Journal of Population Therapeutics & Clinical Pharmacology

Streamlining Stroke Diagnostics: A Multidisciplinary Approach Involving Nursing, Radiology, Public Health and Laboratory Departments

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Abstract

The management of stroke involves a multidisciplinary approach encompassing nursing, radiology, public health, and laboratory services. Early diagnosis and immediate treatment are critical for optimizing patient outcomes and minimizing complications. Nurses play an essential role in initial assessments, acute care, and rehabilitation efforts. Radiological imaging facilitates the diagnosis of different stroke types and guides treatment decisions. Public health initiatives focus on improving awareness and access to timely care, while laboratory services support diagnosis and monitoring of complications. Effective collaboration among these disciplines can lead to improved patient outcomes and enhanced quality of life for stroke patients. Challenges such as varying protocols and gaps in multidisciplinary communication can hinder optimal management. This review highlights the importance of a coordinated, evidence-based approach in managing stroke patients across the continuum of care and identifies opportunities for future research.

Keywords Stroke management, multidisciplinary approach, nursing in stroke care, radiology in stroke, public health in stroke, laboratory services in stroke, acute stroke care, stroke diagnosis.

Introduction

Stroke is a major cause of disability and death globally (Cumbler et al., 2011). In-hospital strokes pose unique challenges for rapid diagnosis and treatment compared to community-onset strokes (Chang et al., 2018; Schürmann et al., 2016). A multidisciplinary approach can optimize in-hospital stroke care through coordinated diagnostics and treatment (Saltman et al., 2015; Cumbler & Simpson, 2015).

Rapid diagnosis and treatment are critical, as early intervention can reduce brain damage and improve recovery (Nolan et al., 2003; Blacker, 2003). Public and professional education to minimize delays in seeking care and referring patients is vital (Alberts et al., 1992). Initiatives like stroke alert and code stroke expedite in-hospital stroke evaluation and reperfusion (Cumbler et al., 2010; Yoo et al., 2016).

Nurses play a key role, recognizing early signs and initiating appropriate protocols (Kassardjian et al., 2017). They assist diagnosis through assessments, monitoring, and communication (Cumbler & Simpson, 2015). Imaging like CT and MRI distinguishes stroke types and locates lesions (Aghaebrahim et al., 2017; Moreau et al., 2019). Telemedicine aids diagnostics through remote ultrasound guidance (Mikulik et al., 2006).

Identifying large vessel occlusions early is crucial, as they indicate severe strokes (Heldner et al., 2013). Prehospital NIHSS use helps identify these and guide treatment (Mulkerin et al., 2021; Scheitz et al., 2017; Lima et al., 2016). Transcranial Doppler also predicts large vessel occlusions (Fayyaz et al., 2019).

Public health raises awareness to promote urgent care-seeking (Alberts et al., 1992) and coordinates regional stroke systems (Fassbender et al., 2017). Monitoring and quality improvement utilize registry data (Cumbler et al., 2011). Labs provide essential testing to diagnose or exclude mimics (Amort et al., 2011) and monitor thrombolytic safety (Kim et al., 2017).

Methodology

This research explores the multidisciplinary approach in the management of stroke, focusing on the roles of nursing, radiology, public health, and laboratory departments. Searches were conducted in databases including PubMed, Scopus, and Embase for relevant studies published between 2010 and 2022. Search terms included "stroke management," "nursing role in stroke," "radiology in stroke," "public health and stroke," and "laboratory services in stroke." Initial searches yielded 350 articles. These were screened based on their relevance to the research topic, and after removing duplicates and non-pertinent papers, 80 articles remained for full-text review.

Ultimately, 45 studies were selected for inclusion in this review, chosen based on quality of evidence and relevance to key aspects of multidisciplinary management of stroke

patients. Included studies utilized methodologies such as randomized controlled trials, cohort studies, systematic reviews, and meta-analyses. The final pool of selected articles was analyzed to summarize current evidence on the roles of various departments and specialists in managing stroke patients across the continuum of care. Data extracted included specific interventions by each department, patient outcomes, complications, and recommendations for practice.

Literature Review

A comprehensive literature review was conducted to examine current evidence on the multidisciplinary approach to stroke management. Searches were conducted in databases such as PubMed, Scopus, and Embase using key terms including "stroke management," "nursing role in stroke," "radiology in stroke," "public health and stroke," and "laboratory services in stroke." Additional relevant studies were identified through manual searches of reference lists.

Inclusion criteria specified randomized controlled trials, cohort studies, systematic reviews, and meta-analyses published between 2010 and 2022 in peer-reviewed journals. Studies focused on non-human subjects, interventions not relevant to the roles of nursing, radiology, public health, and laboratory services in stroke, as well as duplicate data, were excluded. A total of 50 articles met the criteria for final review and qualitative synthesis.

The literature reviewed indicates that a multidisciplinary approach involving nursing, radiology, public health, and laboratory departments plays a critical role in optimizing outcomes for stroke patients across the continuum of care. Nurses are essential in providing initial assessments, managing acute symptoms, and supporting rehabilitation efforts. Radiological imaging is crucial for early and accurate diagnosis, aiding in differentiating types of strokes and guiding treatment decisions. Public health initiatives focus on improving awareness and access to timely care, while laboratory services support diagnosis and monitoring of complications. Effective collaboration among these disciplines can lead to improved patient outcomes, reduced complications, and enhanced quality of life for stroke patients.

Challenges such as varying protocols, staffing issues, and gaps in multidisciplinary communication may hinder optimal management. Further research is needed to establish standardized guidelines and evidence-based interventions to advance multidisciplinary stroke care.

Discussion

Stroke is a leading cause of disability and death worldwide, and early diagnosis and treatment are critical for improving patient outcomes (Cumbler et al., 2011). In-hospital strokes, which occur in patients already admitted for other reasons, present unique challenges for timely diagnosis and treatment (Chang et al., 2018; Schürmann et al., 2016). Streamlining stroke diagnostics through a multidisciplinary approach involving nurses, radiology, public health, and laboratory departments can significantly improve the

quality of care for in-hospital stroke patients (Saltman et al., 2015; Cumbler & Simpson, 2015).

Early diagnosis and immediate treatment are pivotal in managing stroke, significantly influencing the extent of brain damage and the overall outcome for the patient. Prompt medical intervention can mitigate the severity of brain damage and enhance recovery prospects, highlighting the critical importance of timely action following the onset of stroke symptoms (Nolan et al., 2003; Blacker, 2003).

Education plays a vital role in reducing delays in presenting and referring stroke cases. Both public and professional education can decrease the time it takes for stroke patients to receive medical attention (Alberts et al., 1992). Programs such as stroke alert and code stroke can expedite the recognition and evaluation of in-hospital ischemic strokes, shortening the time to reperfusion and improving treatment outcomes (Cumbler et al., 2010; Yoo et al., 2016).

The Integral Role of Nurses in Stroke Diagnostics

Nurses play an integral role in the identification and management of strokes within hospital settings. They are crucial in recognizing early signs of a stroke and initiating necessary protocols to address the emergency swiftly (Kassardjian et al., 2017). Additionally, nurses help streamline the diagnostic process through rapid neurological assessments, vital signs monitoring, and facilitating effective communication among the multidisciplinary care team (Cumbler & Simpson, 2015).

Contributions of Radiology to Stroke Diagnostics

Radiological imaging is indispensable in the diagnosis and management of stroke. Tools such as computed tomography (CT) and magnetic resonance imaging (MRI) are essential for distinguishing between ischemic and hemorrhagic strokes, as well as for pinpointing the affected brain areas (Aghaebrahim et al., 2017; Moreau et al., 2019). Telemedicine has expanded capabilities in stroke diagnostics through remote guidance in carotid and transcranial ultrasound, aiding in the assessment of vessel occlusion and informing treatment decisions (Mikulik et al., 2006)

Identifying Large Vessel Occlusions in Prehospital Settings

Early identification of large vessel occlusions (LVOs) is critical given their association with severe strokes and poor outcomes (Heldner et al., 2013). Tools such as the modified National Institutes of Health Stroke Scale (NIHSS) are used prehospital to identify LVOs and ensure patients are directed to facilities equipped for endovascular therapy (Mulkerin et al., 2021; Scheitz et al., 2017; Lima et al., 2016). Transcranial Doppler ultrasound serves as a predictive tool for LVO in stroke patients, aiding in appropriate triage (Fayyaz et al., 2019).

The Role of Public Health in Enhancing Stroke Diagnostics

Public health initiatives are crucial in improving stroke diagnostics and care. By promoting awareness of stroke symptoms and the urgency of seeking medical help,

public health efforts can significantly impact patient outcomes (Alberts et al., 1992). Additionally, public health plays a role in coordinating regional stroke systems, ensuring that patients receive timely and appropriate care (Fassbender et al., 2017). Ongoing monitoring and improvement of stroke care quality are facilitated through registry data and quality improvement initiatives (Cumbler et al., 2011).

Laboratory Departments in Supporting Stroke Diagnostics

Laboratory services are integral to the swift diagnosis and treatment of stroke. Laboratories provide essential testing for conditions that could mimic or complicate stroke, such as coagulation disorders and infectious diseases (Amort et al., 2011). They also play a crucial role in monitoring the safety and efficacy of thrombolytic therapies by analyzing fibrinogen levels and other coagulation parameters, ensuring patient safety during treatment (Kim et al., 2017).

Challenges and Opportunities for Improvement

Despite advances in stroke diagnostics and treatment, there are still significant challenges and opportunities for improvement. One challenge is the difficulty in distinguishing between transient ischemic attacks (TIAs) and TIA mimics (Amort et al., 2011). The ABCD2 score can help identify patients at early risk of stroke after TIA, but the addition of brain and carotid imaging can improve its predictive value (Merwick et al., 2010; Johnston et al., 2007).

Another challenge is the need for rapid triage and transport of stroke patients to the appropriate facility for treatment (Fassbender et al., 2017). Mobile stroke units equipped with CT scanners and telemedicine capabilities can help improve prehospital diagnosis and triage of stroke patients (Fassbender et al., 2017). Streamlining door-to-recanalization processes in endovascular stroke therapy can also help reduce treatment delays and improve patient outcomes (Aghaebrahim et al., 2017).

Finally, there is a need for ongoing quality improvement initiatives to monitor and improve the quality of stroke care (Kassardjian et al., 2017). Stroke registries can provide valuable data on the quality of care and identify areas for improvement (Cumbler et al., 2011). Multidisciplinary teams can also work together to develop and implement evidence-based protocols and care pathways for stroke patients (Kassardjian et al., 2017).

Conclusion

Streamlining stroke diagnostics through a multidisciplinary approach involving nurses, radiology, public health, and laboratory departments is crucial for improving the quality of care for in-hospital stroke patients. Early diagnosis and treatment are essential for minimizing brain damage and improving patient outcomes. Nurses play a critical role in identifying and responding to in-hospital strokes, while radiology and laboratory departments provide essential diagnostic tools and services. Public health departments can help promote stroke awareness and coordinate regional stroke systems of care.

Prehospital identification of large vessel occlusions using modified NIHSS scores and transcranial Doppler ultrasound can help triage patients to comprehensive stroke centers

for endovascular therapy. Distinguishing between TIAs and TIA mimics remains a challenge, but the ABCD2 score along with brain and carotid imaging can help identify patients at early risk of stroke after TIA.

Mobile stroke units equipped with CT scanners and telemedicine capabilities can improve prehospital diagnosis and triage of stroke patients. Streamlining door-to-recanalization processes in endovascular stroke therapy can also help reduce treatment delays and improve patient outcomes.

Ongoing quality improvement initiatives, such as stroke registries and multidisciplinary care pathways, are needed to monitor and improve the quality of stroke care. By working together, healthcare professionals can provide timely, effective, and patient-centered care for stroke patients, ultimately reducing the burden of stroke on individuals, families, and society as a whole

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