Journal of the Neurological Sciences 375 (2017) 309–315

Contents lists available at ScienceDirect

Journal of the Neurological Sciences

journal homepage: www.elsevier.com/locate/jns

Review Article

Addressing post-stroke care in rural areas with Peru as a case study. Placing emphasis on evidence-based pragmatism

J. Jaime Miranda [a,b,*], Miguel G. Moscoso [a], Lijing L. Yan [c,d], Francisco Diez-Canseco [a], Germán Málaga [a,e], Hector H. Garcia [f,g], Bruce Ovbiagele [h]

[a] CRONICAS Center of Excellence in Chronic Diseases, Universidad Peruana Cayetano Heredia, Lima, Peru
[b] School of Medicine, Universidad Peruana Cayetano Heredia, Lima, Peru
[c] Global Health Research Center, Duke Kunshan University, Kunshan, Jiangsu, China
[d] Duke Global Health Institute, Duke University, Durham, NC, USA
[e] Unidad de Conocimiento y Evidencia (CONEVID), Universidad Peruana Cayetano Heredia, Lima, Peru
[f] Center for Global Health, Universidad Peruana Cayetano Heredia, Lima, Peru
[g] Cysticercosis Unit, National Institute of Neurological Sciences, Lima, Peru
[h] Medical University of South Carolina, Charleston, SC, USA

ARTICLE INFO

Article history:
Received 27 January 2017
Accepted 13 February 2017
Available online 15 February 2017

Keywords:
Stroke
Task-shifting
mHealth
Implementation science

ABSTRACT

Stroke is a major cause of death and disability, with most of its burden now affecting low- and middle-income countries (LMIC). People in rural areas of LMIC who have a stroke receive very little acute stroke care and local healthcare workers and family caregivers in these regions lack the necessary knowledge to assist them. Intriguingly, a recent rapid growth in cell-phone use and digital technology in rural areas has not yet been appropriately exploited for health care training and delivery purposes. What should be done in rural areas, at the community setting-level, where access to healthcare is limited remains a challenge. We review the evidence on improving post-stroke outcomes including lowering the risks of functional disability, stroke recurrence, and mortality, and propose some approaches, to target post-stroke care and rehabilitation, noting key challenges in designing suitable interventions and emphasizing the advantages mHealth and communication technologies can offer. In the article, we present the prevailing stroke care situation and technological opportunities in rural Peru as a case study. As such, by addressing major limitations in rural healthcare systems, we investigate the potential of task-shifting complemented with technology to utilize and strengthen both community-based informal caregivers and community healthcare workers.

Contents

Abbreviations: LMIC, low and middle income countries; SMS, short messaging services.

* Corresponding author at: CRONICAS Centre of Excellence in Chronic Diseases, Universidad Peruana Cayetano Heredia, Av. Armendáriz 497, Miraflores, Lima 18, Peru.
E-mail addresses: jaime.miranda@upch.pe (J.J. Miranda), miguel.moscoso.p@upch.pe (M.G. Moscoso), lijing.yan@duke.edu (L.L. Yan), fdiezcanseco@upch.pe (F. Diez-Canseco), german.malaga@upch.pe (G. Málaga), hgarcia1@jhu.edu (H.H. Garcia), ovibes@musc.edu (B. Ovbiagele).

http://dx.doi.org/10.1016/j.jns.2017.02.027
0022-510X/

1. Introduction

Stroke affects 62 million people worldwide, 87% of whom live in low-and middle-income countries (LMIC) [1–3], imposing major societal and economic burdens [4]. Each year in the US, about 800,000 people experience a stroke and 220,000 die from it [5]. Consequently, 24% of survivors are discharged to inpatient rehabilitation facilities [6]. Stroke costs the US $34 billion annually, including health care services, medications, and lost productivity [5]. In Canada, 62,000 people experience a stroke each year and 6500 stroke survivors access in-patient stroke rehabilitation and stay a median of 30 days [7]. In contrast, for many LMIC, especially in rural settings, access to appropriate stroke care and rehabilitation are substandard. In LMIC, stroke fatality ranges between 18 and 35% [8,9]. For instance, a sub-analysis of the INTERSTROKE study [10], showed that Peruvian participants with a first-ever stroke had a 21% mortality and a 20% re-stroke rate at one year, and less than 20% of stroke survivors completed a rehabilitation program [11,12].

1.1. Burden of stroke and need for optimal post-stroke care

Stroke is a leading cause of disability and death, including LMIC countries like Peru [12–14]. However, while stroke mortality rates have recently decreased due to improved medical treatments, the number of individuals living with the residual effects of stroke is rising [15]. Indeed, currently over 75% of patients survive a first stroke, and among these individuals, 25% are left with a minor disability and 40% experience moderate-to-severe disabilities [16]. Beyond the lingering physical, psychological and social effects of an index stroke, up to 25% of stroke survivors experience recurrent strokes [17], and the morbidity and mortality after a recurrent stroke is more devastating than that of a primary stroke, with a near doubling of the 30-day fatality rate after a first recurrent stroke compared to a first-ever stroke [18]. As well, in family-oriented societies where significant health expenditure is out-of-pocket, stroke dramatically changes the life not only of the stroke survivors but also of their family caregivers. In addition, for a large number of stroke patients living in rural areas, the care they receive is inadequate and far below evidence-based standards [19].

In Latin America, stroke is the fourth leading cause of years of life lost, and in Peru it ranks fifth: [20] there is no national stroke program and only three hospitals have stroke units and thrombolytic therapy [21]. Stroke is listed as a leading cause of disease burden for national priority setting purposes [22]. The consequences of stroke disproportionately affect rural populations where there is a severe shortage of neurologists and rehabilitation specialists, and where those few who receive rehabilitation are at risk of complications that need specialized care [23,24]. People living in rural areas are at a great disadvantage compared to urban areas: for example, the urban-rural income ratio is 2.4 in Peru (urban US$ 362, rural $150) [25,26].

1.2. Limitations of rural healthcare in developing countries

Most healthcare systems are acute-care oriented, specialist-centered, urban-located, and fragmented, and are thus ill prepared to deal with chronic conditions, especially in LMICs [27,28]. For the vulnerable population of stroke patients in poorly resourced rural areas, secondary prevention and rehabilitation are largely unavailable and, where present, are far below evidence-based standards [29]. To rely on specialists to provide such services is not only unrealistic but also unsustainable, particularly in settings where health systems' are fragmented and heavily focused on providing care for acute and infectious diseases rather than chronic conditions [30]. Yet healthcare workers and family caregivers, who live in the same communities as the patients, lack the necessary knowledge, training, and tools to provide at least a basic but appropriate level of care.

Healthcare systems in resource-poor settings are plagued with many barriers to prevention and control of chronic conditions including fragmentation of care, over reliance on healthcare facilities, over burden of specialists in tertiary care, among others. The World Health Organization identifies six main building blocks of healthcare systems: service delivery, information and evidence, medical products and technology, health workforce, health financing, and leadership and governance [31].

The chronic care model provides a systematic framework with six key elements—community, health system, self-management support, delivery system design, decision support, and clinical information systems—that are critical to effective management of chronic diseases [32]. Addressing all six key elements is broadly relevant to most chronic conditions, where fatal and non-fatal outcomes bring a major share of global disability and burden [33]. Focusing on post-stroke care in rural settings highlights multiple challenges given its role as a major cause of mortality, morbidity, disability, productivity loss, and poverty in LMICs, and because it's a condition encompassing multiple dimensions of health care, each with specific risk factors, associated health conditions, consequences, at various health services and community levels of the healthcare system.

1.3. The opportunity of technology and mHealth

Rapid growth in cell-phone use, Internet connectivity, and digital health technology in low-resource countries and regions [34] present new opportunities for improvements in healthcare delivery and population-based outcomes [35], including the engagement of frontline healthcare workers and community actors in mHealth-oriented activities [35–37]. A systematic review aimed to describe approaches to improve mental health in rural areas found that the majority of interventions took advantage of technology in many ways such as telemedicine and videoconferencing in order to help professionals to provide care in remote areas [37].

Cell phone usage has also been rising dramatically and reached high levels in many LMIC. Only in the last ten years, cell phone subscriptions (per 100 people) have increased from 20 to 110 in Peru and nearly to 180 in African countries [38]. By 2013, almost 80% of Peruvian households had at least one family member with access to a cell-phone. Interestingly, the largest increase in the 2012–2013 in mobile phone ownership was observed in rural areas [39]. Usually the cost of sending short messaging services (SMS) is only charged to those who send it. In terms of planning interventions using such platforms, the evidence suggests that more than 95% of those with a cell phone can receive an SMS and more than 90% know how to read it [40], so people generally do not