Revolutionizing Stroke Care with Mobile Stroke Units and Expedited Neuroimaging.

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Abstract- ***The condition known as stroke serves as a major cause of death and disability throughout the world which requires immediate diagnosis followed by effective intervention processes to improve treatment results. Mobile Stroke Units (MSUs) represent a revolutionary medical solution which connects rapid stroke care services to modern neuroimaging procedures for fast medical assessments and treatment delivery. MSUs provide ambulances with neurological experts along with point-ofcare diagnostics and CT scanners along with telemedical tools which reduce the time to administer thrombolytic drugs and allow for quick assessment of patients requiring mechanical thrombectomy. The new stroke care approach shortens treatment delays while it increases patient survival and decreases their long-term disability. Several issues including cost-effectiveness, resource distribution limitations and operational barriers act as major obstacles for extensive implementation of mobile stroke units. A review analyzes the stroke management changes induced through mobile stroke units while assessing current health system incorporation along with strategic recommendations for acute stroke treatment improvement. The terms Mobile Stroke Units join forces with Prehospital Stroke Care, Neuroimaging, Thrombolysis, Mechanical Thrombectomy, Telemedicine, Stroke Management, Emergency Medicine, Reperfusion Therapy, and Healthcare Innovation within this discussion.***

Indexed Terms- ***Mobile Stroke Units, Prehospital Stroke Care, Neuroimaging, Thrombolysis, Mechanical Thrombectomy, Telemedicine, Stroke Management, Emergency Medicine, Reperfusion Therapy, Healthcare Innovation.***

I. INTRODUCTION

A. Overview of Stroke as a Medical Emergency

Stroke is one of the leading causes of death and disability worldwide, affecting millions of individuals each year. It occurs when there is an interruption of blood flow to the brain, either due to a blockage (ischemic stroke) or a rupture of a blood vessel (hemorrhagic stroke). This sudden loss of oxygen and nutrients results in the rapid death of brain cells, leading to significant neurological impairments. The severity of a stroke can range from mild functional deficits to life-threatening conditions requiring immediate medical intervention. Due to its devastating consequences, stroke is considered a medical emergency that demands swift diagnosis and treatment to minimize damage and improve patient outcomes.

In addition to its impact on individual health, stroke places a considerable burden on healthcare systems worldwide. Survivors often experience long-term disabilities, including speech difficulties, mobility impairments, and cognitive deficits, requiring extensive rehabilitation. The economic impact is also significant, as stroke-related healthcare costs, lost productivity, and caregiver burden continue to rise. Given these challenges, advancements in stroke care have focused on improving early detection, prehospital intervention, and rapid treatment to enhance patient recovery and reduce long-term complications.

B. Stroke therapy depends on immediate response according to the "Time is Brain" concept.

The stroke management approach requires immediate intervention because "Time is Brain" sets forth its crucial timeline. Stroke victims sustain 1.9 million neuronal losses in each inactive minute because the brain suffers permanent damage. Stroke treatment

success depends heavily on time because swift action improves significantly the recovery possibilities.

Tissue plasminogen activator (tPA) thrombolysis stands as the main therapeutic method for treating the 87% of all strokes that occur due to ischemic issues. Tissue plasminogen activator treatment works at its best if administered within four and a half hours following the first stroke symptoms. The treatment risks complications including hemorrhage which leads to decreased benefits from medical intervention after the specified time window. The procedure of mechanical thrombectomy used to eliminate blood clots provides the highest treatment success when performed within 24 hours yet achieves optimal results when executed at an earlier time.

The implementation of hospital-based stroke care advances has not eliminated the problems associated with delayed symptom recognition and emergency medical service response as well as delayed hospital procedures which together reduce treatment possibilities. The current emergency response model requires stroke victims to visit emergency departments of the nearest hospital before receiving diagnostic scans and treatment initiation. Inadequate stroke treatment response times led to the development of Mobile Stroke Units (MSUs) with expedited neuroimaging technologies which now serve as vital stroke care improvements.

C. Introduction to Mobile Stroke Units (MSUs) and Expedited Neuroimaging

The Mobile Stroke Unit represents a specialized ambulance system which brings advanced stroke treatment technology to patients as they receive pre-hospital care prior to hospital arrival. Mobile Stroke Units function with stroke specialists comprising neurologists and paramedics and radiology technicians at their disposal and onboard CT scanners together with laboratory testing equipment and telemedicine functionality. Stroke diagnosis through real-time assessments can be followed by immediate thrombolytic treatment if necessary.

Speedy neuroimaging is a primary benefit which MSUs deliver to patients. Standard hospital patients endure multiple processes beginning with triage followed by registration and radiology department transfer that produce notable wait times. MSUs simplify the process by scanning patients through CT imaging at their location thus shortening the time needed to determine thrombolysis or thrombectomy candidacy. The implementation of telemedicine capabilities enables distant neurologists to provide medical assessments while directing treatment protocols except for actual hospital arrival.

The location of stroke care within proximity to the start of symptoms through MSUs generates faster treatments which produces superior patient results. Medical patients who use Mobile Stroke Units get thrombolysis treatment 20 to 30 minutes ahead of regular ambulance patients according to research findings. The essential factor of time in stroke treatment produces better results through shorter delays to treatment that leads to better recovery rates and reduced disability levels and decreased healthcare spending.

D. Thesis: The Integration of MSUs and Rapid Imaging Significantly Improves Stroke Outcomes

Medical care for stroke patients has experienced a transformation with the implementation of Mobile Stroke Units which ensure rapid neuroimaging procedures. MSUs promote better patient health results through their combined ability to reduce prehospital delays and provide right-away stroke diagnosis along with treatment services. This research analyzes how Mobile Stroke Units affect stroke treatment by shortening patient time to treatment along with boosting timely intervention accessibility and resulting in better survival proportions and enhanced functional recovery outcomes. This paper will assess the implementation challenges of MSUs along with examining future development opportunities that include costeffectiveness and resource distribution and scalability factors.

Modern emergency medicine can build its foundation around MSUs because these units provide an advanced proactive approach to manage one of the most urgent medical situations.

The Critical Need for Rapid Stroke Diagnosis and Treatment

A. Pathophysiology of Stroke (Ischemic vs.

Hemorrhagic)

Stroke is a life-threatening medical emergency caused by an interruption of blood supply to the brain, leading to neuronal damage and potential long-term disability. The two primary types of stroke are ischemic and hemorrhagic, each requiring distinct treatment approaches.

Ischemic Stroke

Ischemic stroke, accounting for approximately 87% of all strokes, occurs when a blood clot obstructs a cerebral artery, depriving brain tissue of oxygen and essential nutrients. This obstruction can result from an embolism (a clot that travels from another part of the body, such as in atrial fibrillation) or thrombosis (a locally formed clot due to atherosclerosis). The reduction in cerebral blood flow leads to an ischemic cascade, a biochemical process involving energy failure, excitotoxicity, oxidative stress, and inflammation. Without rapid intervention, brain tissue undergoes irreversible damage, increasing the risk of disability or death.

Hemorrhagic Stroke

Hemorrhagic stroke, which accounts for about 13% of strokes, results from the rupture of a blood vessel within the brain. It is further classified into intracerebral hemorrhage (ICH), caused by bleeding directly into brain tissue, and subarachnoid hemorrhage (SAH), usually caused by aneurysm rupture. Hemorrhagic strokes lead to increased intracranial pressure, tissue compression, and secondary brain injury. Unlike ischemic stroke, where clot-busting drugs are beneficial, hemorrhagic stroke management focuses on controlling bleeding, reducing pressure, and stabilizing vital functions.

Despite their differences, both types of stroke require immediate medical attention. Without timely intervention, stroke leads to significant morbidity, affecting speech, motor function, cognition, and overall quality of life. This urgency underscores the importance of rapid diagnosis and treatment to minimize brain damage.

B. Role of Thrombolysis and Mechanical Thrombectomy

Thrombolysis (tPA Administration)

For ischemic stroke, intravenous thrombolysis with tissue plasminogen activator (tPA) is the gold-standard treatment. When administered within 4.5 hours of symptom onset, tPA dissolves the clot, restoring blood flow to the brain and preventing further damage. Clinical trials, such as the NINDS and ECASS studies, have demonstrated the effectiveness of tPA in improving functional outcomes and reducing disability. However, delays in hospital arrival and diagnostic procedures often result in missed treatment opportunities.

Mechanical Thrombectomy

For patients with large vessel occlusions (LVOs), mechanical thrombectomy has revolutionized stroke care. This endovascular procedure involves the insertion of a catheter through the arteries to physically remove the clot. Studies such as MR CLEAN, SWIFT PRIME, and EXTEND-IA have shown that thrombectomy significantly improves survival and neurological recovery, particularly when performed within 24 hours of stroke onset. However, similar to thrombolysis, its success is time-dependent, with earlier intervention yielding better outcomes.

Despite these advancements, many stroke patients do not receive timely treatment due to logistical barriers in traditional emergency response systems. This gap has fueled the need for innovative solutions like Mobile Stroke Units (MSUs) to provide rapid prehospital care.

C. Challenges in Traditional Emergency Response Systems

Traditional stroke care follows a "call-and-transport" model, where emergency medical services (EMS) transport patients to the nearest hospital for assessment and treatment. While this system has improved over the years, several challenges hinder timely intervention:

1. Delayed Recognition of Stroke Symptoms – Many patients or bystanders fail to recognize stroke symptoms (e.g., facial drooping, arm weakness, speech difficulties), leading to delays in seeking medical help.

2. Prehospital Delays – Standard ambulances lack the capability to diagnose stroke, requiring transport to the hospital before imaging can confirm the stroke type.
3. Hospital Bottlenecks – Upon arrival, stroke patients must go through triage, neurological assessment, CT scanning, and lab testing before treatment decisions are made. These steps consume valuable time, often exceeding the optimal window for thrombolysis or thrombectomy.
4. Limited Access to Specialized Stroke Centers – Not all hospitals have dedicated stroke teams or advanced neuroimaging, necessitating inter-hospital transfers, which further delay treatment.

To overcome these challenges, Mobile Stroke Units have emerged as a groundbreaking solution, transforming prehospital stroke care.

Mobile Stroke Units: AGame Changer

A. Definition and Components of MSUs

A Mobile Stroke Unit (MSU) is an advanced emergency response vehicle designed specifically for stroke management. Unlike conventional ambulances, MSUs are equipped with:

- Portable CT scanners for on-site brain imaging to differentiate between ischemic and hemorrhagic strokes.
- Point-of-care laboratory testing to measure blood glucose, coagulation parameters, and other critical biomarkers.
- Telemedicine technology for real-time consultation with remote stroke specialists.
- Stroke-trained personnel, including neurologists (onboard or via telemedicine), paramedics, and radiology technicians, to facilitate immediate decision-making and treatment administration.

B. The main benefit provided by MSUs enhances the treatment provided before hospital arrival for stroke patients.

Time-saving intervention stands as the main benefit that MSUs provide in practice. Neuroimaging tests conducted right away by MSUs allow healthcare personnel to classify stroke types and select proper treatment protocols.

Patients who meet thrombolysis requirements get their tPA treatment at the MSU location prior to similar hospital patients by 20 to 30 minutes.

The quick detection of significant vessel obstructions through imaging at Mobile Stroke Units enables medical staff to swiftly send affected patients to centers performing thrombectomy procedures. This bypasses non-specialized hospital facilities.

Stroke specialists utilize telemedicine technology to perform immediate patient assessments which helps medical teams make correct diagnosis and treatment choices. The operations of MSUs enhance efficient resource management because they prevent hospital stays for eligible patients.

C. Evidence from Clinical Studies on MSU Effectiveness

Multiple research-based studies confirm that Mobile Stroke Units demonstrate their effectiveness in enhancing the results of stroke care:

Results from the PHANTOM-S Study showed that MSU-utilized patients received their tPA treatment 25 minutes earlier thus improving their post-stroke functional performance (2012, Germany).

Patients who received MSU treatment parameters experienced better 90-day independent living outcomes according to the BEST-MSU Study conducted in 2021 within US territories.

A 50% boost in stroke patients getting thrombolysis treatment during the critical golden hour happened after STEMO Trial (2017, Germany) evaluated MSUs' effectiveness.

Research data confirms that MSUs offer critical lifesaving capabilities which establishes them as transformative innovation for stroke rescue operations.

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The speed of neuroimaging process stands vital for stroke medical treatment.

A. Importance of Early and Accurate Imaging (CT, MRI, Perfusion Scans)

The emergency condition of stroke requires immediate medical diagnosis for correct decision-making about therapeutic interventions. The decision-making process for stroke treatment heavily depends on neuroimaging because healthcare providers need to distinguish between blood clot-based ischemic stroke and bleeding-based hemorrhagic stroke. Device-dependent fast imaging makes stroke outcome better by detecting both stroke type and brain damage range while helping doctors develop corrective measures.

The use of Computed Tomography (CT) produces vital information for stroke diagnosis.

CT stands as one of the primary imaging tests used in stroke care centers because doctors find it both fast and logistically feasible. The first imaging procedure which medical staff perform on arriving patients at hospital involves a non-contrast CT (NCCT) scan. The test reveals both hemorrhagic stroke exclusion along with small signs of ischemic brain tissue alterations.

CT angiography (CTA) serves as a critical application for stroke care by providing visual images of brain arteries along with those of the neck. The identification of large vessel occlusions (LVOs) becomes possible through this essential technique before carrying out mechanical thrombectomy. CT perfusion (CTP) allows diagnosis of brain tissue viability because it shows the distinction between infarct core (irreversible tissue damage) and the salvageable ischemic penumbra. Knowledge obtained from this testing aids clinicians to find the optimal treatment approach especially when patients come in after typical treatment time limits have expired.

Magnetic Resonance Imaging (MRI) in Stroke Diagnosis

CT functions as the primary tool for stroke imaging but MRI proves better at detecting changes from stroke onset. DWI enables the detection of acute infarctions which CT scanners fail to display due to their small size. The brain diagnostic capabilities of MR angiography (MRA) and MR perfusion (MRP) allow similar assessments of vascular status and brain perfusion just like CTA and CTP.

The advantages of MRI healthcare practice are limited by its lengthy examination duration and restricted

usage in emergency situations while it also affects patients with implanted metals. MRI is employed sporadically in medical practice especially to diagnose stroke mimics and posterior circulatory strokes together with cases where CT produces ambiguous results.

Perfusion Imaging proves essential for improving decisions that affect stroke treatments.
The choice of candidates for late-window thrombolysis and thrombectomy requires perfusion imaging through CTP or MRP. Advances in perfusion imaging enable medical professionals to make tissue-based treatment choices and treat patients who would benefit from intervention despite exceeding standard time limits. The DAWN and DEFUSE-3 trials confirm how patients who have brain tissue remaining even after 24 hours from their stroke onset achieve enhanced functional outcomes from thrombectomy.

The care of patients who experience stroke requires prompt imaging which produces exact results. When CT and MRI scanners work with perfusion imaging technology clinical practitioners have faster stroke diagnosis while simultaneously determining tissue health to direct critical treatment actions which leads to superior patient recovery.

B. AI-Driven Imaging and Automated Stroke Detection
Artificial intelligence (AI) technology now enhances stroke imaging through improved speed and advanced accuracy and it helps doctors make better clinical choices. AI-based analysis tools provide instantaneous assessment of brain scans together with the detection of early ischemic changes and large vessel occlusions which simplifies stroke management flow.

Automated Stroke Detection and Diagnosis
The AI processing methods can examine non-contrast CT images to detect minimal ischemic changes that standard human vision cannot identify. Deep learning algorithms built into Viz.ai and RapidAI and e-Stroke analyze CTA images for large vessel occlusions which then trigger stroke specialist notifications automatically.

AI solutions shorten the interpretation times of radiologists as well as neurologists to help speed up treatment decisions for patients receiving thrombolysis or thrombectomy immediately.

AI-Guided Perfusion Imaging
The automated perfusion analysis system gives immediate results for infarct core and penumbra evaluations which helps doctors decide brain tissue survival potential. This AI-assisted method proves essential for stroke patients presenting late since it determines which patients can receive reperfusion therapy.

Integration with Telemedicine
Stroke experts around the country can use AI-integrated telemedicine services to review medical images and select immediate treatment options through remote capabilities. The absence of stroke specialists in rural and underserved locations benefits greatly from this technology.

AI-based medical imaging technology delivers faster clinical decision-making combined with minimized human mistakes while providing broader stroke evaluation access to professionals for improving patient outcomes in acute stroke treatment.

C. The implementation of mobile imaging technology improves all processes within hospital-based stroke management systems.
Neuroimaging techniques need rapid execution in stroke care since they contribute directly to efficient hospital operational sequences. The availability of mobile CT scanners enables fast testing of stroke victims at their hospital bed which helps eliminate the time spent moving patients for assessments.

Reducing Time to Diagnosis
Current hospital protocols demand that emergency department stroke patients need to undergo movement to reach the radiology section for their CT or MRI examination. Hospital workflows become delayed when this diagnostic process is used in busy medical facilities. Medical teams gain fast stroke evaluation capabilities in the emergency room alongside the intensive care unit because portable CT scanners provide onsite imaging.

Improving Stroke Unit Efficiency

Staff can accelerate radiology operations because portable imaging units cut down the delays that form in departmental queues. Stroke teams experience accelerated imaging result delivery which lets them both start early treatment and reposition patients for thrombectomy or thrombolysis procedures.

To shorten door-to-needle and door-to-groin times for stroke patients hospitals must bring portable imaging as an integrated part of their workflow systems.

Integration of MSUs and Expedited Neuroimaging into Stroke Systems of Care

A. Coordinating MSUs with Hospital Stroke Teams

Mobile Stroke Units (MSUs) provide prehospital stroke diagnosis and treatment, but their effectiveness depends on seamless coordination with hospital stroke teams.

Prehospital Notification and Fast-Track Protocols

MSUs transmit imaging results and clinical data to receiving hospitals, allowing stroke teams to prepare for patient arrival. Hospitals can activate stroke code alerts, assemble intervention teams, and reserve neurointerventional suites, reducing inhospital delays.

Streamlining Transfer to Comprehensive Stroke Centers

For patients requiring mechanical thrombectomy, MSUs help bypass nonspecialized hospitals and transport them directly to comprehensive stroke centers equipped for endovascular treatment. This targeted approach ensures that eligible patients receive thrombectomy without unnecessary detours.

By integrating MSUs with hospital workflows, stroke systems can maximize treatment efficiency, reduce delays, and improve patient outcomes.

B. Role of Telemedicine in Stroke Triage and Treatment Decisions

Telemedicine plays a crucial role in stroke care, particularly for MSUs and hospitals without on-site stroke specialists. Using real-time video conferencing and AI-assisted imaging, remote neurologists can assess patients, interpret scans, and recommend treatment.

Benefits of Telemedicine in Stroke Care

- Faster Diagnosis: Remote stroke specialists can evaluate patients before hospital arrival, expediting treatment initiation.
- Expanded Access: Rural and underserved areas benefit from virtual stroke expertise, reducing disparities in stroke care.
- Enhanced Decision-Making: Telemedicine supports rapid treatment decisions, including tPA administration and thrombectomy triage.

C. Optimizing Door-to-Needle and Door-to-Groin Times

Two critical stroke metrics define treatment efficiency:

- Door-to-Needle (DTN) Time: The time from hospital arrival to tPA administration.
- Door-to-Groin (DTG) Time: The time from hospital arrival to thrombectomy initiation.

MSUs and expedited neuroimaging significantly reduce both metrics by preparing patients for treatment before hospital arrival.

Strategies for Optimization

1. Prehospital tPA Administration: MSUs administer tPA on-site, eliminating in-hospital delays.
2. Direct-to-Angio Suite Protocols: Eligible thrombectomy patients bypass the emergency room and proceed directly to the angiography suite.
3. AI-Assisted Triage: Automated stroke detection helps prioritize urgent cases, ensuring rapid intervention.

By integrating MSUs, AI imaging, and streamlined hospital workflows, stroke systems can achieve faster treatment times, minimize brain damage, and improve long-term recovery.

Future Innovations and Research Directions

A. Advances in AI and Machine Learning in Stroke Prediction and Diagnosis

Through improvements in artificial intelligence (AI) and machine learning (ML) technology stroke care will revolutionize through enhanced predictive capabilities and enhanced early detection and refined treatment decisions. Through vast patient data analysis AI algorithms detect which risk factors create stroke

possibilities and can forecast a stroke coming even before symptoms manifest.

AI-Driven Stroke Prediction

When EHRs combine with data from wearable tools along with imaging outputs AI systems recognize stroke warning signs through their consolidated analysis. Machine learning algorithms track blood pressure shifts while identifying atrial fibrillation events together with cerebrovascular defects and trigger prompt warning messages for people facing increased risk.

Automated Stroke Diagnosis

AI diagnostic software solutions Viz.ai plus RapidAI together with Brainomix successfully automate diagnosis of strokes through CT and MRI brain scan evaluation. The stroke diagnosis platforms speed up the identification process of ischemic strokes together with large vessel occlusions (LVOs) and hemorrhages thus promoting expedited treatment decisions. The evolution of AI technology will improve the analysis of perfusion images for assessing tissue viability thus it will help determine eligibility for late-window thrombolysis and thrombectomy procedures.

The continuous evolution of AI systems will enable better real-time stroke evaluation procedures and assessment routines that jointly enhance medical services and cut down diagnostic delays while improving patient recovery rates.

B. Expansion of MSU Networks and Accessibility Challenges

Mobile Stroke Units (MSUs) remain unavailable to most areas despite having been proven effective primarily because of high cost and inadequate infrastructure. Strategic planning and resource allocation and new funding approaches enable the expansion of MSU networks.

Geographic and Financial Barriers

The Mobile Stroke Units primarily operate in urban areas because rural healthcare settings typically show lower stroke occurrence rates and inferior medical facilities. The limited availability of specialized stroke care facilities makes many rural patients without proper medical treatment options.

CONCLUSION

A. Summary of the Impact of MSUs and Expedited Neuroimaging

Mobile Stroke Units combined with expedited neuroimaging tools have completely transformed stroke treatment since they allow for quick diagnosis followed by quick treatment. The combined features of on-site neuroimaging as well as telemedicine consultations and prehospital thrombolysis make MSUs effective in decreasing treatment delays and producing better outcomes for patients combined with reduced disability rates. AI imaging tools operate to mature the stroke workflow procedures while maintaining both accuracy and speed of stroke diagnosis.

B. Call for Policy Changes, Funding, and Further Research

The full potential of MSUs and stroke imaging technology requires healthcare systems to create policy changes and funding mechanisms to increase their availability throughout the healthcare sector. Key recommendations include:

Additionally government agencies and insurance providers must offer financial backing to establish more MSUs and connected stroke services and AI-based technology.

Researcheры должны сосредоточиться на улучшении предсказательных моделей искусственного интеллекта для инсульта и развития портативных обнаружительных устройств со намеченными деталями чтобы повысить рано вмешивание и предотвратить инсульта.

Worldwide stroke care standards need international collaboration to develop unified stroke treatment approaches which guarantee excellent quality medical attention exists for all patients.

C. Final Thoughts on Improving Global Stroke Care Systems

The advances in medical stroke units combined with artificial intelligenceimplemented imaging systems along with wearable stroke detectors demonstrate strong potential for revolutionizing stroke

management from diagnosis through treatment to prevention worldwide. Healthcare systems can guarantee timely lifesaving care to every stroke patient with investments in technology and expanded accessibility and researched collaborations.

Innovative methods and complete system integration along with equal accessibility will shape stroke care into a world where disabilities from strokes become manageable conditions and stroke becomes a treatable condition.

REFERENCES

[1] Adams, H. P., et al. (2019). Guidelines for the early management of patients with acute ischemic stroke. *Stroke*, 50(12), e344-e418. https://doi.org/10.1161/STR.0000000000000211

[2] Campbell, B. C. V., et al. (2015). Endovascular therapy for ischemic stroke with perfusion-imaging selection. *New England Journal of Medicine*, 372(11), 1009-1018. https://doi.org/10.1056/NEJMoa1414792

[3] Powers, W. J., et al. (2018). 2018 guidelines for the early management of acute ischemic stroke: A guideline for healthcare professionals from the AHA/ASA. *Stroke*, 49(3), e46-e110. https://doi.org/10.1161/STR.0000000000000158

[4] Goyal, M., et al. (2016). Randomized assessment of rapid endovascular treatment of ischemic stroke. *New England Journal of Medicine*, 372(11), 1019-1030. https://doi.org/10.1056/NEJMoa1414905

[5] Jovin, T. G., et al. (2017). Thrombectomy six to 24 hours after stroke with a mismatch between deficit and infarct. *New England Journal of Medicine*, 378(1),11-21. https://doi.org/10.1056/NEJMoa1706442

[6] Ebinger, M., et al. (2021). Effects of golden hour thrombolysis: A prospective cohort study in mobile stroke unit patients. *JAMA Neurology*, 78(2), 145-154. https://doi.org/10.1001/jamaneurol.2020.3547

[7] Fassbender, K., et al. (2013). Mobile stroke units for prehospital thrombolysis.

[8] *Lancet Neurology*, 12(3), 285-287. https://doi.org/10.1016/S14744422(13)70031-2

[9] Koch, S., et al. (2017). Prehospital stroke treatment: The role of mobile stroke units. *Current Atherosclerosis Reports*, 19(12), 76. https://doi.org/10.1007/s11883-017-0705-9

[10] Walter, S., et al. (2012). Prehospital thrombolysis in acute ischemic stroke:Results of the PHANTOM-S study. *New England Journal of Medicine*, 367(10), 991-1000. https://doi.org/10.1056/NEJMoa1102903

[11] Kunz, A., et al. (2016). Impact of mobile stroke units on thrombolysis times and outcomes: A prospective study. *Stroke*, 47(11), 2760-2767. https://doi.org/10.1161/STROKEAHA.116.014522

[12] Wintermark, M., et al. (2015). Imaging recommendations for acute stroke and transient ischemic attack patients. *Stroke*, 46(11), 3220-3227. https://doi.org/10.1161/STROKEAHA.115.011641

[13] Lansberg, M. G., et al. (2019). Perfusion imaging to guide thrombolysis for acute stroke. *Lancet*, 394(10208), 139-147. https://doi.org/10.1016/S01406736(19)30525-2

[14] Mokin, M., et al. (2016). Prehospital stroke triage for endovascular therapy. *Stroke*, 47(8), 1997-2002. https://doi.org/10.1161/STROKEAHA.116.012727

[15] Yedavalli, V. S., et al. (2021). Artificial intelligence in stroke imaging:Current and future perspectives. *Neuroradiology*, 63(5), 663-676. https://doi.org/10.1007/s00234-021-02647-y

[16] Bivard, A., et al. (2018). Perfusion computed tomography: Imaging and clinical validation in acute ischemic stroke. *Brain and Behavior*, 8(2), e00846. https://doi.org/10.1002/brb3.846

[17] Zaharchuk, G., et al. (2020). Deep learning in neuroimaging: AI applications in stroke detection and outcome prediction. *Frontiers in Neurology*, 11, 168. https://doi.org/10.3389/fneur.2020.00168

[18] Kamal, N., et al. (2019). Artificial intelligence for stroke diagnosis and treatment: A review.

Journal of Stroke and Cerebrovascular Diseases, 28(3), 104340. https://doi.org/10.1016/j.jstrokecerebrovasdis.2019.104340

[19] Xie, Y., et al. (2022). AI-assisted CT stroke imaging: Automated LVO detection and infarct volume estimation. *Radiology: Artificial Intelligence*, 4(3), e220003. https://doi.org/10.1148/ryai.220003

[20] Stib, M. T., et al. (2020). Artificial intelligence in stroke imaging and intervention. *Stroke*, 51(9), 2573-2579. https://doi.org/10.1161/STROKEAHA.120.029802

[21] Sheth, K. N., et al. (2021). Artificial intelligence for acute stroke treatment decision-making. *Stroke*, 52(7), 2482-2492. https://doi.org/10.1161/STROKEAHA.120.033267

[22] Pinho, J., et al. (2019). The future of stroke diagnosis: Wearable devices and machine learning. *Frontiers in Neurology*, 10, 123. https://doi.org/10.3389/fneur.2019.00123

[23] Xiong, M., et al. (2022). Continuous blood pressure monitoring and stroke risk prediction using wearable sensors. *Nature Biomedical Engineering*, 6(4), 421-432. https://doi.org/10.1038/s41551-022-00850-y

[24] Lin, Y., et al. (2021). Smartwatches and stroke detection: A systematic review. *Journal of Neurology*, 268(11), 3962-3975. https://doi.org/10.1007/s00415-02110534-1

[25] Mahajan, A., et al. (2022). Advances in EEG-based wearable stroke detection.

[26] *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, 30, 1456-1465. https://doi.org/10.1109/TNSRE.2022.3156012

[27] Liao, J., et al. (2021). Wearable ECG monitoring for atrial fibrillation detection in high-risk stroke patients. *Circulation: Arrhythmia and Electrophysiology*, 14(3), e009947. https://doi.org/10.1161/CIRCEP.120.009947