

## Musculoskeletal Trauma Services in Uganda

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**Abstract** Approximately 2000 lives are lost in Uganda annually through road traffic accidents. In Kampala, they account for 39% of all injuries, primarily in males aged 16–44 years. They are a result of rapid motorization and urbanization in a country with a poor economy. Uganda's population is an estimated 28 million with a growth rate of 3.4% per year. Motorcycles and omnibuses, the main taxi vehicles, are the primary contributors to the accidents. Poor roads and drivers compound the situation. Twenty-three orthopaedic surgeons (one for every 1,300,000 people) provide specialist services that are available only at three regional hospitals and the National Referral Hospital in Kampala. The majority of musculoskeletal injuries are managed nonoperatively by 200 orthopaedic officers distributed at the district, regional and national referral hospitals. Because of the poor economy, 9% of the national budget is allocated to the health sector. Patients with musculoskeletal injuries in Uganda frequently fail to receive immediate care due to inadequate resources and most are treated by traditional bonesetters. Neglected injuries typically result in poor outcomes. Possible solutions include a public health approach for prevention of road traffic injuries, training of adequate human resources, and infrastructure development.

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### Introduction

Uganda is among the low- and middle-income countries of East Africa, has a current population of 28 million, and is rapidly growing at an annual rate of 3.4% [12, 15]. Musculoskeletal injuries, mainly due to road traffic crashes, are common and on the rise and have a major socioeconomic impact. Resources to manage this epidemic in the country are scanty, resulting in high mortality and morbidity. This article describes the current situation to highlight the problems and recommend possible solutions.

### Sources

Based on personal experience and literature review, a situational analysis of the burden of musculoskeletal injuries in Uganda is presented. Data sources include the Injury Control Centre in Uganda for the period August 2004 to July 2005 about patterns of musculoskeletal injuries in five regions of Uganda [4] and the National Planning Authority of the Republic of Uganda, Working Draft for National Dialogue of June 2005 [12]. Other sources of information include official documents from the Ministry of Health of the Republic of Uganda, namely the National Health Policy of September 1999, Health Sector Strategic Plan 11 of 2005/06–2009/2010 Volume 1, and the Financial Year 2006/07 District Transfers for Health Services of July 2006 [2, 3, 11].

### The Country

The Republic of Uganda is among the least developed countries found along the equator in the East African

region. It is a former protectorate of Great Britain that attained its independence in 1962. The estimated population of Uganda is approximately 28 million people, 87.7% being rural and 12.3% urban [11, 12, 15, 16]. The gender ratio is 95.3 men per 100 women [12]. Life expectancy at birth is 48 years for men and 51 years for women. Infant mortality rate is 83 per 1000 live births. Thirty-eight percent of the population is living below the poverty line [12] (Table 1). The real per capita income is \$328, the main source of which is agriculture (76.5%) [12]. In the recent past, there has been a serious problem of unplanned urbanization in Uganda. The National Census (2002) indicates an urban growth of 4.6%. This urbanization has been due to natural population growth, a search for better services and employment, and a number of related factors [12]. Poverty is the main underlying cause of the poor health situation in Uganda. Associated factors are the low levels of literacy (69%), high prevalence of communicable disease, emergence of diseases due to lifestyle, inadequate distribution of social service amenities, and the general level of underdevelopment of service infrastructure [11]. The population of Uganda is grossly underserved with health workers. The doctor-patient ratio is 18,600 to 1 and the nurse-patient ratio is 7700:1 [12]. Since 1996, the Republic of Uganda has had a stable democratic government under the leadership of the National Resistance Movement (NRM Government). It has established democratic institutions, accountability, justice, and observance of human rights. The civil service is quite independent from politics. The government acknowledges existence of malpractice and corruption in the country. In respect to the poor health situation attributable to poverty, the government of Uganda has embarked on a major poverty eradication program with emphasis on modernization of agriculture, improvement of rural infrastructure, development of marketing opportunity, universal primary and recently secondary education, primary healthcare (PHC), and water and sanitation [11].

**Table 1.** Population and health indicators

Variable	Data [12]
Population below poverty line	38%
Rural population	95%
Average life expectancy	43 years
Infant mortality rate	88/1000
Maternal mortality	505/100,000
HIV prevalence	6.5% (2001/2002)
Health sector budget	9.6% (2002/2003)
Per capita on health per district	US\$ 4
Population growth	3.5%/year (~8 million)
Total population	26 million (2006)

The health sector budget is 9.4%, and the per capita amount spent on health throughout the districts is US\$ 4 [11, 16].

## Musculoskeletal Injuries

Musculoskeletal injuries in Uganda occur mainly as a result of road traffic crashes. Predisposing factors include rapid urbanization, poor roads, traffic mix (types of vehicles, pedestrians) poorly trained drivers, driving under the influence of alcohol, and lack of respect for traffic regulations (Fig. 1). A majority of the vehicles involved are motorcycle taxis (Boda Boda accounting for 25%) [9] and omnibuses. In a study of cyclists, only 29% used helmets, 38% had no motorcycle driving license, and 46% were not wearing reflective material [5].

In the period August 2004 to July 2005, 1398 (39%) of the 3585 individuals in road traffic accidents had musculoskeletal injuries [4, 10]. The Mulago National Referral and Teaching Hospital sees 44% of these injuries while the Lacor Regional Hospital sees another 23% (Table 2). Most



**Fig. 1** Traffic congestion, mix of vehicle/pedestrian traffic, and other factors including poor road designs raise the risk for road traffic crashes.

**Table 2.** Proportion of musculoskeletal injuries among road traffic injuries (RTIs) by hospital

Hospital	Frequency	Percent
Fort Portal	183	13.1
Lacor	316	22.6
Mbale	187	13.4
Mbarara	103	7.4
Mulago	609	43.6
Total MS injuries	1398	100

**Table 3.** Proportion of musculoskeletal injuries among road traffic injuries by occupation

Occupation	Frequency	Percent
Peasant farmer	220	16.0
Civil servant/private employee	204	14.8
Driver/conductor	161	11.7
Small business owner	181	13.2
Student/pupil	222	16.1
Housewife	103	7.5
Casual laborer	148	10.8
Large business owner	10	0.7
Unemployed	65	4.7
Child/baby	34	2.5
Combatant	13	0.9
Other	14	1.0
All MS injuries	1375	100

**Table 4.** Proportion of musculoskeletal injuries among road traffic injuries (RTIs) by outcome within 2 weeks

Outcome	Frequency	Percent
Discharged	887	66.6
Died	50	3.8
Still in hospital	358	26.9
Ran away	24	1.8
Referred to another facility	12	0.9
All MS injuries	1331	100

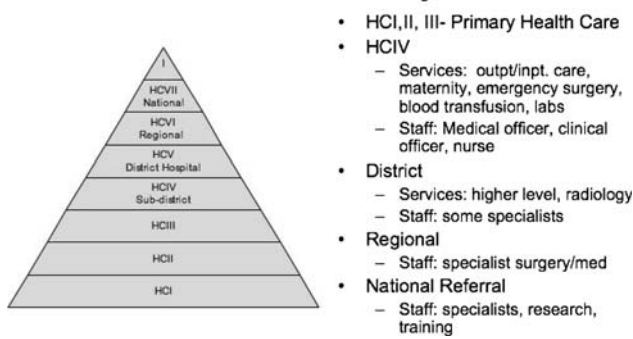
of the injured are younger (mean, 30 years; range, 5–80 years) with the majority from 16 to 44 years of age. Seventy-five percent of the musculoskeletal injuries are male. Not unexpectedly the occupations of the injured vary widely but the two most commonly affected groups are students and peasant farmers (Table 3). Approximately 4% of the admitted patients died within 2 weeks of admission (Table 4) [4, 10]. The annual injury mortality rate in Kampala City is 217 per 100,000 people per year, with 46% of all fatal injuries due to road traffic accidents [6].

### The Health System

Uganda is divided administratively into more than 45 districts (LC5), which are further subdivided into counties, subcounties, parishes, and villages. There are 39,692 villages or local councils (LCI), 4517 parishes (LC2), 893 subcounties (LC3), and 167 counties (LC4). The health service infrastructure follows this pattern, with health centers of increasing capacity (designated HC1, HC11, HC111, and HC1V) [11]. The health referral system starts from the lowest health unit (HC11), which serves a

population of approximately 5000 people. It provides outpatient care, antenatal care, immunization and outreach, and is manned by an enrolled nurse, enrolled midwife, and two nursing assistants. An enrolled nurse or midwife is a certificate holder and not registered. HC111 serves a population of 20,000 people. It provides, in addition to the services of HC111, inpatient services and environmental services. Its staff includes one clinical officer, one enrolled nurse, two enrolled midwives, one nursing assistant, one health assistant, one laboratory assistant and a records officer. HC1V, which is a health subdistrict unit, serves a population of 100,000 people. It provides all services of HC111 plus surgery. It supervises all the lower health units, collects and analyzes data on health, and plans for the health subdistrict. It has at least one medical officer, two clinical officers, one registered midwife, one enrolled nurse, and one enrolled midwife, one comprehensive nurse, two nursing assistants, one laboratory technician, one laboratory attendant, one health inspector, one dispenser, one public dental assistant, one anesthetic officer, one assistant health educator, one records assistant, one accounts assistant, and two support staff. The district hospital (general hospital) serves a population of about 500,000 people. It is a 100-bed hospital, which provides preventive, promotive, and curative outpatient services, maternity, inpatient health services, emergency surgery, blood transfusion, laboratory, and general services. It also provides in-service training, consultation, and research in support of the community-based healthcare programs. It is equipped with two operating theatres, facilities for sterilization, diagnostic services (imaging and radiography), laboratory services, waste disposal, and mortuary services. The unit has running piped water and is connected to the national electricity supply. In addition, emergency power supply in the form of electric generators and solar is available. The budget for a general hospital is equivalent to US\$147,000 per annum [2]. Two orthopaedic officers are available at this level to provide musculoskeletal services. Other staff at this level include, among others, one principal medical officer, one medical officer special grade (has a master's degree in community medicine), four medical officers, one dental surgeon (degree holder), two public health dental officers (paramedical diploma holder), one principal nursing officer, five senior nursing officers, 17 nursing officers (nursing), and three nursing officers (midwifery) [3]. The regional referral hospital serves a region with both general and specialist services and the national referral hospital is at the national level for teaching, research, and specialist patient services. The hierarchy of referral progresses through health centers, district, regional, and finally the national referral at the apex (Fig. 2). There are two national referral hospitals, 10 regional, 56 district, and 250 subdistrict facilities (health center IV). Medical officers and paramedical staff are

### Structure of Referral System



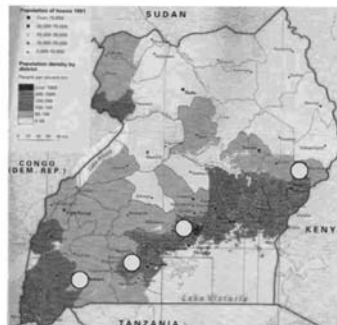
**Fig. 2** Referral system and services provided. Musculoskeletal services are offered from the general hospital level as the lowest unit, where there are basic resources. The complicated cases are referred to the regional and national level.

### Orthopedics in Uganda 2007

23 Ortho surgeons ○  
 Kampala 18  
 Mbarara 1  
 Masaka 1  
 Mbale 2  
 Kumi 1

Unreliable equipment  
 Unreliable supplies

*Orthopedic Officers 200*



**Fig. 3** Orthopaedic surgeons are concentrated at the center in the capital city, with few at the regional hospitals.

posted from health center IV and above. Specialist services are only available at the regional and national level. The orthopaedic surgeons are concentrated in Kampala (18 of the 23) with the other five in four units (Fig. 3).

Limited orthopaedic care at the district (general) hospital is provided mainly by the orthopaedic officers with the support of medical officers. At the regional level care is principally provide by general surgeons and where available orthopaedic surgeons. A medical officer has a bachelor's degree of medicine and surgery and is capable of providing general medical services, pediatrics, obstetrics and gynecology, and general surgical services. They are capable of doing limited obstetric and emergency surgery including herniorrhaphies, Caesarian sections, laparotomies, débridement of open fractures, and fracture stabilization by casting or traction. The clinical officers are paramedicals with diploma qualification. They are capable of providing general medical care. They cannot perform major surgical procedures, but can perform minor surgery limited to surgical toilet, sutures, and draining of abscesses. The orthopaedic officers are also paramedical and have

diplomas by qualification. They can manage most simple orthopaedic conditions and are trained to detect and treat fractures by nonoperative means, have experience in plaster techniques, traction methods, nursing care of orthopaedic patients, treating of clubfeet using Ponseti method, etc. They can detect complicated orthopaedic problems and refer patients to orthopaedic surgeons. There are over 200 orthopaedic officers distributed countrywide. Fractures at the lower-level care centers are mainly managed nonoperatively, while at the regional and national referral levels, both nonoperative and operative methods are practiced. Delay for surgery at the center is common due to a shortage of anesthesia, operating time, irregular availability of supplies, and shortage of manpower.

Surgical services at the Mulago orthopaedic department includes an emergency theatre that runs daily, three operating days for elective surgery, and a separate theatre two times a week for infections. On average 1400 surgeries are performed per year: 500 emergency cases, 500 infection cases, and 400 elective procedures.

Some patients with fractures are treated by traditional bonesetters with manipulations and locally made rigid splints, and some by telepathic (psychic) means. A subset of patients develops serious complications including compartment syndrome, infection, malunion, nonunion, and joint stiffness. Amputations have sometimes been necessary in children who present with gangrene following treatment of supracondylar fractures of the humerus by traditional bonesetters.

Prehospital care is also poor and contributes to high mortality and morbidity. Data from a dissertation at Mulago suggested out of a total of 378 patients with severe musculoskeletal injuries admitted at the accident and emergency department, only 28% arrived within 1 hour of injury [14]. Ambulance personnel, police, and laypeople retrieved patients 2.4%, 12.4%, and 85.2% from injury scenes, respectively. In patients requiring circulatory stabilization, splintage, and intravenous infusions only 31%, 14%, and 11% received the appropriate treatment [14].

### Education and Training

Training of health workers in their environment is a crucial factor at all levels to ensure a sustainable supply of personnel [1]. The Department of Orthopaedics of Makerere University began a master's program in 1996 in collaboration with Health Volunteers Overseas (HVO). It has a faculty of eight orthopaedic surgeons who train 100 medical students per year, 16 orthopaedic residents on a 4-year program, and 100 orthopaedic officers (paramedical) per year. The orthopaedic residents' musculoskeletal training is a postgraduate training program. It includes knowledge of

basic sciences, which is done in the first year of training, and biomechanics, musculoskeletal trauma of all limbs including the spine and pelvis done during the second year of training. The program includes both theory and practical exposure in the clinical area. The orthopaedic officer training program is a 3-year training program leading to the award of a diploma in clinical orthopaedics. The course content includes essential knowledge of basic sciences done in the first year, then theory and practical knowledge of fractures, bone and joint infections and other orthopaedic conditions, plaster techniques and traction methods, and nursing principles. There are approximately 300 orthopaedic officers working in both government and private hospitals. They are certified to treat fractures by nonoperative means, which includes traction and casting. They are also allowed to see and treat other orthopaedic conditions, but may not perform surgery. They improve their skills through experience, continuing professional training, and through support and supervision by the orthopaedic surgeons.

In addition, the College of Surgeons of East Central and Southern Africa (COSECSA) has started a fellowship program in orthopaedics. This is a 5-year postgraduate program offered by the College to registered medical officers who train at accredited hospitals to the college. The program has courses in basic sciences, acute trauma management, and general surgery completed during the first 2 years of the program, followed by detailed theory and practical knowledge in orthopaedics and trauma during the last 3 years of the program. After the first 2 years, an entry exam leading to the award of MCS (Orthopaedics) is taken, and then an exit examination is completed at the end of the fifth year of training leading to the award of FCS (Orthopaedics).

## Discussion

Where Are We Now? Where Do We Need To Go?  
How Do We Get There?

Provision of quality medical care requires a network of functional, efficient, and sustainable health infrastructure closer to the people it serves. The functional status and the linkages between the different levels of care and coordination of the various healthcare providers need to be assured so as to improve access and minimize avoidable waste. In order to meet this goal, it is important to develop mechanisms that will ensure equity in access to basic services for the most important life-threatening health problems, build and strengthen the capacity of health facilities and improve health service provision, including equipping the health units with laboratory and diagnostic

services, facilities for delivery of the essential services, provision of the trained personnel, and availability of the essential supplies and drugs consistent with the established standards. This calls for a sound economic status of the nation.

Access to quality musculoskeletal services is a global concern, especially in resource-constrained countries [8, 13]. In Uganda the situation is complicated by a shortage of human resources, inadequate infrastructure, shortages of equipment, and an irregular supply chain owing to the poor economy. As a result, the quality of care is poor. There are only 23 orthopaedic surgeons (18 in the capital city and five upcountry) serving a population of 28,000,000.

The World Health Organization estimates that by 2020, trauma will be a leading cause of life lost in both developed and developing countries [8, 13]. Low- and middle-income countries account for 85% of the deaths and 90% of the annual disability adjusted life years (DALYs) lost because of road traffic accidents [8, 13].

The solution of access to the quality essential musculoskeletal services will necessarily require the support of governmental and nongovernmental organizations. It can occur only through training and distribution of resources at all levels of healthcare countrywide, provision of adequate infrastructure and sustainable supply chains of essential materials, and improvement of the roads. Adherence to road safety regulations and availability of emergency ambulance services with trained personnel in the country is an essential preventive measure [7]. However, none of this can happen without good planning and a sound national economy.

Government efforts to improve the situation include control of road traffic accidents through road safety campaigns; enforcing road safety laws (eg, use of helmets, safety belts, and speed governors in commercial vehicles); making drunken driving and use of mobile phones while driving punishable by law; and widening of the roads to improve visibility, especially at “black spots” where road traffic crashes frequently take place. These may be areas with a high density of road users, poor visibility, poor road designs, sharp corners, T-junctions, and at the end of steep roads.

Musculoskeletal services in Uganda are largely inadequate resulting in high morbidity and mortality. High population growth, urbanization, motorization, and poverty may be contributing factors. There is a need for the government to plan for the growing population to access essential musculoskeletal emergency services, establish ambulance services, ensure a sustainable supply chain of consumables, develop infrastructure, and train all levels of health workers and deploy them country wide. Law enforcement and road safety measures need to be strengthened. According to Vision 2035 of the Republic of

Uganda [12], life expectancy at birth is expected to be 60 years, the ratio of patient to doctor to be 5000:1 and patient-nurse 1000:1. It is hoped that Uganda will be a developed nation in all aspects with a strong self-sustaining economy through the strategy of poverty alleviation [12]. It is hoped that through a strong self-sustained economy and a strategic national health policy access to quality trauma musculoskeletal services will improve.

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