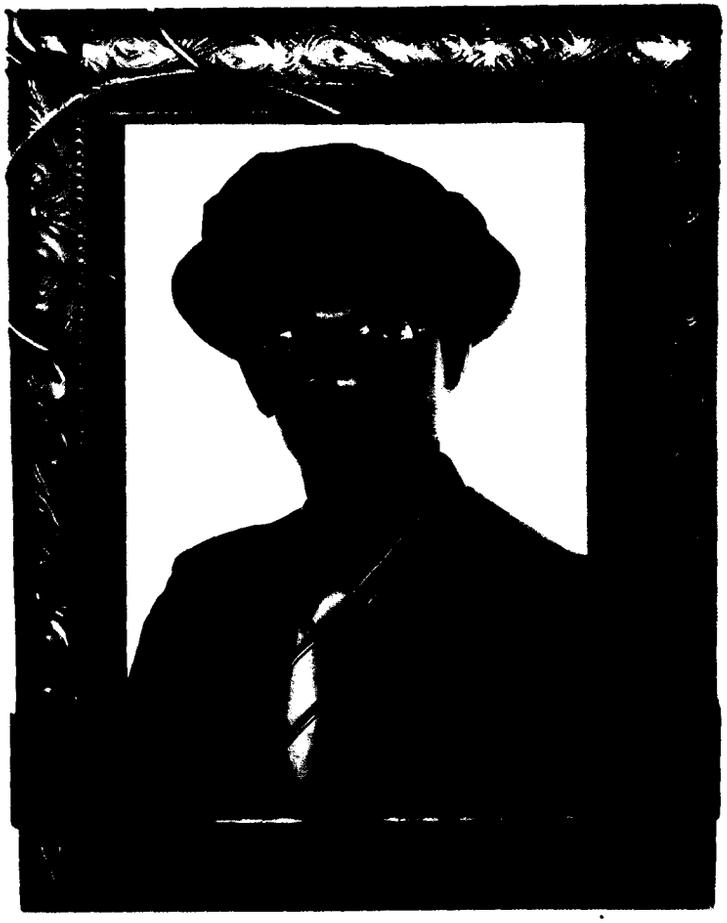

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OF CITIES, MOTIONS AND THE BROKEN ONES

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and Head, Department of Surgery

63rd Inaugural Lecture

OLABISI ONABANJO UNIVERSITY
AGO-IWOYE

Tuesday, 9th April, 2013

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OPENING

The Vice-Chancellor

Principal officers of the university

Provosts of Colleges and the Postgraduate school

Deans of Faculties

Professors serving and retired

Heads of departments

My teachers, colleagues, family and friends

Our Royal highnesses

Men and women of the press

Distinguished ladies and gentlemen

And of course Great OOUITES!

INTRODUCTION

I feel greatly honoured to be opportuned to stand before you today, to deliver the 63rd inaugural lecture in our university and the first by a professor of Orthopaedics and Trauma Surgery. In the beginning, there was nothing or rather, there was void as some would say! Then there was creation, theorized by some fertile mind to have been accompanied by a "big bang"!! Now, among other things, there are injuries and diseases affecting the musculoskeletal system (MSS)

as well as efforts to understand and treat them, as we have attempted to do in the past few years. All praises to **Olodumare**, the ultimate in creation, understanding and cure, who for good reasons bestowed on mankind wisdom, understanding and treatment through *Orunmila* baba ifa, that ancient custodian of wisdom and healing; through *Oduduwa*, Olofin Adimula, Oba nla, the progenitor of the Yoruba and their embodiment of wisdom and tradition; through *Socrates* the great Greek thinker and teacher; through *Galen* the Greek physician, surgeon and philosopher; and of course *Nicholas Andry*. Nicholas Andry in 1741 coined the word "orthopaedics" which in French is "orthopedie", from the Greek words "orthos" meaning straight and "paideion" meaning child. The term described the correction of deformities in children which was the main preoccupation of orthopaedics at that time. Today, it has blossomed into a branch of surgery that deals with injuries, disorders and diseases involving the musculoskeletal system, from the head and neck to our toes. This lecture is intended to describe the burden that accidental injuries and bone infections are to people, the broken ones, and our modest contributions in areas of care of the affected ones.

Several challenges have attended our efforts. These include limited funding of clinical research; grossly limited clinical facilities for diagnosis and treatment of the broken ones; poverty and ignorance which may be the most important combination of reasons for late presentation to the orthopaedic and trauma surgeon, of several people with musculoskeletal diseases and injuries. This is the story of our experiences and contributions in the past sixteen years. It is the story **"Of Cities, Motions and the Broken Ones".**

Of cities, Motions and the Broken Ones

Evolution of cities

The history of human civilization started with nomadic existence, characterized by wandering from place to place in search of food, water and pasture for livestock. Deliberate cultivation of land and animal husbandry, starting from about 10,000 years ago, resulted in the formation of permanent settlements. Ancient cities were thereafter formed as the requirements for city formation were met. These were surplus food, development of food storage systems for surplus food, complex social organisations and technological advancements. Advancements in fire and warmth generation, pottery and domicile construction, loom making and cloth weaving, introduction of the plow and of course, metallurgy. This need to aggregate in a place for residence as the basis of development of cities has been challenged in few instances only, such as in Dubai where pleasure, in luxury at its best, is the leading motivation.

Figure 1. A typical African city, Ethiopia

Cities are complex aggregates of people, with as much diversities as there are cities. Some cities are known for agricultural produce while others are renowned for crafts, metalwork or military prowess. In fact, within some cities, different families became custodians of different things. Frequently, goods and services have to be exchanged between cities, hence the need for travel paths on

land, water and eventually in the air. Human beings have bee exposed to risks of violence and injury from as early as he appeare on land, from animals and fellow human beings. As we can recal from the history of slave trade and the sheer magnitude of the man wars that have been and/or are being fought presently in al continents, man is the main enemy of man, with other life-forms a deliberate or collateral victims.

Cities are artifacts located on natural world templates, profoundly influenced by intra-city and inter-city transportation. Every modern city has a wide array of transportation network to carry people and goods.

Figure 2. A rural foot path

Ancient cities are associated with narrow paths for foot travels and animal vehicles such as horses and camels. Modern cities, on the other hand, are adorned with tarred roads, sometimes as wide as ten lane carriageways, among other routes of transportation.

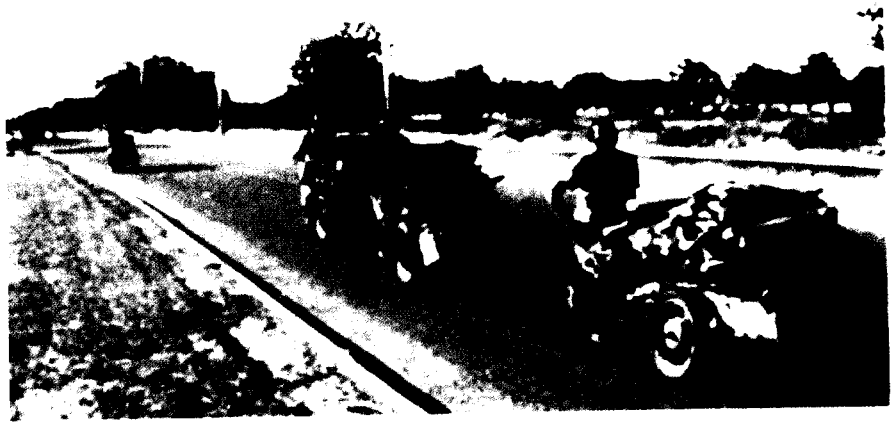


Figure 3. A modern road

Cities have changed dramatically since the industrial revolution of the 1740s. Millions of rural dwellers have moved to the cities to swell urban populations with increasing road travels. The introduction of the global system of mobile telecommunication (GSM) may have increased rather than decrease road travels. Wealth, from the 'black gold', that is crude oil, as well as contemporary trade has made some cities rapidly motorizing, particularly commercial cities like Lagos as well as hubs of the petroleum industry in Nigeria such as Portharcourt.

Evolution of transport systems

Transportation is a means of moving people and goods from one location to another. The earliest means of transportation and probably the safest, though not necessarily the most efficient, is the foot of each and everyone of us. However, the need for transport efficiency propelled dreams, designs and development of novel means of transportation. Chuko Liang (181-234 A.D.) [illegible]

general, is considered to be the inventor of the wheelbarrow, which was used to transport supplies and injured soldiers during his time. The Chinese wheelbarrows of that time had two wheels and required two men to propel and steer. Later, they introduced the single wheeled barrow. A French father and son, in 1861, Pierre and Ernest Michaux, invented the first modern bicycle with pedals and cranks.

Figure 4. Medieval bicycle

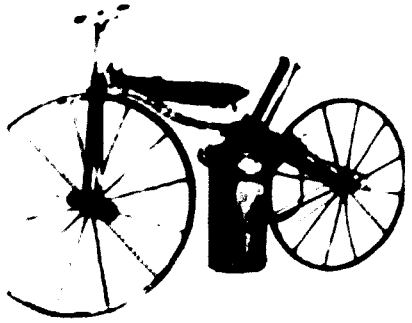


Figure 5. Howard Roper's steam cycle

An American, Sylvester Howard Roper (1823-1896) invented a two-cylinder, steam-engine motorcycle (powered by coal) in 1867. This can be considered the first motorcycle. He also invented a steam engine car. The German, Gottlieb Daimler invented a gas engine motorcycle in 1885. Three and four wheeled motorized vehicles followed and today there are aircrafts with take-off weight of more than 400,000kg, fast land and underground trains as well as sea crafts of various dimensions and utility. The development of these means of transportation were accompanied by crashes and injuries such that today traffic and vehicle related injuries are very common.

A census of this audience will most certainly confirm either a personal experience or knowledge of a friend, family member or acquaintance who has been a victim of a road crash. You will notice a deliberate avoidance of the term "accident" in my descriptive terms

of vehicle crashes and injuries. This is because these familiar events are hardly accidents, in the majority of instances. An accident is a sudden event or sequence of events which for an individual or group of individuals is apparently unpredictable and which may or may not result in injury. Using old and thread-bare vehicle tyres, poorly maintained and tired vehicles still in forced use, driving under the influence of alcohol and mood enhancing drugs, exceeding speed limits on intercity and intracity roads that are replete with pot holes and sometimes craters or man holes, are some of the usual causes of "road traffic crashes" or "road traffic incidents" which should therefore not be referred to as "road traffic accidents". The thread of a tyre refers to the patterns on its rubber circumference that makes contact with the road. Please do not use a car tyre that is more than 6 years old even if it looks brand new. It is expired, structurally weak and is unsafe. To know the age of a car tyre, look for the DOT number on the tyre sidewall. DOT xxx 3311 means the tyre was manufactured in the 33rd week of year 2011. Tyres, including spares, should be checked weekly for correct pressure gauge. Underinflation and overinflation can result in sudden bursting while driving. Tyres should be checked monthly for cracks, bulges and objects caught in the thread. Excessive cracks, bulges and any distortion or deformity is an indication for tyre change. New tyres have an in-built thread wear indicator and when this become visible, the tyre should also be changed. I am unaware of a tyre thread legislation in Nigeria but I advice a tyre change if the thread depth in the middle quarter of the thread surface is less than 2mm.

Epidemiology of injuries

Injury is intentional or unintentional damage to the body, resulting from exposure to thermal, mechanical, electrical or chemical energy; or the absence of essential heat or oxygen. It is a major health issue worldwide, but especially so in developing countries like Nigeria, contributing significantly to morbidity and mortality. Worldwide, injury is the sixth leading cause of death, and the leading cause of death from unintentional injury.

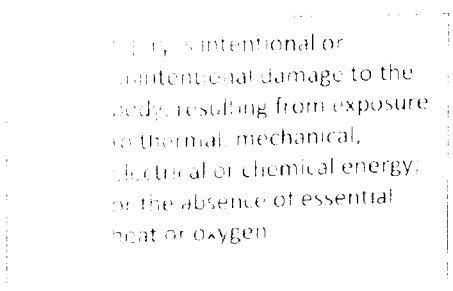


Figure 1: Definition of injury

Injury causes
9% of all mortality
12% of global burden of disease
Most deaths in persons aged 15 to 45years
Injury is 5th leading cause of disability worldwide

Table 1. Injury factsheet - WHO Global Burden of Diseases Report

Injury burden in Nigeria is 11.2 per 100,000 population
This figure is most likely a gross under representation due to
Under reporting
Under documentation

Table 2. Injury factsheet Nigeria.
Ekanem EIA. Prehosp
Disaster Med 2011; 26: 1-6

Injury data collection
Epidemiology of injuries
Epidemiology of Injury disability
Cost of injury care and disability burden
Public perception of causes of injuries

Table 3. Areas of needed strategic trauma research

According to the World Health Organization, Global Burden of Disease report, injury is responsible for 9% of all mortality and 12% of the total burden of disease. It is also the fifth leading cause of disability. Between the ages of 15 and 45 years, trauma is the leading cause of death.

Countries in Africa and parts of Asia account for a disproportionate number of the global burden of injury, that is, over 85% of the global burden. The rate of disability-adjusted life years (DALYS) in low and middle income countries, 2,398 per 100,000 people, is more than triple that in high income countries. Accidental injury death rate similarly is nearly double those reported in high-income countries (65 per 100,000 persons versus 35 per 100,000 persons). As we have shown, the injury burden in Nigeria is 11.2 per 100,000 population

but this is likely to be a gross under representation due to under-reporting and under-documentation which we have also shown to be an important limitation to clinical trauma research. Beyond mortality statistics are the number of persons disabled from unintentional injuries. The number of persons disabled by injuries may be 20 to 50 times the number of those killed. This represents an enormous burden on households, communities and the country as a whole because such persons may no longer be able to work and earn a living, thereby becoming dependent on the scarce resources that are available to others.

In Sub-Saharan Africa, reports on the epidemiology of injuries are few. This may be due to a paucity of research on violence and injury prevention. In order to constructively engage public policymakers and evolve strategies for effective violence and injury prevention, more research must be done in Sub-Saharan Africa in areas of injury data collection, defining the epidemiology of injuries, estimating the cost to governments and communities of the burden of injuries and injury disabilities, and understanding public perception of the causes of injuries. In Nigeria, there is no true national or regional trauma registry and data on injuries generally is obtained from studies of the records of single hospitals. There is a disparate collection of data with the Nigeria Police, Federal Road Safety Corps and a medley of Emergency Management Agencies, all "doing their own thing".

There is an urgent need for the establishment of
National trauma registry
Regional trauma registries
Institutional trauma registries

Table 4. Types of Trauma Registry

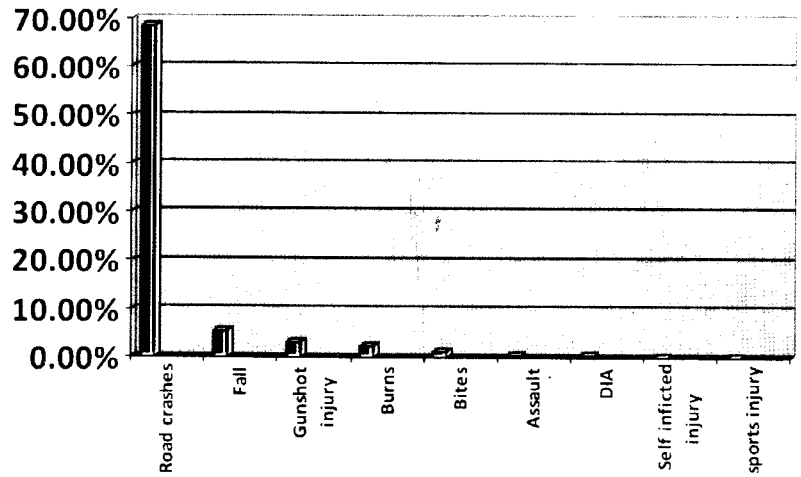
Road traffic injuries
Gunshot injuries
Fall
Drowning
Burns
poisoning

Table 5. Major causes of injuries

The major causes of injury are road traffic incidents, falls, firearms use and abuse, burns, drowning and poisoning. However, differences exist in injury pattern and injury mortality within and between different countries as well as in time trends. In some urban US cities,

the prevalence of homicide and civilian firearm injuries are as high as 45.3% of all injuries. In South Africa, gunshot injuries have been reported to be as much as 60% of the injuries in some cities, and in India, 41.4%. Road traffic crashes are however, the leading cause of injury in many parts of Africa, Asia, Europe, and the US. Falls frequently are reported as the cause of injury in children and adolescents ≤ 18 years of age with incidence rates of >40% and also in persons 80years and older. Poisoning, often seen in children <5 years of age, is not common in Africa. We conducted a systematic analysis of the epidemiology of injuries in Nigeria and observed that young productive males (twice as many females) between the ages of 14 and 40 years are often the victims, the broken ones. The leading causes of injury in Nigeria are road traffic crashes, fall, gunshot or firearm injuries and burns (Figure 7).

Figure 7. Aetiology of injuries in Nigeria



DIA: domestic / industrial accidents

Childhood injuries

According to the WHO / UNICEF joint world report on child injury prevention, more than 2000 children and teenagers die everyday

from an injury which could have been prevented. This is a staggering over 700,000 deaths annually. Majority of injuries in children are however minor injuries that occur as an unavoidable part of the therefore, learning and developmental process of perfecting psychomotor skills. The usual "fall" and "bumping" into objects around them are learning events in the process of perfecting psychomotor skills. Injury is the number one reason for hospital admission of children, accounting for more than 36% of all admissions. We have shown that injury is also responsible for the longest duration of hospitalizations of children admitted for surgical treatment. The longest duration of admission of children for injuries that we have recorded is 127 days (mean 22 ± 25). Fractures, the leading cause of childhood surgical admission account for 43% of all injuries followed by burns 19%. Fall, either from heights or on a level ground, is six times more important cause of injury in children than in adults, representing 29% cause in children in Nigeria (figure 8). Despite this however, road traffic incidents are the most common causes just as in adults, accounting for 34% of all childhood injuries in Nigeria.

- Globally More than 2000 children and teenagers die everyday from injuries that could have been prevented

Table 6. Global childhood injury death fact sheet. WHO / UNICEF joint world report on child injury prevention

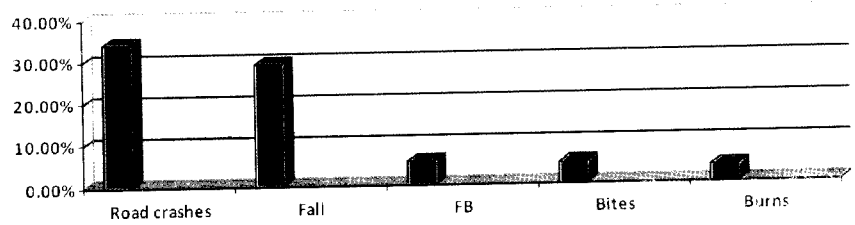
- Fractures 43%, the leading cause of childhood surgical admission
- Burns 19%, second leading cause of childhood surgical admission
- Injury from fall occur six times more often in children than in adults
- Road traffic incidents are the leading cause of injury in children

Table 7. Childhood injury factsheet- Nigeria Thanni LOA et al West Afr J Med 200 24:1-12

Drowning injuries appear to be rare since it almost never feature i our hospitals' trauma statistics. There is a growing awarenes worldwide, that drowning is underreported but the barriers to unde reporting are not fully known. The few or many cases that occur i Nigeria and elsewhere may not reach the hospital. The youngster that are commonly victims are quickly buried so as to limit family grief. Burns is the only type of injury that predominantly occur in children and women. Leaving crawling children near a fireplace unattended or cooking with stoves placed near a child's reach are predictable risk factors for burns which is often not fatal, but can result in severe disfiguring of especially the face, neck, hands and feet. The implication of these findings are important. An ill and hospitalized child destabilizes the home by keeping the mother in hospital, away from the care of other siblings. There is also interruption of the mother's economic activities with which she significantly subsidises the family cost of living or in some instances completely underwriting the living expenses of the family. All too often, the mother is compelled to ask for her child's discharge from admission when her meager resources have become stretched to breaking point. There is therefore a need to subsidise the trauma care of children, at least the cost of bed stay and feeding. Our children are our future. They should be receiving a part of the so called Sovereign Wealth Fund rather than stashing this away in foreign currencies and in financial institutions over which we have absolutely no control. It is interesting to hear and read about the need for government to "hands off" in matters relating to health, education, fuel and energy supply, et cetera for there to be efficiency in these sectors. Despite repeated withdrawal of subsidy on education and health and increasing involvement of the private sector, the decline in these and other sectors continue freely. The height and depth of arguments for subsidy withdrawal command many intellectual expositions, but the shallowness of our wisdom in all these is palpable. What is

government for? Is it not to promote and protect the interests of its citizens, especially children, women, the poor and the disadvantaged so that we can have true national security? How more broken can a people be as we are presently, when surreptitiously some governments are influenced to act against popular interests. Maybe the reasons lie in us all, as, a people are said to deserve the leadership it gets. Our rulers come from amongst us and reflect who or what we are. Let us reflect often on this quote "When Allah wants to deal kindly with a nation, He entrusts its reins in the hands of wise men, gives wealth to its generous people: and when He wants to deal with a nation harshly, He entrusts its control in the hands of foolish people, and gives wealth to its miserly men". We determine whether we get rulers or leaders. Nevertheless, we must continue to wage verbal battle against apostles of unguarded subsidy withdrawal as and I quote Richard Neustadt "the only battle that counts is the last battle".

Figure 8. Aetiology of Childrens' injuries in Nigeria



FB: foreign body related

Injury in elderly persons

Socioeconomic reengineering towards the abolition of poverty as well as improvement in all aspects of healthcare is expected to result in increased longevity and therefore an increase in the elderly population. The number of elderly injured persons can be expected to increase thereby. The vulnerability of the elderly injured person is increased by preexisting conditions like osteoarthritis, poor coordination and balance, cardiac diseases, renal diseases and altered metabolism. It is therefore important to learn about the aging

population and the special problems they present so that we can continue to improve the quality of care we deliver to them.

Motor vehicle crashes and fall are known to be the major mechanisms of injury in the elderly, that is, persons 65years of age and older. Absolute age and sociocultural settings may cause variations in the relative prevalence of these mechanisms of injury causation. Fall is the leading cause of injury related death in these older adults. Up to 40 percent of elders fall annually and 25% of them requires hospitalization. About 40 percent of those hospitalized will be unable to return to independent living while 25 percent of them are likely to die within a year thereof.

- Fall is the leading cause of injury related death in these older adults
- 40 % of elders fall annually
- 25% of those that fall require hospitalisation
- 40% of those hospitalised will not return to independent living
- 25% of those hospitalised are likely to die within a year

Table 8. Fall among elderly persons - factsheet

We conducted a study of 3839 patients that were seen in the accident and emergency unit of our university teaching hospital. Among them, there were 32 injured elderly patients of an average age of 71 years. This represents an injury rate of 8 per 1000 persons. Since this is a hospital data, the true population rate will be higher. Only five of these patients were 80 years or older. Road traffic crash (RTC) was the cause of injury in 26 of the elderly persons, mostly as occupants of commercial buses (42.3%), fall in 4 persons, while assault and blast injuries occurred in a patient each. This prevalence pattern of RTC and fall injuries is consistent with the results of publications from other continents on the mechanism of injury in the elderly. There was no death in this cohort of patients. The small number of

octogenarians in our dataset may explain the small number that had fall injuries. Even though we concluded from that study, that accidental injury in the elderly is relatively uncommonly seen at our centre, we know from clinical experience that the rate may be increasing due to the risks posed to the elderly pedestrians in the cities by commercial motorcycles.

- Fall is the leading cause of unintentional injury at home
- People 80 years and older are especially vulnerable
- risks of falling increases with age
- risks of fall is greater for postmenopausal women
- Two thirds of those who fall are likely to fall again within six months

Table 9. Fall among elderly persons – factsheet 2

- Age related visual impairment
- Medications that cause sedation
- osteoporosis
- Confinement and lack of exercise
- Slip prone floor such as rug carpet, wet floor
- Cords and cables of household appliances
- Dark rooms/corridors

Table 10. Risk factors for fall of elderly persons

- Keep floor dry
- Maintain slip resistant floor. Rugs are dangerous, do not use them
- Keep rooms and corridors well lighted
- Ensure people are around to help
- Regular use of calcium and vitamin D supplement
- Avoid sedative drugs
- Ensure prompt treatment of visual impairment

Table 11. Safety measures to reduce fall among elderly persons

Fall is the leading cause of unintentional injury at home. These include falling and tripping on wet surfaces, on rugs, on stairs, off step stools, over house-hold appliance cords and bumping into household furniture in the dark. People that are 80 years and older are especially vulnerable. The risks of falling increases with age and is greater for women particularly those that are postmenopausal. Two thirds of those who experience a fall are likely to fall again within six months. Age related visual impairment, from cataract and glaucoma, must be detected and treated early as it constitutes a risk to falling. Decrease in bone density, osteoporosis, contributes significantly to fall and resultant injuries especially fractures of the hip which is an important cause of hospital admission and death in the elderly. Failure to exercise regularly results in poor muscle tone, decreased strength and worsening osteoporosis. It is therefore inadvisable to relocate old people from villages to city flats where they become inactive, more osteoporotic and more likely to fall, suffer fall related injuries and die prematurely. Measures to reduce falling are rather simple and cheap. These include maintaining a dry floor, doing away with rugs, improving on interior lighting, avoiding sedating drugs and ensuring prompt treatment of visual impairment, among others. Injuries arising from abuse (of children, adults, sexual and intimate partners), maltreatment and drowning are areas of research that are still begging for attention.

Road traffic crashes

Road traffic injuries are ranked ninth among global causes of disability-adjusted life years lost and developing countries account for over 80% of deaths globally due to road traffic incidents. According to the world report on road traffic injury prevention, a joint report of the WHO and the World Bank, road traffic injuries kill 1.2 million people annually or 3242 people every day. That is, someone dies every second from road traffic injuries, while 20 to 50 million are injured or crippled worldwide annually. Road traffic crashes are the 11th leading cause of death globally accounting for 2.1% of all deaths. It is the leading cause of death in persons older than 15 years and less than 45 years old. It is projected to become the third largest contributor to the global burden of disease by 2020, especially if timely and effective interventions are not made. At Olabisi Onabanjo University Teaching Hospital, located in Sagamu, road crashes are found to be responsible for a little over 90% of the injuries seen in the emergency room. This prevalence as we have reported, was the highest prevalence of road crashes as a cause of injury reported from any centre in West Africa, and contrasts sharply with pedal cycles being involved in more than 70% of injuries in some cities in China. Sagamu is located close to the Lagos – Ibadan and the Lagos – Benin expressways, the major commercial land routes to Northern and Eastern Nigeria respectively with little affordable alternatives for human and material transportation from Lagos, the commercial nerve centre. It is only divine inspiration that can unravel the reasons behind the self inflicted insistence of transportation managers on ensuring that major haulage is only significantly possible by land routes in Nigeria. If overland and underground rail systems are developed, there will be less road travels and haulage, thereby making the roads safer and longer lasting.

The most vulnerable road users are pedestrians, pedal cyclists, motor cyclists, passengers of commercial buses and drivers in that order. Out of a total of 955 road traffic injured that we studied, 4.4% were pedestrians, 84.9% were passengers and 10.4% drivers. The

seemingly low level of pedestrians and the disproportionate number of passengers and drivers involvement observed in this study is because more than 60% of the road traffic incidents involved commercial mini buses, an ubiquitous means of intracity and intercity transportation in Nigeria. These vehicles are cheaper than cars to travel in but results in a high rate of injured persons per crash The poor who form the majority of road users are obviously holding the short end of the stick when they are made to pay toll on roads that are poorly constructed, and overused due to transportation maladministration, in addition to being the most frequently broken by road crashes.

The morbidity and mortality burden in developing countries, from trauma, is rising due to a combination of factors. These include rapid motorisation, poor road and traffic infrastructure as well as the negative behaviour of road users. This contrasts with technologically advanced countries where the indices are reducing. Effective policies on road safety can only be developed when based on the evidence of local research and designed for target demographic, economic and political environments. Successful interventions in technologically developed countries cannot simply be adopted but rather adapted because of differences in the behaviour of road users, quality of vehicles and the environment.

- Road traffic injuries cause
- ❖ 1.2 million deaths annually or 3242 deaths daily
- ❖ one death per second
- ❖ 9th cause of disability-adjusted life years lost, globally
- ❖ 20 – 50 million injured or crippled annually
- ❖ Leading cause of death in persons 15-45 yrs old
- ❖ Developing countries account for >80% of deaths globally

Table 12. Road traffic injury: world factsheet. WHO/World Bank. World Report on Road Traffic Injury Prevention

The causes of road traffic crashes, in our experience, are mostly burst tyre, collisions and loss of control by drivers. To be able to translate this research findings to injury prevention strategies, we need to know the reasons why tyres on our vehicles burst so often. Is it over inflation, underinflation, overuse and wear or

Figure 9. A typical commercial minibus

- The morbidity and mortality burden in developing countries, from trauma, is rising due to a combination of factors
- ❑ Rapid motorisation
- ❑ Poor road and traffic infrastructure
- ❑ Poor enforcement of traffic regulations
- ❑ Negative behaviour of road users

Table 13. Leading causes of high burden of road traffic crashes in developing countries

- Burst tyre
- Vehicle collision
- Loss of control by driver

Table 14. Leading causes of vehicle crashes
Thanni LOA. Nig Med Pract 1998; 36: 3-5
Thanni LOA. Postgrad Med J 2003; 10: 231-233

- The leading causes of death from road traffic injuries are
- Multiple injury / exsanguination, 29%
- Craniocerebral injury, 26.9%
- Multiple organ failure

Thanni LOA. Prehosp Disaster Med 2011; 26: 1-6
Thanni LOA, Kehinde OA. Afr Health Sci 2006; 6:103-106

using the wrong tyres such as fairly used imported tyres that are meant for snow and winter seasons? Can it be due to the system failure of uncritical tyre cheeks? Dearth of research funding has made it difficult to research further into this subject. It would have been more rewarding for us to introduce tyre thread gauging as part of traffic management rather than redesign motor number plates in Nigeria, as was recently done, and compel all owners of vehicles, old and new to compulsorily obtain this new number plates at cut throat costs. This is a case of making money from motorists at the expense of ensuring their safety.

Motorised cycles have in the past decade become an important means of intracity travel, supereceding taxi cars. While the commercial motorcycles, an index of rising poverty, popularly known as Babur or Achakpa in northern Nigeria, Inaga in the east and Okada in the south-east and south-west Nigeria as well as in Ghana are providing employment for the army of our unemployed youths, they have at the same time increased the victims of their dreadful and daredevil drivers, especially children and elderly pedestrians, not minding the adult passengers. Effective traffic control or outright elimination of these "injury machines" as well as reducing the injuries they cause, is a major challenge that only improvement in the socioeconomic status of a community or nation can truly achieve.

The leading causes of death from road traffic injuries are exsanguination from multiple injuries and from craniocerebral injuries. Multiple organ failure is also an important cause, resulting mostly from haemorrhage. We confirmed these at our centre, OOUTH where injury mortality is 2% and in Nigeria through systematic analysis of published injury data. Severe injury, where injury severity score is more than 15, is associated with greater death rate of >30%. Injury mortality used to occur in a trimodal pattern of immediate death (50%), early (30%) and late deaths (20%). Due to improvements in trauma care, particularly in prehospital care, resuscitation, and establishment of trauma systems, this trimodal

pattern has yielded to a bimodal pattern involving immediate and late deaths. Our reported rate of death from craniocerebral injuries and multiple injuries, 26.9% and 29% respectively compares favourably with reports of 42% and 39% respectively from some US centres but similar to reports of 29% each from India. The implication for practice, of these observed causes of injury, is the need to honestly establish prehospital and emergency ambulance services incorporating advanced trauma life support services on board such ambulances. This is feasible and affordable for our governments which already have a pact of service delivery with our people and it will assuage the need for better trauma care. Oxygen therapy and blood

- Inadequate Oxygen therapy
- Inadequate Blood transfusion therapy

Table 16. Challenges of emergency trauma care

	male	female
• SubSaharan Africa	46	47
• Middle East/North Africa	65	67
• High income countries	75	82
• Highest is for Japan		88

[Figures in years]

Table 17. Projected life expectancy by 2030

transfusion service are the major challenges of critical or emergency room care. Blood transfusion service is dangerously poor in most parts of Nigeria. The major problems with blood transfusion services presently are weak blood donation drive and inadequate blood banking capacity. Practitioners like me need establishment and government support by providing the wherewithal to make these therapies available. It is appropriate at this junction to

specifically make a call for the upgrading of trauma service in OOUTH which serves Ogun State in particular, and nearby Lagos and Oyo states, so as to improve the survival of injury victims with musculoskeletal, cardiothoracic and craniocerebral injuries. My unit has since 1997 provided orthopaedic and trauma service for which we are capable. We have been compelled to, in addition, provide some spine trauma, neurotrauma and cardiothoracic trauma services despite having a average of only one specialist trauma surgeon over most of these years.

The WHO has set aside every third Sunday of November as a day of remembrance for road traffic crash victims as a sign of support for those dealing with the loss of a family member or friend through road crashes and to sustain attention to the subject. A country like Nigeria where life expectancy continues to hover around 47years can ill afford the loss, through death and disability, of its citizens in the productive age range of 15 to 45 years from injuries especially due to road crashes. The link between the quality of vehicles on our roads, the vehicle drivers, the roads, physical and socioeconomic environment in the causation and therefore prevention of road crashes cannot be over emphasized. Enforcement of traffic legislation has been shown to effectively decrease the prevalence of road crashes. Let us all individuals, corporate organisations and government support the United Nations "decade of action for road safety" 2011 to 2020. There is a need to establish trauma registries in major trauma centres like OOUTH to upswing research in areas of trauma data collection, epidemiology of injuries, the cost of care of acute injuries and injury disabilities as well as the public perception of the causes of injuries. We must continue to engage public policy makers to ensure roads are constructed and maintained, ensure socioeconomic recovery so that motorcycles can cease being a major means of commercial transportation and miscreants do not make a living by damaging roads so that road crashes can occur. As such, we can reduce the number of the broken ones.

Traditional bone-setting and injury treatment

Traditional medicine can be defined as the sum total of all knowledge and practices, whether they can be explained or not, used in the prevention, diagnosis and elimination of physical, mental and social imbalances, and relying exclusively on practical experience and observations handed down from generation to generation, whether orally or in writing.

According to the WHO, 80% of the population in some Asian and African countries depend on traditional medicine for primary health care, especially with the use of herbal medicine. There is no doubt that traditional medicine can treat various conditions. Artemisinin or Qinghaosu is an antimalarial drug developed from the plant *Artemisia annua* that has been in use in China for over 2000 years. However, charlatans using counterfeit or poor quality herbal products now pose a significant risk to patient safety in Nigeria today. Traditional bone-setters (TBS) are traditional healers who specializes in the manipulation of limbs and joints including the spine.

Traditional bone setting is popular today, not just in Africa or Asia, but also in Europe and America, where it is popular for manipulation of the spine in persons with chronic low back pain when it is sometimes as effective as conventional physical and exercise therapy. It appears as if beliefs, expected cheaper costs and anticipated shorter duration of treatment are the important reasons for the popularity of traditional healers in Africa in addition to non availability and or inaccessibility of modern orthopaedic service which may be hundreds of kilometers away. Metropolitan areas with several modern health care facilities, in Nigeria and other Sub-Saharan African countries, are however replete with TBS. Using a questionnaire survey of respondents from a popular motor garage, traditional and modern health facilities in Sagamu, we found that 70% of respondents believe that TBS are either indispensable or desirable. Sixty seven percent of the respondents believe that they are either

Figure 10. Artemisia annua.

Opinion	TH	TBS
• Indispensable/ Desirable	69.3%	70%
• Undesirable	7.8%	8.9%
• Nuisance/ Fraudsters	16.7%	11.1%
• Others	6.2%	10%

Table 18. Public opinion of traditional healers (TH) and traditional Figure bone setters (TBS). Thanni LOA. West Afr J Med 2000; 19: 220 - 224

very competent or good in their work. Education did not seem to influence these beliefs as the expressed opinion on the indispensability / desirability of TBS by those who had no formal education was similar to that of those who had primary, college or university education. In addition, more than 57% of the respondents believe that it is cheaper to be treated by the TBS rather than the orthopaedic surgeon in a modern hospital. From these observations, it is clear that TBS are being patronised because the prevailing opinion of their services within our communities is largely positive although this is not necessarily factual.

Traditional bone setting involves the use of topical application of herbs and in some cases admixed with mud. Scarification of the skin, incantations and sacrifices may be used to complement the

topical herbs. In addition, an injured or diseased limb is manipulated intermittently followed by the application of a splint, usually made from bamboo sticks woven together to form a bandage. The manipulation is without any form of anaesthetic medicament administered, so the victim experiences excruciating pain but is held down by able assistants. The TBS, not being lettered in basic vascular and neuromuscular anatomy of the limb, applies the bamboo stick with so much pressure that ischaemia and limb gangrene sometimes results.

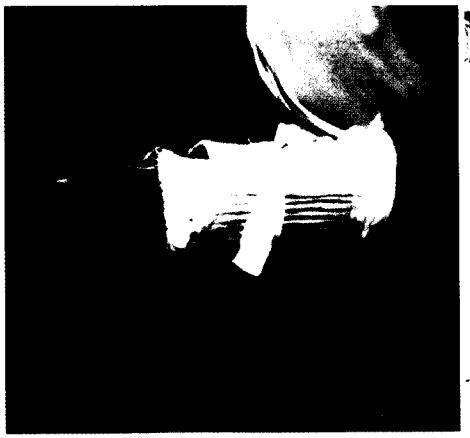


Figure 11. Traditional bone-setter's splint

Figure 12. A compilcation of traditional bone-setting

Figure 13. Gangrene of a lower limb complicating Traditional bone-setting

- Complications from traditional bone setting is responsible for
- 23% of all amputations in Nigeria
- 2.4% of all amputations in the southwest
- 6.9% of all amputations in the northeast
- 20.6% of all amputations in the southeast
- 70.2% of all amputations in the northcentral

Table 19. Complications from traditional bone-setting. Nigeria factsheet. Thanni LOA, Tade OA. J Roy Coll Surg Edin 2007; 5: 213 - 217

- Very short training course for TBS by surgeons on preventing limb ischaemia and gangrene
- Written documentation of traditional medicine, herbs, treatment methods
- Regular audit of traditional medicine practice, just like that of western medical practice

Table 20. Strategies for reducing complications from traditional bone-setting

Several complications have been shown to arise from the treatment of TBS. These are avoidable skin and soft tissue damage as well as infection. Fractures may fail to unite because the immobilization with bamboo sticks, is biomechanically unsuitable to prevent excessive movement at a fracture site, in addition to being too compressive. However, the most devastating complication is limb loss from ischaemia and gangrene for which an emergency amputation in hospital is necessary to save the life of the victim, the broken one. Extremity amputation is performed in Nigerian hospitals commonly. From a systematic review and meta-analysis, we found that complications from traditional bone-setting accounts for 23% of all amputations in Nigeria, second only to trauma which is the indication for this mutilating operation in 34% of cases. While this national pattern is true for the southwest geopolitical zone, complications from traditional bone-setting are the leading

indications for extremity amputation in the southeast, northeast and northcentral geopolitical zones. These may be indirect indications of geopolitical pattern of illiteracy and poverty levels and accessibility of modern medical care. This is a major public health issue that is still begging for attention. TBS must be constructively engaged and educated on the dangers associated with the use of overtight bamboo stick bandages and encouraged to send their patients to an orthopaedic centre as soon as splinting has been effected. They need to be educated about the symptoms and signs of an overtight bandage and encouraged to inform their clients to return for loosening of such bandages immediately the signs are noticed. Eshete in Ethiopia has previously shown that one or two days training course by orthopaedic surgeons for TBS, can reduce the complications of gangrene following traditional bone-setting by at least 50%.

Some have canvassed for the introduction of traditional treatment in our hospitals in parallel with modern medical care. This is reported to happen in China where traditional Chinese medicine is thousands of years old. In China, traditional medicine is written down in formal documents, its teaching is formal and structured and so can be reviewed and easily regulated. In Nigeria, this is unworkable presently. Training of traditional healers is by oral tradition and shrouded in mystery thereby making it unopen and unavailable for critical appraisal or review. Short training workshops will be an avenue to further appeal to the practitioners to open up their practice by documentation so that structured training of new entrants into the trade can be carried out and effective regulation including establishment of a referral system developed.

Chronic osteomyelitis

Osteomyelitis is an acute or chronic infection of the medullary cavity and cortex of bone. It is a common orthopaedic condition, most often seen in children and young adults. The orthopaedic surgeon rarely encounters acute osteomyelitis. Parents, patent medicine dealers or non medically qualified health workers would

have treated affected patients, often with antibiotics, but in inadequate doses and duration. Chronic osteomyelitis (COM) is the commonest complication of acute blood stream derived (haematogenous) osteomyelitis. It is frequently a lifelong disease with intermittent symptom free intervals. It is characterized by persistence of infecting organisms, low grade inflammation with acute exacerbations (flare up), dead bone (sequestra) and reactive bone thickening (sclerosis). Its clinical hallmark is a discharging sinus on the skin. Quality of life is adversely affected by this condition due to functional impairment in the affected body areas, from pain and discharge of pus necessitating frequent hospital visits, absence from school or work as well as inability to socialize.

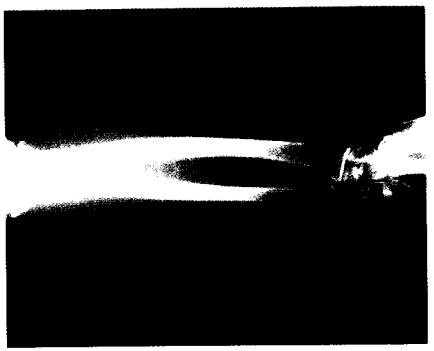


Figure 14. Normal forearm bones

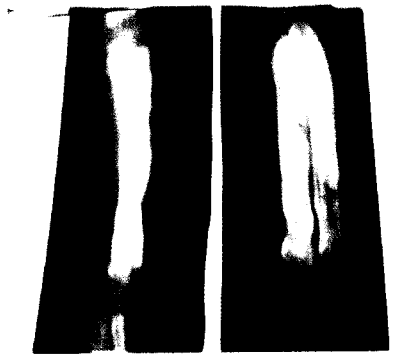


Figure 15. Chronic osteomyelitis of forearm bones

Figure 16. Forearm affected by chronic osteomyelitis

Osteomyelitis can be classified as haematogenous, that is of blood stream origin; postoperative or following open fractures; and primarily chronic osteomyelitis. The most debilitating is haematogenous osteomyelitis which arises from circulating blood stream bacteria (bacteraemia), usually from an unknown source. It may however be from throat infections (pharyngitis), minor skin abrasion or a distant boil. Bone inoculation is frequently in the metaphysis of a long bone around the knee, although no skeletal site is exempted. There may be a preceding history of trivial trauma to the affected bone but this is exceptional. Predilection for the metaphyseal bone site may be due to several factors. These include abundance of blood flow to the growing ends of bones, presence of delicate blood vessels that are easily traumatized leading to formation of haematoma which is a good culture medium for bacteria, and stasis or slowing down of blood in metaphyseal capillaries. Virulence factors of certain organisms, for example, possession of glycocalyx is important for attachment to bone and resistance to antimicrobial drugs. Sialoprotein binding protein and fibronectin binding protein are important for adherence of *staphylococcus aureus* in bone infections as well as in orthopaedic implant related infections. Slowing down of metabolic rate complements the production of biofilm to make these organisms escape antibiotics and host defences. The growth of bacteria like *staphylococcus aureus*, pseudomonas spp and bacteroides is in glycocalyx enclosed colonies. Poor host resistance is also important for infection to occur, and a classic example is in sickle cell disease (SCD) in which salmonella osteomyelitis is recognized, due to a specific opsonising defect, among other reasons. These are the challenges that treatment must overcome to heal an individual who gets broken by this clinical condition.

The infection may be focal or multifocal. The most common organism causing osteomyelitis is *staphylococcus aureus*. This

Table 24. Geographic variation in the global prevalence of bacterial isolates in osteomyelitis

Bacterial isolates	Nigeria n(%)	USA n(%)	Europe n(%)	Saudi Arabia n(%)	Total
Salmonellae	25(21.4)	77(70)	16(64)	11(37.9)	129
S. aureus	45(38.5)	18(16.4)	1(4.9)	18(62.1)	82
Other GNB	40(34.2)	10(9.1)	5(20)	0	55
Other GPC	7(6)	5(4.5)	3(12)	0	15
Total	117(100)	110(100)	25(100)	29(100)	281

GNB: Gram negative bacilli
GPC: Gram positive cocci

Our results showed that there are geographical differences in the prevalence of bacterial pathogens associated with osteomyelitis in patients with major sickling haemoglobinopathies. Salmonellae are the most common pathogens in these conditions in the USA whereas *staphylococcus aureus* is the most common pathogen in such patients in Nigeria and the Middle East. These differences cannot be readily explained. However, salmonella infections in general are rather common in the USA and Europe, arising from consumption of raw food and use of animal waste in food production. In Nigeria, boiling of food before eating is a common practice that may control the transmission of salmonella that may contaminate food. In addition, availability of antibiotics as over the counter drugs in many Nigerian cities may have resulted in abuse that could have controlled endemicity of salmonella infections thereby reducing its association with osteomyelitis in this region. An audit of our hospital data at the time of the systematic review revealed 17 patients with major sickling haemoglobinopathies that had COM. All of them had HbSS. Out of ten positive cultures, *staphylococcus aureus* was isolated from three of them and Gram negative bacilli other than salmonellae from seven others. The latter included three klebsiella species, two proteus and pseudomonas species each.

Table 25. Prevalence of musculoskeletal infections in [illegible] Nigeria

Osteomyelitis	64.7%
Pyomyositis	17.6%
Septic arthritis	10.1%
Cellulitis	5.9%
TB arthritis	0.8%
Necrotising fasciitis	0.8%

Treatment of chronic osteomyelitis can be summarized [illegible] "difficult". This is because eradication of infecting microorg[illegible] for reasons already outlined above, is a Herculean ta[illegible] difficulty with treatment has led to different treatment [illegible] These include various combinations of use of local and [illegible] antimicrobials as well as debridement, that is surgical ex[illegible] infected bone and its soft tissue envelope. Following su[illegible] debridement, the defect created in the affected bone is fil[illegible] muscle or bone grafts with primary or secondary wound [illegible] Surgical debridement is cardinal to curing chronic osteomye[illegible] dead (necrotic) bone and infected granulation tissue [illegible] removed and dead space obliterated to achieve success. F[illegible] completely remove dead bone is the most common [illegible] persistent or recurrent osteomyelitis. Coverage of bone def[illegible] muscle improves cure rate despite a possible concern that [illegible] an infected wound may actually result in worsening of in[illegible] The reason for this is unclear. However, obliteration of de[illegible] prevents haematoma formation. Wound coverage preven[illegible] dessication while muscle flaps improves local blood [illegible] Revascularisation improves tissue oxygenation [illegible] neutralizing the hypoxia associated with bone infection.

Figure 17. Antibiotic beads in a bone cavity

To be effective, antimicrobial treatment must be prolonged (for several weeks). Local antibiotics have the advantage of achieving very high (as much as 100 fold) drug concentration in infected bone. Local antibiotic carriers may be non biodegradable like polymethylmethacrylate (PMMA), or biodegradable like collagen sponge, apatite-ceramic complex, hydroxyapatite, polylactate / polyglycolate implants. Polylactate polymers carrying quinolones have shown promise because of prolonged antibiotic release in concentrations 100 – 1000 times the MICs of causative organisms. Non biodegradable carriers have the disadvantage of requiring surgical removal on completion of use two to four weeks after. Our current practice is to use local gentamicin in synthetic biodegradable carrier beads made of calcium sulphate complex. The results are clinically satisfactory but a formal analysis of results will follow in due course.

Mr vice-chancellor sir, ladies and gentlemen, it is my pleasure to in conclusion, give a vote of thanks. My gratitude goes to my parents who brought me forth - my mother who transited to angelic climes long ago and my father whose two hands did all that four hands should do. To my teachers, colleagues, students and patients; I cannot say thank you enough for all I've learnt from and through you. I am lucky and thankful to have friends who have been there for me always. I must not forget the members of my extended family who make me feel a part of a big family. I have deliberately left the last but huge dose of gratitude to my immediate family. I say thank you to my wife and daughter. They both make it joyful and easy for me to remember Olufolakemi who was my daughter, but has been elevated to the realm of the ethereal. In loving and everlasting memory of her brief but impactful life, I hereby announce the establishment of "Olufolakemi Thanni Prizes", in the Obafemi Awolowo College of Health Sciences of our university, in perpetuity, to provide an annual prize to the overall best student in the first MB examination, who must have obtained one or more distinctions in anatomy, physiology or biochemistry; and the overall best student in the Part IV final MBChB examinations with one or more distinctions in surgery, internal medicine or community medicine and primary care.

I thank you all for coming and for listening.

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