

**IMPROVING STROKE TREATMENT PRACTICES BASED ON HOSPITAL
REGISTRY DATA IN ANDIJAN CITY**

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Abstract:Stroke is a serious health problem that causes disability and death. This study looked at stroke patients in Andijan city using hospital registry data from 2020 to 2024. The goal was to understand how patients are treated and how treatment could be improved.

Out of 1,312 stroke cases, 71% were ischemic strokes and 29% were hemorrhagic strokes. The average age of patients was 63 years, and 55% were men. The most common health problems were high blood pressure (80%), heart disease (43%), and diabetes (27%). Hemorrhagic stroke patients had more severe symptoms, stayed longer in the hospital, and had higher death rates (29%) compared to ischemic stroke patients (9%). Older age, low consciousness level, and diabetes were linked to higher risk of death.

The study shows that stroke mostly affects older adults with other health problems. Improving treatment with specialized stroke units, faster therapy, and better rehabilitation can help reduce death and improve recovery.

Keywords:stroke; ischemic stroke; hemorrhagic stroke; hospital data; treatment; rehabilitation; Andijan; Uzbekistan; risk factors

Introduction

Stroke remains one of the leading causes of morbidity, mortality, and long-term disability worldwide, posing a major public health challenge for both developed and developing countries. According to the World Health Organization (WHO), approximately 15 million people suffer from stroke each year, of whom 5 million die and another 5 million are left permanently disabled, placing a significant social and economic burden on healthcare systems [1,2]. In low- and middle-income countries, including Uzbekistan, the incidence of stroke continues to rise due to an aging population, increasing prevalence of hypertension, diabetes mellitus, obesity, and other modifiable risk factors [3].

The improvement of treatment strategies for stroke is one of the most urgent tasks of modern neurology. Evidence-based management protocols—including early diagnosis, reperfusion therapy, neuroprotection, and multidisciplinary rehabilitation—are essential to reduce mortality and improve functional outcomes [4,5]. However, in many regions, including Andijan city, the implementation of these modern treatment principles remains inconsistent, often due to limited resources, delayed patient admission, and insufficient application of clinical guidelines [6].

Hospital registry data play a crucial role in analyzing the real-world patterns of stroke care, identifying gaps in clinical management, and developing region-specific strategies to optimize treatment outcomes [7,8]. By systematically collecting and analyzing data on stroke types,

clinical features, treatment methods, and outcomes, healthcare institutions can identify key determinants of patient recovery and mortality, ultimately guiding the refinement of therapeutic approaches [9].

This study aims to analyze hospital registry data from Andijan city to assess current treatment practices for stroke and identify ways to improve therapeutic strategies. The findings are expected to contribute to the optimization of clinical management protocols, the enhancement of multidisciplinary collaboration, and the overall improvement of stroke care quality in the region.

Methods

This retrospective observational study was conducted based on the hospital stroke registry data of Andijan city for the period between January 2020 and December 2024. The registry included all patients admitted to neurological and intensive care units with a confirmed diagnosis of ischemic or hemorrhagic stroke, verified by clinical and neuroimaging criteria according to the World Health Organization (WHO) and American Heart Association/American Stroke Association (AHA/ASA) definitions [1,2]. The study aimed to evaluate the structure of stroke cases, applied treatment methods, and clinical outcomes to determine opportunities for improving therapeutic strategies in regional healthcare institutions.

The inclusion criteria comprised adult patients (aged ≥ 18 years) with a diagnosis of acute stroke confirmed by computed tomography (CT) or magnetic resonance imaging (MRI). Patients with transient ischemic attacks (TIA), traumatic intracranial hemorrhage, or incomplete medical records were excluded from the analysis [3]. Data were extracted from the hospital registry and included demographic characteristics (age, sex, residence), clinical features (stroke type, severity, comorbidities, risk factors), treatment modalities (pharmacological and non-pharmacological), and clinical outcomes at discharge.

Treatment protocols were categorized into several groups: standard conservative therapy (antiplatelet agents, anticoagulants, antihypertensive therapy, and neuroprotectors), thrombolytic therapy using recombinant tissue plasminogen activator (rt-PA) within the therapeutic window, and rehabilitation interventions (physical therapy and speech therapy). The frequency of these interventions and their relationship with patient outcomes were analyzed to assess the effectiveness and accessibility of current stroke management practices [4,5].

Statistical analysis was performed using SPSS version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics (mean, standard deviation, and percentages) were used to summarize continuous and categorical variables. The chi-square test was applied to compare categorical variables, while Student's t-test and one-way ANOVA were used for continuous variables. A p-value < 0.05 was considered statistically significant [6]. The findings were interpreted in the context of international stroke management standards, emphasizing discrepancies between current local practices and global recommendations [7,8].

Ethical approval for the study was obtained from the Andijan Medical Institute Bioethics Committee (Protocol No. 02/2024). Patient confidentiality was maintained by anonymizing all registry data in accordance with the Declaration of Helsinki and national ethical guidelines [9].

Results

During the study period from January 2020 to December 2024, a total of 1,312 stroke cases were registered in the hospital database of Andijan city. Of these, 936 cases (71.3%) were ischemic strokes and 376 cases (28.7%) were hemorrhagic strokes. The mean age of patients was 63.1 ± 11.5 years, ranging from 23 to 91 years, with the majority (64.5%) being 60 years or older. Males comprised 55.2% of the cohort, resulting in a male-to-female ratio of approximately 1.23:1.

The most prevalent risk factor was **arterial hypertension**, identified in 80.1% of patients, followed by **ischemic heart disease** (42.8%), **diabetes mellitus** (27.1%), and **atrial fibrillation** (18.5%). Lifestyle-related factors included **smoking** (33.4%) and **alcohol consumption** (10.2%). Hypertension and atrial fibrillation were significantly more frequent in ischemic stroke patients ($p < 0.05$), whereas alcohol consumption was slightly higher among hemorrhagic stroke cases ($p < 0.05$).

Regarding clinical presentation, the mean **Glasgow Coma Scale (GCS)** score at admission was 13.2 ± 2.2 for ischemic stroke and 10.5 ± 3.0 for hemorrhagic stroke, indicating more severe neurological impairment in hemorrhagic cases. Hospital treatment primarily included standard conservative therapy (82.7%), thrombolytic therapy with rt-PA (9.4%), and rehabilitation interventions (physical therapy, 63.8%; speech therapy, 28.5%). The mean **length of hospital stay** was 11.2 ± 5.0 days, with hemorrhagic stroke patients requiring longer hospitalization (12.8 ± 5.4 days) compared to ischemic stroke patients (10.4 ± 4.6 days; $p < 0.01$).

The overall **in-hospital mortality rate** was 15.6%, significantly higher in hemorrhagic stroke patients (29.3%) than ischemic stroke patients (8.8%; $p < 0.001$). The most common in-hospital complications were **pneumonia** (17.1%), **deep vein thrombosis** (5.0%), and **recurrent stroke** (3.2%). Multivariate logistic regression identified **advanced age (≥ 70 years)**, **low GCS score (< 10)** at admission, and **diabetes mellitus** as independent predictors of in-hospital mortality ($p < 0.05$).

Table 1. Demographic, Clinical, and Treatment Characteristics of Stroke Patients in Andijan City (n = 1,312)

Parameter	Total (n=1312)	Ischemic Stroke (n=936)	Hemorrhagic Stroke (n=376)	p-value
Mean age (years)	63.1 ± 11.5	63.8 ± 11.0	61.5 ± 12.1	0.038
Male sex, n (%)	724 (55.2%)	510 (54.5%)	214 (56.9%)	0.412
Hypertension, n (%)	1052 (80.1%)	790 (84.4%)	262 (69.7%)	<0.01
Diabetes mellitus, n (%)	356 (27.1%)	271 (28.9%)	85 (22.6%)	0.045
Atrial fibrillation, n (%)	243 (18.5%)	202 (21.6%)	41 (10.9%)	<0.01
Smoking, n (%)	438 (33.4%)	298 (31.8%)	140 (37.2%)	0.051

Parameter	Total (n=1312)	Ischemic (n=936)	Stroke	Hemorrhagic (n=376)	Stroke	p- value
Alcohol use, n (%)	134 (10.2%)	79 (8.4%)		55 (14.6%)		0.007
Mean GCS score	12.4 ± 3.0	13.2 ± 2.2		10.5 ± 3.0		<0.001
Length of stay (days)	11.2 ± 5.0	10.4 ± 4.6		12.8 ± 5.4		<0.01
Thrombolysis, n (%)	123 (9.4%)	123 (13.1%)		0 (0%)		<0.001
Rehabilitation, n (%)	726 (55.3%)	642 (68.6%)		84 (22.3%)		<0.001
In-hospital mortality, n (%)	205 (15.6%)	82 (8.8%)		123 (29.3%)		<0.001

Natijalar shuni ko'rsatadiki, Andijon shahridagi stroke bemorlarining asosiy qismini ishemik kasallik tashkil etadi, lekin gemorragik stroke bemorlari ko'proq og'ir holatlarda bo'lib, o'lim xavfi yuqori. Bu natijalar mintaqaviy sharoitda davolash strategiyalarini optimallashtirish va resurslarni samarali taqsimlashning muhimligini ko'rsatadi [1,2].

Discussion

The present study analyzed hospital registry data from Andijan city to evaluate stroke treatment practices and clinical outcomes over a five-year period. The results confirm that ischemic stroke represents the majority of cases, accounting for 71.3% of all strokes, whereas hemorrhagic strokes, though less frequent, are associated with more severe neurological deficits and higher in-hospital mortality. This distribution is consistent with global trends, which indicate that ischemic stroke is more common due to the rising prevalence of atherosclerosis, hypertension, and other cardiovascular risk factors [1,2].

The demographic characteristics observed in this study reveal a predominance of older patients, with 64.5% aged 60 years or older, and a slight male predominance (55.2%). These findings align with epidemiological data from other regional studies, suggesting that age and male sex remain significant risk factors for stroke incidence [3,4]. The high prevalence of comorbid conditions such as hypertension (80.1%), ischemic heart disease (42.8%), diabetes mellitus (27.1%), and atrial fibrillation (18.5%) emphasizes the multifactorial nature of stroke and the need for comprehensive cardiovascular risk management.

Clinical outcomes demonstrated that hemorrhagic stroke patients presented with lower GCS scores at admission and longer hospital stays, reflecting the higher severity and complexity of care required for these patients. The in-hospital mortality rate of 29.3% for hemorrhagic stroke, compared to 8.8% for ischemic stroke, highlights the urgent need for targeted interventions to improve outcomes in this high-risk group. These findings are consistent with international studies showing that hemorrhagic strokes carry two- to threefold higher mortality than ischemic strokes [5,6].

Analysis of treatment modalities indicated that standard conservative therapy was the most commonly applied intervention, while thrombolytic therapy with rt-PA was limited to 13.1% of ischemic stroke cases. Rehabilitation services, including physical and speech therapy, were underutilized, particularly among hemorrhagic stroke patients. This suggests barriers to optimal care, including delayed patient admission, limited access to specialized stroke units, and resource constraints, which are common challenges in developing countries [7,8].

Multivariate analysis identified advanced age (≥ 70 years), low GCS score at admission (< 10), and diabetes mellitus as independent predictors of in-hospital mortality. These factors are well-documented in the literature as critical determinants of stroke prognosis and underscore the importance of early risk stratification and intensive monitoring of high-risk patients [9,10].

The findings of this study have important implications for improving stroke management in Andijan city. First, the establishment of regional stroke units with standardized protocols for acute care, including early thrombolysis, hemodynamic monitoring, and multidisciplinary rehabilitation, is essential to enhance survival and functional recovery. Second, preventive strategies focusing on hypertension control, diabetes management, and lifestyle modification should be prioritized to reduce the incidence of stroke. Finally, enhancing prehospital emergency services and public awareness about stroke symptoms could lead to earlier hospital admission, enabling timely interventions and improved outcomes [11,12].

In conclusion, this study highlights critical gaps in stroke treatment and rehabilitation in Andijan city and provides evidence-based recommendations for optimizing clinical management. By addressing these gaps, healthcare providers can reduce mortality, improve patient outcomes, and align regional practices with international standards.

Conclusion

This study highlights the current state of stroke treatment practices in Andijan city based on hospital registry data from 2020 to 2024. Ischemic stroke remains the most prevalent subtype, while hemorrhagic stroke, though less frequent, is associated with more severe clinical presentations and higher in-hospital mortality. Key risk factors, including hypertension, diabetes mellitus, ischemic heart disease, and atrial fibrillation, were highly prevalent among the patient population, indicating a significant burden of cardiovascular comorbidities.

The analysis also identified advanced age, low Glasgow Coma Scale scores at admission, and diabetes mellitus as independent predictors of in-hospital mortality, emphasizing the need for early risk stratification and intensive management of high-risk patients. The limited application of thrombolytic therapy and underutilization of rehabilitation services reflect existing gaps in the regional healthcare system, highlighting opportunities for improvement.

To optimize stroke care in Andijan, the study recommends establishing specialized stroke units, implementing standardized treatment protocols, expanding access to thrombolysis and rehabilitation, and strengthening preventive strategies targeting hypertension, diabetes, and lifestyle-related risk factors. These measures are expected to reduce mortality, improve functional outcomes, and align local practices with international standards, ultimately enhancing the quality of stroke management in the region.

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