

The Role of Interdisciplinary Teams in Stroke Management: Combining paramedics, ambulance services, laboratory markers, radiological imaging, and nursing interventions for faster diagnosis and treatment

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Abstract

Stroke remains a significant public health concern, ranking among the leading causes of mortality and long-term disability globally. The critical importance of rapid diagnosis and intervention in stroke management has led to the establishment of interdisciplinary teams composed of paramedics, ambulance service personnel, laboratory technicians, radiologists, and nursing staff. These professionals contribute synergistically to the stroke care continuum, ensuring that patients receive timely and effective treatment. Paramedics are often the first responders and play a crucial role in early recognition and prehospital management of stroke symptoms, utilizing protocols such as the FAST (Face, Arms, Speech, Time) assessment. Once patients are transported to specialized stroke centers, the rapid processing of laboratory markers, including glucose levels and coagulation profiles, is essential for determining treatment options. Simultaneously, radiological imaging, particularly CT and MRI scans, allows for accurate stroke type differentiation, guiding immediate therapeutic decisions. Nursing staff serve as pivotal players in the hospital phase, monitoring patient statuses, administering medications, and providing education and support to patients and their families. This review underscores the significance of interdisciplinary collaboration in enhancing the effectiveness of stroke response systems, promoting better patient outcomes through faster diagnosis and treatment. By maximizing the strengths of various healthcare professionals, the interdisciplinary approach reduces delays, improves care quality, and ultimately contributes to lowering the burden of stroke-related disabilities. Continuous efforts to refine communication, training, and integration among team members are vital for optimizing stroke management practices in the healthcare system.

Introduction

Stroke continues to pose significant public health challenges worldwide, standing as one of the leading causes of both morbidity and mortality. The timely recognition and treatment of stroke are critical, as every minute counts in the preservation of neurological function and reduction of disability. Advances in medical science and technology have underscored the fact that the first few hours following the onset of stroke symptoms are vital; effective interventions during this period can transform patient outcomes (1). Consequently, the management of stroke has emerged as a highly coordinated effort necessitating the collaboration of various healthcare professionals.

Interdisciplinary teams that include paramedics, ambulance service personnel, laboratory technicians, radiologists, and nursing staff are essential for providing a comprehensive and efficient response to stroke management.

The role of paramedics is pivotal in the prehospital phase; they are often the first responders to recognize the early signs of a stroke. Utilizing assessment frameworks such as the FAST (Face, Arms, Speech, Time), paramedics enable rapid identification of stroke patients, facilitating faster transport to appropriate medical facilities (2). This speedy response is critical, as it significantly influences the treatment window for interventions such as thrombolysis. Once the patient arrives at the hospital, laboratory and imaging studies play indispensable roles in diagnosing the stroke etiology and promptly guiding treatment decisions. The processing of laboratory markers is crucial for verifying patient eligibility for thrombolytic therapy as well as for evaluating secondary complications that might arise (5). Moreover, cutting-edge neuroimaging techniques, such as CT and MRI, allow healthcare professionals to differentiate between ischemic and hemorrhagic strokes, making timely clinical decisions based on accurate assessments of the patient's condition (6).

The role of nursing interventions cannot be overstated in the hospital setting. Nursing staff provide comprehensive care that includes continuous monitoring, patient education, and coordination of interdisciplinary care plans. The combination of efforts from all team members creates a streamlined process that is crucial for enabling the timely initiation of treatments, minimizing the time to care delivery, and ultimately improving patient outcomes. This review will elucidate the integral roles played by paramedics, ambulance services, laboratory technicians, radiologists, and nursing staff in the interdisciplinary management of strokes. Emphasizing their collaborative efforts highlights how the integration of their skills and knowledge can lead to enhanced treatment efficiency and improved prognoses for stroke patients.

Review:

The Role of Paramedics and Ambulance Services

Paramedics serve as the frontline defenders in the battle against stroke, wielding the first critical tools necessary for influencing outcomes. Their ability to swiftly identify the early signs of stroke based on established guidelines such as the FAST assessment is crucial for ensuring that patients receive timely treatment. In instances where strokes are misidentified or not recognized until later stages, the results can be dire, resulting in preventable neurological damage and poor functional recovery (2).

When paramedics determine that a patient meets stroke criteria, they act quickly to initiate lifesaving interventions. This includes administering supplemental oxygen, establishing IV access, and closely monitoring vital signs. These actions not only stabilize the patient but also prepare them for transport to specialized stroke centers. The advent of mobile stroke units has revolutionized the prehospital care landscape. Equipped with neurologists, advanced diagnostics, and imaging capabilities, these units can provide on-site assessments and potentially initiate treatments, such as administering tPA, even before patients reach the hospital. Studies have shown that this approach can reduce the time to treatment significantly compared to traditional ambulance transport, enhancing the likelihood of favorable outcomes (3).

Effective communication between paramedics and hospital staff forms another cornerstone of quality stroke care. As paramedics transport a stroke patient, they provide detailed information on the patient's history and symptoms, especially the timing of symptom onset. This critical intelligence allows emergency department teams to activate their stroke protocols even before the patient arrives, expediting the necessary preparations for diagnosis and treatment (4). This seamless communication process fosters a collaborative environment in which patient care takes precedence, ultimately minimizing delays that could compromise a patient's recovery trajectory.

Laboratory Markers and Radiological Imaging

Upon a stroke patient's arrival at the hospital, the rapid processing and evaluation of laboratory markers are essential for guiding effective treatment strategies. These laboratory tests serve as critical indicators that can directly influence treatment decisions and interventions. One of the first tasks in the hospital setting involves checking blood glucose levels. With the known potential for hypoglycemia to mimic stroke symptoms, immediate testing is crucial, as failing to identify abnormal glucose levels can lead to inappropriate treatment decisions, which might worsen the patient's condition (5). For example, a patient presenting with stroke-like symptoms but with significantly reduced blood glucose may require glucose administration instead of thrombolytic therapy, showcasing the importance of differential diagnosis in acute settings.

Furthermore, comprehensive coagulation profiles must be swiftly performed to assess the patient's risk of bleeding, which is particularly essential for those being considered for thrombolytic therapy. The urgency in this scenario cannot be overstated; suboptimal coagulation status can preclude the use of tissue plasminogen activator (tPA), thereby delaying appropriate intervention (5). In addition to standard coagulation tests, other markers such as platelet counts and international normalized ratios (INR) are also incorporated into the initial workup, further guiding clinical judgment. Real-time laboratory results enable emergency physicians to make informed decisions rapidly, ensuring that eligible patients receive the most effective treatments for ischemic strokes while identifying those who may need alternative therapeutic approaches or individual care pathways based on their unique clinical presentations.

Central to the evaluation of stroke patients is the utilization of advanced neuroimaging techniques, which provide essential data for timely diagnosis and intervention. Computed tomography (CT) scans are typically the first-line imaging modality in acute stroke cases due to their speed and availability. CT imaging allows healthcare professionals to quickly differentiate between ischemic and hemorrhagic strokes, a distinction with profound implications for treatment decisions. For instance, in cases of hemorrhagic stroke, the use of thrombolytics could exacerbate bleeding and lead to further neurological decline (6). The ability to visualize either a clear brain infarct or a bleeding event impacts not only immediate care pathways but also longer-term management strategies and prognostic assessments.

Moreover, advancements in CT technology and imaging protocols, including multi-phase CT angiography, enable comprehensive assessments of cerebral vasculature, allowing for the identification of any occlusions that may be amenable to endovascular interventions. These innovations can significantly expedite the decision-making process that determines whether a patient might benefit from mechanical thrombectomy, a procedure increasingly recognized for its effectiveness in treating patients with large vessel strokes (7). The optimization of imaging timeframes with rapid assessment teams dedicated to stroke cases has been instrumental in minimizing the time to treatment, thereby aligning with the goal of "time is brain."

In addition to CT scans, magnetic resonance imaging (MRI) serves as a powerful alternative in certain scenarios, particularly in the evaluation of subtle or smaller infarcts that may not be visible on CT. MRI techniques, such as diffusion-weighted imaging (DWI), are adept at detecting cytotoxic edema associated with acute ischemic strokes, providing a more nuanced view of brain injury in its early stages (6). Additionally, MRI can reveal more complex patterns of brain injury due to stroke, allowing for improved patient stratification and prognostication, thereby supporting tailored rehabilitation approaches post-stroke. Radiologists are critical to this process, utilizing their expertise to rapidly evaluate imaging findings and relay vital information to the clinical team, ensuring that treatment strategies align with the latest evidence and technology.

These imaging capabilities enable targeted interventions that are vital for appropriately prioritizing cases that necessitate advanced treatment options. Collaboration between radiologists and emergency physicians is vital at this stage; timely communication of imaging results can expedite treatment decisions, which may include surgical interventions, thereby improving survival and functional outcomes for stroke patients (8). The efficiency of image acquisition, interpretation, and communication underscores the importance of integrating radiology as an essential member of the stroke care team. This interdisciplinary approach not only enhances immediate diagnostic capabilities but also facilitates the ongoing evaluation of treatment efficacy and decisions regarding the need for further interventions, which is vital for patients recovering from stroke.

Through the integration of laboratory markers and advanced radiological imaging, healthcare providers can lay the foundation for a robust diagnostic framework that addresses the complexities inherent in stroke management. Such a framework not only assists with acute decision-making but also informs the continuous refinement of stroke care protocols, promoting better outcomes and diminished morbidity within an already vulnerable patient population. Ultimately, the fusion of timely laboratory testing and advanced imaging technologies into the stroke management protocol exemplifies the critical need for a coordinated interdisciplinary approach that prioritizes rapid diagnosis and personalized treatment.

Nursing Interventions

Once patients are admitted to the hospital, nursing staff take on a central role in delivering comprehensive stroke care. Their responsibilities encompass monitoring neurological status and vital signs, administering medications, and managing potential complications that can arise during treatment, such as aspiration pneumonia or adverse reactions to therapies (9). Continuous vigilance on the part of nurses is paramount; they are trained to identify subtle changes that might indicate a deterioration in a patient's condition, enabling clinical teams to act swiftly if complications arise.

In addition to clinical monitoring, nursing interventions extend to patient education and support. A stroke diagnosis can be overwhelming, and nurses often serve as the primary source of information for patients and their families. Providing education about recovery, rehabilitation options, and lifestyle modifications can empower patients to take active roles in their healing processes, ultimately improving adherence to secondary stroke prevention strategies (10). As nurses initiate discussions regarding follow-up care and life after a stroke, they aid in reducing anxiety and fostering a sense of control over recovery.

Moreover, nurses serve as collaborators within interdisciplinary teams, ensuring that treatment plans are followed and communicated effectively across various specialties. Participation in multidisciplinary rounds allows nurses to advocate for patient needs, contributing insights gained through direct patient interactions (11). This collaboration encourages a comprehensive approach to stroke care that goes beyond immediate treatment to encompass long-term recovery and rehabilitation goals.

Conclusion

The multidisciplinary management of stroke continuously proves to be a model for enhancing patient outcomes through collaboration among paramedics, ambulance services, laboratory services, radiologists, and nursing staff. This integrated approach guarantees that patients experience a continuum of care from the moment they exhibit symptoms through rehabilitation, significantly impacting hospitalization durations and recovery trajectories. Recognizing the interdependent roles of each team member is vital in not only propelling advances in stroke management but also promoting the efficacy and effectiveness of healthcare delivery systems as a whole. Future efforts must focus on optimizing interprofessional communications, bolstering training programs, and leveraging technology to ensure that all healthcare professionals involved in stroke management are equipped to respond efficiently and effectively to this acute medical emergency, ultimately working toward reducing the burden of stroke-related disabilities and improving the quality of care across the continuum.

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