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Traumatic Brain Injury in Africa: The Republic of Malawi as an example.

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Background: ***Due to the high rate of mortality and morbidity, traumatic brain injury is of great significance throughout the world. Preventive concepts have managed to considerably reduce the incidence in many countries in the northern hemisphere, but such an approach either does not exist or has failed in the developing nations of the southern hemisphere, where in some is a lack of data on the current incidence of traumatic brain injury. This is a review of the literature reflecting the current status of traumatic brain injuries in Malawi.***
Methods: ***Issues of epidemiology as well as actuality of the data have been addressed in a PubMed and Medline review for the Republic of Malawi.***
Results: ***There are very good studies about injuries in Malawi. However, they are not recent in a developing society and country. Traumatic brain injury as a neurosurgical and neurocranial problem in Malawi is underrepresented in the recent literature.***
Conclusion: ***There is an urgent need for epidemiological studies of neurological and neurosurgical diseases including traumatic brain injuries to forward structured development in Malawi.***

Key words: Medical education; Public health; Africa; Neurosurgery; TBI

Introduction

Traumatic brain injury is a global problem, both medically and socially. During times of peace and war, traumatic brain injuries are steadily increasing in number[1]. Traumatic brain injury refers to damage involving the head, including the brain and/or its linings, with neurological dysfunction[2]. In recent decades, considerable advances have been made in the management of patients suffering a traumatic brain injury. In 1996 and 2007, the Brain Trauma Foundation published its first ever guidelines on the management of traumatic brain injury[3,4]. The introduction and standardization of treatments for traumatic brain injury has resulted in a significant improvement in therapeutic outcomes as concerns mortality, morbidity, functional outcomes, treatment duration and costs[5-8]. Nevertheless, there are still considerable differences across the globe in terms of how traumatic brain injury is treated. Such differences depend on the one hand on medical technology and equipment and on the other hand on the medical expertise available.

The relevance of diagnostic decisions and adequate therapy for traumatic brain injury is evident from the wide-ranging outcomes. There may be short-term and acute effects, such as headache, impaired consciousness and focal neurological deficits, as well as long-term effects such as impaired cognitive performance and delayed development, fatigue, drowsiness, nausea, emotional disorders, e.g. changes in character and sleep disorders[9]. The objective of treatment for traumatic brain injury must be to prevent long-term morbidity, particularly in developing nations. Traumatic brain injury is still one of the great challenges to medical science, especially in developing countries such as in Africa[10].

This review aims to address traumatic brain injury and its management in a third-world country as Malawi. Further aim was to confront the medical and social impact of traumatic brain injury in this fast economical and medical developing country and its representation in the recent medical literature. Relevant literature from the last 15 years (MedLine, PubMed) has been reviewed and summarized.

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Malawi is one of the smallest, poorest, and most densely populated nations in Sub-Saharan Africa. It has a surface area of roughly 120,000 km^2 and a population of about 15,263,000. Current life expectancy at birth is 51 years in women and 44 years in men. Infant mortality in children under 5 years of age is 110 per 1,000 live births. The mortality rate in the population aged between 15 and 60 years is 496 in women and 691 in men per 1,000 inhabitants. Gross national income per capita is 619 EUR[11]. 65% of the population is living below the poverty line, surviving on less than 76 eurocents per day[12]. In principle, everyone has the right to public healthcare provision.

Malawi's healthcare system encompasses 21 district hospitals, each located in its own regional health district. In addition, there are four central hospitals in four larger municipal districts. Together, the state-run hospitals manage almost 60% of the nation's healthcare needs. Further health services are provided by church missions and independent hospitals, thereby managing the remaining 40% of the healthcare needed[13].

There are roughly 23 trained surgeons in Malawi covering the entire surgical spectrum. They are not stationed at the district hospitals, however. Most district hospitals have one doctor who, after completing his medical studies and basic practical training, is assigned to one of the said facilities. He assumes responsibility for the hospital's medical and commercial management. Clinical officers with four years of paramedical training support the work of this District Health Officer. Periodically, surgeons from the central hospitals visit the district hospitals to provide assistance with the clinical workload[13]. At present, two neurosurgeons are working in Malawi.

Epidemiology of injuries and surgical statistics

A study of the epidemiology of injuries conducted at Kamuzu Central Hospital (February to June 2008) revealed that of the 1474 patients counted, men were in the majority (75.7%). The age distribution was described as bimodal, with a peak at the age of < 5 years and between 26 and 30 years (Figure 1).

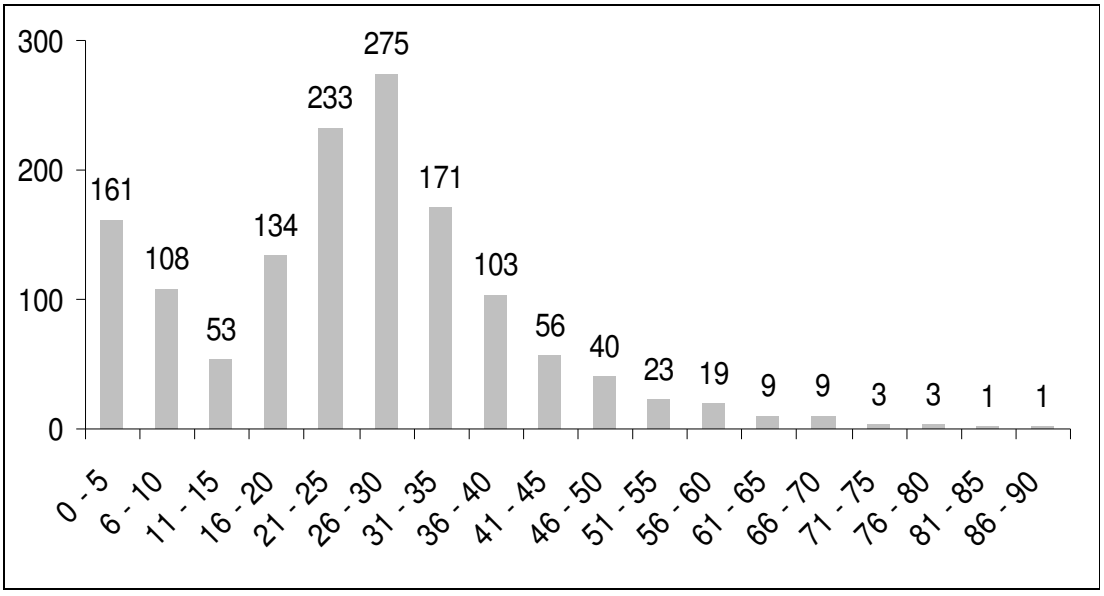

Figure 1. Age distribution of patients recorded in the Malawi Trauma Registry[14].

A study at Kamuzu Central Hospital in 2008 found that road traffic accidents (43%) were the most common cause for the injuries (N=1474). Passenger cars were most commonly involved in such accidents (19%), followed by attacks and assaults (24%), then falls (13.5%). Traumatic

brain injuries were reported at a rate of 7.5%. The most frequent means of reaching the hospital were private vehicle (43.8%), ambulance (15.4%), walking (14.5%) and public transport (7.8%). Depending on the method used for reaching the hospital, the pre-hospital phase varied between 3 hours and 21 minutes[14].

Traumatic brain injury and its management in Malawi

Traumatic brain injury is one of the leading causes of death and morbidity worldwide[15]. Just as in Europe, road traffic accidents are one of the main causes for traumatic brain injury in Malawi[2]. When compared on an international level, Malawi has fewer roads and means of transportation (*compared at a statistical level of approx. 100,000 vehicles*), but a very high number of road traffic accidents. In 1995, 82.9 accidents per 1000 vehicles were reported. Between 1987 and 1995, 126.8 to 138.7 deaths were reported following an accident per 10,000 vehicles. 55.6 to 73.5 individuals died at the site of the accident per 1000 vehicles[16]. According to the German Federal Statistical Office, 761 individuals were killed by a road traffic accident in March 2012 (80200)[17]. Roughly 25% of traumatic brain injuries in Germany are caused by road traffic accidents[18]. More recent figures are not available for Malawi. However, older figures reveal that there were about 5 acute traumatic brain injuries per 100 hospital admissions at the Queen Elizabeth Central Hospital between July and December 1995. In 1994, traumatic brain injury was the main cause of death amongst emergency admissions at the surgical department, ahead of burns or HIV-associated Kaposi's sarcoma[19].

If the frequencies of surgical interventions in Malawi are compared, it becomes clear that neurocranial operations are extremely rare despite the fact that the number of traumatic brain injuries is high. Boreholes (no other neurosurgical procedures like craniotomy) are the most uncommonly procedure in Malawi (Number of operations = 48 696; 25 053 in district hospitals and 23 643 in central hospitals)[13].

Even when neurosurgery itself is not the major medical issue in Malawi - beside greater problems like HIV, lung diseases or mortality in children - the following epidemiological questions thus arise from the discussion above, also with a view to improving a small medical speciality and the relevant medical care. What are the current figures and causes for traumatic brain injuries in the municipal and rural areas of Malawi? How are traumatic brain injuries distributed in Malawi in relation to age, sex and severity? What structure exists for managing traumatic brain injuries in Malawi (admissions, surgical treatment, and computed tomography)? What are the (treatment) outcomes following traumatic brain injury in Malawi?

The current incidence of traumatic brain injury in Malawi is unknown. There is an urgent need for new epidemiological research. With the growing prosperity and advancing logistical development of a country, the short and long-term effects of traumatic brain injury may not be underestimated.

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