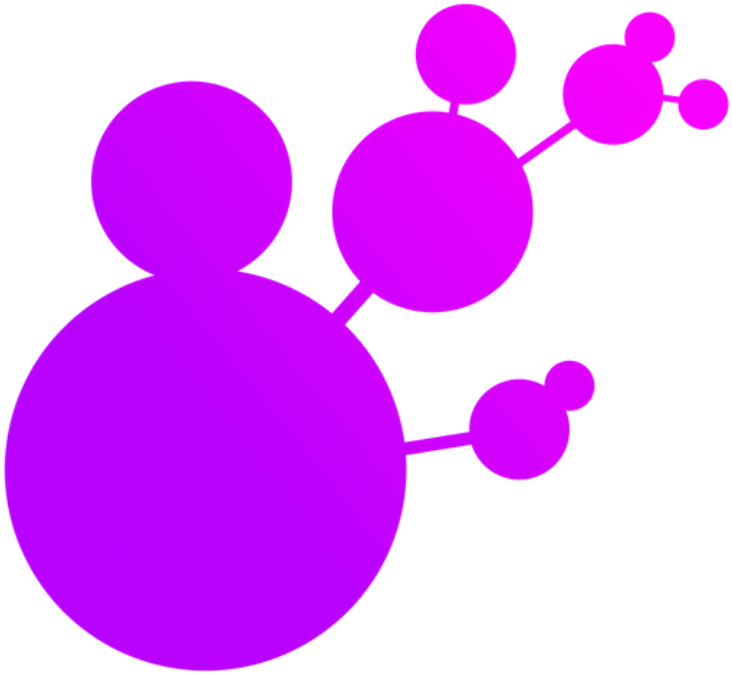


Traumatic Brain Injuries (TBIs) India

SPARSHMIND INNOVATIONS

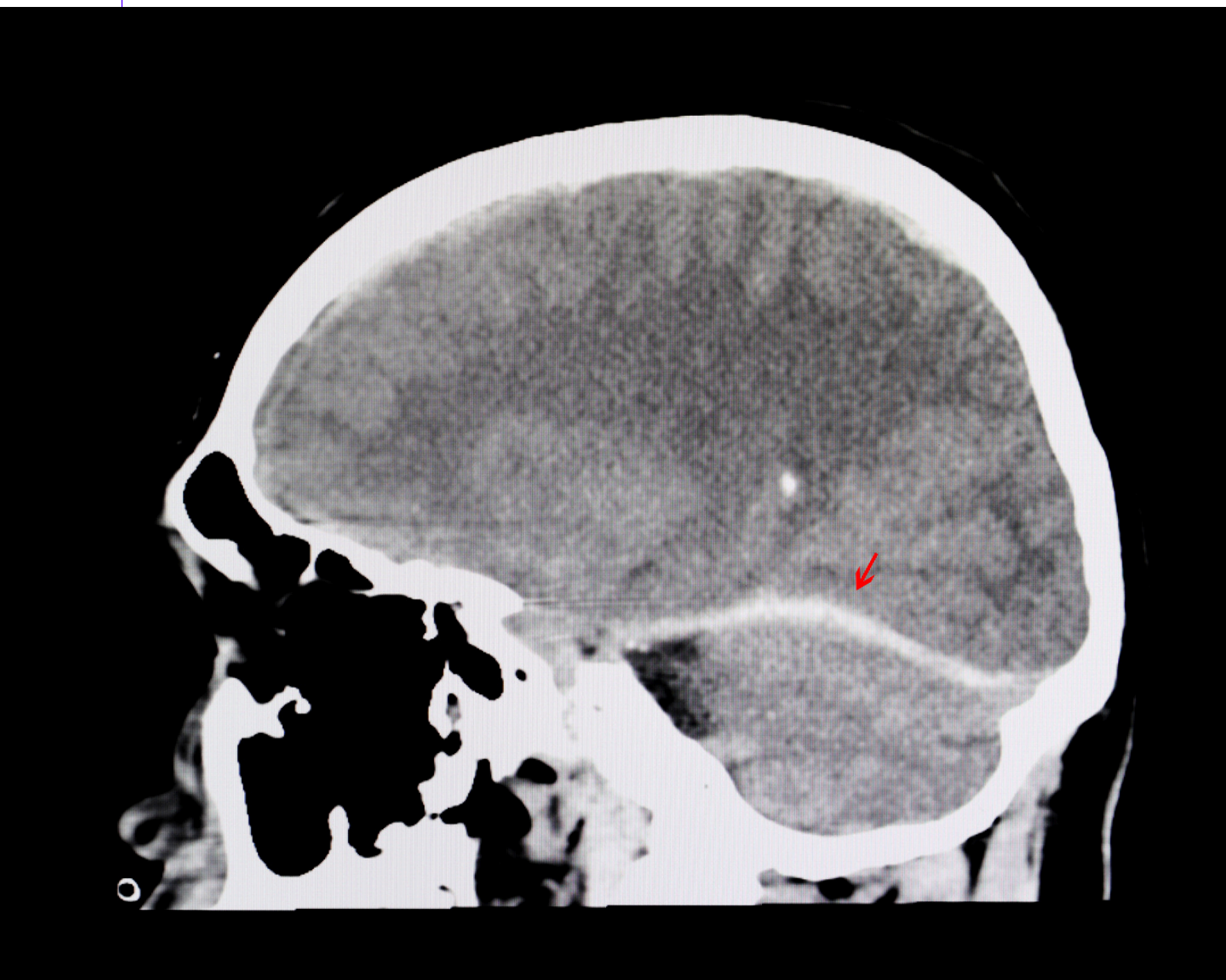
SEPTEMBER 2024

TABLE OF CONTENT

Abstract

Traumatic Brain Injury (TBI) is a significant public health concern in India, contributing to high rates of mortality and long-term disability. **With over 1.5 million individuals sustaining head injuries annually and more than 100,000 fatalities each year**, the impact of TBI is profound. This document explores the prevalence, causes, and challenges associated with TBI in India.

It also highlights innovative solutions, particularly in neuro-tech advancements, that aim to improve treatment and rehabilitation outcomes. By shedding light on this pressing issue, we aspire to foster greater awareness, encourage collaborative efforts, and ultimately enhance the quality of life for those affected.



TBI at a Glance

WHAT IS TBI?

Traumatic Brain Injury occurs when an **external mechanical force causes brain dysfunction**, often leading to **temporary or permanent impairments in cognitive, physical, and psychosocial functions**. Globally, TBIs are a leading cause of death and disability, with low- and middle-income countries bearing the brunt due to higher incidence rates and limited resources.

INCIDENCE RATE [1]

1.5 to 2 million PEOPLE SUSTAIN TBIS ANNUALLY

MORTALITY RATE [2]

1,50,000 PEOPLE DIE FROM TBI ANNUALY

1 out of every 6

TRAUMA VICTIMS DIES DUE TO INADEQUATE CARE DURING CRITICAL EARLY HOURS POST-INJURY.

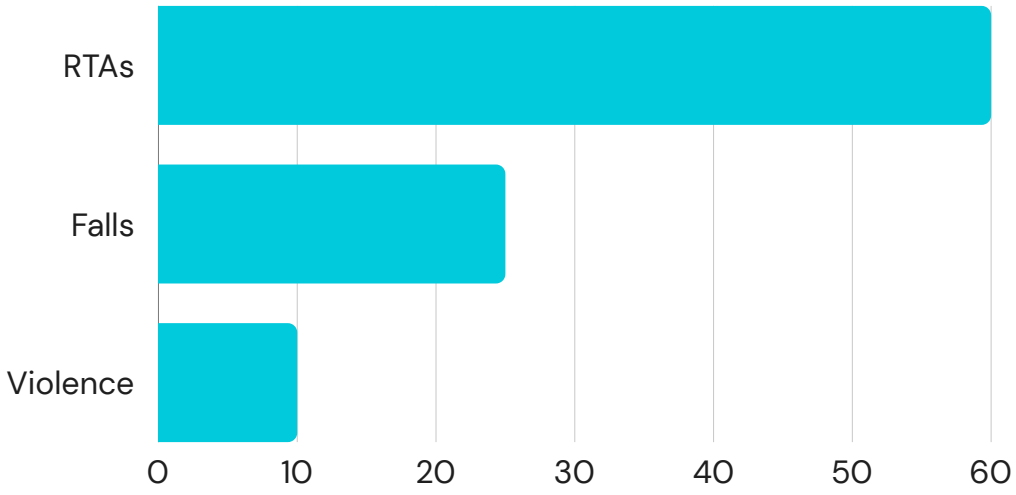
Causes of TBIs [3]

60% CAUSED BY ROAD TRAFFIC ACCIDENTS (RTAs)

20%-25% CAUSED BY FALLS

10% CAUSED BY VIOLENCE

PREVELANCE



ROAD TRAFFIC ACCIDENTS (RTAS)

Contributing to about **60% of TBIs**, RTAs are fueled by rapid urbanization, increased vehicle ownership, and inadequate enforcement of traffic laws. The rise in road traffic accidents is notable, with vehicle density increasing from 1.14 vehicles/km in 1970 to 43 vehicles/km in 2018.R

FALLS AND OCCUPATIONAL HAZARDS

Falls account for **20%-25% of TBIs**, affecting both the elderly and working-age populations, particularly in construction and agriculture sectors.

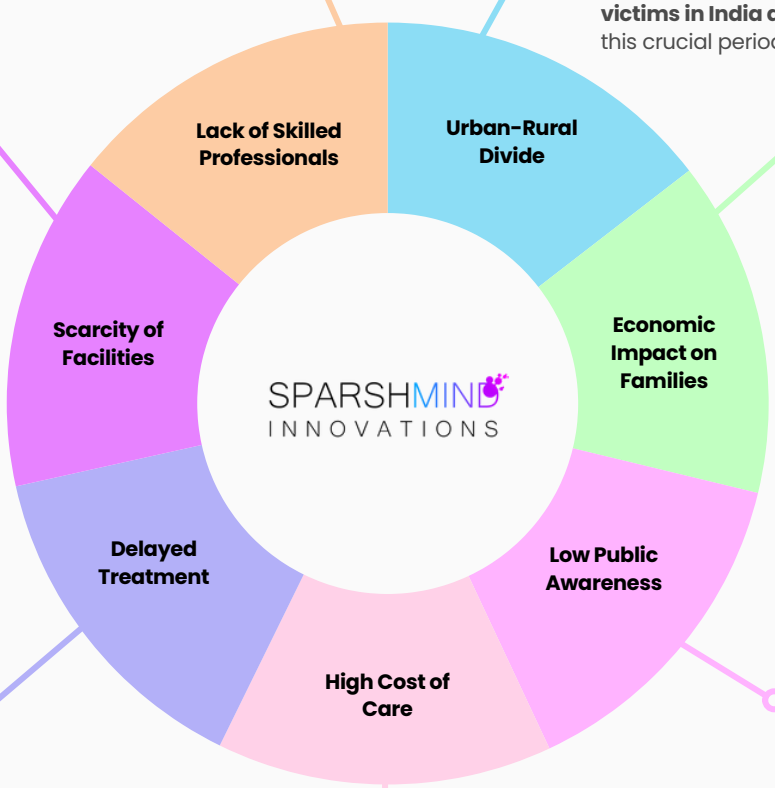
VIOLENCE AND SPORTS INJURIES

About **10% of TBI cases stem from violence**, while sports injuries, particularly without proper protective measures, also contribute to the problem.

Challenges in Treatment and Rehabilitation

There are approximately **40,265 rehabilitation professionals** serving a **population of 1.38 billion**, which translates to less than 1 rehabilitation professional per 100,000 population [4].

Rural areas, where many TBIs occur, often lack immediate access to specialized trauma care. This exacerbates the delay in critical "**golden hour**" treatment, where approximately **95% of trauma victims in India do not receive adequate care** in this crucial period.



The World Health Organization (WHO) has indicated that there is a significant gap in rehabilitation services, with only **5% to 15% of disabled individuals in low- and middle-income countries (including India)** having access to assistive devices and comprehensive rehabilitation care [4].

With the majority of TBI victims being **young adults**, who often serve as primary income providers, imposes substantial economic burdens on affected households. The **long-term socioeconomic impact of traumatic brain injuries,** potentially leading to prolonged financial instability and reduced quality of life for entire families.

The delayed administration of time-sensitive interventions often worsens outcomes.

A lack of knowledge about TBI prevention, early detection, and management continues to hinder effective intervention and rehabilitation efforts.

Long-term rehabilitation is expensive and often not covered by insurance. Families are often left bearing the economic burden, especially considering the high mortality rates. For instance, **1 out of every 6 trauma victims in India dies from their injuries**, compared to 1 in 200 in the United States.

Addressing these challenges requires a concerted effort from policymakers, healthcare providers, and society at large to improve access to timely, quality care and comprehensive rehabilitation services for TBI patients across India.

Approaches to TBI Rehabilitation

INNOVATIVE APPROACHES TO TBI REHABILITATION

- VR-based therapies are emerging as an innovative solution to enhance neuro-rehabilitation. These therapies offer personalized treatment plans and are particularly engaging for patients, increasing their motivation to recover. Additionally, the remote accessibility of VR therapies makes them essential in overcoming geographical barriers.

INTERDISCIPLINARY REHABILITATION

- **Comprehensive Care**: TBI rehabilitation often involves a team of healthcare professionals, including physical therapists, occupational therapists, speech-language pathologists, and neuropsychologists. This interdisciplinary approach ensures that all aspects of recovery—physical, cognitive, and emotional—are addressed effectively.
- **Inpatient vs. Outpatient**: Patients may start in an inpatient rehabilitation facility where they receive intensive therapy before transitioning to outpatient services for ongoing support.

THERAPEUTIC INTERVENTIONS

- **Physical Therapy**: Focuses on improving mobility and strength through exercises tailored to the individual's capabilities. Techniques include task-oriented practice, locomotion training, and resistance training.
- **Cognitive Rehabilitation**: Aims to enhance cognitive functions such as memory, attention, and problem-solving skills through structured activities and exercises designed to stimulate brain function.
- **Speech-Language Therapy**: Addresses communication difficulties and swallowing issues that may arise after a TBI.

SPECIALIZED TECHNIQUES

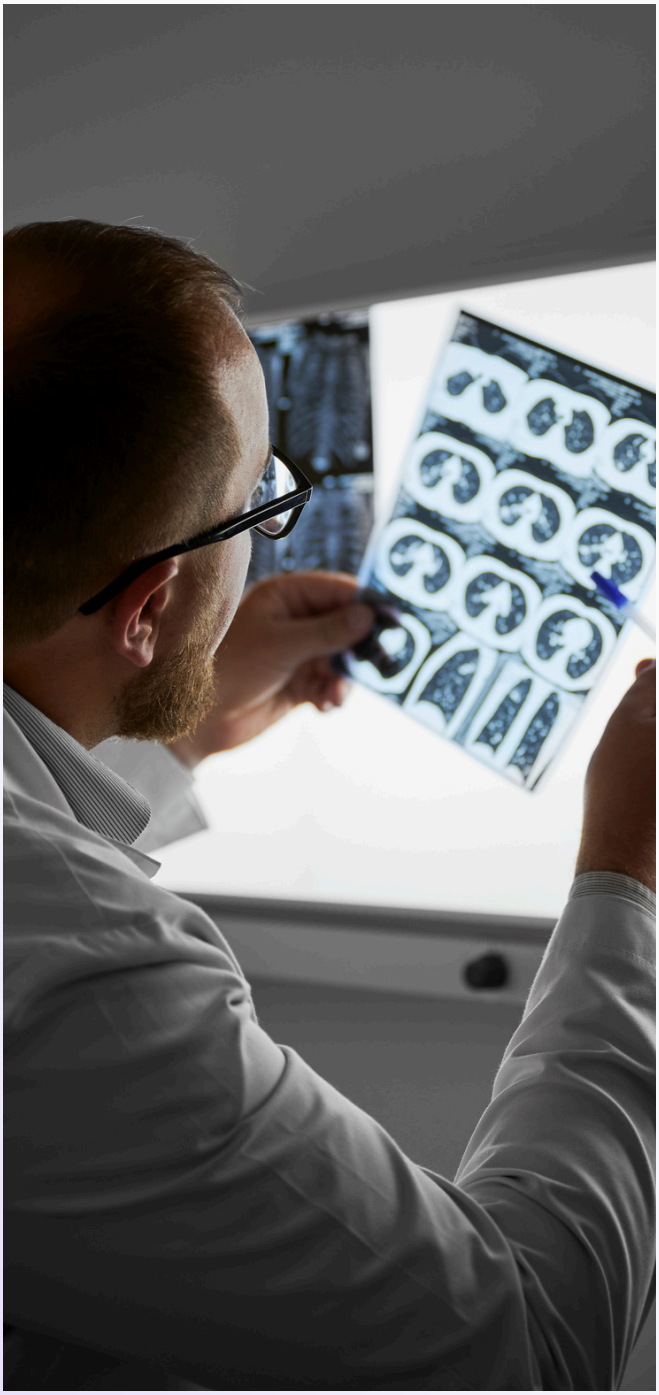
- **Constraint-Induced Movement Therapy (CIMT)**: Encourages the use of the affected limb by constraining the unaffected limb, promoting neuroplasticity through repetitive practice.
- **Functional Electrical Stimulation (FES)**: Involves using electrical impulses to stimulate muscle contractions during functional tasks, aiding in motor recovery.
- **Dual Task Training**: Combines cognitive tasks with physical activities to improve balance and functional mobility, which is particularly beneficial for those recovering from TBI.

COMMUNITY REINTEGRATION

- **Social Skills Training**: Helps individuals re-establish social connections and navigate community settings safely and independently.
- **Family Education**: Involves educating family members about TBI management and rehabilitation strategies to support their loved ones effectively during recovery

Collaborative Efforts

Research partnerships in the field of traumatic brain injury (TBI) in India are evolving, with various institutions and collaborations emerging to address the significant public health challenge posed by TBIs. Here are some key aspects of these partnerships:



COLLABORATIVE RESEARCH INITIATIVES

- **Interdisciplinary Collaboration**: Research on TBI in India often involves collaboration among multiple medical departments, including neurosurgery, forensic medicine, and neurology. **A study indicated that researchers from 46 medical departments have contributed to TBI publications,** with the Department of Neurosurgery leading in output.[5]
- **International Partnerships**: Many Indian institutions have engaged in research collaborations with foreign entities. **Eleven states have published papers in association with international authors,** enhancing the scientific impact and exchange of ideas

FUNDING AND SUPPORT MECHANISMS

- **Government Initiatives**: The National Science and Technology Entrepreneurship Development Board (NSTEDB) supports startups through Technology Business Incubators (TBIs), which can foster research and innovation related to TBI. These initiatives aim to promote technology-based entrepreneurship and facilitate the commercialization of research findings.
- **Research Grants**: Funding opportunities for TBI research are available through various government schemes aimed at enhancing healthcare infrastructure and promoting scientific research in India

FOCUS ON EVIDENCE-BASED PRACTICES

- **Systematic Reviews and Meta-Analyses**: Recent studies are focusing on systematic reviews to evaluate current management practices for TBI in India, addressing gaps in knowledge and treatment efficacy. This approach aims to compile evidence-based data that can guide clinical practices and future research directions.
- **Epidemiological Studies**: There is a growing emphasis on multicentric epidemiological studies to gather comprehensive data on TBI incidence, causes, and outcomes across different regions of India. Such studies are crucial for informing public health strategies and improving patient care

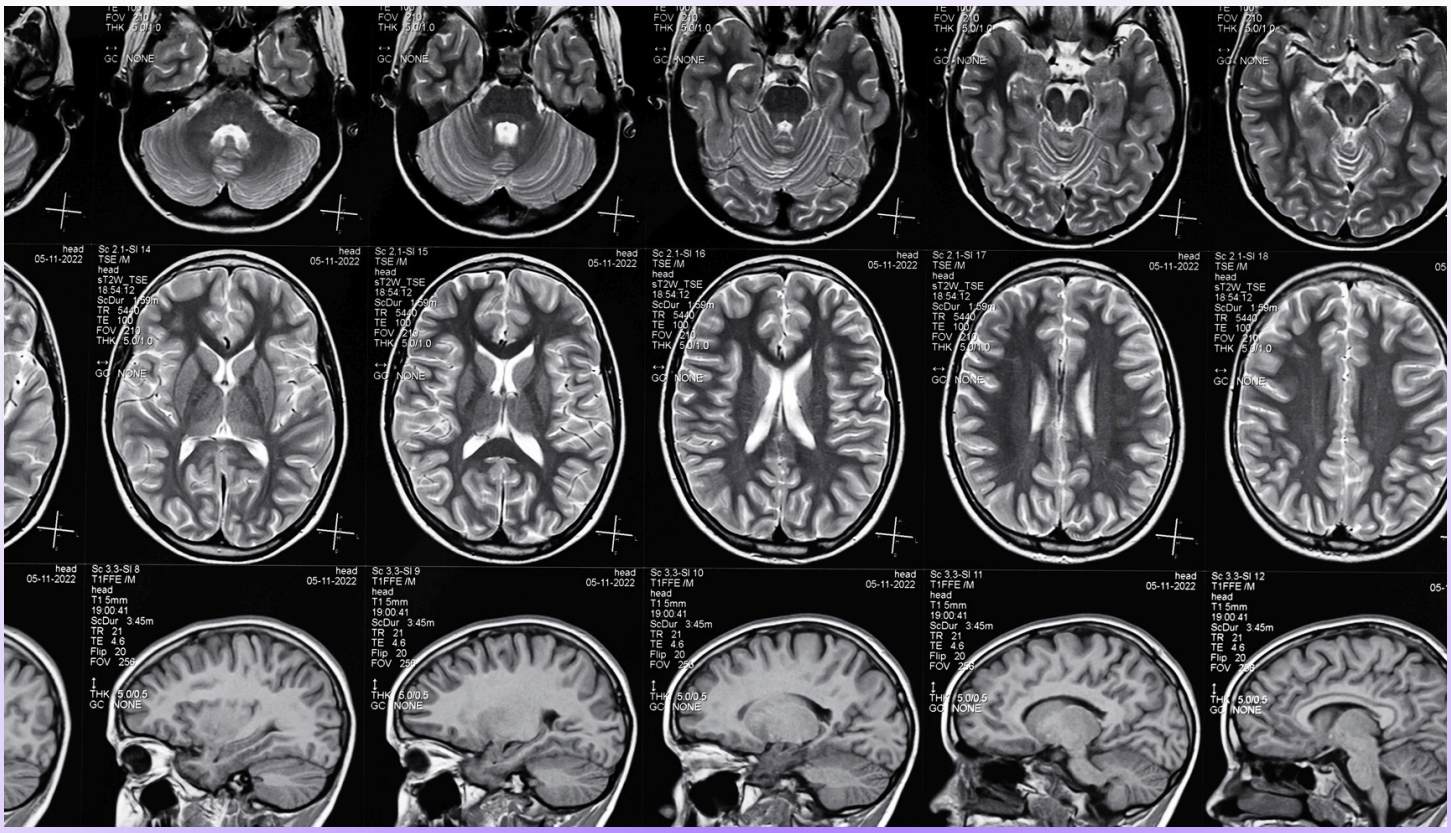
These partnerships are essential for advancing TBI research in India, ultimately aiming to improve prevention, treatment, and rehabilitation strategies for individuals affected by traumatic brain injuries.

CONCLUSION

- Government Initiatives: Advocating for policies that improve emergency response systems, such as increasing access to trauma centers in rural areas, and funding rehabilitation services, is vital. **Approximately 6% of the global RTAs annually occur in India**, even though it only has 1% of the world's vehicles. The RTA rate of 35 per 1000 vehicles and the **RTA fatality rate of 25.3 per 10,000 vehicles is the highest in the world.**

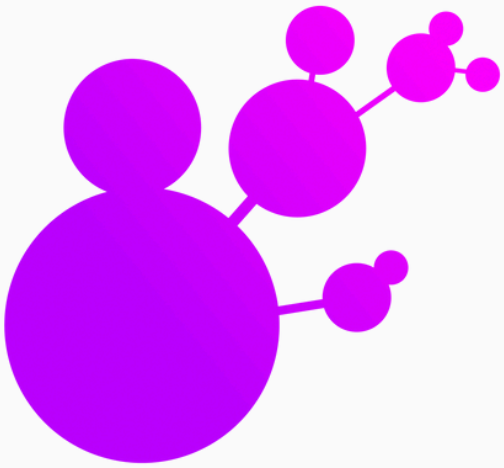
- Insurance Reforms: Pushing for coverage of long-term rehabilitation in health insurance plans is essential to ensure that families are not left shouldering the financial burden alone.

Traumatic Brain Injuries present a **complex challenge** that demands a multifaceted response. By **embracing innovation, fostering collaborations, and enhancing public awareness**, India can make significant strides in reducing the impact of TBIs. **Advancements in neuro-tech and the expansion of rehabilitation services** are crucial in offering effective and accessible care.



References

No.	Source	Citation
1	Indian Head Injury Foundation	https://indianheadinjuryfoundation.org/traumatic-brain-injury/
2	Times Of India	https://timesofindia.indiatimes.com/life-style/health-fitness/health-news/head-injury-has-devastating-consequences/articleshow/108809831.cms
3	Pubmed	https://pubmed.ncbi.nlm.nih.gov/11783750/
4	National Medical Library (US)	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9540924
5	National Medical Library (US)	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4901829/



Thank You!

You can reach us for any questions

contactus@sparshmindinnovations.com

sparshmindinnovations.com