Journal of Critical Care 42 (2017) 351–354

Contents lists available at ScienceDirect

Journal of Critical Care

journal homepage: www.jccjournal.org

Special Feature

Critical care of tropical disease in low income countries: Report from the Task Force on Tropical Diseases by the World Federation of Societies of Intensive and Critical Care Medicine

Tim Baker, MD, PhD [a,b,*], Karima Khalid, MD [c], Ozlem Acicbe, MD [d], Steve McGloughlin, MD [e], Pravin Amin, MD [f], On behalf of the Council of the World Federation of Societies of Intensive & Critical Care Medicine

[a] Department of Anaesthesia & Intensive Care, Queen Elizabeth Central Hospital, Blantyre, Malawi
[b] Global Health – Health Systems & Policy, Department of Public Health Sciences, Karolinska Institutet, Stockholm, Sweden
[c] Department of Anaesthesia and Critical Care, Muhimbili Ortopaedic and Neurosurgical Institute (MOI), Muhimbili University of Health and Allied Sciences (MUHAS), Dar es salaam, Tanzania
[d] Van Teaching and Research Hospital Intensive Care Unit, Van, Turkey
[e] Intensive Care Unit, Infectious Diseases Physician, The Alfred Hospital, Melbourne, Australia
[f] Department of Critical Care Medicine, Bombay Hospital Institute of Medical Sciences, Mumbai, India

ARTICLE INFO

Keywords:
Tropical medicine
Critical care
Developing countries
Neglected diseases
Quality of health care
Quality improvement

ABSTRACT

Tropical disease results in a great burden of critical illness. The same life-saving and supportive therapies to maintain vital organ functions that comprise critical care are required by these patients as for all other diseases. In low income countries, the little available data points towards high mortality rates and big challenges in the provision of critical care. Improving critical care in low income countries requires a focus on hospital design, training, triage, monitoring & treatment modifications, the basic principles of critical care, hygiene and the involvement of multidisciplinary teams. As a large proportion of critical illness from tropical disease is in low income countries, the impact and reductions in mortality rates of improved critical care in such settings could be substantial.

1. Introduction

The term tropical diseases can encompass all diseases that occur in the tropics, whether they are communicable or non-communicable. In regions with a tropical climate there is an increased burden of infectious diseases including malaria, dengue, leishmaniasis, schistosomiasis and other infections [1,2]. In 2004 an estimated 15 million people died from tropical infectious and parasitic diseases, predominantly in low and middle-income countries [3]. While some progress in tropical regions has been made, in 2015 the Global Burden of Disease Study estimated that there were still over 700,000 deaths from malaria and over 1.6 million deaths from diarrhoeal illnesses. Although there is very little data describing the critical illness burden in low income countries (LICs), it is clear that many patients with tropical illnesses become critically ill.

The principals of critical care for these patients are the same irrespective of diagnosis. As well as disease-specific therapies, patients who are critically unwell from a tropical disease need the same life-saving and supportive therapies to maintain vital organ functions required by all critically ill patients. Critical care revolves around supporting the patients' airway, breathing and circulation, with an emphasis on team-work, patient safety and standardised approaches to care [4-6]. This review highlights the importance of critical care being provided to patients suffering from tropical illnesses even when resources are limited. Require

2. Current state of critical care in low income countries

The information on critical care capacity in LICs is sparse: over 50% of countries lack data on Intensive Care Unit (ICU) capacity [7]. National ICU bed capacity has been shown to be strongly related to the national budget set aside for healthcare and hospitals in LICs, therefore LICs often lack ICUs, especially outside major cities [7,8]. There are also discrepancies in the description of an ICU [9], from the availability of advanced equipment for monitoring and intervention, to an increase in level of care and supervision [10].

Whereas mortality rates in ICUs in high income countries (HICs) are declining and are now estimated at below 20% [11,12], mortality rates in critical care in LICs report alarmingly high rates of 30–80% [13-16]. Indeed, mortality rates in ICUs have been seen to correlate to lower national income (Fig. 1) [12]. The higher mortality rates may be due to a sicker patient population and/or the lower resources available in ICUs in LICs.

* Corresponding author at: Department of Anaesthesia & Intensive Care, Queen Elizabeth Central Hospital, PO Box 95, Blantyre, Malawi.
E-mail addresses: tim.baker@ki.se (T. Baker), karimakhalid@yahoo.com (K. Khalid), ozlemacicbe@hotmail.com (O. Acicbe), S.McGloughlin@alfred.org.au (S. McGloughlin), pravinramin@gmail.com (P. Amin).

https://doi.org/10.1016/j.jcrc.2017.11.028
0883-9441/

Comparisons of illness severity are hampered by the fact that tools such as SOFA (sequential organ failure assessment), SAPS (simplified acute physiology score) and APACHE (acute physiology and chronic health evaluation) [17] were developed in high resource settings and include parameters that are usually unavailable in hospitals in LICs. In one ICU in Tanzania, 69% of admissions had at least one severely deranged vital sign [16] suggesting a sick population. The epidemiological pattern of diseases in LICs is different to HIC. There is a higher rate of nosocomial infections in LIC and a high prevalence of multidrug resistance bacteria such as methicillin-resistant *Staphylococcus aureus* [18]. One study of ICUs in 75 countries from varied resource levels found that infected patients have higher mortality rates than non-infected patients [19]. Unlike in the HICs where the causes of severe sepsis are mainly bacterial, in LICs, non-bacterial infections like protozoal diseases such as malaria and viral diseases like dengue and viral haemorrhagic fevers also cause sepsis [20]. There is also a large burden of critical illness due to trauma which disproportionately affects low-income countries [21,22]. In addition, patients may present late due to a lack of infrastructure for transport and emergency medical services, and suboptimal care on arrival to hospital, leading to more severe disease.

A shortage of facilities, equipment, drugs and disposable materials has been shown to be a major obstacle in handling the critically ill patients in LICs [23]. Hospitals lack the resources to follow international guidelines for sepsis [23,24], and for traumatic brain injury [25]. Shortage of treatment routines and trained personnel capable of taking care of critically ill patients is another challenge facing critical care [8,9,26]. The World Health Organization (WHO) reports that there is a critical shortage of physicians and nurses in over 57 countries [27]. Malawi, with 17 million inhabitants and Tanzania with 50 million inhabitants have only four and 22 specialists in Anaesthesia and Intensive Care respectively, a workforce for the surgical and intensive care needs that has been called "critically inadequate" [28]. The high workload, disappointing outcomes and lack of suitable training deters health professionals from entering the field [29]. There is also a low availability of medical technicians to maintain equipment and no budget set aside to replace spare parts, thus machines that could help save lives are often left lying dormant. Lack of adequate support services such as blood banks and laboratory services also play a great role in the overall picture of critical care in LICs [9,30].

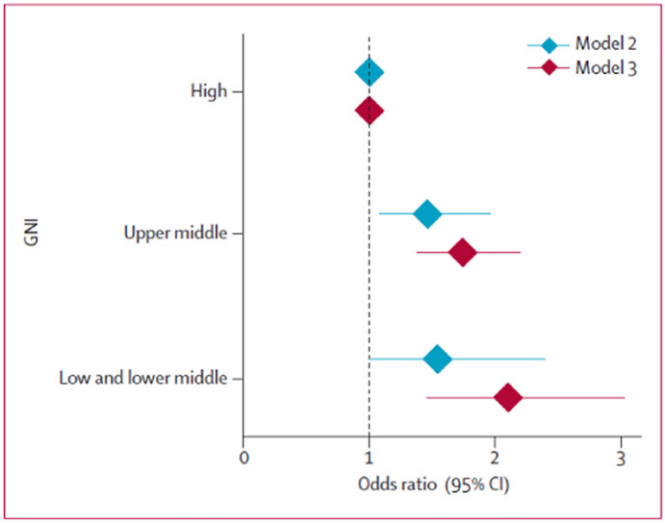

Fig. 1. Adjusted odds ratios of in-hospital death. Odds ratios are according to the GNI in the whole cohort, with patients admitted to intensive care units in countries with high GNI as the reference category. Model 2 includes adjustment for hospital-level variables. Model 3 includes adjustment for patient-level and hospital-level variables. GNI = gross national income. Reprinted with permission from The Lancet Respiratory medicine; Vincent JL et al. 2014;2 [5]:380–6. Assessment of the worldwide burden of critical illness: the Intensive Care Over Nations (ICON) audit [12].

3. Intensive care unit or critical care?

İntensive care units are not uniform and there is no commonly agreed definition of an ICU. Several suggestions have been made to classify ICUs [9,31,32]. A recent international taskforce suggested three levels: A level 1 ICU is capable of providing oxygen, non-invasive monitoring, and more intensive nursing care than on a ward, whereas a level 2 ICU can provide invasive monitoring and basic life support for a short period. A level 3 ICU provides a full spectrum of monitoring and life support technologies [10]. For the purposes of this review, the term "Critical Care" is preferred and is defined as "the care given to any patient who is critically ill". As such, Critical Care can be provided in many settings – in an emergency department, on a general ward, or in an ICU.

4. Requirements for critical care in LIC

4.1. Hospital design

Hospitals should be designed to optimise the management of critically ill patients. Critical illness is time-dependent and hospitals require systems that can respond quickly and effectively. Critical care is not contained solely within ICUs, it also takes place pre-hospital, in the emergency department and on hospital wards [10,33]. This can be with designated critical care areas - a resuscitation room in the emergency department, a High Dependency Unit, a critical area on the ward, or an ICU. An effective triage and emergency care is essential to identify critically ill patients without delay [34]. In Malawi, paediatric mortalities were reduced by 50% following the introduction of such a system [35]. Once admitted, caring for patients in a dedicated ICU allows a higher nurse/patient ratio, close monitoring and enables a concentration of critical care knowledge and resources [33]. Emergency equipment and drugs can be kept close to the patient and always stocked.

4.2. Training

Staff should be trained in emergency and critical care. Critical care should be a standard part of curricula for nurses, doctors and other clinicians in their undergraduate training. In-service and refresher training should be held at regular intervals for all staff managing critically ill patients [36]. All LICs should have specialists trained in critical care, and curricula should at least meet international minimum standards [37].

4.3. Triage

Triage is the quick and accurate identification of patients with critical illness. In low-income countries triage is often absent or of poor quality [8,38]. All hospitals should have a formal triage system that is quick and simple and precedes registration processes and payment for services. The choice of system depends on the available resources but should involve the patients' vital signs.

4.4. Monitoring and treatment modifications

Critically ill patients need continuous observation, frequent clinical examinations and if available, a continuous patient monitor with appropriate alarm limits. Deranged physiological parameters can be used to identify deterioration, and care should be frequently modified to achieve defined physiological goals [39,40]. There must also be a method of monitoring and then recording patient's vital functions. This monitoring can be either via non-invasive or invasive methods [10].

4.5. ABC care

Emphasis should be placed on maintaining a free airway in all patients. Unconscious patients should be placed in the lateral position and suction used to keep airways clear. Although pressurized oxygen and compressed air for avoiding and treating hypoxia may be lacking, oxygen can still be