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Challenges in Critical Care in Africa: Perspectives and Solutions

Critical care medicine in Africa is largely an unknown entity in the medical world, though it has recently begun to emerge as a prominent concern, mostly due to increasing research that has highlighted the plight of this sub-specialty in Africa (Adhikari et al., 2010, Riviello et al., 2011). However, the fact that critical care medicine is considered an expensive sub-specialty of medicine in so many aspects does not help the cause for recognition and funding. This article aims to explore the plethora of challenges that the critical care sector in Africa is faced with, and to provide potential solutions.

Primary healthcare delivery in the developing world already faces many challenges. Infectious disease interventions with respect to HIV, tuberculosis (TB) and malaria have been prioritised, and the sectors of maternal and children's health have joined the fray in attracting funding support (Kwizera et al. 2012). This is against the backdrop of poor funding priorities by African governments.

Studies that have looked at the challenges faced in Africa with regard to critical care medicine have tried to analyse and categorise the problems related to critical illness management in low-income countries (Okafor, 2009; Dünser et al. 2006). First and foremost, the African intensive care unit (ICU) patient population tends to be younger than the ICU population in the developing world (35.5 and 61.8 years respectively) (Kwizera et al. 2012). This impacts on African countries' productivity and presents a significant hindrance to economic development. The impact is widespread since a lot of critically ill patients are breadwinners in their families. On another note, a shortage in nursing staff has led to family members taking time off income generating activities to care for the sick. The overall mortality rate is comparable across the board in Africa albeit much higher than in high income countries (30–50% and 8–20.9% respectively) (Kwizera et al. 2012; Halpern et al. 2004).

Admission diagnoses tend to be similar to those found in higher income countries but they tend to be acute; because of the younger population they should be more survivable if basic resources and practices are put in place. Head injuries are a common reason for admission, and they are associated with higher mortality rates than other conditions (Kwizera et al. 2012; Okafor 2009). This is not surprising, considering that most African ICUs are generally mixed units and do not usually have specialised neuro-critical care resources. This is coupled with the fact that many African countries do not have a functional emergency medical response system. Inadequate transportation of trauma victims to healthcare facilities and delays in definitive care are a result. Adequate emergency care at a crash scene (for example, airway management, positioning, oxygen and fluid resuscitation) is known to improve trauma outcome, but the high number of non-helmet wearing motorcycle riders in African countries, especially Uganda, contributes to the high injury severity and mortality rate of neuro-trauma (Kwizera et al. 2012).

Unsurprisingly, there is also a limited number of ICU beds in the continent. For example, Uganda as a whole has only one ICU bed for every one million Ugandans or 0.1 ICU beds/100,000 (Kwizera et al. 2012). This compares poorly with South Africa (8.9/100,000), Sri Lanka (1.6/100,000), and the United States of America (20/100,000) (Adhikari et al. 2010). This means that there is pressure on the few beds that are present, with a resultant high number of missed ICU opportunities. This limitation is further compounded by a well-documented dearth of anaesthesiologists, a critical human resource for ICUs (Hodges et al. 2006; Dubowitz et al. 2010).

Common Illnesses and High Risk Patient Groups

Sepsis is a common cause of mortality in Africa, with rates higher than those reported from industrialised countries (Jacob et al. 2009). This is due to insufficient early sepsis care characterised by delayed presentation of sepsis patients to the hospital, and subsequently to the ICU if they make it or if such facilities are available (Jacob et al. 2009). The paucity of resources for managing patients with sepsis (for exam example, insufficient amounts of fluids, unavailability of intravenous broad-spectrum antibiotics and unavailability/unreliability of microbiological diagnostics) is a contributing factor, and even though a recent paper published guidelines to help resource-poor settings manage critically ill patients with sepsis (Dünser et al. 2012), it remains to be seen whether its application will carry through if the basics are not put in place. Early and to a large extent preventable deaths in the ICU are a common occurrence; the most likely explanation for this is the lack of trained staff and resources for providing adequate care for critically ill patients who have a high disease severity (for example, those with brain trauma, shock or sepsis) (Riviello et al. 2011).

Looking at special groups, children account for 11–12% of all ICU admissions, of which there is a mortality rate of 40–60%, which is considerably higher than in industrialised countries (Henry et al. 2011). Paediatric medical patients have a higher mortality than paediatric surgical patients, probably because a lot of the post-operative patients are elective surgical patients who are admitted for observation. Most paediatric medical patients are children with acute respiratory failure in need of mechanical ventilation. The relatively young population in low income countries (LICs), and the fact that respiratory illness is the leading cause of deaths in under five year olds in these countries (Kwizera et al., 2012), implies that more emphasis should be placed on strengthening paediatric critical care resources in LICs.

Obstetric admissions are a common occurrence largely due to perioperative cardiac arrest occurring as a consequence of peripartum haemorrhage, eclampsia and/or sepsis (Okafor 2007). The introduction of protocolised care for peripartum emergencies and the establishment of the obstetric high dependency unit (patient monitors, more intense nursing and protocols without mechanical ventilation) will improve outcomes

in this group. This would need to be significantly embedded into maternal and child health initiatives that aim at achieving the millennium development goals.

The fact that HIV is endemic in Africa explains why HIV and AIDS is one of the most common co morbidity related reasons for admission in this population. Due to the advent of easily accessible, highly active anti-retroviral therapy, together with septrin prophylaxis, the incidence of HIV-related diseases (such as pulmonary infection with *Pneumocystis jiroveci*, which usually presents as acute respiratory failure) has markedly decreased (Mocroft et al. 2010). Chronic obstructive pulmonary disease is a very rare cause of acute respiratory failure in the African setting. Other rare HIV-related causes of ICU admission are viral encephalitis and liver failure.

Resource-Based Challenges and Proposed Solutions

Having discussed common illnesses found in African ICUs, we turn our focus to resource-based challenges and their solutions. We will use Uganda as an example. The per capita income in this equatorial East African nation is less than four dollars a day, and one third of the population lives below the poverty line. In light of this, the provision of critical care may not appear to be a rational or cost-effective priority in a country where the annual healthcare expenditure is just over 100 dollars per person (Central Intelligence Agency, 2008). However, looking at it more critically, poor health seeking behaviour, low doctor-patient ratios and the low numbers of primary health facilities means late illness presentations requiring life-saving acute care are rife and are the commonest causes of death in hospitals countrywide. This would make critical care medicine at regional referrals a higher priority than normal, while the government tries to solve the longer-term problems of the primary healthcare.

Assuming the governments in African countries decide to tackle this problem, development of critical care capacity must involve the education of nurses and physicians countrywide. Recognition of the initial clinical syndromes of sepsis or hypovolaemia, combined with an awareness that critical illness need not lead inevitably to fatal deterioration, is vital to ensuring early initiation of basic treatments such as antibiotics administration and fluid resuscitation. The WHO released the Integrated Management of Adolescent and Adult Illnesses guidelines that focus on acute care at the basic primary level (WHO, 2009). In Uganda this toolkit is being rolled out at the district hospital level.

Looking at infrastructure, many ICUs have old, used and donated, and poorly serviced equipment, if any. Mechanical ventilators tend to be old and they often cut out during service, thus endangering patients. Many hospitals do not have adequate or appropriate oxygen, or even medical gas to drive ventilators for that matter. Maintenance of equipment is poorly done if available and funding for capital development is limited.

Even when funding is available, the procurement system is plagued by rampant corruption that leads to tenders being fraudulently awarded. This is also characterised by the end users not being involved in the procurement process, assuming they even have the technical expertise. Simple devices like patient monitors, syringe pumps, suction machines and glucometers are a rare resource and yet they play a significant role in guiding and delivering therapy.

There is in addition, an increasing influx of Western world discarded or donated, but mostly useful, biomedical equipment. This equipment will work for at least six to twelve months and then breakdown due to lack of spare parts. As a result, Africa has in effect become a dumping ground. A policy toolkit needs to be put in place to guide governments on the types and categories of equipment they can purchase or receive as donations, and on recommended simple designs for the construction of ICUs. Even without expensive resources, high impact critical care medicine can be practiced. Evidence based practices like early goal-directed therapy for sepsis, handwashing practices, early identification of childhood illnesses and early referrals for high level trauma patients are interventions that are within reach of many healthcare units on the continent. Innovative practices that try to match international guidelines have emerged, for example the lack of commercially prepared enteric feeds at our ICU led us to create a special diet for our critically ill patients. A single feed consists of a small cup of silver fish powder; a small cup of instant soya flour; two tablespoonfuls of sugar; half a teaspoonful of table salt; two crushed multivitamin tablets; and two tablespoonfuls of cooking oil, all mixed in 250mls of fresh whole milk. This feed is given through a nasogastric tube every three hours. Feeds stop at 11pm to rest the gut (and avoid overfeeding) and resume at 7am after measurement of gastric residual volumes.

To improve oxygenation in the absence of face masks and nasal prongs in children, we use mini oxygen tents made of semirigid discarded polyethene bags. This helps to improve the fraction of oxygen from 25% to almost 40% and has been observed with pulse oximeters.

Developments

Task shifting has to an extent been successful in other areas of medicine; a currently successful running model is using the growth of anaesthesia to grow intensive care medicine. In Uganda, a successful programme supported by the Association of Anaesthetists of Great Britain and Ireland and Global Partners in Anesthesia and Surgery (a US based physicians organisation) has transformed the training domain of physician anaesthetists from two trainees in 2007 to eight graduates and 22 trainees in 2012.

Additionally, the three- to four-year long programme adopted the European Society of Intensive Care Medicine (ESICM) diploma curriculum: Competency Based Training in Intensive Care Medicine (CoBaTrICE), and embedded it as part of a one-year intensive care medicine module. This is also topped up by a four- to six month clinical fellowship in a Western ICU to round-off the education for those interested in pursuing intensive care medicine as a full-time career. Furthermore, the undergraduate medical curriculum now requires that trainees partake in a 17-week clinical rotation, including anaesthesia and critical care, thus equipping junior doctors with the basics of intensive care medicine. The same principle should be applied to nursing training schools as well.

While it is generally accepted that there will not be enough doctors in Africa, training a core group of anaesthesia-based intensivists would hopefully provide the leadership that is necessary to drive the growth of critical care across Africa. Many well-intended Western sourced, funded and driven initiatives fail because African physicians are not significantly involved from the outset. This failing process should stop. African critical care physicians should be networked to share experiences, carry out research and form advocacy groups to lobby for more resources to

improve critical care in Africa.

It should be emphasised that critical care medicine plays a significant role in helping to lower the burden of surgical disease by providing much needed postoperative care after major surgery in high risk areas like obstetrics, trauma and paediatrics. Additionally, the realm of infectious diseases (including HIV, TB and malaria) stands to benefit from critical care, especially with respect to patients in the acute phases of the respective illnesses. One could argue that critical care medicine is the missing link to providing holistic care for patients in this category of illness. This message can be used to inform priority setting in existing well funded programmes and to tap resources that can transform critical care medicine in low-resource countries.

Lastly, any well-intending physicians and nurses who want to help improve critical care in Africa should come open-minded, with the understanding that the culture in this continent predominates over everything. Do not be quick to judge, but politely question first why things are the way they are. You will get some really interesting answers. Please come with a mission to build capacity; choose a local champion through whom you can help to transform the community that you are visiting, and above all things, don't be in a rush. We are not.

Conclusion

Critical care remains a neglected area of health service delivery in Africa, with large numbers of patients with potentially treatable conditions not having access to such services. Further advocacy is necessary to highlight these challenges and to provide sustainable solutions for ensuring access to good quality, inexpensive, basic critical care.

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