

INCIDENCE, PREVALENCE, AND BEST PRACTICE LEARNINGS FOR STROKE MANAGEMENT IN INDIA AND THE US: A SYSTEMATIC REVIEW

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INTRODUCTION

- Cerebrovascular accidents, also known as strokes, are common in patient populations and can be a major cause of morbidity and mortality. Strokes are classified as either ischemic, hemorrhagic, or subarachnoid. A stroke happens when a blood vessel that supplies the brain with oxygen and nutrients is either obstructed by a clot or bursts. When this occurs, a portion of the brain is deprived of the blood and oxygen it needs, which results in the death of the blood vessel and brain cells.
- Globally, in 2019, there were 122 million incident stroke cases, 101 million prevalent cases, 143 million DALYs as a result of stroke, and 655 million fatalities from a stroke.
- Significant increases in stroke prevalence are being attributed to changes in lifestyle, eating behaviour, demographics (older population), sociocultural, and technological advancement. Generally, the condition can be prevented by making little changes to people's daily routines or just altering our lifestyle.

INTRODUCTION

- **As per the US CDC, a stroke occurs to someone in the US every 40 seconds, and every 4 minutes, a person succumbs to a stroke. Every year, in the US, new or reoccurring strokes affect about 800,000.**
- **Strokes account for 70% or more of all deaths in low- and middle-income nations, including India.**
- **In India, ischemic strokes account for 70-75% of all strokes—meanwhile, in the US—ischemic stroke accounts for 87% of all stroke cases.**
- **Stroke survivors and their families/caregivers bear the brunt. Poor caregiver quality of life is linked to greater rehospitalization and care expenses for stroke survivors.**

INTRODUCTION

- **The anticipated overall cost of stroke in the US was \$66.3 billion in 2015, and this amount is projected to increase to \$143 billion, by 2035.**
- **There is a lack of information on stroke statistics, data collection and surveillance system in India. To address the need of high-quality studies of stroke, researchers at ICMR propose to establish The National Stroke Registry Program in India composing of a hospital-based stroke registry (HBSR) to monitor care patterns and patient outcomes with stroke in various treatment areas, and a population-based stroke registry (PBSR) to collect accurate epidemiological data of first-ever stroke episodes in defined populations.**

RATIONALE

- Stroke is becoming a common cause of death and disability in India;
- Currently, it ranks as the fourth-leading cause of mortality and disability in the country.
- To face the rising burden of stroke in India, reliable data on stroke incidence, prevalence, and outcomes are required to inform healthcare policies, organise stroke services, and monitor the effects of any changes in care.
- However, there is a scarcity of data and a lack of consistency in published studies' techniques. This review will aid in learning epidemiology and the best practices from the countries with suggestions derived upon the literature available.

OBJECTIVES



METHODOLOGY

1. **Study Design:** Descriptive study (Systematic review)
2. **Data Collection Procedure:** Secondary data (Research studies, blogs, surveys, reports, webpages).
3. **Sampling Technique:** Systematic sampling with fixed inclusion and exclusion criteria.
4. **Inclusion criteria:** All research materials (Journal Articles, blogs, surveys, reports, webpages) from 2018 originating from India or the US.
5. **Exclusion criteria:** All research materials older than 2018 and not from either India or the US.
6. **Sample Size:** 19 articles
7. **Exceptions:** A report from ICMR published in 2017 has been included.
8. **Limitations:** Since each study chooses and selects a sample of participants to represent the study population, estimates of the prevalence of stroke may vary slightly between studies (e.g., state, region, or country)

INCIDENCE, PREVALENCE

- According to a BRFSS report, the prevalence of stroke in adults in the US is 3.4%, with the lowest prevalence in Puerto Rico (1.3%) and Colorado (1.8%) and the highest prevalence in Louisiana and Tennessee (4.7%). Stroke is the fifth leading cause of death in the US, accounting for 150,005 deaths in 2019.
- In India, according to the 2017 ICMR report titled "India: Health of the Nation's States," stroke was the fourth leading cause of mortality and is responsible for 3.5% of DALYs. According to a recently published study which reviewed literary evidence, in India, rate of incident (crude) ranged from 108 to 172/100,000 persons whereas a significant variation was seen in the figures denoting crude prevalence rates 26 to 757/100,000 individuals.

LITERATURE REVIEW: GUIDELINES

Table 1. Stroke management protocol recommendations by India and the US

Protocol	India	US
Prevention	Primary Prevention: Expansion of services at HWC must cover: i. Population census, community-based risk evaluation, and community mobilisation for NCD screening by ASHAs. ii. Availability of screening at the HSC/ HSC-HWC and PHC/ PHC-HWC levels at the facility or in the village, depending on the situation and availability of appropriate screening venues. iii. 3. Referral of tested persons to PHC / PHC-HWC for confirmation of diagnosis and treatment commencement iv. Monthly check-ups and medication administration as per the treatment plan at the SHC/ SHC-HWC level v. Health Promotion to raise awareness about risks factors and encourage lifestyle changes	Primary Prevention: Stroke systems must i. create support mechanisms to aid communities and health providers in launching prevention programs for larger populations. ii. support systems to help communities, patients, and providers stick to primordial and primary preventative treatment regimens over the long term. iii. support national and regional education programs aimed at the general population to increase stroke awareness, especially targeting populations at increased risk for stroke and poor outcomes after stroke. iv. track efficacy of community education in increasing behavioural reactions to warning signs, stroke treatment rates, mortality, etc.

Table 1. Stroke management protocol recommendations by India and the US		
Protocol	India	US
Diagnosis	i. Patients who have two or more TIAs in a week should be associated with a higher risk of stroke and must be evaluated as soon as feasible within 24hrs. ii. "Dekhna, dikhna, hath, paer, bol, chal" is a simple mnemonic. Any abrupt onset disruption in dekhna, dikhana, hath, paer, bol, or chal should raise the possibility of a Stroke and warrant immediate medical attention. iii. To recognize stroke, FAST (Face drooping, A numb/weak arm, S slurred speech, T - Time) [Time must not be wasted, must act quickly for treatment] abbreviation should be used.	i. In order to ensure that all patients with known or suspected stroke are quickly identified and assessed using a validated and standardised instrument for stroke screening, such as FAST (Face, Arm, Speech, Time), LA Prehospital Stroke Screen, or CPSS, triage paradigms and protocols must be developed in collaboration with local, regional, and state agencies, as well as medical authorities and local experts. ii. Prehospital patients who screen positive for suspected stroke should be triaged using a standard prehospital stroke severity assessment technique. It is permissible to modify the Mission: Lifeline algorithm to meet the demands of the community in the absence of new data. iii. Protocols that include a paramedic prearrival alert that a stroke patient is on the way should always be employed.

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Protocol	India	US
Treatment	i. It is important to record each patient's GCS score (individually for best motor, best verbal, and eye-opening responses). ii. Validated stroke assessments, such as the NIHSS, may be used to gauge the severity of neurological loss. . iii. systematic ways must be used (e.g., stroke teams with minimum of two stroke-trained physicians/doctors, four nurses, and a physiotherapist, stroke units, and SOPs). iv. Every district hospital must have around the clock CT scan facility.	Stroke centres should i. use methodical strategies (e.g., stroke teams, stroke units, and written procedures). ii. For all patients with a history of stroke or TIA or suspicion of having had one, implement secondary prevention strategies that address all major modifiable risk factors and are consistent with national guidelines in order to lower mortality, maximise rehabilitation, and prevent reoccurring stroke and cardiovascular problems.

AHA, in its recently issued scientific statement recommends incorporating following elements to ensure safe and efficient management of in-hospital stroke incidents:

- Train all hospital employees to initiate in-hospital stroke warnings during a stroke training session.
- Establish RRTs, with specialised training in stroke management and quick access to neurological knowledge.
- Institutionalize the physical examination and imaging procedures used to evaluate patients who may be experiencing an in-hospital stroke.
- Address any potential hurdles, such as facility transfers for advanced stroke care.
- Evaluation and surveillance of quality of stroke care provided in hospitals, providing data-driven performance feedback, and guiding focused quality improvement initiatives.

For an overall shift in thinking on holistic stroke care, the following three suggestions were made by the Columbia University Irving Medical Centre, in their special report:

- The AHA and ASA should implement an expanded GWTG-Stroke program, focusing on rehabilitation readiness and outcome measures at 90 days.
- Additionally, a public health campaign to provide upbeat and practical messages for secondary prevention should be launched.
- The main requests from patients and family—improved access, greater secondary prevention, stroke recovery, and individualised care—must be honoured right away.

Discharge and rehabilitation

In both countries, it has been emphasized that:

- As soon as patient is stable, discharge planning involving patient and family should be initiated.
 - All required training in caring for the patient, should be given to caregivers.
 - All issues, including secondary prevention, should be discussed to patients, along with the necessity and scheduling of follow-up visits following discharge.
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- In order to decide whether rehabilitation services are required and what kind, when, where, and how long such therapy should last, the stroke system should make sure that every stroke survivor has evaluated periodically during their initial hospitalisation.
 - Stroke patients should receive rehabilitation from a multidisciplinary team that includes a doctor, a physiotherapist, an occupational therapist, a nurse, a speech therapist, a clinical psychologist, an orthotist, a dietician, and a social worker.
 - Patients with persistent disabilities should be identified through long-term primary care and follow-up by an expert (physician or neurology) so that these patients can receive the right kind of ongoing rehabilitation.
 - A stroke system should routinely evaluate the quality of its available community resources and rehabilitation programs

LITERATURE REVIEW: BEST PRACTICES

Table 2. Stroke Management Best Practices: Examples from Evidence			
Author (year)	Title	Result	Salient Features
Buerck A. et al (2019) (US)	Improved 30 Day Readmission Rates in the Acute Stroke Population Through Patient Teach Back	In a study conducted in the US between 2015-2017, a hospital managed to reduce its' readmission rates by 3.2%, from 9% in 2015 to 5.8% in 2017 and improved patient satisfaction by over 9.5% by improving patient education and patients' capacity to comprehend discharge instructions through implementation of teach back education and patient follow-up.	Improved health literacy of patient and caregiver reduced readmissions.
Haranath et al (2021) (India)	eNeuroIntensive Care in India: The Need of the Hour	The feasibility of tele-health capacities for neuro intensive care has been affirmed, and the need and scope of establishing remote critical care facilities in rural India, to cater to emergencies has been emphasized.	Reaching out to rural communities by leveraging technology.
Paplikar et al (2020) (India)	A Screening Tool to Detect Stroke Aphasia: Adaptation of Frenchay Aphasia Screening Test (FAST) to the Indian Context	The researchers adapted and validated the aphasia diagnostic test (ab. FAST) to 2 Indian languages: Telugu and Kannada addressing the language barrier between literate and illiterate population. The results reported a strong association between the WAB (widely used diagnostic instrument), and the Aphasia Quotient of the Indian version of the FAST total scores and found it to be a simple screening tool in the Indian context, for identifying linguistic difficulties associated with stroke.	Adoption of screening tools in a regional language helps accurate and quick diagnosis of stroke related complications.
(In collaboration with multiple health systems) (2014-ongoing) (US)	BEnefits of Stroke Treatment Delivered Using a Mobile Stroke Unit (BEST-MSU)	According to an ongoing study at a health system in US, 53% of the stroke patients who were treated by a mobile stroke unit (MSU) received clot-busting drugs like tissue plasminogen activator (tPA) faster, more frequently, and recovered fully as opposed to 43 percent of individuals not receiving care on a mobile stroke unit.	Early identification and administration of clot busting drugs prevents morbidity and disability from stroke.

RESULTS AND CONCLUSION

- Research shows that the stroke incidence in India ranges from 108 to 172 per 100,000 persons. The overall prevalence (crude) of stroke in rural and urban populations was estimated to be 26 to 757 per 100,000 individuals.
- The stroke case mortality rate within 30 days was estimated to range from 41.08 to 42.06% in urban areas and from 18 to 46.3% in rural areas.
- The incidence and prevalence rates of stroke in the US are about 2.4% and 3.4% [95% CI, 2.4%–3.6%] respectively.

RESULTS AND CONCLUSION

- Research shows that **comprehensive systems** of stroke which **focus on primary prevention, timely diagnosis** with emergency care, prompt treatment with **least door-to-needle time, better transitions of care** and **improved follow-up and rehabilitation provisions** help reduce the morbidity and mortality caused by stroke.
- Leveraging technology in this day to introduce **mobile tele neurological care services**, remote care provision through **tele-stroke ICUs** using telehealth, and improved **frequency of follow-ups** using software and tools can greatly help healthcare providers.

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Data is power, data saves lives.

THANKYOU