

RFI: Soliciting Input on Opportunities, Gaps, and Challenges in Global Health Research in Neurological Diseases and Stroke

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1. The most impactful research opportunities for addressing global neurological health needs:

The Society for Academic Emergency Medicine (SAEM) and the American College of Emergency Physicians (ACEP) community would like to share our thoughts on the most impactful research opportunities for addressing global neurological health needs.

- Opportunity: Basic understanding on the epidemiology of commonplace neurologic diseases and stroke in Low and Middle Income Countries (LMICs) are poorly described, and in the scant studies that do exist, they have demonstrated marked divergence from High-income Countries (HIC) distribution. To that end, support for the conduct of epidemiological studies is needed to better understand the burden and distribution of acute and emergency neurological conditions in LMICs.
 - Example: Establish registries for stroke and traumatic brain injury (TBI) to collect data on incidence, outcomes, and risk factors.
 - Impact: Informing public health strategies and resource allocation based on accurate and comprehensive data.
- Opportunity: Research and develop affordable and portable diagnostic tools for neurological conditions such as stroke and Traumatic Brain Injury (TBI).
 - Example: Investigate the efficacy of mobile CT scanners, low-cost MRI or portable ultrasound devices for advanced diagnostics in resource-limited settings.
 - Impact: Improving early diagnosis and timely intervention in acute neurological emergencies.
- Opportunity: Research biomarkers that exist as determinants of neurologic disease and/ or stroke in LMIC populations.
 - Example: Establish biobanks with established and exploratory markers of disease that can be studied, along with registries, in these novel populations.

- Impact: This will help guide development of low-cost, point-of-care testing for early diagnosis and prognostication of affected patients; consequently, it will help guide improved delivery of care, and potentially affect morbidity and mortality.
- Opportunity: Investigate the impact of interprofessional care in resource limited settings.
 - Example: Evaluate the impact of emergency medicine pharmacists on door-to-needle (DTN) times and patient outcomes in acute ischemic stroke and time to antiseizure medication administration in seizures in LMICs. This could include the deploying pharmacists in emergency settings and evaluating their influence on the timeliness and efficacy of treatment.
 - Impact: Emergency medicine pharmacists may optimize existing infrastructure and enhance care.
- Opportunity: Research strategies to develop and optimize emergency medical services (EMS) for neurological emergencies in LMICs.
 - Example: Assess the impact of training EMS personnel in neurological emergency protocols and barriers to developing such tools as pre-hospital notification systems for stroke.
 - Impact: Reducing pre-hospital delays and improving outcomes through faster and more coordinated care.
- Opportunity: Explore the use of telemedicine to provide specialist neurological care and consultation in remote and underserved areas.
 - Example: Implement tele-stroke programs with remote neurologists providing capacity-enhancing specialist consultation to local healthcare providers in real-time during acute stroke management.
 - Impact: Increasing access to specialist care and improving the quality of emergency neurological treatment.
- Opportunity: Utilize implementation science methods to understand barriers and facilitators to incorporating evidence-based neurological emergency guidelines such as stroke protocols into standard practice in diverse LMIC settings.

- Example: Conduct an implementation science study to address low utility of a new hospital stroke protocol to address barriers to adhering to evidence-based acute stroke care.
 - Opportunity: Increase research-capacity among experts in LMICs to lead high-impact neurologic and stroke disease research.
 - Example: Training program targeting neurology and stroke experts in LMICs covering topics such as research methods, research administration, frontiers in neurologic and stroke research, and facilitate development of communities-of-practice among these leaders.
- 2. Challenges to research progress experienced by LMICs and how they can be addressed:**
- Challenge: Poorly developed data systems in acute care limiting data on epidemiology and clinical courses for conditions such as stroke and TBI.
 - Solution: Support the development of robust systems for epidemiological and clinical data collection, management, and analysis to include the development of international, capacity building collaborations supporting the development of technical infrastructure.
 - Challenge: Advocating for increased funding and policy support for neurological research and care in LMICs.
 - Solution: Engage with policymakers to prioritize neurological health in national health agendas and allocate sufficient resources. Sustainable funding and supportive policies are essential to drive research, improve healthcare delivery, and ensure long-term impact on neurological health.
 - Challenge: Leveraging technology and innovation to improve neurological care.
 - Solution: Implement systems that include telemedicine for remote consultations, mobile health applications for monitoring and managing conditions, and innovative diagnostic tools. Technology can bridge gaps in access to care, especially in remote and underserved areas, and enhance the efficiency and effectiveness of healthcare delivery.
 - Challenge: Lack of emergency medicine pharmacists in LMICs due to funding constraints and lack of progressive clinical pharmacy practices. Emergency medicine pharmacists optimize care in neurological emergencies.
 - Solution: Develop funding mechanisms and programs that support the training and deployment of emergency medicine pharmacists in LMICs. Encourage international collaborations and exchange programs to build capacity.
- 3. Strategies to build and improve sustainable neurological research capacity at LMIC academic/research institutions, including basic, translational, and clinical research**

- Strategy: Create International Research Training Grant (D43) programs specifically focused on research in neurologic disorders.
 - Rationale: Promote long term career development and research engagement in the neurologic diseases in LMIC academic and research institutions.
- Strategy: Establish a consortium for neurological research in LMICs similar to existing Stroke NETT and SIREN networks.
 - Rationale: Create research networks and build infrastructure to implement trials across geographic areas and allow for increased patients in studies.
- Strategy: Encourage interdisciplinary collaboration among neurologists, emergency medicine specialists, pharmacists, nurses, public health experts, and social scientists. This can lead to comprehensive approaches in understanding and addressing neurological diseases in LMICs.
 - Rationale: Interdisciplinary teams can provide diverse perspectives and expertise, leading to more innovative solutions and holistic care models.
- Strategy: Encourage the development of training programs in emergency medicine, including pharmacy training, providing long-term engagement opportunities and support for trainees
 - Rationale: Leverage existing organizations in HIC, such as the American College of Clinical Pharmacy (ACCP), American Society of Health-System Pharmacy (ASHP), Society for Academic Emergency Medicine (SAEM). Grants and funding programs from these groups may support pharmacy-specific research projects in LMICs. Expand existing consortia for neurological research to include LMIC institutions.
 - Build upon the use of written educational materials developed in past international collaborations, leveraging modern technology to develop additional open source educational resources
 - Example of resource build on paper for which additional resources like videos would increase their educational value:
https://iris.who.int/bitstream/handle/10665/81170/9789241548373_eng.pdf?sequence=1&isAllowed=y
- Strategy: Focus on strengthening health systems in LMICs by improving infrastructure, supply chains for essential medicines, and access to diagnostic tools. Invest in building robust health information systems for better data collection and analysis.
 - Rationale: Strong health systems are fundamental for effective delivery of healthcare services, including timely diagnosis and treatment of neurological conditions.

4. The most important training needs and/or most promising training approaches in global neurological research, including how best to support a pipeline of trained scientists and health professionals in neuroscience:

- Training Need: Support of research training throughout development.
 - Solution: Using examples, including HIV research efforts, a broad based strategy should be created that combines long term (e.g., Masters or PhD granting programs) and short-term research training programs. This program should support scientific longitudinal researcher development including a small grants program to support early-career researchers and the expansion of institutional research capacity grants.
- Training Need: Limited Emergency Medicine Pharmacy training programs in LMICs.
 - Solution: Develop comprehensive training programs that include both long-term (pharmacy residency and fellowship programs) and short-term training (i.e., certification courses for currently-practicing pharmacists wishing to develop expertise in emergency medicine clinical pharmacy)

5. Strategies to promote mutually beneficial research partnerships among LMICs and HICs as well as other external stakeholders:

- Information Exchange:
 - Strategy: Facilitate information exchange and collaboration through sister site programs and international conferences. Create platforms for sharing best practices and research findings.
- Telemedicine:
 - Tele-stroke programs administered by institutions within HICs may enhance care and reach within LMICs. The benefit to HICs is gaining a more holistic perspective in the treatment of neurological emergencies by treating cases that are not as commonly seen in HICs.

6. Examples of current global health research efforts and/or potential partnerships in which NINDS could engage:

- Engage with organizations such as the Society for Academic Emergency Medicine's Global Emergency Medicine Academy (SAEM GEMA), the International Federation of Emergency Medicine network, AFREhealth (The African Forum for Research and Education in Health), World Stroke Organization, and American College of Clinical Pharmacy Emergency Medicine Practice & Research Network and Global Health Practice & Research Network to identify and support research efforts involving emergency medicine pharmacists.

7. Best practices for promoting equity in global health research, regardless of region or geopolitical situations:

- Strategy: Ensure equitable participation of emergency medicine professionals (including physicians, nurses, pharmacists, paramedics, etc.) from LMICs in global health research. Address systemic barriers to funding and resource allocation to promote inclusivity.
- Recommendation: Implement community engagement and education programs to raise awareness about neurological diseases and their risk factors. Empower local communities to participate in preventive and management strategies.
 - Rationale: Community involvement is crucial for the successful implementation of public health interventions and can lead to improved health outcomes through increased awareness and proactive management.

8. The most impactful social and/or other determinants of health that affect LMICs and how they can be addressed to improve neurological health outcomes:

- Impact: Limited access to healthcare services, including emergency care, diagnostic facilities, and specialist care, leads to delayed or inadequate treatment of neurological conditions such as stroke, TBI, and seizures.
 - Addressing the Issue:
 - Infrastructure Development: Invest in building and upgrading healthcare facilities, especially in rural and underserved areas.
 - Telemedicine: Utilize telemedicine to provide remote consultations and follow-up care, thereby improving access to specialist care.
 - Mobile Clinics: Deploy mobile clinics to reach remote areas and provide essential neurological care and screenings.
- Impact: Low levels of education and health literacy hinder the understanding of neurological conditions, their risk factors, and the importance of timely treatment.
 - Addressing the Issue:
 - Public Health Campaigns: Conduct public health campaigns to raise awareness about the signs and symptoms of neurological emergencies and the importance of seeking immediate medical attention.
 - Determinants of Health:
 - Hypertension control is an important factor for preventing stroke.
 - Road safety campaigns and information are important to prevent severe traumatic brain injury, as pedestrians and two wheelers have significant trauma burden.
 - Community Health Workers: Train community health workers to educate the public about neurological health and provide basic care and referrals.



- Impact: Malnutrition and unhealthy behaviors, such as smoking and excessive alcohol consumption, contribute to the risk of neurological diseases.
 - Addressing the Issue:
 - Nutritional Programs: Establish nutritional programs to provide access to healthy foods and educate communities on proper nutrition.
 - Behavioral Interventions: Implement behavioral interventions to reduce tobacco use and alcohol consumption through education, counseling, and support programs.