

Emergency Department Stroke Protocol: Role of Nursing, Radiology, Emergency Medical Services, and Social Work

Ahmed sitr ateeq Alharbi¹, Naif furaih k Alshammari², Amaal Shaim Tarfa alrowily³, Miad Moghid Qysom Alruwaili⁴, Amnah Mohammed D Alruwaili⁵, Alanazi, Khalid Saad Q⁶, Saba Saleh Hussain Alabdali⁷, Sultan Raja M Alanazi⁸, Moraya Hussain Muidh⁹, Abdullah Ali Alotaibi¹⁰

¹ Nursing Technician, Ibn Sina Hospital for Extended Care, Makkah, Makkah Region, Kingdom of Saudi Arabia.

² Nursing Technician, Al-Nayisiyah Primary Healthcare Center, Hail, Hail Region, Kingdom of Saudi Arabia.

³ Nursing Technician, Endocrine and Diabetic Center, Sakaka, Al-Jouf Region, Kingdom of Saudi Arabia.

⁴ Nursing Technician, Endocrine and Diabetic Center, Sakaka, Al-Jouf Region, Kingdom of Saudi Arabia.

⁵ Nursing Specialist, King Abdulaziz Specialist Hospital, Sakaka, Al-Jouf Region, Kingdom of Saudi Arabia.

⁶ Nursing Technician, Technical Studies Institute of the Royal Saudi Air Force, Dhahran, Eastern Region, Kingdom of Saudi Arabia.

⁷ Nursing Specialist, Al-Haditha Hospital, Qurayyat, Al-Jouf Region, Kingdom of Saudi Arabia.

⁸ Health Assistant-Health Security, Northern Borders Health Cluster, Arar, Northern Borders Region, Kingdom of Saudi Arabia.

⁹ Social Services Specialist, Armed Forces Hospital, Dhahran, Eastern Region, Kingdom of Saudi Arabia.

¹⁰ Radiological Technology Technician, Al-Salihiya Middle Health Center, Northern Borders Health Cluster, Arar, Northern Borders Region, Kingdom of Saudi Arabia.

Abstract:

The Emergency Department (ED) stroke protocol emphasizes a coordinated approach involving nursing, radiology, Emergency Medical Services (EMS), and social work to ensure timely and effective care for patients experiencing a stroke. Nurses play a crucial role in the initial assessment, recognizing symptoms through the use of standardized stroke scales like the NIHSS (National Institutes of Health Stroke Scale) to triage patients rapidly. Their ability to act swiftly in initiating the stroke protocol—including activating the stroke team, monitoring vital signs, and managing intravenous access—significantly impacts patient outcomes. In parallel, radiology serves a vital function by performing timely neuroimaging studies such as CT or MRI scans to assess the type of stroke and determine suitable intervention strategies. EMS providers are integral in the pre-hospital phase, using their training to identify stroke symptoms early in the field and execute protocol-driven transport to the appropriate stroke center. Their communication with the ED staff ensures that crucial information is relayed quickly, which minimizes door-to-treatment times upon arrival. Additionally, social work plays a vital role in addressing the post-acute care needs of stroke patients, helping them navigate home health care services, rehabilitation options, and emotional support resources. All these components demonstrate a comprehensive approach to stroke management, highlighting the intersection of various healthcare professions to optimize patient care and recovery outcomes in emergencies.

Keywords: Emergency Department, stroke protocol, nursing, radiology, Emergency Medical Services (EMS), social work

Introduction:

Stroke remains one of the leading causes of morbidity and mortality globally, necessitating prompt identification and management to minimize

neurological damage and enhance patient outcomes. The impact of ischemic and hemorrhagic strokes on individuals, families, and healthcare systems underscores the critical need for an organized and interdisciplinary response within the emergency

department (ED). The evolution of stroke care has led to the development of stroke protocols, which outline clear pathways for identifying, assessing, and treating stroke patients. These protocols are characterized by their interdisciplinary nature, emphasizing the essential contributions of nursing, radiology, emergency medical services (EMS), and social work [1].

Stroke occurs when blood flow to the brain is disrupted, leading to cell death and potentially significant complications for the patient. The American Stroke Association designates time as a crucial factor in the treatment of stroke, with the phrase "time is brain" highlighting the necessity for immediate action. Rapid diagnosis and treatment—often referred to as the "golden hour"—can significantly impact the prognosis and long-term outcomes of affected individuals. Given the diverse manifestations of stroke symptoms and the complexity of the care that follows, a protocol-driven response involving multiple disciplines is paramount in ensuring timely and effective care [2].

Nurses are often the first healthcare professionals to assess patients presenting with stroke symptoms in the ED. Their role encompasses initial patient evaluation, assessment of vital signs, and rapid implementation of the stroke protocol, including the use of validated screening tools such as the FAST (Face, Arm, Speech, Time) method. Nurses coordinate with physicians to facilitate immediate interventions, such as obtaining access for intravenous therapy and initiating life support measures if necessary [3].

The critical skills of nurses extend beyond technical competencies; their ability to communicate effectively with both patients and families is essential. They provide education regarding the nature of the stroke, the expected medical interventions, and the necessity of follow-up care, ensuring that patients and families are empowered to make informed decisions. Furthermore, nurses serve as frontline advocates for patient care, navigating any barriers that may arise during the treatment process to ensure adherence to the established protocol [4].

Following identification of a potential stroke, timely imaging is vital to determine the type and extent of the stroke, guiding subsequent therapeutic measures. Radiological examinations, including computed

tomography (CT) scans and magnetic resonance imaging (MRI), are cornerstones of stroke assessment. Radiologists play a pivotal role in this stage of care by quickly interpreting scans, providing crucial information about hemorrhagic versus ischemic strokes, and assisting in decision-making regarding intervention [5].

The efficiency of the radiology department in responding to stroke alerts is critically important. Protocols developed in conjunction with emergency department staff can help ensure that imaging technologies are readily available and that imaging sequences tailored to stroke evaluation are consistently employed. This collaboration reduces turnaround times for imaging interpretation and enhances the overall responsiveness of the emergency care team [6].

Before patients even arrive at the emergency department, EMS personnel perform triage and critical decision-making during transport. They are often integral in identifying symptoms of stroke, initiating pre-hospital assessments, and alerting the receiving ED about incoming stroke cases. Advanced training in stroke recognition equips EMS providers to execute preliminary protocols, including assessments and documenting the timeline of symptom onset, which is essential for treatment considerations such as thrombolysis [4].

The collaboration between EMS and ED staff extends beyond merely transporting the patient; it encompasses strategic communication aimed at expediting the care continuum. EMS protocols designed specifically for stroke response segments allow for standardization in how EMS communicates critical patient information upon arrival, thus facilitating a smoother transition into emergency care [2].

While nursing and medical teams address immediate clinical needs, social workers provide a crucial layer of support that impacts the patient's overall care trajectory. The unique emotional and social challenges faced by stroke patients and their families necessitate the expertise of trained professionals in this field. Social workers conduct assessments that evaluate the psychosocial factors affecting the patient, including mental health, social support systems, and financial barriers to care [5].

In conjunction with the stroke protocol, social workers also offer resources for rehabilitation, home

care services, and continued support for family members who may need guidance in navigating the aftermath of a stroke. They help coordinate care plans that address the long-term needs of stroke survivors, including assistance with rehabilitation services and community resource allocation, ensuring continuity of care beyond the acute phases [6].

Nursing Role in Stroke Assessment and Management

Stroke is one of the leading causes of morbidity and mortality globally, often resulting in significant long-term disability and impacting the quality of life of survivors and their families. The rapid assessment, intervention, and management of stroke are critical, and the nursing profession plays a pivotal role in every phase of stroke care, from initial assessment through rehabilitation. The integration of nursing expertise in stroke management not only enhances patient outcomes but also contributes to the effectiveness of the healthcare system at large [7].

A stroke occurs when there is a disruption of blood flow to the brain, resulting in the death of brain cells and subsequent neurological deficits. The two primary types of strokes are ischemic strokes, which account for approximately 87% of all strokes and are caused by a blockage in a blood vessel, and hemorrhagic strokes, which result from bleeding in the brain. The symptoms of stroke can vary widely but commonly include sudden onset of weakness or paralysis, difficulty speaking or understanding, vision problems, and sudden severe headache. The acronym "FAST"—Face drooping, Arm weakness, Speech difficulties, and Time to call emergency services—serves as a vital reminder for identifying stroke symptoms swiftly [8].

1. **Initial Assessment and Recognition:** Nurses are often the first healthcare professionals to evaluate a patient presenting with stroke symptoms. Rapid recognition of these symptoms and the initiation of the assessment protocol are crucial. Utilizing standardized tools such as the National Institutes of Health Stroke Scale (NIHSS) allows nurses to quantify the severity of stroke symptoms, facilitating timely intervention [9].
2. **Communication and Education:** Effective communication is key in stroke management.

Nurses provide vital information to patients and families about stroke symptoms, risk factors, and the importance of seeking immediate medical attention. Education extends to stroke prevention strategies, including lifestyle modifications and adherence to medical therapy [7].

3. **Collaborative Care:** Stroke management is inherently multidisciplinary, involving a team of healthcare professionals such as neurologists, radiologists, pharmacists, physical therapists, and occupational therapists. Nurses coordinate with these team members to ensure a comprehensive care plan is developed and executed. Effective collaboration promotes continuity of care and optimizes patient outcomes [8].
4. **Monitoring and Vital Signs:** Regular monitoring of vital signs, neurological status, and lab values is a core nursing function in the acute setting. Early identification of any changes in a patient's condition can be pivotal for timely interventions. Blood pressure management, glucose control, and neurological assessments must be consistently performed to prevent further complications such as secondary strokes [2].
5. **Medication Administration and Management:** Nurses are responsible for administering medications as prescribed, which may include thrombolytics for ischemic strokes, anti-hypertensives, or anticoagulants. Understanding the indications, contraindications, and potential side effects of these medications is essential for patient safety. Close monitoring for adverse reactions or complications resulting from drug therapy is also paramount [10].

Interventions During Acute Stroke Management

1. **Rapid Response Protocols:** Nurses are integral to the implementation of rapid response protocols, including the "Code Stroke" systems in hospitals. These protocols establish expedited pathways for the evaluation and treatment of stroke patients, promoting early intervention that can significantly alter outcomes [1].
2. **Patient Safety Measures:** In the acute setting, stroke patients may experience a range of

complications, including aspiration, pressure ulcers, and falls. Nurses are responsible for instituting necessary precautions to minimize these risks. For instance, stroke patients may require modified diets or swallowing assessments to prevent aspiration [8].

3. **Psychosocial Support:** The onset of a stroke can be a traumatic experience for patients and their families. Nurses provide emotional support, assist with coping strategies, and can facilitate access to social services or psychological support resources. Understanding the psychosocial implications of stroke is essential for holistic care [10].

The Role of Nurses in Rehabilitation

After the acute phase of stroke care, the focus shifts towards rehabilitation, aimed at maximizing the patient's functional independence and quality of life. The nursing role in rehabilitation is multifaceted [11]:

1. **Coordinating Rehabilitation Services:** Nurses play an essential role in setting up and coordinating rehabilitation services that may include physical therapy, occupational therapy, and speech therapy. They establish goals in collaboration with patients and the rehabilitation team to facilitate recovery [11].
2. **Goal Setting and Motivation:** Engaging patients in goal-setting can enhance motivation and adherence to rehabilitation programs. Nurses are ideally positioned to encourage patients, emphasizing progress, no matter how incremental, and reinforcing positive behaviors that contribute to recovery efforts [4].
3. **Teaching and Training:** Education continues into rehabilitation, where nurses teach patients and families about managing disabilities and navigating daily activities. Training may include the use of adaptive devices, techniques for safe mobility, and fall prevention strategies [12].
4. **Long-Term Follow-Up:** As stroke management is a continuous process, nurses often provide follow-up care for stroke patients, ensuring they remain compliant with rehabilitation goals, medication regimens, and lifestyle modifications. This long-term engagement is crucial in reducing the risk of recurrent strokes and other cardiovascular events [12].

The Role of Imaging Techniques in Stroke Diagnosis

Radiologists employ a range of imaging modalities to diagnose strokes, each offering unique insights into the vascular status of the brain. The most commonly utilized techniques include Computed Tomography (CT), Magnetic Resonance Imaging (MRI), and, less frequently, ultrasound methods. Each of these imaging approaches provides critical information that helps clinicians differentiate between stroke types, determine the location and extent of brain damage, and guide therapeutic decisions [13].

1. Computed Tomography (CT)

CT is often the first-line imaging modality in stroke diagnosis due to its availability, speed, and ability to visualize acute hemorrhagic strokes. Using X-ray technology, CT scans can rapidly assess the brain's structure and detect any bleeding, making it indispensable in acute settings like emergency rooms. A non-contrast CT scan is particularly important since it can quickly rule out intracerebral hemorrhage [14].

Time is of the essence in stroke treatment, and CT's efficiency allows for rapid decision-making. Following an initial non-contrast CT, some patients may undergo CT angiography (CTA), an advanced technique that visualizes the blood vessels of the brain. This method helps identify the presence of clots in the cerebral vasculature, providing real-time insights that are vital for interventions such as thrombectomy [13].

2. Magnetic Resonance Imaging (MRI)

MRI is another cornerstone in stroke diagnosis, especially when it comes to evaluating ischemic strokes. While it is generally less accessible and slower than CT, MRI provides superior soft tissue contrast and can reveal changes in brain tissue that may not yet be visible on CT. Diffusion-weighted imaging (DWI), a specialized MRI technique, is particularly useful as it can detect acute ischemic changes within minutes of onset, allowing for early interventions that could significantly alter patient outcomes [14].

Moreover, MRI can also help clarify ambiguous cases after a CT has been performed. For instance, while CT might show signs of a hemorrhage, MRI can elucidate the underlying cause, such as vascular

malformations. Furthermore, MRI with angiography (MRA) can assess blood flow and vascular integrity, enhancing the understanding of the cerebral circulation [15].

3. Ultrasound

While not as commonly used as CT or MRI in acute settings, ultrasound imaging—specifically transcranial Doppler ultrasound—can play a role in stroke evaluations, particularly for monitoring blood flow in the major arteries of the head and neck. This portable and radiation-free imaging technique can be especially useful in specific populations and clinical scenarios, such as those who are bedridden or when other imaging modalities are contraindicated [16].

The integration of these imaging approaches into the stroke care pathway emphasizes the essential interplay of technology and timely intervention. A well-coordinated imaging strategy is critical. Rapid access to imaging tools enables swift diagnosis, which is paramount since treatment for ischemic strokes (such as thrombolytic therapy) is most effective if administered within a few hours of symptom onset [15].

Conversely, identifying hemorrhagic strokes through CT helps avoid the potentially devastating consequences of administering thrombolytic agents, which can exacerbate bleeding. Accurate imaging also facilitates appropriate secondary prevention strategies, such as medical therapy or interventional procedures [17].

As radiology continues to evolve, new imaging technologies and advanced techniques hold the promise of further enhancing stroke diagnosis. For example, perfusion imaging—whether through MRI or CT—can provide functional information regarding blood flow to specific brain regions, enabling clinicians to assess the extent of ischemic changes and inform patient management [12].

Artificial Intelligence (AI) is also making its way into radiological practice. Machine learning algorithms are being developed to analyze images for signs of stroke more quickly and accurately, potentially reducing the time required for diagnosis and facilitating earlier interventions [17].

Emergency Medical Services (EMS) and Pre-Hospital Care:

Upon arrival at a scene where a stroke is suspected, EMS personnel follow established protocols to assess the patient's condition rigorously. Initial assessments include checking the patient's airway, breathing, and circulation (ABCs), followed by key evaluations for stroke indicators. This assessment often utilizes tools such as the Cincinnati Prehospital Stroke Scale (CPSS) or the Los Angeles Prehospital Stroke Screen (LAPSS) [18].

1. Initial Assessment and Protocols:

- **Cincinnati Prehospital Stroke Scale (CPSS):** EMS providers assess facial droop, arm drift, and speech disturbance. A positive finding in any of these categories suggests the possibility of a stroke.
- **Los Angeles Prehospital Stroke Screen (LAPSS):** This is an extended assessment that includes age, history of seizures, nature of symptoms, and duration of symptoms, providing a more nuanced evaluation for determining stroke risk [19].

2. Vital Signs Monitoring:

- Continuous monitoring of vital signs is conducted to evaluate the patient's cardiovascular stability. Blood pressure readings can provide insight into potential complications, especially during a hemorrhagic stroke scenario [11].

3. Standardized Guidelines:

- EMS protocols often recommend the initiation of pre-alerts to local hospitals that stroke teams are likely to respond to. This includes providing details of the patient's status and estimated time of arrival (ETA), allowing the hospital to mobilize resources effectively [20].

Once a stroke diagnosis is suspected or confirmed, timely transportation to an appropriate medical facility is critical. The chosen destination must be equipped to handle acute stroke care, including advanced imaging resources and specialized stroke teams. The following guidelines outline the protocols for transportation [11]:

1. Destination Decision:

- The decision-making process regarding which hospital to transport the patient stems from several factors, including the type of stroke suspected, the urgency of care needed, and protocol agreements with healthcare facilities. Many EMS systems have established a network of designated stroke centers that adhere to the latest treatment protocols [21].

2. Drive Time Considerations:

- Given the time-sensitive nature of stroke treatment (often referred to as the "golden hour"), EMS personnel evaluate driving routes for optimal efficiency. Understanding the dynamics of city traffic and considering alternative routes can significantly impact patient outcomes [12].

3. Patient Positioning and Stabilization:

- Patients are usually transported in a supine position to facilitate monitoring and intervention. The EMS team ensures that the patient is stabilized, including securing intravenous access for potential medication administration, such as thrombolytics, upon hospital arrival [22].

4. Continuous Monitoring During Transport:

- While en route, EMS crews continue to monitor the patient's vital signs, neurological status, and any changes in condition. Communication with the receiving facility is maintained throughout transport, sharing observations and updates, which is vital for continuity of care.

Effective communication between EMS personnel and hospital staff cannot be overstated. Pre-hospital care transitions into emergency room management rely on critical information exchange, including patient assessment findings, times of symptom onset, and immediate actions taken by EMS. This collaborative approach not only facilitates the rapid treatment of stroke patients but also aligns with best practices outlined in national guidelines, such as those set forth by the American Stroke Association [23].

Social Work's Role in Post-Stroke Support:

Social workers specialize in offering psychological support, facilitating community resources, and aiding in the navigation of the healthcare system, making them indispensable allies for stroke patients and their families. Their engagement typically spans several critical areas [20]:

1. **Assessment of Psychosocial Needs:** Upon a stroke patient's admission to a rehabilitation center or hospital, social workers conduct thorough psychosocial assessments. These assessments evaluate not only the patient's mental health status but also consider their social environment, family dynamics, economic stability, and support systems. By identifying areas of concern, social workers can tailor interventions that address specific needs, leading to a more personalized recovery plan [19].
2. **Emotional Support and Counseling:** Emotional well-being is crucial for a successful recovery. Social workers provide counseling and therapeutic support, enabling stroke survivors to express their thoughts and feelings about their experiences. Issues such as grief over lost abilities, fear of future strokes, and frustration with limitations can be overwhelming. Individual and group therapy initiatives led by social workers can greatly assist patients in processing these emotions, coping with their new realities, and developing resilience [11].
3. **Facilitating Family Involvement:** Stroke impacts not just the individual but also their family members, who may experience caregiver stress, anxiety, and altered relationships. Social workers engage families in the recovery process, providing education about stroke recovery, fostering understanding of the patient's condition, and promoting effective communication strategies. They guide families on how to support their loved ones while also addressing their mental health needs, thus facilitating a supportive environment conducive to recovery [22].

4. **Connecting to Resources:** Access to suitable healthcare, rehabilitation services, financial assistance, and community resources is vital for post-stroke recovery. Social workers play a crucial role in connecting patients and their families to available resources. This may include arranging access to occupational therapy, physical therapy, support groups, and transportation services. They also assist in navigating insurance and financial aid systems to alleviate the economic burden of post-stroke care [23].
5. **Advocacy:** Social workers act as advocates for stroke patients, ensuring they receive adequate care and support within the healthcare system. They often collaborate with interdisciplinary teams to communicate the psychosocial needs of patients, advocating for necessary adjustments in care plans or services that are sensitive to individual patient needs. This advocacy extends to efforts that influence policy, striving to improve stroke care and support resources within communities [24].

Social workers seldom operate in isolation; their skills are best utilized within an interdisciplinary approach involving doctors, nurses, therapists, and other healthcare professionals. Collaborative efforts ensure that all facets of a patient's recovery are addressed holistically. For instance, while physicians focus on the physical rehabilitation, social workers can simultaneously provide compensation methods for cognitive deficits and emotional support for mental health challenges [25].

Research shows that integrated care models, where social work is embedded within healthcare teams, lead to better outcomes for patients. This collaboration promotes seamless communication and fosters a more comprehensive understanding of each patient's unique challenges and strengths [21].

Despite the essential role of social workers, they face numerous challenges in providing post-stroke support. High caseloads, time constraints, and limited resources can hinder their ability to implement effective interventions. Moreover, stigma surrounding mental health can impede patients from seeking necessary psychosocial

support. Social workers often have to navigate these barriers while maintaining compassion and commitment to their patients' recovery [25].

Conclusion

The implementation of an effective emergency department stroke protocol is not merely a clinical responsibility; it is a collaborative endeavor that involves diverse disciplines unified by a common goal: to improve outcomes for stroke patients. The roles of nursing, radiology, EMS, and social work are interdependent; each specialty contributes unique skills and expertise that enhance the overall effectiveness of stroke care. Together, these professionals work to mitigate the impact of stroke, strengthen patient advocacy, and improve the quality of life for survivors and their families. Continued research and practice in this area will further refine the protocols and improve collaborative practices, ultimately leading to more timely, coordinated, and effective stroke care in the emergency department setting.

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