds of neurovascular disease patients had an established diagnosis of hypertension. Among ischemic stroke and TIA patients, diabetes was present in two-thirds, dyslipidemia in one-third, and recurrent events in one-third, all of which were more common than intracerebral hemorrhages. Diagnosis of deep vein thrombosis was 3.9% in ischemic stroke and 2.9% in intracerebral hemorrhage, while hospital infections were less frequent in ischemic stroke compared to intracerebral hemorrhages (pneumonia 30.8% vs 40.6%, urinary tract infection 10.9% vs. 13.9%). The mean length of hospital stay was longer in neurovascular diseases than in others (22 vs. 17, in days). In-hospital mortality was 10.3% in ischemic stroke and 15.5% in intracerebral hemorrhage, 60% of which was due to infection.
DISCUSSION AND CONCLUSION: NöroTek, the first point prevalence study in the stroke clinical literature, revealed the profile of the main quality metrics of stroke patients hospitalized in Turkey. The presented data will be key in determining the gaps in current acute stroke management, providing actionable targets to improve the care of stroke patients.
Keywords: Ischemic stroke, mortality, etiology, quality, survival, Turkey.

TÜRKİYE'DE HASTANEDE NÖROVASKÜLER HASTALIK YÖNETİMİ:

MANTIK, HİPOTEZ, YÖNTEMLER VE TANIMLAYICI KARAKTERİSTİKLER

(NÖROTEK: TÜRKİYE NÖROLOJİ TEK GÜN ÇALIŞMASI)

ÖZ

GİRİŞ ve AMAÇ: Türkiye'de yatarak tedavi gören akut inme hastalarının profiline ilişkin nesnel veriler sınırlıdır. Ancak bu, bölgesel akut inme yönetimi de dâhil olmak üzere ilgili sağlık sisteminin optimize edilmesi için gereklidir. NöroTek çalışması, temel hastane içi kalite ölçütleri perspektifinde iskemik inme, intraserebral kanama ve kardiyopulmoner arrest vakalarının özelliklerini toplamayı amaçladı.
YÖNTEM ve GEREÇLER: NöroTek, 10 Mayıs 2018 Dünya İnme Farkındalık gününde Türkiyede'ki 30 sağlık hizmet bölgesini temsil eden 87 merkezin (16 Hastane, 26 inme ünitesi ve 45 inme merkezi) dahli ile gerçekleştirilmiş olan nokta prevalans çalışmasıdır. Toplam 1802 yatan hasta (Kadın %50,4; yaş: 61,4±18,4 yıl) çalışmaya dâhil edildi. Hastane süreçleri, akut inme klinik, görüntüleme, tedavi ve prognoz ile ilgili soruları içeren bir form (başvuru gününde 6 kategoride 49 soru ve taburculuk anında 7 kategoride 52 soru) araştırmacılar tarafından doldurduldu.
BULGULAR: Belirlenen tarihte toplam 1070 nörovasküler hastalık (TIA %3,7, iskemik inme %48,4, intraserebral kanama %7, kardiyopulmoner arrest %0,4 ve vegetatif durum %0,1) ve 732 (%40,4) Nörolojik hastalık kaydedildi. Nörovasküler hastalık nedeniyle izlenmekte olan hastaların üçteikisinde bilinen hipertansiyon mevcuttu. İskemik inme ve TIA'da diabet üçteiki, dislipidemi üçtebir ve rekürren olay üçtebir oranında olup hepsi intraserebral kanamalardan daha sık idi. Derin ven trombozu tanısı iskemik inmede %3,9 ve intraserebral kanamalarda %2,9 oranında iken hastane enfeksiyonları iskemik inmede intraserebral kanamalardan daha az idi (Pnömoni %30,8'e %40,6, idrar yolu enfeksiyonu %10,9'a %13,9). Ortalama hastane yatışı süresi nörovasküler hastalıklarda diğerlerinden uzundur (22'ye 17 gün). Hastane içi mortalite iskemik inmede %10,3 ve intraserebral kanamalarda %15,5 olup %60'ının nedeni enfeksiyonu idi.
TARTIŞMA ve SONUÇ: İnme klinik literatüründe "ilk" "nokta prevalans çalışması" olan NöroTek Türkiye hastanelerde yatan inme hastalarının başlıca kalite metriklerinin profilini ortaya koymuştur. Elde ettiğimiz veri pandemi sonrası akut inme yöntemi strateji belirleniminde anahtar olma potansiyeline sahiptir.
Anahtar Sözcükler: İskemik inme, mortalite, etiyoloji, kalite, sağ kalım, Türkiye.

INTRODUCTION

Stroke is a disease with an increasing incidence as a reflection of the aging of the population in our country. There has been very little research on the profile of stroke patients who are hospitalized in Turkey (1-3). However, these studies, most of which are old-dated, do not meet today's needs. To maximize hospital facilities, especially stroke acute treatment, up-to-date data is required. The NöroTek project aims to collect current and basic data on ischemic stroke, hemorrhagic stroke, and cardiac arrest in Turkey, which are the most basic and often used quality metrics in neurology. This labor, which is only motivated by dedication, serves as a model for developing countries in terms of providing advice and crucial information. The major effort can be characterized as photographing stroke clinics across Turkey and establishing the groundwork for future research.

METHODS

This study is based on the data of patients hospitalized in Neurology units of hospitals participating in the study on World Stroke Awareness Day, May 10, 2018. The sample of the study consisted of all patients admitted to the hospital on the morning of May 10 (including those discharged that day), and these individuals were evaluated both retrospectively and prospectively. The form in which the data was collected consisted of two parts. The first part was filled by the researchers on 10 May. The second part is completed when the patients are discharged.

Ethics: The study was performed in accordance with Helsinki Declaration Ethical Standards and approved by Hacettepe University Non-Interventional Ethics Committee (Date: 27.03.2018, No: 18/331) for clinical studies consortia. Following the informed consent of the patients for data exchange and the permission of the hospital/unit managers, data collection was carried out on the given day. Consent and permission documents were kept in the centers.

Financing: The NöroTek study was carried out entirely on the initiative of the researcher, with no financial assistance from the industry or any other party. The study is significant in terms of demonstrating the evolution of neurologists' relationships in Turkey, and it serves as a critical example for the medical literature.

Selection of Study Centers: Participation in the study was by invitation. Invitations were distributed through the Turkish Neurological Society website, a researcher invitation meeting held during the VIII National Cerebrovascular Diseases Congress (6 May 2018), and numerous social media platforms. Individual invites were given to hospitals in Turkey to represent 30 healthcare districts in the study (4).

Data collection: Written forms were used in the study. After completing the first pages of the forms, a photograph was taken or a PDF was given to the study center. The back of the forms and the Microsoft® Excel form sent were filled out and sent to the study center after the last patient who was hospitalized in the participating hospital on the day of the trial was discharged. The original forms were stored at the participation center in case they were needed later.

Collected Data: The front side of the form was used on the first day. The questions here are divided into 6 categories. All patients were asked to complete the first 3 parts. The questions on the back of the form are divided into 7 categories. The first item was requested to be completed for all patients in this case. The second item was requested for all neurovascular patients to be completed. Other items were filled based on the disease's diagnosis (Annex).

1. Descriptive Demographic Information: Gender was coded as “Female” and “Male”; age is written as “years”. The name of the center, the name or nickname of the doctor who filled out the form, the patient sequence number in the center and the number of neurology beds in the center were noted. No patient identification was written on the form. “Marital status” of the patients is categorized as “Married”, “Single”, “Widowed” and “Divorced”; “Educational status” is categorized as “Literate”, “Primary School”, “Middle School”, “High School”, “High School” and “Faculty”. The patients' hospitalization routes to the neurology clinic units were documented as "Emergency Service," "Referral from another hospital," "Transport from another department," "Polyclinic," and "Other."

2. Previous Hospitalization[s]: This section starts with the question “Did it happen in the hospital?”. If the answer is “Yes”, it was asked to write the time of occurrence of the neurological event. The patient's previous hospitalizations were

defined in the next question. "Has he been hospitalized in the previous year?" is the first question and the responses were "yes-no." For patients who have been hospitalized, the number of hospitalizations is classified as “1 time”, “2 times”, “3 times”, “4 times”, “5 or more”, and if he was hospitalized, “how many days left” in the last hospitalization was clearly questioned as the day.

3. The Patient's Current Hospitalization Diagnosis: "Ischemic stroke," "transient ischemic attack (TIA)," "hemorrhagic stroke," "cardiopulmonary arrest," and "vegetative state" are coded in this part, while the name of "the disease that is the reason for hospitalization" is explicitly noted in parenthesis under the "other disease" category. The reason for a patient's hospitalization due to a vegetative state should also be explicitly mentioned. The purpose of hospitalization was defined as “diagnosis”, “treatment” or “both”. It was requested that the date of "Symptom occurrence time," "Time of arrival to the hospital," and "Time to hospitalization" be written as day and time in this subheading. The parameters "Did he apply to the hospital within 24 hours of symptom onset?" "Time between symptom on admission at the hospital" and "Time between symptom on hospitalization" and "Time between hospital admission and hospitalization" were evaluated.

4. Ischemic Stroke and TIA: This section is only for people who have had an ischemic neurovascular event. It was requested to note the computed tomography of the brain (CT) status and the time as “day” and “hour/minute” if it was taken, and in the same way, it was requested to note whether or not brain magnetic resonance [“MR”] imaging was performed and if so, the time of performing it in “hours/minutes”. It was asked whether the American National Institutes of Health stroke score (NIHSS) was applied (5). If NIHSS is administered, it is categorized into three groups based on who receives it: These are i-"Neurology specialist" [including specialty students]; ii-"Physicians from other specialties"; and iii-"Other health professionals" [such as nurses, emergency medical technicians]. The time of delivery of the NIHSS was requested to be noted [in days and hours] and the “total score” was noted. NIHSS subscore data were not gathered. This section was extended with a discussion of the use of intravenous (IV) tissue plasminogen activator (tPA). The reason for not administering IV tPA to patients was categorized and asked: "treatment time interval has been surpassed" was coded, and other reasons were asked to be documented explicitly. The follow-up question is “Did you have a thrombectomy?” and if the application was not made, the reason was asked again. In this section, the alternatives "exceeding the treatment window" and "not having this opportunity in the center" were classified categorically, and other reasons particular to the patient were asked to be explicitly written down. The following issues concern vascular risk factors and the primary applications utilized to address them. The patient was questioned if he or she had hypertension, if he or she had taken antihypertensive medication, and if so, which medicine. If he or she has diabetes mellitus (DM), he or she was asked if he or she takes diabetes medication and, if so, which drug. The usage of insulin is offered as an option here, and if alternative medicines are taken, it is required that they be specified. Smoking history was collected by classifying it as "never smoked", "quitted" and "active smoking". If there is dyslipidemia or high lipid, it was required that he or she note whether or not he or she utilized hypolipidemic medicines and, if so, the drug he or she used. If there is a history of atrial fibrillation, it was asked whether he took medication for this purpose, and if so, which drug he used. Drugs divided as “aspirin”, “other antiplatelet drugs”, “warfarin”, the arrival INR value in those taking warfarin, “Non-Vitamin C oral anticoagulants (NOAK)” and the name and dose if they are taking NOAC, “other drugs” and “low molecular weight heparin”. In this context, Dabigatran, Apixaban, Rivaroxaban and Edoxaban are offered as available options. This section also inquired about the presence of coronary artery disease and the occurrence of a past stroke. The number of times this occurred and the timing of the last episode were questioned in individuals who had previously been reported to have suffered a stroke.

5. Hemorrhagic Stroke: In cases with intracerebral hematoma (ICH), information on the location of the hematoma, its volume, and whether blood flow to the ventricles were obtained. Although the "ABC/2 formula" is supposed to be used to compute the hematoma volume, this information has been documented as it is used. In this context, (i) It was in the file and I wrote it here, (ii) It was not in the file, I recalculated and

wrote it here, (iii) I estimated the volume in a different way, not ABC/2, and (iv) There is no bleeding volume information" was coded in a separate category called "hematoma volume information." The cause of the bleeding was labeled as hypertensive, antiaggregant, anticoagulant, or other. Again, other reasons were asked to be expressed clearly. The imaging modalities used in cases of bleeding are labeled "CT," "MR," and "angiography." If angiography was used to determine the cause of a hematoma, it was important to know if it was "CT angiography," "MR angiography," or direct "catheter angiography (DSA)."

6. Cardiopulmonary Arrest (CPA): The location of CPA occurrence is categorized as "out of hospital" and "in hospital," and "Neurology service" and "other services" in hospital. Following the question "whether hypothermia was applied for therapeutic purposes?" (must be answered as "Yes" or "No"), it was asked whether "CT", "MR" and "EEG" were performed for diagnosis/prognosis purposes. If these examinations were made, it was requested to process the day and time of the examination.

7. Discharge Information: The time of discharge was directly recorded as "day" and "time," and the route was documented as "home," "FTR-rehabilitation," "other hospital," or "other." It was requested that the modified Rankin score [mRS] determined at the time of discharge be written down (6). If the patient died while in the hospital, it was requested to document the date, time, and apparent cause. The form further stipulated that KPA should not be written on the reason for death, and "sudden deaths" were not allowed. Under this heading, it was asked where the patient was “first” hospitalized and followed up during his/her stay in the hospital. The answer was classified as “Neurology service”; “Stroke unit”; “Neuro-intensive care” or “Other”. In the other part, the place where the patients were first taken is written clearly. It was attempted to determine the frequency of two complications during a hospital stay. The first is the frequency of infection, with infections categorised as "Pneumonia," "Urinary tract infection," and "Other." The second is deep vein thrombosis (DVT) / pulmonary thromboembolism (PTE), and other consequences were specifically asked.

8. In-hospital Examinations: It has been noted whether the patient has had an angiographic examination during his hospital stay, and if so, the modality, whether it is "CT angiography," "MR angiography," or "catheter angiography," and whether the area investigated is the brain, neck, or both. It was stated whether transcranial Doppler ultrasonography (TCD) was performed with the carotid and/or vertebral arteries. Similarly, if transthoracic echocardiography (TTE), transesophageal echocardiography (TEE), Holter monitoring, and cardiac monitoring were performed, it was marked as "yes," otherwise it was coded as "no." In this section, there are 4 questions about nutrition. The first was "swallowing," and the second one was whether or not the "nutritional status" evaluation was performed, and if so, the day and time were recorded. The method of evaluation was not asked. The other two questions are "yes/no" questions about whether or not the "enteral feeding tube" and "percutaneous gastrostomy" were opened. The question "Is mechanical ventilation used?" was then posed. The answer is coded as “No” or “Yes”. When asked about DVT prevention, the options were low molecular weight heparin (LMWH) and/or intermittent pneumatic compression (Jobst) if applicable. More than one option can be ticked here. If the control of the presence of hypertension is questioned and if the hypertensive (systolic blood pressure >140 mmHg and/or diastolic blood pressure >90 mmHg) is found, continued with the question “Has anti-hypertensive medication been started?”. The answer was coded as “yes/no”. "Has blood glucose and hemoglobin A1c been checked?", "Is there a diagnosis of DM?", "Was the diagnosis known?" or "Is it a new diagnosis?" questions were asked for the diagnosis of DM, and if there was a diagnosis of DM, the usage of insulin or other medications in the treatment was documented. The final question is “Is giving up smoking recommended?”. The answer was asked to be coded as “yes/no”.

9. Specific Treatments Applied to Patients with İschemic Stroke: ““Have an anti-aggregant drug been given?”, and if so, what the drug was. Coded as “aspirin”, “clopidogrel” or “other”. It is stated that multiple options may be chosen. The time when each drug was started was indicated as “day” and “time”. To determine the presence of atrial fibrillation (AF), two questions were asked. The first question is whether the AF diagnosis is "known," "new" (unknown before to stroke, but discovered in the emergency room or during

hospitalization), or "paroxysmal" (patients with a previously known sinus onset rhythm or patients with an AF episode discovered during follow-up). The second question was the type of treatment applied, and options such as “Heparin”, “LMWH”, “Warfarin”, “NOAK”, “Other” were given. If an anticoagulant medicine was not administered, the explanation was to be explicitly noted down. The last question in this section is whether LDL level detection is done or not. If LDL was assessed and determined to be high (above 100 mg/dL), whether a statin [or other suggestion] was given was inquired about.

10. For patients applied to IV tPA: If the patient received intravenous (IV) tissue plasminogen activator (tPA), the patient was asked which acute stroke neuroimaging was conducted prior. Here the codes are “CT”, “CT angiography”, “MR”, “MR angiography” and “other”. Following that, the "unit where IV tPA was delivered" question was asked, with the options being "Emergency Medicine units," "neurological acute care," "Neurology service," and "stroke unit." The timing of IV tPA administration and associated temporal metrics are reproduced here. These are the "time to symptom onset," the "time to an emergency admission," and the "time to start IV tPA." When asked if the "24th-hour NIHSS" was examined for treatment follow-up, the answer was "yes/no," and if "yes," the score was requested. Patients who received IV tPA were asked if cranial CT was conducted on the second day, then asked "yes/no" again, and if yes, whether bleeding was detected. If there is bleeding, information was requested whether it was symptomatic or not. If it was categorized as symptomatic bleeding, the researcher was contacted.

11. For Patients Undergoing Neuro Endovascular Therapy (Neuro Thrombectomy): This section is completed for patients experiencing Neuro Endovascular Therapy (Neuro Thrombectomy). Investigations made before administering the treatment were coded. The options include "CT," "CT Angiography," "MR," "MR Angiography," and "Other," and if investigations such as perfusion studies were performed, it was asked that they be written as an explanation next to the other code. The second question concerns the operator's area of experience in performing the neuroendovascular operation. In this section, “neurologist”, “radiologist” and “other” options are given. The third question concerns the time of femoral implantation, also known as "groin insertion" in modern parlance. As with IV tPA, symptoms and emergency admission times were queried again just before this item. Time metrics were requested to be recorded as "day" and "hour". At this stage, whether or not he/she received IV tPA was noted again, and a reminder was issued. Subsequently, the success of the endovascular recanalization procedure was evaluated with the mTICI (Modified Treatment In Cerebral Ischemia) scoring and determined as mTICI 0, mTICI 1, mTICI 2a, mTICI 2b, mTICI 2c and mTICI 3, mTICI 2b, c and 3 categories were accepted as provided “successful reperfusion” (7). Following that, in cases treated with endovascular treatment, a "24th-hour NIHSS" was given, and if it was, the total value of the score was asked to be written down. When asked if "cranial CT" was performed on the second day, these patients were asked to answer "yes/no," and if "yes," they were asked to indicate whether hemorrhage was observed and, if so, whether it was symptomatic.

12. Hemorrhagic Stroke: : It was attempted to assess whether hypertension was controlled in patients with hemorrhagic stroke by inquiring only the highest systolic and diastolic blood pressure values on the previous day.

13. Cardiopulmonary Arrest: The functional prognosis upon discharge of patients admitted to neurology units with the diagnosis of CPA was requested to be coded using the "Cerebral Performance category system"(8). The categories of this system are given in the form. It was asked, "Which of these options at discharge?" [1] "Independent": no problems standing, walking, eating and drinking, fully awake and responsive to the environment; [2] "Partially addicted": can stand but not walk well, drinks but cannot eat normally, can work part-time in supported environments, fully independent in daily life activities [such as dressing, using public transportation, preparing food]; [3] "Completely dependent": unable to stand unaided, unable to eat and drink, fully awake but [4] "Coma": Unable to relate vocally or psychologically; and [5] "Death" categories are provided as alternatives.

Planned Analysis and Statistical Methods: All of the facts given above were prepared for the study, and the specifics were explained, particularly the basic features of acute stroke patients and the determination of metrics in in - hospital

management, IV tPA and thrombectomy administration, nutrition, and atrial fibrillation practices. It is aimed to discuss these through separate analyzes and reports. All values in the study were suitably "mean±standard deviation"; are reported as "mean (95% confidence interval)," "percentage (95% confidence interval)," and "median (interquartile range)." The data distribution normality was assessed by utilizing the Kolmogorov-Smirnov or Shapiro-Wilk tests. According to the results, differences between groups were evaluated using Student's t test, Mann-Whitney u test, chi-square, Fisher's exact test or ANOVA. The characteristics of various subgroup analyses were used to generate logistic regression or multiple analysis of variance models. The statistical significance level was set as $p<0.05$. SPSS version 22.0 was used for all calculations.

RESULTS

Centers Participating in the Study, Patients and Their Distribution

121 hospitals were invited to this study. 91 (75%) of these reported their decision to participate in the study. However, data could not be obtained after 4 hospitals. Thus, 87 centers were included in the study. The study population consisted of 1802 individuals who were being monitored in these cooperating hospitals. This corresponds to 2.2 per hundred thousand population. Patients were drawn from Turkey's 30 health regions. Although there was no significant difference between the regions in general, there was less patient participation from the 23rd and 30th regions, and more than the 17th, 21st and 26th regions. Figures 1a (Number of patients from regions) and 1b (Proportion of patients included in the study by population) demonstrate the distribution of patients included in the study by health areas.

Sixteen (18.4 %) of the study's centers met the definition of "Stroke ready hospital," and the word "hospital" will be used to refer to this group in this article (9). Twenty-six (29.9%) of the facilities meet the criteria for a "primary stroke center" and are designated as a "Stroke Unit" in the "Directive on Health Services to be Provided to Patients with Acute Stroke," which was released on July 18, 2019 (10, 11). The remaining 45 (51.7%) facilities meet the criterion of "Comprehensive Stroke Center" and are referred to in the stroke directive as "Stroke Centers"(10, 11). The distribution of diagnoses among patients does not differ considerably according to hospital category. The percentages of neurovascular disease / non-vascular neurological disease were 7.2% to 5.2% in hospital; 31% to 32.4% in stroke units and 60.4% to 63.8% in stroke centers. Neurovascular disease rates were 67% in the hospital, 60.6% in the stroke unit, and 58.1% in the stroke center ($p=0.147$).

Demographic Characteristics of Patients

Of the 1802 patients included in the study, 1070 (59.4%) were hospitalized with the diagnosis of neurovascular disease. TIA accounted for 3.7%, ischemic stroke for 48.4%, ICH for 7%, KPA for 0.4%, and vegetative condition for 0.1%, while other neurological illnesses accounted for 40.4%. There were a total of 908 women and 894 men. The diagnostic distribution of the disease was not different according to gender ($p=0.072$). In women patients, TIA was 3.9%, ischemic stroke was 50.2%, ICH was 8%, KPA was 0.6%, vegetative status was 0.1% and other neurological diseases was 37.2%, while in men TIA was 3.6%, ischemic stroke was 46.5%, ICH was 5.9%, KPA was 0.2%, vegetative status was 0.1%, and other neurological diseases was 43.7%. Non-vascular neurological diseases demyelinating diseases were 17.4%; epilepsy was 9.7%; neuropathy was 9.2%; Parkinson's disease was 8%; motion sickness was 5.1%; M. Gravis was 4.3%; encephalitis was 3.4%; headache was 3.4%; preparation before vascular intervention was 3.3%; transverse myelitis was 2.8%; dementia was 2.4%; intracranial hypertension was 2%; neuro-ophthalmologic diseases and conditions were 2%; vertigo was 1.8%; ALS 1.7%; status epilepticus was 1.7%; myopathy was 1.3%; hydrocephalus was 0.9% and other diseases/conditions were 19.4%. The overall study population had a mean age of 61.4±18.4 (17-97) years, and the mean age of 1070 patients hospitalized for Stroke, TIA, or ICH, ie neurovascular disease, was considerably greater than patients hospitalized for other diseases (68.8±13.6 to 50.6±19. $p<0.001$). This difference applies to women (66.7±13.6 to 51.6±18.9, $p<0.001$) and men (71.2±13.3 to 49.8±19.1, p0.001). Age distribution by diagnosis and gender is documented in Figure 2. There was no age difference according to neurovascular disease subtypes ($F=0.973$; $p=0.421$).

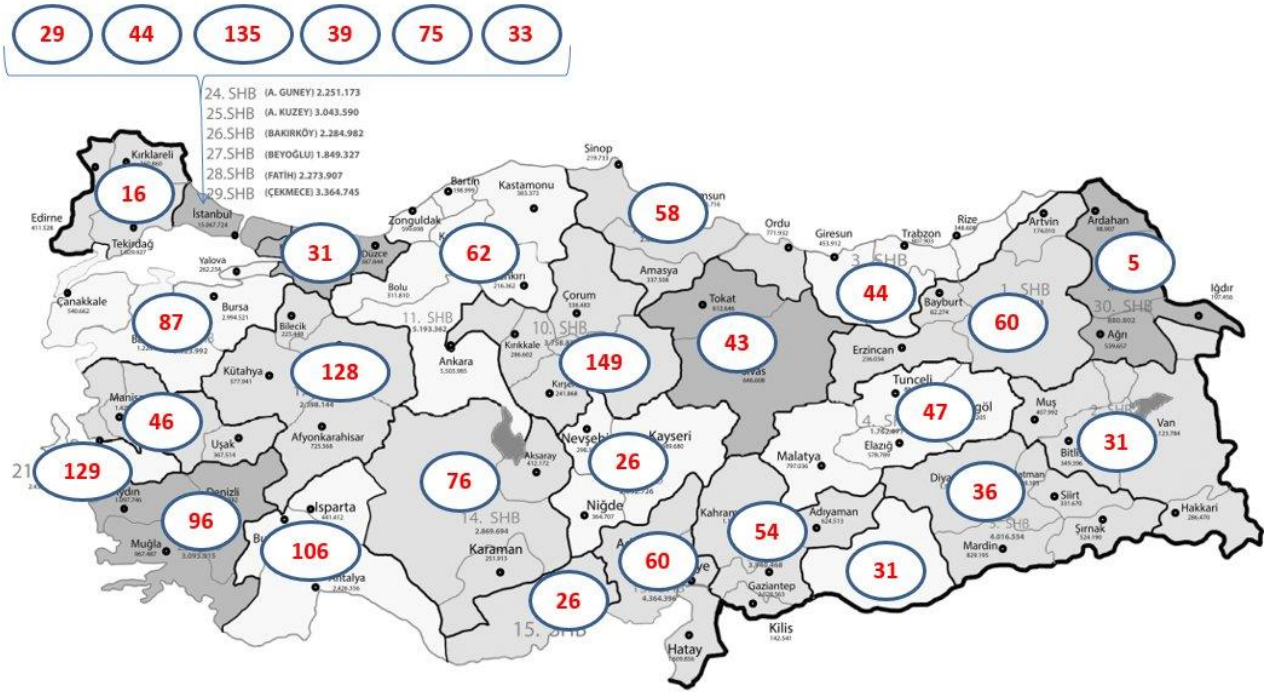

Figure 1a. Distribution of patients included in the NöroTek Turkey study by health regions (numerical).

Figure 1b. Distribution of patients included in the NöroTek Turkey study by health regions (Proportion of patients included in the study by population).

Marital status information was available in 1768 (99.7%) of the patients. Of the patients, 71.2% were married, 10% were single, 17% were widowed, and 1.5% were divorced. In neurovascular diseases, the proportion of single patients was lower (2.6% vs 20.6%, p0.001), whereas the proportion of widowed patients was higher (23.2% vs 8.1%, p001). No difference was found in the rates of married (72.5% vs. 69.9%) and divorced (1.6% vs 1.4%) patients. In terms of marital status, there was no difference between neurovascular diseases.

Educational status information was entered in 99% of the patients. Illiteracy is 20.9 %; literacy but not completion of primary school is 13.3 %; primary school graduate is 32.2 %; secondary school is 10.5 %; high school is 13.4 %; college is 2.9%; and faculty is 5.8 %. Approximately 2/3 of the patients (66.4%) have received primary school education or below. Males and those hospitalized for the neurovascular disease have lower educational levels (Figure 3).

Patients' Admission Characteristics

In neurovascular diseases, % of admissions were emergency, 14.8% were referrals from other hospitals and centers, and 3.1% were transferred from other departments. While hospitalization from the outpatient clinic was only 4.8%, 0.3% of the cases were hospitalized from other pathways. Hospitalizations through a referral from emergency departments (28%) and other hospitals (4.9%) were lower in nonvascular neurological diseases, but hospitalizations from outpatient clinics were higher (63.4%). The number of transfers from other departments (2.4%) and hospitalizations from other pathways was not different (1.3%).

In neurovascular diseases, hospitalization is only 0.7% for diagnosis and 33.3% solely for treatment, but it is 66% for both diagnosis and treatment. Purpose of hospitalization diagnosis in other neurological diseases 6.8%; treatment was 38.3% and two were 54.9% (p<0.001). In 22 cases, this information was left blank. No difference was found in neurovascular disease types (Table 1).

The rate of an occurrence in the hospital that resulted in a patient being transferred to the neurology units over the same hospitalization period was 3.7% in stroke cases and 1.7% in other neurological diseases (p=0.014). The risk of TIA during hospitalization in patients with neurovascular diseases was extremely low (never seen) (Table 1).

Repeated hospitalizations in the previous year were 26.7% in the stroke group, compared to 38.3 % for other neurological diseases (p0.001). While 31.2% of stroke patients had two or more lifetime hospitalizations, this was significantly lower than other neurological illnesses (40.9%, p=0.008). The length of stay in the hospital at the previous hospitalization was 6±8 (days, median±IQR) in the stroke group and did not differ significantly from the other patients (5±9 days).

While 79.2% of neurovascular patients were admitted to the hospital during the first 24 hours of symptom onset, this rate was significantly greater than that of other neurological disorders (17.6%, p<0.001).

In-hospital Diagnostic Methods in Neurovascular Diseases

TIA patients arrived at the hospital an average of 5 hours after symptoms began. CT (94%) or MRI (94%) were performed in almost all cases. The mean door-imaging time for CT was 3.5 hours, as for MR this interval was 5.4 hours. Nevertheless, the percentage of patients for whom this parameter was not processed for both CT and MR time was significant (81% and 74%, respectively), and the values ranged widely. No significant change was found when the analysis was limited to only the patients presenting within the first 12 hours (Table 2).

In 71.2 % of ischemic stroke cases, the average delay to symptom onset was roughly 6.5 hours. CT was taken on the first day in 88% of the cases, and the mean door-CT time was 2.3 hours. This information was obtained in 68% of the instances, and the rates and durations were identical for those who applied during the first 12 hours. While brain MR imaging was achieved in roughly 88% of the patients, the door-to-MR imaging time in 60% of the instances was around 4.2 hours. No difference was found in patients admitted within the first 12 hours (Table 2). Within the first 4.5 hours, 32% of ischemic stroke patients arrived at the emergency department, and 51.2% arrived within the first 8 hours.

In intracerebral hematomas, CT was performed in three-quarters and MR imaging was performed in one-third. Furthermore, time measurements were mainly absent from the forms (Table 2)

22% of stroke cases, 43% of intracerebral hemorrhages and 89% of PVS/CPA were

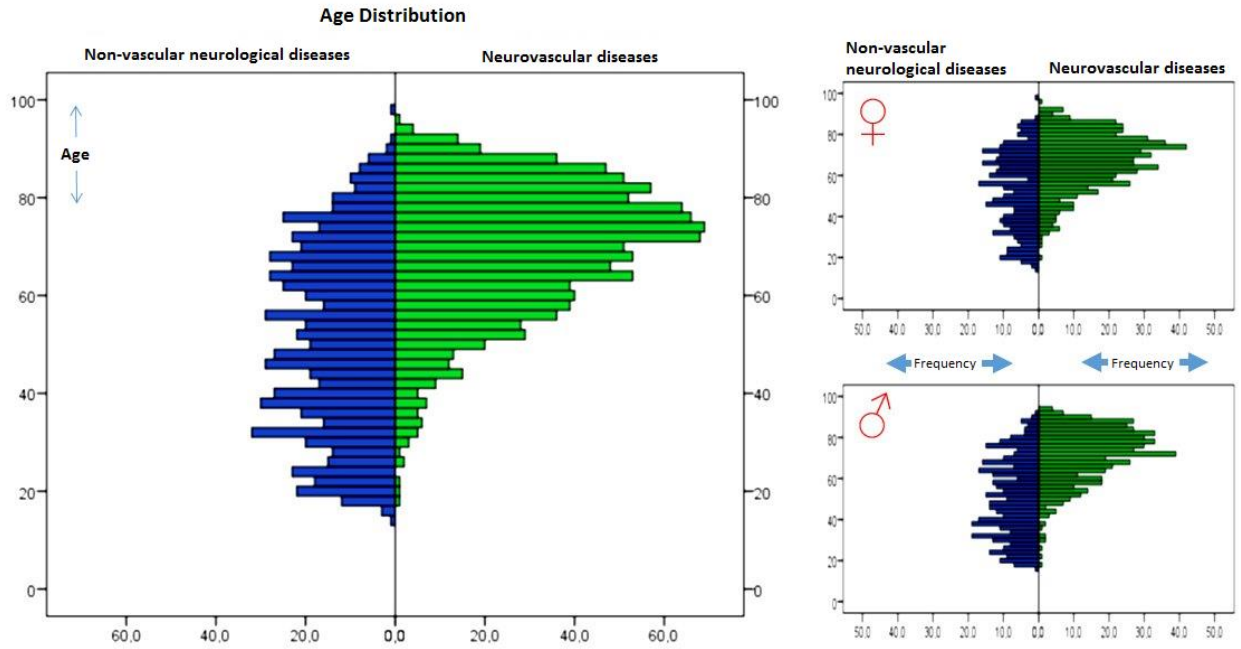

Figure 2. Age distribution in neurovascular and non-vascular neurological diseases in the NöroTek Turkey study (right: Entire population, Top left: Female, lower left: Male).

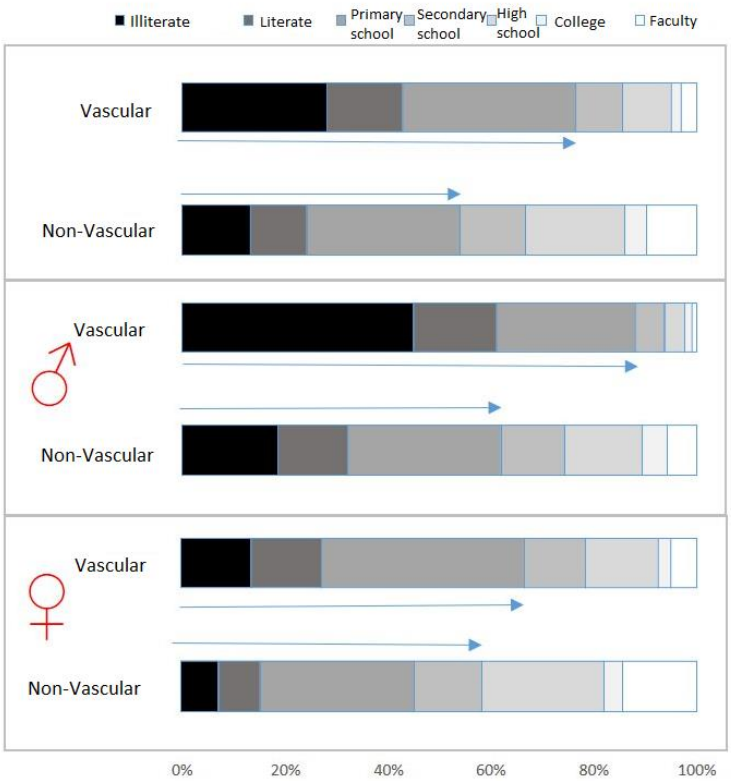

Figure 3. Distribution of disease diagnoses (neurovascular and non-vascular neurological diseases) and educational status by gender.

Table 1: Demographic overview of neurovascular disease types.

	TIA	Ischemic	Hemorrhagic	PVS/CPA	Other
n	70	859	125	9	727
% female	50%	53%	58%	67%	47%
Age	69,7±14, 2	68,9±13,5	66,7±14,2	72,8±9,4	50,5±19
Marital status					
Married	65,7%	73,4%	71,9%	77,8%	69%
Single	0%	2,2%	6.6%	0%	20.6%
Widowed	31,4%	22,8%	19.8%	22.2%	8.2%
Divorced	2.9%	1.5%	1.7%	0%	1.4%
No data available	0%	0%	0%	0%	0.8%
Educational status					
Illiterate	26.1%	27.8%	23.6%	11.1%	12.0%
Literate	17.4%	14.0%	16.3%	22.2%	11.4%
Primary School Graduate	30,4%	34,3%	32,5 %	33.3%	29.9%
Secondary School	8,7%	9.5%	5.7%	0%	12.7%
High School	8,7%	9.2%	10.6%	22.2%	19.1%
College	2.9%	1.8%	3.3%	0%	4.3%
Faculty	4.3%	2.4%	8.1%	11.1%	9.6%
No data available	1.4%	1.1%	0%	0%	1.0%
Hospital admission					
From the emergency units	77,2%	77,3%	75,4%	55,6%	28%
From another hospital	12.8%	14.9%	15.1%	22.2%	4.9%
From another service	0%	2.9%	5.6%	22.2%	2.4%
From polyclinic	10%	4.6%	3,9%	0%	63%
Other	0%	0.3%	0%	0%	1.3%
Purpose of hospitalization					
Diagnosis	2.9%	0.6%	0.8%	0%	6.8%
Treatment	36.2%	31.5%	39,8%	40%	38,3%
Diagnosis and treatment	60,9%	57.9%	59,4%	60%	54,9%
Place of occurrence					
In the hospital	0%	3.3%	7.3%	33.3%	1.7%
Hospitalization					
Repetitive	26.5%	27.8%	19.5%	44,5%	38,3%
Repetitive≥2	17.5%	30,3%	37.9%	40%	40,9%
Last length of hospitalization	4,6±3,8	7,4±10,9	7,2±1,3	10,3±9,3	8,6±9,2
Within 24 hours	85,1%	78.8%	79,7%	55,6%	17.6%

Abbreviations: PVS/CPA: Persistent vegetative state / CardioPulmonary Arrest; TIA: Transient Ischemic Attack.

hospitalized in neurology intensive care units. 5% of strokes and 7% of hematomas were first monitored in other intensive care units (Table 2).

Cerebral angiography (55%), cervical angiography (59%), cervical vascular ultrasonography (66%), transthoracic echocardiography (91%), and Holter monitoring (33%), were all conducted in at least one modality during TIA hospitalization. Cerebral angiography was conducted in 59% of ischemic strokes, cervical angiography in 57%, cervical vascular ultrasonography in 57%, transthoracic echocardiography in 89%, and Holter monitoring in 29%. Although rates for these diagnostic tests in intracerebral hemorrhages were determined, they were not subjected to further investigation due to a high rate of data entry error (Table 2).

Risk Factors in Neurovascular Diseases

Table 3 lists the vascular risk factors for neurovascular diseases. About two-thirds of patients with TIA, ischemic stroke, and ICH are patients with known hypertension. However, despite being hypertensive, 5.6% of TIA patients do not take any medication, 9.8% of ischemic stroke patients do, and 21.1% of intracerebral hemorrhage patients do. Being hypertensive and not taking antihypertensive medication is associated with an increased risk of intracerebral hemorrhage (p=0.052). In the vast majority of cases, blood pressure was checked and recorded in the hospital (approximately 95%). "Newly diagnosed" hypertension is 0.9% in TIA, 6.8% in ischemia, and 11.2% in intracerebral hematomas, and it is significantly higher in intracerebral hemorrhages (p=0.029; Table 3).

Diabetes mellitus was found in roughly one-third of TIA and ischemic stroke patients, and one-fifth of hemorrhagic stroke patients. Diabetes mellitus was detected in roughly one-third of TIA and ischemic stroke patients, and one-fifth of

Table 2. Hospital processes in neurovascular diseases.

	TIA	Ischemic	Hemorrhagic	PVS/CPA
Entire Group (n)	**70**	**859**	**125**	**9**
Time between symptom and emergency entry (minutes)	300±310 (n=60)	375±334 (n=612)	307±385 (n=86)	97±100 (n=4)
CT	94.3%	88,3%	71.2%	45%
Door-CT time (minutes)	209±312 (n=57)	137±258 (n=586)	160±317 (n = 26)	157±202 (n=2)
MRI	94.1%	88,1%	35%	33%
Door-MRI time (minutes)	323±385 (n=52)	252±353 (n=512)	160±318 (n=25)	-
First 12 hours* (n)	**57**	**672**	**118**	**4**
Time between symptom and emergency entry (minutes)	303±313 (n=54)	377±335 (n=598)	312±389 (n=86)	-
CT	96,5%	88,5%	83,5%	-
Door-CT time (minutes)	186±278 (n=53)	142±266 (n=512)	184±342 (n=21)	-
MRI	94.6%	87,6%	29%	-
Door-MRI time (minutes)	312±389 (n=49)	277±349 (n=445)	503±561 (n=17)	-
Where the patient was first observed				
Neurology Service	86%	60%	44%	11%
Stroke unit	3%	13%	6%	0%
Neurological intensive care	11%	22%	43%	89%
Other Intensive care	0%	5%	7%	0%
Cerebral angiography				
Not performed	45%	41%	59%	100%
MRI angiography	26%	35%	18%	-
CT Angiography	24%	19%	19%	-
DSA	5%	5%	4%	-
Cervical angiography				
Not performed	46%	43%	71%	-
MRI angiography	27%	34%	11%	-
CT Angiography	22%	19%	15%	-
Digital subtraction angiography	5%	4%	3%	-
Other examinations				
Carotid-vertebral CDUS	66%	57%	10%	100%
TCD	0%	1%	0%	0%
TTE	91%	89%	45%	100%
TEE	3%	6%	0%	22%
Cardiac monitorization	36%	61%	64%	0%
Holter monitoring	33%	29%	4%	100%

*: No data were entered in 3 cases in the TIA group, 6 cases in the ischemia group, and 7 cases in the intracerebral hematoma group; It includes the views made on the first day.
Abbreviations: CT: Computed tomography; DSA: Digital subtraction angiography; MRI: Magnetic Resonance; PVS/CPA: Persistent vegetative state/CardioPulmonary Arrest; CDUS: Color Doppler Ultrasonography; TCD: Transcranial Doppler; TEE: transesophageal echocardiography (This was not included in the metric form, so the figures are doubtful.); TIA: Transient Ischemic Attack; TTE: Transthoracic Echocardiography.

hemorrhagic stroke patients. In a significant part of patients (>90%), the blood glucose value was written in the file note upon arrival. Hemoglobin A1c level was determined in approximately two-thirds of the cases. Diabetes mellitus is "newly diagnosed" in 6% of TIA patients, 5% of ischemic stroke patients, and 1% of intracerebral hemorrhage patients (p=0.094, Table 3).

At the time of the occurrence, 7.2% with TIA, 15.5% of patients with ischemic stroke, and 16.7% of patients with intracerebral hemorrhage were active smokers. The rate of those who smoked and quit was 37% in TIA and 25% in ischemic stroke and intracerebral hemorrhage. Before discharge, 79.1% of 129 active smokers were recommended to quit smoking.

While the information on dyslipidemia was gathered both at discharge and on arrival in TIA and ischemic stroke patients, it was not collected as part of the study design because it was not recognised as an in-hospital indicator for intracerebral hemorrhages. Despite the fact that about one-third of ischemic stroke and TIA patients had a history of dyslipidemia, 54% and 69% of these patients, respectively, were not taking statins. A significant proportion (>90%) of patients with ischemic stroke and TIA have LDL cholesterol measured in the hospital. In TIA and

Table 3: Vascular risk factors in neurovascular diseases, detection and management of vascular risk factors in hospital.

		TIA	Ischemic	Hemorrhagic	PVS/CPA
n		70	859	125	9
Hypertension (admission)		67.1%	70,2%	71,8%	40%
Anti-Hypertensive use (admission)		61,5%	60.4%	50.7%	0%
Blood pressure was noted during hospitalization		94%	93%	96%	100%
Anti-Hypertensive use (discharge)		68%	76%	83%	83%
Diabetes mellitus (admission)		34,3%	38,4%	19.7%	25%
Anti-Diabetic use (admission)		30%	38%	12,3%	0%
During the hospitalization, blood sugar was noted		93%	92%	87%	100%
During the hospitalization, HbA1c was noted		65%	73%	57%	100%
Diabetes mellitus	No	63%	58%	81%	-
(discharge)	Yes (known for sure)	31%	37%	18%	-
	Yes (new diagnosis)	6%	5%	1%	-
Smoking (Admission)	Never smoked	55.7%	59.3%	58.3%	0%
	Quitted	37,1%	25.2%	25%	75%
	Active	7.2%	15.5%	16.7%	25%
Advised to quit smoking*		35%	37%	21%	0%
Dislipidemia		37,1%	32.1%	20.5%	0%
Use of hypolipidemic agents		12.7%	18.5%	4.5%	0%
Dyslipidemic and not taking medication		69%	54,2%	80%	-
LDL noted during hospitalization**		91%	93%	72%	-
Statin recommended for dyslipidemia**		38%	38%	-	-
Diet only for dyslipidemia (Discharge)**		62%	61%	-	-
Coronary artery disease		21.4%	33,9%	4.5%	20%
Previous stroke		36.2%	24.1%	13,9%	0%

*It was filled in by 73.7% of the patients;**This parameter was not collected for the intracerebral hematoma group in the forms, therefore it was present only in 13% of the cases. Admission dyslipidemia information was available in 58.4% of the cases (Data availability rate for comparison were TIA 100%, ischemic stroke 98%).

stroke cases, statins were begun in 38% of individuals with increased LDL, while a diet was indicated in 62%.

One-fifth of TIA cases and one-third of ischemic stroke cases had coronary artery disease.

Stroke history is present in almost one-third of TIA episodes, roughly one-third of ischemic stroke cases, and 14% of intracerebral hemorrhage cases (Table 3). There will be no further data published here because recurrent strokes will be studied separately.

In-hospital Treatment Processes and Major Complications in Neurovascular Diseases

Deep vein thrombosis/pulmonary thromboembolism (DVT/PTE) prophylaxis was not used in one-quarter of ischemic stroke cases and one-third of intracerebral hemorrhages. While pharmaceutical protection was greater in ischemic strokes, stockings and intermittent pneumatic compression were preferable in intracerebral hemorrhages (2.5% vs. 18%, p<0.001, Table 4). While DVT was not discovered in TIA patients, it was found in 3.9% of ischemic stroke patients and 2.9% of intracerebral hemorrhage patients.

In TIA cases, 14% had pneumonia and 13% had UTI (urinary tract infection), 30.8% had pneumonia and 10.9% had UTI, and 40.6% had pneumonia and 13.9% had UTI in intracerebral hemorrhages. While pneumonia was lower in TIA, there was no difference in the frequency of UTI (p<0.001, Table 4).

The Appearance of Patients at Discharge

The mean length of hospital stay is longer in neurovascular diseases than others (Neurovascular disease: 22±28 (mean±SD) and 13±17 (median±IQR) days; in non-neurovascular diseases, 17±28 and 10±14 days, p=0.003). The period of stay is much greater in situations of arrest and significantly shorter in cases of TIA (Table 5). The rate of patients hospitalized for more than 30 days in the neurovascular disease group was 19.2%, while it was 13.1% in the non-neurovascular disease group (p=0.003).

A considerable proportion of patients are discharged directly home, and there is no statistically significant difference between vascular (84.7%) and nonvascular (92.3%) diseases and ischemic / hemorrhagic vascular

events (85.1% and 86.4%). This information is available in 1006 (94%) patients with neurovascular diseases and 534 (73%) patients with other diseases. (p<0.001). While no TIA or arrest cases were referred for rehabilitation, this rate does not differ between ischemic and hemorrhagic vascular events and nonvascular diseases (p=0.209) (Table 5).

The modified Rankin score was recorded in 1006 (94%) of patients with neurovascular diseases and 384 (53%) of patients with other conditions at discharge. (p<0.001). The good prognosis (mRS≤1) was 72.1% in the TIA group; 36.6% in ischemic stroke; 23.3% in intracerebral hemorrhages and 67% in another neurological disease group. The functional result with a deficit (mRS>1) was higher in the ischemic and hemorrhagic stroke groups than in the other neurological diseases, as expected (p<0.001 for both). When all vascular events are considered, the rate of no deficit at discharge in vascular diseases is 37.3% (significantly low, p<0.001). Independent and mobile functional outcome (mRS≤2) was 79.5% in the TIA group; 52.1% in ischemic stroke; 38% in intracerebral hemorrhages and 76.2% in other neurological disease groups. This is still higher in ischemic and hemorrhagic stroke (p<0.001) than in other neurological diseases. It is 52% in all neurovascular diseases, which is significantly lower than non-neurovascular diseases (p<0.001) (Table 5).

A total of 121 (11.3%) cases died in the hospital before being discharged. Infection (pneumonia, urinary tract infection, catheter infection, and sepsis) was seen in 71 (58.7%) cases, neurological events (herniation, bleeding, central nervous system infection) were seen in 22 (18.2%) cases, systemic complications (kidney failure, heart failure, acute myocardial infarction, multi-organ failure) were seen in 14 (11.6%) cases, and respiratory causes were seen in 7 (5.8%) cases. Mortality rates for ischemic (10.3%) and hemorrhagic (15.5%) strokes are greater than for TIA (2.9%) and nonvascular illnesses (3.4%), but lower than for arrests (50%) (Table 5).

Acute Ischemic Stroke

Out of a total of 859 acute ischemic stroke cases, 586 (68%) NIHSS were given. NIHSS was utilized in 412 (62%) of 672 cases who applied within the first 12 hours. The mean score in these individuals was 9.9±7.6, and it was only given by neurologists an average of 115±211 minutes after the emergency admission. Very few (5%) patients with intracerebral hematoma are systematically coded by the NIHSS. Furthermore, the NIHSS file contained information on 73% of cases hospitalized during the first 4.5 hours and 69% of cases admitted within the first 8 hours. The results of IV tPA (n=103) and thrombectomy (n=71) in acute ischemic stroke patients will be detailed in a separate paper. Atrial fibrillation was found in 275 (29.6 %) of stroke (n=859) and TIA (n=70) patients. Atrial fibrillation diagnosis and treatment processes and characteristics of recurrent ischemic events will also be prepared in separate reports. Antiaggregant therapy was given to 93% of TIA patients after they were discharged from the hospital. Aspirin and clopidogrel combination was used in 33% of the cases. In ischemic strokes, the rate of usage of antiaggregant medications at discharge was 80% (combination 31%) (Table 4).

Intracerebral Hematomas

The question regarding the hematoma volume of 118 (94.4%) of a total of 125 ICH cases was answered. As a result, the volume information was written in the file in 17.8%, while it was not in the file in 55.1%, but for this form, it was computed and written using the ABC/2 formula. While non-standard size statements were made in 17.8% of the cases, the notation "no volume information" was written in 9.3% of the situations. In a total of 109 cases, the mean of hematoma volume is ±SD 25.3±43.8 cc (median±IQR: 12.5±20. cc). Transition to the ventricle was noted in 120 cases, and its frequency was 32.5%.

Hematoma location and etiology were filled in 121 (96.8%) cases. Lobar 31%, thalamus 28.6%, basal ganglia 24.6%, pons 7.1%, cerebellum 4%, and primary intraventricular hemorrhage in 1 patient.

While the reason for one instance is unknown, it is hypertensive in 75.2%, antiaggregant-related in 3.3%, anticoagulant-related in 5.8%, and other factors in 14.9%. In 120 patients, imaging modalities for hematomas were completed. CT was conducted on 59.3% of patients, whereas CT and MRI were performed on 40.8%. Vascular imaging information in hematoma cases was noted in 111 (88.9%) cases. While vascular imaging was not conducted in 69 cases, MR angiography, CT angiography, and DSA were performed in 15 cases, 24 cases, and 3 cases,

Table 4. In-hospital treatments and major complications in neurovascular diseases.

	TIA	Ischemic	Hemorrhagic	PVS/CPA
n	70	859	125	9
Deep venous thrombosis prophylaxis*				
Low molecular weight heparin	58%	74%	52%	70%
Unfractionated heparin	0%	0.5%	0%	0%
Intermittent pneumatic compression	0%	1.5%	6%	20%
Socks	0%	1%	12%	0%
Not implemented	42%	23%	30%	10%
Deep vein thrombosis was diagnosed	0%	3,9%	2.9%	0%
Infection in the hospital				
No	81%	63.5%	49.5%	14,5%
Pneumonia	6%	24.5%	30.7%	57.1%
Urinary tract infections	5%	4.6%	4%	-
Pneumonia+ Urinary tract infection	8%	6.3%	9.9%	28.6%
Infection that cannot be located	0%	0.7%	3%	-
Other Infections	0%	0,4%	3%	-
Antiaggregant treatment				
Any	93%	80%	0%	20%
Aspirin	92%	77%	0%	20%
Clopidogrel	33%	35%	0%	20%
ASA + Clopidogrel	33%	31%	0%	20%

*Although the purpose of the issue is unclear, it is assumed that it was processed here on the form, and it may have been used in some portions for preventing early stroke recurrence or for other medical objectives.

Table 5. Prognostic view of neurovascular disease types.

	TIA	Ischemic	Hemorrhagic	PVS/CPA	Other
n	70	859	125	9	727
Duration of stay in hospital	11±16	22±28	27±25	69±20	17±28
mean±SD (max-min)	(1-131)	(1-323)	(1-139)	(39-104)	(1-420)
Mechanical ventilation	10%	21%	28%	88%	-
Where he/she was discharged					
To house	95,6%	85,1%	86.4%	25%	92.3%
Rehabilitation	0%	%6,5	4.1%	0%	2,6%
Another hospital	0%	6.4 %	6.3%	50%	3.6%
Other	4.4%	2%	3.2%	25%	1.5%
mRS (discharge)					
0	55.9%	14,6%	12,1%	0%	41.1%
1	16.2%	22%	11.2%	0%	25.9%
2	7.4%	15.5%	14.7%	0%	9.2%
3	2.8%	10.8%	9.5%	12%	6.8%
4	7.4%	12.7%	23.2%	0%	7.6%
5	7.4%	14.1%	13.8%	33%	6%
6	2.9%	10.3%	15.5%	56%	3.4%

respectively. The question of whether an MRI sequence sensitive to bleeding was performed was answered in 98 (78%) cases. It was discovered that in 39% of these cases, one of these sequences was carried out. On the day of discharge, 95 (76%) of patients had their systolic blood pressure measured; the mean value was 129±16 mmHg, and it was higher than 160 mmHg in 5 (5.3%) of patients. The diastolic blood pressure value was noted in 86 (69%) cases, with a mean of 77±9 mmHg and over 90 mmHg in 11 (13%) patients.

Persistent Vegetative State / Cardiopulmonary Arrest

The PVS (n=2) and CPA (n=7) patients were two-thirds females, with a greater mean age than the other groups (Table 1). While five patients were admitted to the neurology units over the emergency department, two were moved from another hospital and two from another service. Three patients had CPA in the hospital. In the neurology intensive care unit, all patients were monitored. Seven patients were in the stroke

center and 2 patients were in the stroke unit type hospital. CPA/PVS patients stayed in the hospital for an average of 70 days. Only 5 patients had CPA as a result of acute myocardial infarction. No patients were subjected to therapeutic hypothermia. Information about hospital processes was filled in for six patients. Four of these patients got CT scans and three had MRIs for prognosis after arrest. In three of them, the examination was performed on the first day after the arrest. None of the patients had an EEG. While five people died in the hospital, three were able to be discharged as mRS 5 and one as mRS 3. Only one patient could be sent home. The remaining three patients were moved to different hospitals and departments (Table 2). The Cerebral Performance category was 3 in two patients and 4 in the other two patients.

DISCUSSION AND CONCLUSION

Important characteristics of hospitalized stroke and other acute neurovascular diseases in our country were discovered in this study. First of all, approximately two-thirds of hospitalized patients have been found to have had a stroke. This is an important consideration when deciding on a training approach in areas such as neurological speciality and neurology nursing.

The rate of being single is 10 times lower in patients with ischemic stroke compared to other diagnoses, which can be explained by the age of the patient. However, nearly one-fourth of the stroke cases had a fatal spouse. This is four times that of other neurological diseases. This feature may be useful in care planning in the context of living with stroke sequelae.

Approximately two-thirds of our patients (66.4%) have a primary school education or less. Surprisingly, the degree of education is low, particularly among males with neurovascular diseases. This level of education should be considered in population education efforts that are currently being developed or are intended to be developed (12-14).

Stroke is an acute occurrence, and hospitalization can be deemed elective for up to 5% of patients; however, elective hospitalization accounts for nearly two-thirds of patients with other neurological diseases. This may be important in making plans for the emergency service watch and its demands. 3.7% of stroke cases hospitalized in neurology services, on the other hand, were strokes that happened while they were hospitalized. Due to neurological difficulties that emerge while an inpatient in other services, the rate of transfer to neurology units is just 1.7%.

In stroke and TIA cases, brain parenchyma and vascular imaging are conducted frequently and on the first day. Transthoracic echocardiography was performed in 90% and Holter in one-third during hospitalization. Overall, the patients did well in terms of fundamental etiological examinations within the scope of the study.

32% of ischemic strokes presented in the first 4.5 hours and 51.2% in the first 8 hours. In the E-KIP study, 42.7% of ischemic stroke cases were admitted to the hospital within the first 4.5 hours (15). The use of thrombolytic treatment and thrombectomy was minimal in both studies, although the reasons for this were not investigated objectively.

It has been established that hypertension is a significant and controllable risk factor in neurovascular disorders in our country. About two-thirds of the patients were known to be hypertensive. A history of untreated hypertension (19%, 2 times ischemic stroke, about 4 times TIA) and post-event diagnosis of hypertension (11%, 2 times ischemic stroke, approximately 10 times TIA) were higher in intracerebral hemorrhage, as would be expected. Previous large hospital-based case series in Turkey found that hypertension was present in 63-73% of ischemic stroke patients and 79-88% of intracerebral hemorrhage patients (Table 6) (1, 2, 13, 15-17).

Diabetes and dyslipidemia were identified in two-thirds of ischemic stroke and TIA cases in this study, while recurrent occurrences were discovered in one-third, and all were found less frequently in intracerebral hemorrhages. Diabetes and dyslipidemia have remained important during the previous quarter-century, based on the high frequency of large-scale studies from Turkey (Table 6) (1, 2, 13, 15, 17).

Atrial fibrillation (NöroTek 28.5%; other: 12.4% -24.5%) and coronary artery disease (NöroTek 33.9%; other: 13.9 % -31.3%) were higher compared to previous studies. Active smoking is lower in NöroTek than in other trials (NöroTek 15.5% vs. other: 17-41%), and dyslipidemia is within the recommended range

Table 6. Comparison of risk factor frequencies detected in NöroTek study with previous studies*

	Turkish MST[1]	Ankara-ACROSS[2]	E-KIP[2]	NöroTek	Aegean	İstanbul[4]
Year	1995-1996	2016 – 2018	2018	2018	1991-1995	2000-2015
Hospital	40	3	11	87	1	1
Number of Patients	3100	787	1136	1802	2000	2534
Male	51.3%	58.8%	54.3%	49.6%	55,6%	53.9%
TIA	5.1%	-	6.1%	6,6[3%]	-	-
Ischemic stroke	66.1%	787	85,1%	81,5[3%]	77%	100%
Intracerebral hemorrhage	28.8%	-	8,7%	11,9[3%]	19%	-
Ischemic	**n=2040**	**n=787**	**n=967**	**n=969**	**n=1529**	**n=2534**
Hypertension	62.7%	69.9%	72.9%	76%	63%	69,4%
Diabetes mellitus	23.1%	36.8%	30,6%	42%	35%	26.7%
Atrial fibrillation	18.8%	24%	12.4%	28.4%	-	-
Coronary artery disease	13,9%	31.3%	-	33,9%	-	-
Dislipidemia	41.5%	70.5%	15.2%	32.1%	-	31.2%
Smoking	31.3%	21.9%	32%	15.5%	17%	41%
Alcohol	10.6%	-	8.8%	-	-	18%
Obesity	49.9%	24.7%	-	-	-	-
History of stroke	21.1%	20.3%	20.8%	24.1%	-	-
Hemorrhagic	**n=894**	**-**	**n=99**	**n=125**	**n=388**	**-**
Hypertension	79.2%	-	79,8%	83%	88%	-
Diabetes mellitus	12%	-	31.3%	19%	15%	-
Atrial fibrillation	4.9%	-	19.2%	6.4 %	-	-
Coronary artery disease	6.2%	-	-	4.5%	-	-
Dislipidemia	38.7%	-	32.3%	20.5%	31%	-
Smoking	25.2%	-	32.3%	16.7%	15%	-
Alcohol	7.5%	-	15.1%	-	-	-
Obesity	50.7%	-	-	-	-	-
History of stroke	17.4%	-	22.2%	13,9%	-	-

*Turkish MST and Ankara ACROSS Cross-sectional prospective, E-KIP, EGE and Istanbul Retrospective and NöroTek Point prevalence study.
[1]A control group of 1363 patients was also included in the Turkish MST study, and risk factors for ischemic and hemorrhagic stroke were found. Patients are consecutive cases hospitalized for 1 year in 40 centers.
[2]It was released following the completion of the NöroTek study.
[3]Calculated exclusively for ischemic stroke, and intracerebral hemorrhage (1054 cases in total).

(NöroTek 32.1%; other: 15.2% -70.5%) (1, 2, 13, 15, 17).

One of the quality metric complications examined in the NöroTek study was DVT frequency and prevention practices. Deep vein thrombosis was found in 3.9% of ischemic stroke patients and 2.9% of intracerebral hemorrhage patients. Although this figure is lower than expected, it is probable that systematic screening was not carried out, which could be attributed to patient characteristics. It is clear that the use of stockings is not discontinued, particularly in cases of intracerebral hemorrhage (18). DVT/PTE prophylaxis was not applied in one-fourth of ischemic strokes and one-third of intracerebral hemorrhages. However, the adequacy of this number could not be interpreted because information about patient immobility was not collected.

The rate of infection development, which was a complication parameter for the hospital, was another quality metric investigated in the NöroTek study. According to the findings in the literature, the pneumonia rates in NöroTek were unusually high (19). Even though there were fewer nosocomial infections than intracerebral hemorrhages in ischemic stroke, they were at a much higher rate (Pneumonia 30.8% vs 40.6%, urinary tract infection 10.9% vs 13.9%). This should undoubtedly be considered as an area for improvement.

Although the length of hospitalization for stroke patients varies, it is typically 3 weeks. In approximately one-fifth of the cases, the length of stay exceeds 1 month. One in every twenty patients is discharged from the hospital and promptly transferred to a rehabilitation unit. It should be highlighted that this rate is rather modest, given that patients without a modified Rankin score of 1 or 0 are only 2/3 more likely to have an ischemic stroke and 34% more likely to have an intracerebral hemorrhage (20). However, as we did not code the need for rehabilitation at discharge or the acceptability of receiving it in an inpatient environment, this interpretation is merely speculative.

The mortality rate in the patient is 10% in ischemic stroke and 15% in intracerebral

hemorrhage. However, post-stroke infections are responsible for nearly 60% of all deaths. However, post-stroke infections are responsible for nearly 60% of all deaths. All post-stroke infections are potentially preventable. As a result, by adhering to quality measures more strictly, these rates can be reduced. The 1-month death rate for ischemic stroke was 19.7% in the Aegean stroke database, which evaluated 2000 hospitalized patients between 1991 and 1995, and 29% for hemorrhagic stroke (1). In the E-KIP study, which was completed in 2018, the 1st-month mortality was 6.4% in ischemia and 26.2% in hemorrhage (15). The disparity in reported data should be interpreted as a reflection of patient demographics (21). However, there has been no notable improvement in stroke mortality during the last twenty years. Since the causes of death from stroke were examined for the first time in the NöroTek investigation, no conclusions could be drawn about the preventability of stroke mortality (22).

The maximal value of blood pressure on the day of discharge, as well as the rate at which hemorrhage-sensitive MR sequences (SWI, GRE, T2*) were conducted, were evaluated as intra-patient metrics in intracerebral hemorrhages in the NöroTek study. MR sequence sensitive to hemorrhage was performed in 39% of the cases. At discharge, 5.3% had high systolic blood pressure, and 12% had high diastolic blood pressure. These criteria stand out as areas in which the etiological study and management of intracerebral hematomas can be improved. The comparatively low mortality rates in intracerebral hemorrhages may have influenced the follow-up of cases with severe clinical signs on admission to neurosurgery and general intensive care units.

Despite the fact that the number of hospitalized patients was quite low due to the long duration of follow-up after cardiac arrest, it is worth noting that no therapeutic hypothermia was used. Furthermore, while EEG was never used for predictive purposes, CT/MR was used in less than half of the patients and was conducted earlier than advised (possibly for the cause). Multicenter research with another model of vegetative life or cardiac arrest prognosis in neurology clinics appears to be warranted.

The method of the NöroTek study may not be fully categorized. This can be treated as a crowd-at-a-time study (FMR: Turkish version of Flash Mob Research). The flash mob study approach is based on the concept of the "flash mob," in which groups of people unexpectedly gather in a public location, do a specific action briefly, and then immediately disperse, which was initially introduced by Bil Wasik in 2003 over the internet (23). This strategy allows us to obtain structured qualitative data from a large number of patients in a short amount of time. Within the framework of FMR, an answer is sought in numerous locations at a specific moment, but only for a short period of time and frequently with a specific question (24). This method could be used to consistently determine the number (25) of breaths taken by unexpectedly hospitalized patients, capillary refill times (26), or the patient's most significant anticipation (27).

NöroTek should be considered in the category of "point prevalence" study rather than FMR. The proportion of people in a specific population that have a specific disease or condition at a specific period is referred to as point prevalence. This is a snapshot of the condition or disease in time. The first instances that come to mind are delirium day work (28), nutrition day work (29), and mobilization labor (30) in mechanical ventilation. In surveys of drug and health technology usage, including antibiotics, point prevalence infection rate estimation is the method of choice (31, 32). Follow-up beyond the FMR, a multi-question survey, or, as with NöroTek, a brief and unambiguous follow-up period and questions after demographic identification are all examples of point prevalence.

Limitations

Some data from the NöroTek study could not be evaluated because the forms were not processed in sufficient numbers. Parameters such as neuroimaging in non-vascular diseases, their time metrics, and risk variables were not provided in many forms. Transoesophageal echocardiography was not put into the form. The number of instances with a diagnosis of cardiac arrest and prolonged vegetative state was so few that a definitive conclusion could not be reached. Since homogeneity could not be achieved, the etiological classification of ischemic stroke was not included in the forms, and the etiological classification of intracerebral hemorrhage, for example, the neuroimaging required for the diagnosis of cerebral amyloid angiopathy, could not be routinely performed. Data on atrial

fibrillation and thrombolytic/thrombectomy procedures were mostly completed via correspondence and phone, but this method was not successful for other items. Although the study's data cleaning and broadcasting were delayed owing to pandemic conditions, it has and will retain its significance because repeating it has become difficult due to shifting conditions.

As a result, for the first time in our nation (and the globe), the NöroTek study revealed numerous crucial aspects, the majority of which are stroke quality indicators in Turkey, utilizing the point prevalence approach. In terms of portraying the entirety of Turkey, these results are based on a more precise manner than earlier surveys. In the NöroTek study, a high rate (>95 %) of neuroimaging, transthoracic echocardiography, blood pressure, blood glucose, and lipid profile measurements were recorded, with low rates of vascular imaging and Holter/cardiac monitoring, NIHSS recording in the acute period, and direct transfer of discharged patients to rehabilitation. At first glance, the high pneumonia rate stands out as an area in need of improvement.

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Ethics

Ethics Committee Approval: The study was approved by Hacettepe University non-interventional Ethics Committee (Number: 18/331, Date: 27.03.2018).
Informed Consent: The authors declared that informed consent was signed by the patients for data sharing.
Copyright Transfer Form: Copyright Transfer Form was signed by all authors.
Peer-review: Internally peer-reviewed.
Authorship Contributions: Surgical and Medical Practices: All authors. Concept: MAT, AOÖ, EMA. Design: MAT, AOÖ, EMA. Data Collection or Processing: All authors. Analysis or Interpretation: MAT, AOÖ. Literature Search: MAT. Writing: MAT.
Conflict of Interest: No conflict of interest was declared by the authors.
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ANNEX. Protocol

TND BDH BCG SINGLE DAY STUDY PATIENT FORM (ACCEPTANCE)
[NOROTEK TURKEY study]

1.1. DESCRIPTIVE

Gender □ Women □ Man Age _____ Phone:_____
Center _____Number of neurology beds in the center:_____
Center row number:_____ Center doctor name:_____
marital status □ Married □Single□ widowed □ Divorced
Educational status□ Literate □ Primary School □ Middle School □ Highschool □ College □ Faculty
Hospitalization: □ Emergency room □ transfer from another hospital □transfer from another department
□Policlinic □Other

1.2. PREVIOUS HOSPITAL ADMISSION

(*Did it happen in the hospital?* □No□ Yes, *If yes, please write the time of occurrence of the neurological event*)
Has he or she been hospitalized in the past year? □ Yes □ No
How many times has he/she been hospitalized? □ 1 time □ 2 times □ 3 times □ 4 times □ 5 or more
If he or she was hospitalized, how many days were left in the last hospitalization? _____ day

1.3. DIAGNOSIS

ISCHEMIC STROKE □ TIA □
HEMORAGIC STROKE□
ARREST□
VEGETATIVE STATUS □(reason:_____)
OTHER DISEASE □ (Clearly written_____) Purpose of hospitalization: □diagnosis □treatment □both
Time of symptom occurrence: __/__/2018 at _____
Time of arrival at the hospital: __/__/2018 at _____
Hospitalization time: __/__/2018 at _____

1.4. Ischemic Stroke□ TIA □

BT □ Not Taken □Taken [Time: __/__/2018 at _____]
MR □ Not taken □ Taken [Time: __/__/2018 at _____]
NIHSS :□ Not Given □ Given [Who?_____score _____ time __/__/2018 at _____]
Has he or she received IV tPA? □No (Why? □Late Time other □_____) □Yes
Has a thrombectomy been performed?□No (Why? □No Facility □ Other_____) □Yes
Vascular risk factors
HypertensionNone □Yes □ [does he or she take medication? No□ Yes□What drug is he or she using?:_____]
1Diabetes No□ Yes□ [does he or she take medication? No□Yes □ What does he or she take?: Insulin
□ other _____]
Cigarette □Never used □ quitted □ using
Dyslipidemia No□ Yes □ [Does he or she use medication? No□ Yes□What drug is he or she using?:_____]
Atrial fibrillation No□ Yes □[Medication:ASA□other antiagg□Coumadin□ INR__ NOAC□ (Name: □Dabigatran, □Apixaban, □Rivaroxaban, □Edoxaban; Dose: _____)
coronary artery disease No □ Yes□
Previous stroke: No □ Yes □How many times? _____ When is the last time? __/__/20__

1.5. HEMORAGIC STROKE □

Location: _____ Volume:_____ Is it present in the ventricle? No □ Yes□
Hypertensive □Anti-aggregant □ Anticoagulation □ Other □
Imaging □ CT □ MRG □Angiogram (□Not done □ MRA □ CTA □ DSA)

1.6. CARDIOPULMONARY ARREST [CA] □

Out of hospital□ In the hospital □In the neurology service □In other services □
Hypothermia Yes □No □
BT □Not Taken □Taken [Time: __/__/2018 at _____]
MR □Not taken □ Taken [Time: __/__/2018 at _____]
EEG □Not taken □ Taken [Time: __/__/2018 at _____]

DISCHARGE FORM [Insert patient number ___*here*____]

2.1. DISCHARGE INFORMATION

When?: __/__/2018 ___at……Where? □house □rehabilitation □other hospital
Result: If mRS _____ □ Exitus, reason:_____ [*KPA should not be written here*]
Infection: □Pneumonia □UTI □Not located □other_____
Complication: □DVT/PTE
Where was it observed? □Service □stroke unit □Neuro-intensive care □ other_____

2.2. WHAT HAS BEEN DONE?

Angiography:No □Yes □Modalite □CTA □MRA □ catheterangio Brain No □Yes □ Neck No □ Yes □
Carotid/vertebral US: No□ Yes□ TCD No □Yes □
Echocardiography: No □ Yes □……Holter: No □ Yes □
Cardiac Monitoring: No □ Yes □
Ingestion assessment No □ Yes □When: __/__/2018 at ____
Nutritional status assessment No □ Yes □ When: __/__/2018 at ____
Enteral feeding tube inserted? Hayır □ Evet □
Is the PEG turned on? Hayır □ Evet □
Has mechanical ventilation been applied? Hayır □ Evet □
DVT prophylaxis: No □ Yes □ DMAH□ jobst□
were HTN checked? □No□Yes >140/90 Anti-HTN□was given □no
DM: Blood sugar checked?□No□Yes, was HbA1c checked? □No □Yes
DM □Known □New diagnosis, Medication [Insulin□ other _____]
Recommended to quit smoking□No □Yes

2.3.ISCHEMIC STROKE

Anti-aggregan: □Not given □Given: □ASA □Clopidogrel □other
[When was it started? __/__/2018 at ____ __/__/2018 at ____ __/__/2018 at ____]
Atrial fibrillation: □Known □New diagnosis □Paroxysmal
Medication: □Heparin □DMAH □Warfarin □NOAC Other □ (If anti-coagulant is not given, why?_____)
Was LDL checked? □No □Yes >100 statin □was given □ other hypolipidemic was given □no

2.4. For cases receiving tPA:

What was done before giving? □CT □CTA □MR □MRA □Other (_____)
Where was it given? □Emergency □NYB □neurology service □stroke units
when was it given? Semptom:_____entering ER:_____IVtPA starting:_____
NIHSS was checked for 24 hours □Yes (NIHSS:____) □no
Second day CT □ no □ yes _ is there any bleeding? □no □asymptomatic □symptomatic

2.5. For cases who underwent thrombectomy:

What was done before it was given? □ CT □ CTA □ MR □ MRA □ Other (_____)
Who? □Neurologist □Radiologist □Other
When was the inguinal entry given? Symptom:_____entering the ER:_____
IV tPA: □yes □No
DSA results: □ TICI 0, □TICı 1, □ TICI2a, □ TICI2b, □ TICI 2c, □ TICI3
NIHSS was checked for 24 hours □ Yes (NIHSS:____) □no
Second day CT □ no □ yes _ is there any bleeding? □no □asymptomatic □symptomatic
NIHSS was checked for 24 hours □ Yes (NIHSS:____) □no

2.6. HEMORAGIC STROKE

Last day blood pressure maximum value: ____mmHg

2.7. ARREST

Which one on the way out?
□1=There is no problem in standing, walking, eating and drinking, fully awake and responsive to the environment.
□2= Slightly disabled: can stand but not walk well, drinks but cannot eat regularly, and can work part-time in supported situations. Complete self-sufficiency in daily living activities (dressing, using public transport, preparing food).
□3= Severely disabled: unable to stand without assistance, unable to eat or drink, conscious but unable to respond to ambient stimuli Conscious requires daily care because of significant brain injury.
□4= Coma: Verbal and psychological relationships cannot be established. and □ 5= death

Patient List

Number of patients	Number of neurovascular cases	Percentage of neurovascular cases	Center
5	4	80	Kars Harakani State Hospital, Neurology Clinic, Kars
6	6	100	Muş State Hospital, Neurology Clinic, Muş
24	17	71	İstanbul Haseki Training and Research Hospital, Neurology Clinic, İstanbul
27	18	67	Uşak State Hospital, Neurology Clinic, Uşak
16	8	50	İstanbul University Cerrahpaşa Medical Faculty, Department of Neurology, İstanbul
2	0	0	Kemer State Hospital, Neurology Clinic, Antalya
4	4	100	Şanlıurfa Training and Research Hospital, Neurology Clinic, Şanlıurfa
20	8	40	Haydarpaşa Sultan Abdülhamid Han Training and Research Hospital, Neurology Clinic, İstanbul
25	5	20	Uludağ University Faculty of Medicine, Department of Neurology, Bursa
24	15	63	Atatürk Training and Research Hospital, Neurology Clinic, Ankara (şimdi City Hospital, Ankara)
22	**13**	59	Eskişehir Yunus Emre State Hospital, Neurology Clinic, Eskişehir
13	**10**	77	Gülhane Training and Research Hospital, Neurology Clinic, Ankara
38	**9**	24	Çukurova University Faculty of Medicine, Department of Neurology, Adana
14	**8**	57	Namık Kemal University Faculty of Medicine, Department of Neurology, Tekirdag
7	**3**	43	Baskent University Faculty of Medicine, Department of Neurology, Ankara
16	**14**	88	Tokat State Hospital, Neurology Clinic, Tokat
20	**17**	85	Celal Bayar University Faculty of Medicine, Department of Neurology, Manisa
20	**5**	25	Fırat University Faculty of Medicine, Department of Neurology, Elazığ
30	**16**	53	Dışkapı Training and Research Hospital, Neurology Clinic, Ankara
34	**10**	29	Ankara University Faculty of Medicine, Department of Neurology, Ankara
11	**10**	91	Giresun University Faculty of Medicine, Department of Neurology, Giresun
9	**0**	0	Balıkesir University Faculty of Medicine, Department of Neurology, Balıkesir
1	**1**	100	Kocaeli Derince Training and Research Hospital, Neurology Clinic1, İzmit
2	**1**	50	İstanbul Medipol University Faculty of Medicine, Department of Neurology, İstanbul
22	**8**	36	Karadeniz Teknik University Faculty of Medicine, Department of Neurology, Trabzon
10	**8**	80	İstanbul Bağcılar Training and Research Hospital, Neurology Clinic, İstanbul
19	**13**	68	Kocatepe University Faculty of Medicine, Department of Neurology, Afyon
49	**37**	76	Dumlupınar University Faculty of Medicine, Department of Neurology, Kütahya
20	**3**	15	İstanbul University İstanbul Medical Faculty, Department of Neurology, İstanbul
10	**6**	60	Bülent Ecevit University Faculty of Medicine, Department of Neurology, Zonguldak
4	**0**	0	Acıbadem University Faculty of Medicine, Altunizade Hospital Neurology Clinic, İstanbul
25	**13**	52	University of Health Sciences, İzmir Bozyaka Training and Research Hospital, Neurology Clinic, İzmir
21	**11**	52	Gazi University Faculty of Medicine, Department of Neurology, Ankara
16	**16**	100	İstanbul Bakırköy Prof .Dr. Mazhar Osman Training and Research Hospital for Psychiatry, Neurology and Neurosurgery, Neurology Clinic, İstanbul,
7	**3**	43	Mustafa Kemal University Faculty of Medicine, Department of Neurology, Hatay
51	**21**	41	Ege University Faculty of Medicine, Department of Neurology, İzmir
39	**31**	79	University of Health Sciences, Şişli Hamidiye Etfal Training and Research Hospital, Neurology Clinic, İstanbul
18	**8**	44	Medeniyet University Faculty of Medicine, Department of Neurology, İstanbul
28	**15**	54	Burdur State Hospital, Neurology Clinic, Burdur
47	**25**	53	Atatürk Training and Research Hospital, Neurology Clinic, Erzurum
5	**4**	80	Balıklıgöl State Hospital, Neurology Clinic, Urfa
27	**16**	59	İnönü University Faculty of Medicine, Department of Neurology, Malatya
12	**9**	75	Erzurum Bölge Training and Research Hospital, Neurology Clinic, Erzurum
31	**29**	94	İstanbul Bakırköy Dr. Sadi Konuk Training and Research Hospital, Neurology Clinic, İstanbul
26	**8**	31	Mersin University Faculty of Medicine, Department of Neurology, Mersin
15	**8**	53	University of Health Sciences, Tepecik Training and Research Hospital, Neurology Clinic, İzmir
15	**10**	67	Başkent University, Adana Application and Research Center, Department of Neurology, Adana
21	**10**	48	Akdeniz University Faculty of Medicine, Department of Neurology, Antalya
26	**15**	58	Bakırköy Training and Research Hospital for Psychiatry, Neurology and Neurosurgery, 1st Neurology Clinic, İstanbul
38	**18**	47	Eskişehir Osmangazi University, Faculty of Medicine, Department of Neurology, Eskişehir
9	**7**	78	Konya Medicana Hospital, Neurology Department, Konya
35	**22**	63	Necmettin Erbakan University Faculty of Medicine, Department of Neurology, Konya
27	**18**	67	Cumhuriyet University Faculty of Medicine, Department of Neurology, Sivas
24	**15**	63	Aydın State Hospital, Neurology Clinic, Aydın
28	**21**	75	Sakarya University Faculty of Medicine, Department of Neurology, Sakarya
26	**9**	35	Erciyes University Faculty of Medicine, Department of Neurology, Kayseri

Patient List Continued

Number of patients	Number of neurovascular cases	Percentage of neurovascular cases	Center
25	**15**	60	Sıtkı Koçman University Faculty of Medicine, Department of Neurology, Muğla
44	**36**	82	University of Health Sciences, Antalya Training and Research Hospital, Neurology Clinic, Antalya
27	**11**	41	Marmara University Faculty of Medicine, Department of Neurology, İstanbul
33	**26**	79	Bakırköy Training and Research Hospital for Psychiatry, Neurology and Neurosurgery, 2nd Neurology Clinic, İstanbul
16	**12**	75	Numune Training and Research Hospital, Neurology Clinic (now Ankara City Hospital), Ankara
22	**14**	64	Harran University Faculty of Medicine, Department of Neurology, Urfa Giresun University Faculty of Medicine, Department of Neurology, Giresun (REPETITIVE)
28	**15**	54	Sütcü İmam University Faculty of Medicine, Department of Neurology, Kahramanmaraş
14	**14**	100	İstanbul Training and Research Hospital, Neurology Clinic, İstanbul
5	**4**	80	Memorial Hizmet Hospital, İstanbul
34	**26**	76	Samsun Training and Research Hospital, Neurology Clinic, Samsun
10	**8**	80	Yalova State Hospital, Neurology Clinic, Yalova
2	**1**	50	Kocaeli Derince Training and Research Hospital, Neurology Clinic, Kocaeli
38	**21**	55	Dokuz Eylül University Faculty of Medicine, Department of Neurology, İzmir
18	**18**	100	İstanbul Aydın University, VM Florya Medikal Park Hospital, Comprehensive Stroke Center, İstanbul
5	**4**	80	İstinye University Bahçeşehir Liv Hospital, İstanbul
2	**2**	100	Pendik Medikal Park Hospital, İstanbul
10	**7**	70	Yozgat City Hospital, Neurology Clinic, Yozgat
16	**16**	100	Ondokuz Mayıs University Faculty of Medicine, Department of Neurology, Samsun
25	**16**	64	Yuzuncu Yıl University Faculty of Medicine, Department of Neurology, Van
36	**19**	53	Dicle University Faculty of Medicine, Department of Neurology, Diyarbakır
16	**16**	100	Ankara Hospital EAH, Neurology Clinic, Ankara
2	**2**	100	Edirne State Hospital, Edirne
21	**10**	48	Adnan Menderes University Faculty of Medicine, Department of Neurology, Aydın
30	**13**	43	Hacettepe University Faculty of Medicine, Department of Neurology, Ankara
14	**10**	71	Bakırköy Prof. Dr. Mazhar Osman Training and Research Hospital for Psychiatry, Neurology and Neurosurgery, Neurology Intensive Care Unit
53	**45**	85	University of Health Sciences, Bursa Yüksek İhtisas Training and Research Hospital, Stroke Unit, Bursa
11	**7**	64	Süleyman Demirel University Faculty of Medicine, Department of Neurology, Isparta
26	**16**	62	Gaziantep University Faculty of Medicine, Department of Neurology, Gaziantep
32	**14**	44	Konya Selçuk University Faculty of Medicine, Department of Neurology, Konya
26	**5**	19	Pamukkale University Faculty of Medicine, Department of Neurology, Denizli