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Burn management in sub-Saharan Africa: Opportunities for implementation of dedicated training and development of specialty centers

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ARTICLE INFO

Article history:
Accepted 21 May 2013

Keywords:
Burn
Africa
Rwanda
Treatment capacity
Training
Thermal injury
Burn management
Capacity survey

ABSTRACT

Background: In low- and middle-income countries burn injuries remain responsible for a large burden of death and disability. Given an annual worldwide incidence of almost 11 million new individuals affected per year, major burn injuries have a higher annual incidence than HIV and tuberculosis combined.

Methods: A survey instrument was adapted for use as an international assessment tool and then used to measure the availability of personnel, materials, equipment, medicines, and facility resources in nine Rwandan hospitals, including three referral centers.

Results: Forty-four percent of surveyed hospitals had a dedicated acute-care burn ward, while two-thirds had intensive care options. Relevant wound-care supplies were widely available, but gaps in the availability of critical pieces of equipment such as monitors, ventilators, infusion pumps, electrocautery, and dermatomes were discovered in many of the surveyed institutions, including referral hospitals. Early excision and grafting were not performed in any of the hospitals and there were no physicians with specialty training in burn care.

Conclusions: Whereas all surveyed hospitals were theoretically equipped to handle the initial resuscitation of burn patients, none of the hospitals were capable of delivering comprehensive care due to gaps in equipment, personnel, protocols, and training. Accordingly, steps to improve capacity to care for those with thermal injury should include training of physicians specialized in critical care and trauma surgery, as well as plastic and reconstructive surgery. Consideration should be given to creation of national referral centers specializing in burn care.

1. Introduction

Developed countries have seen a decrease in the incidence of burn injuries, mostly attributable to primary prevention efforts [1]. In low- and middle-income countries (LMIC), burn injuries have an incidence of almost 11 million major injuries per year, a rate that is substantially higher than tuberculosis and HIV infection combined [2,3]. The impact of burn injury in underdeveloped nations is amplified by a lack of subspecialty

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0305-4179/$36.00
http://dx.doi.org/10.1016/j.burns.2013.05.015

care and shortcomings in infrastructure, expertise, training, technical support, architecture, and resources. The lack of facilities and capacity, i.e. the material resources and adequate training to adequately and comprehensively treat the high volume of burn patients, is a known barrier to accessing definitive burn care [4–9,11,15]. Greater than 90% of all fatal thermal injuries occurs in low-resource settings, and one-sixth of all worldwide disability-adjusted life years (DALYs) lost in those who are 15–59 years of age are attributable to burn injury [3,10]. A better understanding of the capability to deliver burn care in LMIC is crucial to reducing the excess burden of preventable morbidity, mortality, and lost productivity.

Rwanda is a small, land-locked East African nation, located in central sub-Saharan Africa with few natural resources, and a predominantly agrarian economy. The country has a population of about 11 million people, 42% of whom are below the age of 15 [12,13]. Approximately 75% of the country's populace is literate, and though the nation qualifies as a low-income economy, there is a steady upwards trend in the country's GDP [13,14].

There is approximately one nurse for every 1500 people and one doctor for every 18,000 people, more then 25-fold fewer per-capita than are found in most high-income countries [40]. The hospital system in the country consists of four national referral hospitals, 41 district hospitals, and two police/military hospitals [13]. Health care is available in Rwanda through a tiered referral system that requires referral from district hospitals to referral hospitals with greater resources. While some minor surgery can be performed at the district level, trained surgeons are only available at the four referral hospitals, with only one surgeon permanently in country providing plastic and reconstructive surgery. Even though over 90% of the country maintains government issued health insurance, the healthcare environment in Rwanda is currently designed such that the onus for purchasing and providing supplies for medical care is on the patient and the patient's family [13]. This includes supplying physicians and nurses with gloves, both sterile and non-sterile, gauze, dressings and other disposables. Specific statistics on the burden of thermal disease in Rwanda are not currently available, nor have they ever been studied specifically for the country.

The evaluation and quantification of the ability of LMICs such as Rwanda to treat and manage all aspects of the thermally injured patient is necessary to direct patient and health care provider education, allocation of resources, and referral patterns to improve patient care, clinical outcomes, and ease the healthcare burden.

2. Methods

2.1. Design

A cross-sectional, interview-style survey design was used to assess Rwandan burn capacity. Ethical approval was obtained from University Central Hospital of Kigali (CHUK) in Rwanda and exempt status was designated at the University of Virginia. In July 2012, nine Rwandan hospitals were surveyed (Fig. 1 and Table 1). The study group was comprised of a convenience sample of geographically and financially diverse

Fig. 1 – Location of health care facilities surveyed. Red – district hospitals. Blue – referral hospitals. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of the article.)

hospitals, a method that has been used in similar capacity studies in the region [16,39]. The hospitals included six representative district hospitals, two university affiliated tertiary referral hospitals, and one independent tertiary care hospital. The National Institute of Statistics of Rwanda defines district, or "general," hospitals as providing preventative, outpatient, maternity, and emergency care, and are immediately involved in community-based health care programs. Referral hospitals encapsulate those with comprehensive specialist services, and conduct the vast majority of medical research and medical teaching [13].

2.2. Survey

A survey instrument from Physicians For Peace, an organization created to provide health care and education to under served

Table 1 – Health care facilities surveyed in this study.

Facility demographics		
Hospital surveyed	Province	District
CHUK	Kigali City	Nyarugenge
King Faisal Hospital	Kigali City	Gasabo
Kibagabaga	Kigali City	Gasabo
Rwanda Military Hospital	Kigali City	Kicukiro
Ruhengeri	Northern	Musanze
Butaro	Northern	Burera
CHUB	Southern	Huye
Kabutare	Southern	Huye
Nyamata	Eastern	Bugesera