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The Challenges of Managing Children With Epilepsy in Africa

Jo M. Wilmshurst, MBBS, MRCP, FCP, MD[*], **Angelina Kakooza-Mwesige, MMED**[†], and **Charles R. Newton, MD**[‡,§,‖]

[*]Department of Pediatric Neurology, Red Cross War Memorial Children's Hospital, School of Child and Adolescent Health, University of Cape Town, Cape Town, South Africa [†]Department of Pediatrics and Child Health, Mulago Hospital/College of Health Sciences, Makere University, Kampala, Uganda [‡]Centre for Geographic Medicine Research—Coast, Kenya Medical Research, Institute and Wellcome Trust Research Programme, Kilifi, Kenya [§]Neurosciences Unit, UCL-Institute of Child Health, London, United Kingdom [‖]Department of Psychiatry, University of Oxford, Oxford, United Kingdom

Abstract

Children with epilepsy who reside in the African continent are faced with some of the greatest challenges of receiving adequate care. The burden of disease is exacerbated by the high incidence of acquired causes and the large treatment gap. Skilled teams to identify and care for children with epilepsy are lacking. Many patients are managed through psychiatric services, thus potentially compounding the stigma associated with the condition. Little data exist to assess the true proportion of comorbidities suffered by children with epilepsy, the assumption is that this is high, further aggravated by delayed interventions and adverse responses to some of the more commonly used antiepileptic drugs.

Introduction

The incidence and prevalence of active epilepsy is greatest in Africa compared with that of all other continents, even those with equivalent poor settings.1–3 Some of the most severe complications and comorbidities occur in children with epilepsy (CWE) who live in the resource-poor areas of world.4 These areas include many regions of low- and middle-income countries, particularly rural areas that have limited resources for diagnosis and treatment. Africa, in particular, contains most of the poorest countries in the world and has the highest incidence of many of the risk factors for epilepsy, especially central nervous system (CNS) infections, perinatal insults, and traumatic brain injury.

Recent estimates in 2010 suggest that epilepsy contributes to 0.7% of the global burden of disease,5 with Africa contributing to 0.261% (or 37% of the epilepsy burden) to the total worldwide burden of epilepsy (http://viz.healthmetricsandevaluation.org/gbd-compare/). These models underestimate the burden in the poorer areas of the world because they only

Address reprint requests to Jo M. Wilmshurst, Department of Pediatric Neurology, Red Cross Children's Hospital, School of Child and Adolescent Health, University of Cape Town, Cape Town, South Africa. Jo.wilmshurst@uct.ac.za.

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include the previously termed idiopathic or cryptogenic epilepsy and not epilepsy secondary to causes, such as CNS infections, stroke, or even genetic syndromes. These models often had to extrapolate data from high-income countries to account for the lack of data in the lower- and middle-income countries. In cross-sectional surveys, the incidence and, to a lesser extent, the prevalence appear to be greater in these poorer areas than in high-income countries.4

In Africa, most people with epilepsy suffer the disease from childhood, particularly during the first few years of life. For example, in 5 sites across Africa, over 60% of people with active convulsive seizures reported that their first seizures occurred before 13 years of age. The incidence of epilepsy appears to be highest in childhood, with an incidence of 187 per 100,000 per year (95% confidence interval [CI]: 133-256) reported in children between the ages of 6 and 12 years living in a rural area of Kenya.6 The prevalence is also high and tends to be higher in rural areas than in urban areas,2 although this may reduce with the demographic transition to urbanization, as it appears to have occurred in Asia. In rural Kenya, the adjusted prevalence estimates of lifetime and active epilepsy were 41 of 1000 (95% CI: 31-51) and 11 of 1000 (95% CI: 5-15) in children between the ages of 6 and 9 years.6

The proportion of focal epilepsies appears to be higher in children living in Africa than elsewhere. The incidence of perinatal insults; infections of the CNS, such as bacterial and tuberculous meningitis; and head trauma in children is greater in Africa than elsewhere. In addition, Africa has the highest burden of parasitic infections, such as falciparum malaria and onchocerciasis, both of which are associated with the development of epilepsy.7–10 In addition, parasitic infestations such as with Toxocara species and *Toxoplasmosis gondii* are ubiquitous in Africa, and infections with these organisms are associated with epilepsy.10,11 Neurocysticercosis is common is some parts of Africa. Parasitic infections are believed to cause up to 27% of pediatric epilepsy in some areas,10 with antenatal and perinatal risk factors of more effect in other regions.10,12 Human immunodeficiency virus infection is prevalent across Africa, especially sub-Saharan Africa, where 90% of infected children reside. Most seizures associated with human immunodeficiency virus infection appear to be caused by opportunistic infectious organisms, although it is associated with epilepsy per se.13

Mortality appears to be increased in Africa14 based on recent data from China15 and Kenya,10 which suggest that the premature mortality is very high in these settings, particularly affecting the older children and adults. In Africa, the mortality is particularly related to poorly controlled epilepsy, with a greater proportion of children dying with status epilepticus, drowning, and burns caused by seizures compared with other continents.

In 2010, the International League Against Epilepsy published a revised terminology for the organization of seizures.16 This represented a logical progression in the light of the improved diagnostic techniques in the field of neuroimaging and molecular genetics. However, in the context that most people with epilepsy are based in resource-poor countries, with less than half gaining access to biomedical services, these recommendations are a

challenge to implement.17 Few centers in Africa have access to the screening tools, such as electroencephalography, neuroimaging, metabolic screens, or molecular genetics.18

Challenges to Accessing Care

Stigma, is significant and CWE in the poor areas have reduced opportunities for education as well as future employment and marriage. The stigma often arises from the cultural beliefs about the cause of epilepsy, as in many societies epilepsy is not thought to be a biomedical illness affecting the brain but is thought to be caused by spiritual beliefs and sometimes contagious. These beliefs permeate throughout society, including professions such as teachers and law enforcement personnel.19 Where epilepsy is heavily stigmatized, the social and economic morbidity of the condition influences every aspect of a person's life,20 thus limiting opportunities for education,21,22 employment,7 and marriage and resulting in poverty, food insecurity, poor housing quality, and physical vulnerability.7 In some circumstances, CWE are even more vulnerable, increasingly subjected to physical and sexual abuse.7 The effect appears greater in the poorer regions, particularly in Africa, where the stigma often results in people with epilepsy being hidden by their families.

The lack of access to quality, reliable, convenient, and cost-effective health care services is a key constraint to the management of CWE. Access to modern health care facilities may be nonexistent for the rural population23 who often have to traverse great distances to seek medical assistance.24 In many African countries where the public transportation system is poorly developed and is not subsidized by the government, this incurs an added expense that may not be affordable for all.25 This expense is further heightened when the few patients and their caregivers who attempt to seek specialized epilepsy care in the urban health care facilities would have to meet the entire cost of the required medications and investigations. In the government units where the antiepileptic drugs (AEDs) may be free of charge, these medicines are frequently out of stock.26

Access to diagnostic equipment to assist in the management of epilepsy (electroencephalography and neuroimaging) is extremely limited in many parts of Africa.27 Even where equipment is available, it is not uniformly affordable or accessible.28 In this context, many individuals with epilepsy disorders remain undiagnosed because of the limited diagnostic facilities at health centers, which is even worse in rural settings. The use of cell phones has emerged as a mode of interventional health delivery through the use of the short message service or text messaging.29 The use of the cell phone, which is widely accepted, makes it a potentially nondiscriminating service media that could be applied in long-term disease management programs, such as epilepsy care. It can also be used to record home videos of seizure events that could later be brought to the epilepsy specialist for review or also be used to set up reminders of the scheduled outpatient visit or when to pick up medications. Ongoing technology innovations using the cell phone may serve as a potential way to reduce geographic barriers.

Limitations in the availability, number, and geographic distribution of specialists trained in the care of epilepsy are a major cause of the delays in accessing care. Sub-Saharan Africa has the highest person-to-doctor ratio worldwide for neurologists, with most of these

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professionals located in the cities and practicing general medicine, psychiatry, or both. Within Africa there is variation among some countries having no neurologists, whereas others such as Tunisia have a ratio of 162,885 persons per neurologist, more typically the range is from 1,612,039 persons per neurologist to 5,099,908 persons per neurologist.28 In addition, these few skilled health professionals tend to work in the private sector. Carers for CWE often choose to seek the more accessible traditional health providers (THPs) or other allied health providers who have limited options for epilepsy care to offer. In sub-Saharan Africa, the ratio of THPs to the general population is approximately 5:1000. It is estimated that 60%-80% of the population in Africa consult a traditional healer before going to a primary health care practitioner.30 The reasons for this are several and include among others: being more physically accessible to patients; offering plausible explanations of disease causality in a naturally acceptable fashion, focusing more on the psychological and social context of disease rather than the particular ailment31; and provision of continuity of care and social support for patients. These factors are often inadequately delivered with the biomedical model. A qualitative study conducted in Zambia to better understand the epilepsy care delivered by THPs found that despite their acceptance of familial and symptomatic types of epilepsy, they still believed that witchcraft played a central, provocative role in most seizures. In certain instances, they recognized the role for biomedical care and referred patients to the hospital and also referred refractory cases to other THPs. For the first seizure, the treatment initiated consisted of certain plant and animal products. Although the content of these products has not been studied, the THP's therapy is not always harmless as the toxicity of these animal or plant concoctions is not defined and accidents, such as burns, sustained during the treatment are reported.20 Despite the popularity of the THP in sub-Saharan Africa, measures to assess effectiveness are grossly lacking and there is no standard of care. THPs are central figures in health care provision for CWE, and as such, it is important that ways in which they could be more formally integrated into the health care delivery system are urgently sought.

Nodding Syndrome

Africa is unique for many reasons. The entity of "nodding syndrome" (NS), which occurs in epidemic proportions in African children, is an enigma that remains specific to the continent and is yet to be truly defined.32,33 Four African countries have reported cases of this condition among its populations, with initial reports coming from Tanzania34 and subsequently Liberia,35 South Sudan,36,37 and Uganda.33,38 This neurologic condition is of unknown etiology and is characterized by spells of stereotypic head bobbing complicated with malnutrition, progressive cognitive decline, and multiple physical and functional disabilities with onset during childhood.33,39 The head nods are atonic seizures.33 Other seizure types, such as absences, complex partial, myoclonic, and tonic-clonic seizures, are also described.40 The nodding spells are often triggered by cold weather, feeding, or the sight of food.36,39

AEDs (phenobarbital, phenytoin, carbamazepine, and sodium valproate) are administered for cases with NS with varied outcomes.33,41 Although there are a series of independent studies on NS, the possible etiology, mode of transmission, pathogenesis, clinical course, evidence-based treatment, and rehabilitation strategies remain elusive. An association with

infestation with *Onchocercia volvulus* was demonstrated in some studies,39,41 whereas others have questioned this relationship.42,43 Nutritional deficiency of serum vitamin B_6 and toxic exposures were considered; however, evidence to support this is lacking.41

There is a need for a concerted multidisciplinary research team effort to study the possible potential etiologic factors that could be infectious, environmental, or toxicological; to explore any genetic predispositions; to establish standardized treatment guidelines and rehabilitative strategies; and to identify measures of prevention of this devastating neurologic condition that has affected the lives of the future African generation.

Management of Patients With Epilepsy

A study in rural Kenya found that 89% of CWE had neither been diagnosed nor received AED therapy.6 Health care facilities are often long distances for patients to reach, supply of AEDs tends to be unreliable, and compliance is often poor based on a combination of limited access to AEDs, cost, and lack of understanding of the nature of the disease.44 The most readily available and cost-effective AED is phenobarbital, it is the most widely prescribed AED in Africa for CWE and is recommended by the World Health Organization as the first-line therapy for convulsive epilepsy.18 http://www.who.int/mental_health/mhgap/evidence/epilepsy/q7/en/index.html (accessed January 2014). There are conflicting statements published as to whether it is a safe agent to give without adverse effects on the maturing brain, especially at higher doses.45–48 The lack of consistency in study methodologies, the lack of consistency in dose ranges administered, and the lack of formal neurocognitive profiles limit any safety assessment conclusions.49,50 Studies in Bangladesh and India did not find major behavioral problems associated with phenobarbital, but the doses were relatively low and cognition was not formally tested.51 However, without long-term neurocognitive studies, the appropriateness of this agent, which is predominantly now only used in resource-poor countries, remains undefined. In fact, it has been suggested that the poor tolerance of phenobarbital and frequent withdrawal rates may in themselves be compounding the treatment gap.50 The emergent management is limited by poor outcomes with standard AEDs.52 Behavioral complications are part of the long-term sequelae.

Neuroinfections that are prevalent in Africa include bacterial meningitis, particularly, tuberculous meningitis. Parasitic infections are influenced by public health interventions with high rates of neurocysticercosis in some parts of Africa. Phenobarbital, carbamazepine, and phenytoin all have major interactions with antiretroviral therapy (ART).53 Sodium valproate has been recommended as the agent that is most viable for use in the African context, as it has the least interactions with ARTs.13

Epilepsy surgery is generally viewed as a quaternary service, which can only be practiced in resource-equipped countries. However, there is an argument to support a place for epilepsy surgery in carefully selected patients in key centers with adequate infrastructure in resource-poor settings.54,55 Beyond the resolution of some types of epilepsy following brain maturation or the resolution of acquired insults (eg, tuberculomas), this intervention remains the only definitive “cure” for epilepsy. Based on the challenges of limited access to care, unreliable supply of AEDs, and the potential adverse effects of long-term use of various

AEDs, intervention with epilepsy surgery could be deemed to be a high priority for resource poor countries to target the overall burden of disease. Currently, very few centers in Africa have the capacity to screen viable patients let alone perform surgical interventions.54,55

Epilepsy is perceived in many African countries to be a mental illness, with a result that care is often by psychiatrists, who outnumber pediatricians or neurologists, and most definitely child neurologists.56,57 Although this is logical for management of the comorbidities associated with epilepsy, the added stigma of a patient diagnosed with epilepsy attending a psychiatric clinic can have negative implications. Psychiatrists tend not to be trained in the most current interventions for epilepsy. The Mental Health guidelines published by the World Health Organization included epilepsy as part of the program to reduce the mental health gap.58

Comorbidities and Epilepsy

Epilepsy encompasses a spectrum of disorders, which range in severity. The care needs for such individuals varies from the time of initial diagnosis to the long-term management. In an ideal world, there should be an individual approach from one affected patient to another. Comorbidities in CWE are common and often adversely affect the patient more than the seizures themselves, resulting in reduced quality of life.59 The few studies in the literature looking at comorbidities in CWE from Africa have noted that cognitive impairments are frequently present.6,60 This has a significant effect especially on children who often miss the opportunity to be educated because of the limited access to special schools.12

The prevalence of autistic spectrum disorders in Africa is not known but the association with epilepsy as a comorbidity is accepted and is a major management challenge.61 Globally, there are data to illustrate a high correlation between psychiatric disorders, such as schizophrenia or schizophrenia-like psychosis, personality disorders, neurotic disorders, substance abuse, and nonorganic sleep disorders, and epilepsy.62 This important area has hardly been studied in sub-Saharan Africa. There are reports of psychotic episodes in patients with epilepsy in Tanzania63 and of the association between temporal lobe epilepsy and schizophrenia-like psychoses in Nigerians.64 There is need for multisite studies in sub-Saharan Africa to explore the prevalence of various psychiatric disorders among CWE and the associated risk factors. Furthermore, there should be an endorsement of integrative care by psychiatric specialists with neurologists to ensure that accurate assessment and early intervention of psychiatric disorders are achieved in CWE.

All these issues emphasize the need for strengthening linkages between the services of other professionals, such as nutritionists, social workers, speech and language pathologists, occupational specialists, or special needs teachers in the holistic management of CWE. Appropriate referrals should be streamlined among the different care options that include the primary care providers, neurologists, epileptologists, and specialists in the various comorbidities of epilepsy.

Together, all these factors make the management of people with epilepsy and provision of cost-effective epilepsy care extremely challenging in Africa.

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Training and Teaching Initiatives in Africa

There are few centers in Africa with the capacity to train health care workers in the management of CWE.18,56,57 Trained staff emigrate for higher salaries and better working conditions and job opportunities; safety and political instability also play a part.65,66 Ideally, training should be promoted within Africa by Africans for the training to be relevant to the health needs of the region. Programs have to be adaptable such that the relevance of patient management improves care across all levels of health care. Community-based programs to raise awareness are essential, and the use of “radio drives,” community projects, and promotion through schools can make a significant difference to awareness, attitude, and compliance.18,57 These are often driven by national nongovernment epilepsy organizations.57

Research—How it Can Help Improve Care of Children With Epilepsy in Africa?

It is clear that children bear the brunt of epilepsy in Africa, but there are still many unanswered questions. Three main areas need to be addressed. First, as many of the causes of epilepsy in Africa can be prevented, it is important to determine the attributable fraction of the preventable causes, so that decisions about the most cost-effective interventions to prevent epilepsy can be proposed to the Ministries of Health. Second, improving access of CWE to biomedical facilities for the diagnosis and treatment is critical to reduce the burden of epilepsy in this continent. Third, operational research into how this can be best achieved is important as public education programs are needed to change the perceived causes of epilepsy and reduce the stigma so that parents and guardians bring their children for diagnosis and treatment. There are little data about the comorbidities, particularly behavioral and psychiatric problems, and how these should be diagnosed and treated in Africa. Further data are needed to improve adherence to AEDs in children, for the investigation of AEDs other than phenobarbital given the concerns about its effects on cognition and behavior in the West, and to study the interactions with ARTs.

Conclusion—The Way Forward

Health practitioners and CWE in Africa are faced with unique challenges to ensure that access to viable care is maintained. This is from the significant proportion of preventable etiologies, the limitations in confirming a diagnosis of epilepsy through to the huge challenges of providing reliable care for CWE. In Africa, the burden of epilepsy is further exacerbated by social, geographic, and economic barriers. There is almost certainly a further underestimation of the true prevalence and incidence of epilepsy among people that is related to the major stigma associated with the condition in Africa, the limited training available to most health care workers who are the primary point of assessing most people with epilepsy, and the results of the increased premature mortality. The significant proportion of patients affected by various comorbidities remains a further poorly delineated area for which at the current time there is little infrastructure in place to support. Finding innovative ways, which may need to be novel to Africa, to address the huge barriers faced by people with epilepsy in Africa needs to be a major goal for the millennium.

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