

Cardiac Critical Care in Resource-Limited Environments

Lessons from Tanzania

Pilly Chillo*, Stephen H. Humphrey*[†], John Meda*, Vanessa B. Kerry^{‡,§,||,¶}
Dar es Salaam, Tanzania; Washington, DC, USA; and Boston, MA, USA

ABSTRACT

The concept of cardiac critical care is emerging as a tool in the management of cardiovascular diseases in many Sub-Saharan African countries. The region is undergoing significant epidemiological transition. There remains a significant burden of infectious and nutritional disease, but cardiovascular disease, notably hypertension and coronary artery disease, as well as other noncommunicable diseases (NCD) are emerging rapidly, placing a double burden on existing healthcare systems. Within this complex, heterogeneous, and changing epidemiologic setting, efforts to diagnose and treat cardiovascular diseases have increased. As more patients are diagnosed with acute cardiac conditions, the number requiring management in a cardiac critical care unit is also increasing. In this review, using the Tanzanian experience, we attempt to chronicle the appearance of cardiac critical care services and the many challenges to their implementation in a resource-limited environment.

The concept of cardiac critical care has become integral to the management of patients with cardiac disease throughout the developed world. These specialized units permit rapid diagnosis and advanced management of life-threatening conditions that require close or constant attention by a group of specially trained health professionals. The first dedicated cardiac critical care facilities were coronary care units. In the 1950s, mortality from myocardial infarction was alarmingly high. Coronary care units were established early in the 1960s to rapidly identify and terminate arrhythmias associated with myocardial infarction [1]. The advent of coronary care units was associated with a substantial decrease in in-hospital mortality after myocardial infarction [2]. Subsequent advances in technology, coupled with survival of more complicated cases of coronary artery disease, produced changes in the clinical characteristics of patients admitted to coronary care units. Patients with complex, multisystem organ involvement became more numerous [3].

These changes called for more comprehensive cardiac critical care services, including a proposal by the American Heart Association to increase the availability of clinicians with general critical care skills [4]. The evolved cardiac critical care unit is an intensive care unit for complex patients with cardiovascular disease who become critically ill and who are more prone to major systemic complications. Three cardiac critical care levels have been proposed.

Level 1 is identified with large tertiary medical centers and is capable of managing all cardiovascular conditions and associated multisystem complications. All forms of invasive and noninvasive monitoring capabilities and advanced technologies to support the cardiovascular system are available. Patients are managed by full-time cardiac intensivists, or general intensivists working in collaboration

with a cardiologist, who are available at all times and may be continuously on-site. The nurse-to-patient ratio is 1:1 or 1:2. Multidisciplinary teams comprising pharmacists, nutritionists, and respiratory physicians are present. Access to interventional cardiology and cardiac surgery is usual at this level.

A level 2 critical care unit is capable of providing initial evaluation and treatment of most acute cardiovascular conditions and medical comorbidities. All invasive and noninvasive monitoring is available. The unit is staffed by cardiologists with intensivists available for consultation or comanagement of complex patients. The nurse-to-patient ratio is 1:1 to 1:3.

Level 3 units are capable of managing respiratory failure, administering inotropic therapy, and providing immediate resuscitation of cardiac arrest. They focus on patients with suspected acute coronary syndrome, heart failure without shock, and hemodynamically stable arrhythmias. Noninvasive monitoring and echocardiography are readily available at this level. Cardiology service admission or consultation is available for management of patients admitted to these units with primary cardiac conditions. The nurse-to-patient ratio is 1:2 to 1:3.

These functional designations for cardiac critical care units are driven by numerous assumptions regarding the prevalence of various cardiac disorders, availability of supporting technologies, therapeutic modalities, and infrastructure. They provide a useful structure for understanding and planning critical care services. As in many other countries, cardiac critical care is in its infancy in Tanzania. Its trajectory of evolution may be quite different from the path followed in currently developed countries. Patterns of disease prevalence, the healthcare delivery system and workforce, medical education, and available

The authors report no relationships that could be construed as a conflict of interest.

From the *Department of Internal Medicine, Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania; †Global Health Service Partnership (United States Peace Corps—Seed Global Health), Washington, DC, and Boston, MA, USA;

‡Division of Pulmonary and Critical Care, Department of Medicine, Massachusetts General Hospital, Boston, MA, USA; §Center for Global Health, Massachusetts General Hospital, Boston, MA, USA;

||Department of Global Health and Social Medicine, Harvard Medical School, Boston, MA, USA; and ¶Seed Global Health, Boston, MA, USA. Correspondence: S. H. Humphrey (humphreysteveh@gmail.com).

GLOBAL HEART
 Published by Elsevier Ltd. on behalf of World Heart Federation (Geneva).
 VOL. 9, NO. 3, 2014
 ISSN 2211-8160/\$36.00.
<http://dx.doi.org/10.1016/j.jheart.2014.06.004>

resources will all have their effects. In the sections to follow, we will attempt to briefly review these important variables that will determine the evolution of cardiac critical care services in Tanzania and other resource-limited nations.

PATTERN OF CARDIAC DISEASES IN TANZANIA

The spectrum of cardiac conditions in a Sub-Saharan African country such as Tanzania is quite different from that observed in the developed world. These differences must be understood and taken into account in any discussion of cardiac critical care in evolving healthcare systems. Evidence now shows that Sub-Saharan Africa is at a period of epidemiological transition, with cardiac diseases associated with lifestyle and urbanization becoming more prevalent [5–7]. What is unique and different from transitions that occurred in Western European countries about a century ago is that the epidemiologic transition in Sub-Saharan Africa is occurring at a time when the cardiac diseases associated with poverty and infections still persist. This has created a double burden in which new cardiac diseases are imposed on the already stressed health systems and brings challenges to clinicians in terms of prioritization and management of the large number of patients requiring attention. In a typical tertiary healthcare facility in Sub-Saharan Africa, the spectrum of cardiac disease is that of mixed “old” and “new” diseases [5,7].

Hypertension, which was rare until the 1970s [8], has become the most important cause of cardiac outpatient clinic visits [9], and hypertensive heart disease is a major cause of heart failure [7] and hospital admissions [10] among adults in Tanzania. Nonischemic dilated cardiomyopathy is frequent, being the second most common cause of heart failure in many parts of Sub-Saharan Africa [11], including Tanzania [7]. Three forms of nonischemic dilated cardiomyopathy are recognized in our setting: peripartum cardiomyopathy, which occurs a few weeks before or after delivery; human immunodeficiency virus (HIV)-associated dilated cardiomyopathy; and idiopathic dilated cardiomyopathy. Whereas chronic rheumatic heart disease has become rare in the developed world, it is still a common cause of cardiac disease in Sub-Saharan Africa, especially among children and young adults [7,12]. Ischemic heart disease is becoming more prevalent in the region, although hypertension remains the most important cause of heart disease in many parts of Sub-Saharan Africa [13]. There is, however, an alarming increase in the prevalence of precursors of ischemic heart disease, especially in the urban populations [14], and it is reasonable to expect that with time the disorder will become an important cause of cardiac disease. In Sub-Saharan Africa, acute myocardial infarction typically occurs in individuals in middle and high socioeconomic classes [13].

Although patients with HIV infection have been found to be at increased risk for coronary atherosclerosis [15], acute coronary syndromes are still uncommon in this

group. However, aneurismal dilation of major blood vessels is not uncommon among patients with HIV infection [16]. These patients may present with acute aortic dissection requiring care in acute cardiac units. Pulmonary hypertension and cor pulmonale related to frequent respiratory tract infections including tuberculosis are common among HIV-infected patients in our population [16]. Massive pericardial effusion with tamponade is another important cause of acute admission requiring critical care management in our setting and is primarily due to tuberculous pericarditis [17]. As a sequela of tuberculous pericardial effusion, constrictive pericarditis is common, producing significant disability and often resulting in long hospital stays ultimately requiring surgical management, if available. Endomyocardial fibrosis is an important and surprisingly prevalent form of restrictive cardiomyopathy in this part of the world, which typically produces right heart failure and ascites [18]. With this form of restrictive myocardial disease, there is an association with low socioeconomic status. Uncorrected congenital heart diseases are frequently encountered, often presenting challenges to surgical teams as most of these late comers present with complications such as heart failure or severe pulmonary arterial hypertension.

In the developed countries, cardiac critical care systems emerged primarily in response to coronary artery disease and myocardial infarction. In resource-limited regions of the world, the decidedly different burden, distribution, and nature of the prevalent cardiac diseases will move the evolution of cardiac critical care along a different trajectory. This scale-up will also have to take place within the healthcare system existing in these areas, using infrastructure already in place and adapting to current patterns of patient management and referral. An understanding of healthcare delivery systems already in place is essential to predicting the ways in which cardiac critical care will likely emerge in resource-limited countries.

THE TANZANIAN HEALTH CARE SYSTEM AND CURRENT PROVISION OF CARDIAC CRITICAL CARE

The Tanzanian health system is a multitiered decentralized system designed to move patients from a local point of first contact through increasingly centralized and specialized facilities [19]. There are 6 tiers of care starting at the village level where most primary care is delivered (Fig. 1). Hospital care begins at the district level. It includes outpatient and basic inpatient services including surgical services, emergency obstetric care, and laboratory and basic diagnostic x-ray services. Designated critical care or intensive care services, however, are generally not available at the district level (Table 1).

Intensive care is more readily available starting at the regional level. These hospitals have a larger staff of medical doctors including general surgeons, general medical physicians, pediatricians, specialized nurses, and midwives. The level of critical care provided in these intensive

Download English Version:

<https://daneshyari.com/en/article/2916435>

Download Persian Version:

<https://daneshyari.com/article/2916435>

[Daneshyari.com](https://daneshyari.com)