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Jana B.A. MacLeod

Orlando C. Kirton

Thomas Jefferson University Hospital

Linda L. Maerz

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Surgical intensivist and global critical care: is there a role?

Jana B A MacLeod,¹ Orlando C Kirton,² Linda L Maerz³

¹Kenyatta University, Nairobi, Kenya

²Department of Surgery, Abington-Jefferson Health, Abington, Pennsylvania, USA

³Department of Surgery, Yale School of Medicine, New Haven, Connecticut, USA

Correspondence to

Dr Linda L Maerz;
linda.maerz@yale.edu000058

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THE FRAMEWORK: THE INTERNATIONAL ARENA

For decades, infectious diseases such as HIV and tuberculosis have been on the forefront of the global public health agenda and should rightfully remain high on the list for the foreseeable future.¹ Similarly, childhood infectious diseases account for a huge burden of disease and receive enormous support and funding, largely because of the potential for successful intervention.² For example, campaigns to eradicate polio and guinea worm capture the attention of governments and society because of the potential for eradicating a disease with a defined impact on the health of a population. Consequently, assistance directed toward *systems of care* in medicine, such as critical care have often been neglected in programmatic initiatives.

However, it has recently been recognized that success, even in disease-specific programmes, is often unobtainable by the independent introduction of a single intervention, such as a vaccine or new medication. For example, in existing HIV intervention programmes, a concurrent expansion of health systems capacity was undertaken along with the introduction of HIV-specific treatments. Without this concurrent support of the local healthcare systems, the delivery of adequate medical care to contain the HIV epidemic and improve survival would have been impossible. HIV public health programmes now routinely include infrastructure development within the hospital systems with which they work. Fortunately, global funds have made possible completion of facility and personnel upgrades, and as a result, systems as a whole have benefited.³

Accordingly, public health has shifted programmatic strategies to include healthcare infrastructure improvements, including hospital facilities and personnel, as well as disease-focused assistance. In the recent past, maternal mortality programmes focused on traditional birth attendants, education of front-line workers, and health promotion interventions, but with little success.⁴ Many of the commonest causes of maternal mortality are only averted by implementation of hospital-based 'curative category' interventions, such as a standardized caesarian section operative procedure.^{4 5} Scientifically, the current reductions in maternal mortality have been attributed to intrapartum care or, in particular, the support and development of hospital-based quality caesarian section operations. This example and others like it have led the way in shaping public health agendas to finally recognize that strengthening a hospital infrastructure is not only plausible, but can be highly successful in achieving improved population-level patient

outcomes. This has renewed an interest in developing hospital-based care as one of the components of overall improvement in the health of populations. Therefore, critical care should be included in future hospital-based improvement plans. The time has come to address concerns about introducing or supporting critical care services in resource-limited healthcare settings.

THE AGENDA: CRITICAL CARE

The need for critical care is reflected in global mortality rates, which can serve as a proxy for the burden of critical care in a region, as those who die are likely to require high-level care. Globally, the vast majority of deaths, primarily from treatable etiologies, occur in low-income and middle-income countries.⁶ Of the 8–10 million children under the age of 5 years who die annually, >90% die in the 42 poorest countries of the world.^{7 8} It is estimated that 90% of trauma-related mortality also occurs in low-income and middle-income countries.^{9 10} Finally, 50% of all maternal deaths that ensue during pregnancy and childbirth occur in developing countries.^{4 11} Critical care services in the developing world are urgently needed to address the weight of these serious conditions and their associated mortality. In Africa in particular, the need for critical care is urgent.¹²

Globally, over 50% of patients in any given intensive care unit (ICU) have a surgical problem or are post-trauma. In the USA, estimates demonstrate that there are ~6000 ICUs across the country that care for over five million admissions annually, which amounts to ~55 000 patients daily being treated in an ICU in the USA, with a significant number being surgical or trauma-related admissions.^{13–15} The earliest publications from ICUs in developing countries have demonstrated a similar epidemiology. For example, in 1968 in Nigeria, a review of the first 100 cases of critical illness demonstrated that the majority of the admissions were either postoperative or postobstetric complications with an overall unit mortality rate of 30%.¹⁶ Recent publications, such as a 2006 review of ICUs in low-resource healthcare settings in Tanzania and the Republic of Congo, demonstrate that 5 of the top 10 admission diagnoses are directly attributed to either trauma or postsurgical patients, with another 20% directly related to obstetric causes.¹² Therefore, critical illness in the developing world disproportionately affects the young, productive portion of society. Accordingly, improvement in critical care services has the potential to greatly impact population-level mortality rates and improve the impact of mortality on society.

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However, obstacles to implementation and support of critical care in the developing world remain. Critical care is viewed as a highly specialized, highly technical field that requires both expensive equipment and personnel training. Ironically, some of the expensive equipment in US ICUs is infrequently used and lacks scientific merit with respect to improving patient outcomes.¹⁷ For example, after the polio epidemic of the 1950s, the Bird respirator was developed to provide a more portable form of mechanical ventilation. Since that time, many new models of ventilators have been developed. However, only the provision of positive end-expiratory pressure and maintaining low plateau pressures have scientifically demonstrated a reduction in mortality, and these components of mechanical ventilation are neither technology-specific nor ventilator-specific.¹⁸ Many technologies, such as pulmonary artery catheters, were once extensively used, but have subsequently been demonstrated to be of little benefit and are now rarely used.¹⁹ Conversely, timely, appropriate sepsis management that provides early institution of fluid resuscitation and antibiotics has been demonstrated to reduce mortality, whereas technology, per se, has not.¹⁸

Therefore, critical care is a clinical service that is feasible to implement, requires less technology than is commonly realized, and has the potential to substantially impact the young, productive portion of a population, minimizing years of life lost. Within most resource-limited countries, surgeons are still needed in large numbers, and anesthesiologists are even scarcer.²⁰ For example, in Africa, the clinical care of most ICU services, if provided by doctors with specialist training, is often limited to anesthesiologists who commonly lack formal critical care training. Interestingly, critical care training for nurses is often more easily available than for physicians or surgeons. With the exception of a few countries in the north and south of the continent, there is no formal critical care fellowship-level training for physicians and surgeons. Additionally, the allocation of space and beds for an intensive level of care is sparse. Even in South Africa, in large cities such as Cape Town, it is estimated that only 6.6% of all beds are allocated to critical care.²¹ In a survey of anesthetic services in 68 hospitals in Zambia, only 7% reported having an ICU.²² Finally, the majority of units are found in tertiary care centers and major urban locations, further reducing access to the appropriate level of care when needed. Therefore, even those patients who seek hospital care often do not receive the intensity of care they require to survive their illness. In a community, non-tertiary hospital in a northeastern state of South Africa, a review of admitted hospital patients demonstrated that 25% met criteria warranting ICU admission had they been admitted to a hospital with such a unit.²¹ Patient acuity in the trauma units, operating rooms, and wards of the low-income countries is often high. Malnutrition, chronic anemia, and the high prevalence of HIV coupled with the many cultural and socioeconomic factors that result in patients presenting late, all contribute to acuity severity on admission. Therefore, in low-income and middle-income countries, the challenge for critical care is significant, with a potentially larger burden on hospitals than is seen in other parts of the world. As the United Nations Development Program's (UNDP) new 2030 sustainable development goals are rolled out, there is a major focus on improved health. Its goals include an increased emphasis on universal quality healthcare access for communicable, non-communicable, and injury-related illness.²³ As the global agenda in health expands, critical care must be brought into the clinical service agenda.^{24 25}

THE PERSPECTIVE: THE SURGICAL INTENSIVIST

There is a burden of unmet need in the international critical care arena, there is a global recognition by UNDP of this need, and at present, local resources, including facilities and personnel, are inadequate to address it. Concurrently, some colleagues in high-resource countries are increasingly interested in reaching out to other institutions globally to share knowledge, experience and mentoring—now is the time to match the high-resource and low-resource institutions and individuals to maximize the benefit to all. Technology, expensive equipment, and advanced medications are not essential to primary critical care. This is best reflected in the motto of the international Society of Critical Care Medicine (SCCM): 'Right Care...Right Now'. This approach is universal and can be adopted globally wherever critically ill patients are found. The basic tenets of surgical critical care should be included in essential surgical care initiatives.

FULL CIRCLE: THE PATHWAY TO BUILDING A SOLUTION

Matching high-resource and low-resource institutions and individuals requires communication, mentorship, and collaboration. High-level communication technology does not require physical presence, but provides a means for involvement in critical care abroad and can be leveraged to facilitate mentorship, education, and research, all of which require collaboration. The international need for surgical intensivists is great, and the desire to provide assistance exists. Facilitating the partnership of low-resource and high-resource institutions and individuals will benefit all involved, including, and especially, the world's critically ill patients.

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