



**Karolinska
Institutet**

Department of Physiology and Pharmacology
Section of Anesthesiology and Intensive Care Medicine
and
Department of Public Health Sciences, Global Health – Health
Systems & Policy

Critical Care in Low Resource Settings

THESIS FOR DOCTORAL DEGREE (Ph.D.)

By

Tim Baker

Public Defence

Friday November 6th, 2015 at 9:00

Nanna Svartz Auditorium, Karolinska University Hospital, Solna

Principal Supervisor:

Dr. David Konrad
Karolinska Institutet
Department of Physiology and Pharmacology
Section of Anesthesiology and Intensive Care
Medicine

Co-supervisors:

Dr. Jaran Eriksen
Karolinska Institutet
Department of Laboratory Medicine
Division of Clinical Pharmacology

Associate Professor Lars Irestedt
Karolinska Institutet
Department of Physiology and Pharmacology
Section of Anesthesiology and Intensive Care
Medicine

Opponent:

Professor Elizabeth Molyneux
University of Malawi
Department of Paediatrics

Examination Board:

Associate Professor Hans Barle
Karolinska Institutet
Department of Clinical Sciences

Professor Anna-Karin Hurtig
Umeå University
Department of Public Health & Clinical
Medicine

Associate Professor Louis Riddez
Karolinska Institutet
Department of Molecular Medicine and Surgery

ABSTRACT

Background: Critical care is the care of patients with immediately life-threatening disease or injury. The substantial global burden of critical illness is especially high in low resource settings. There is a striking lack of knowledge about the quality of critical care in such settings and about how to improve care.

Aim: To assess the quality of critical care in low resource settings and to evaluate methods for identifying critical illness and improving critical care.

Methods: All studies were conducted in Tanzania, a low-income country in East Africa. Quality standards for critical care in low resource settings were developed and used to evaluate a sample of ten hospitals in a cross-sectional survey. Deranged vital signs were studied in patients at admission to hospital and to the Intensive Care Unit (ICU). Severe derangements were defined as “danger signs” and combined to form compound scores. The relationships between in-hospital mortality and deranged vital signs were assessed using prospective cohort studies. A context-appropriate vital signs directed therapy (VSDT) protocol was designed and implemented on an ICU using a multi-faceted approach. The effects of VSDT on the acute treatment of critically ill patients and on mortality rates were evaluated.

Results: There were deficits in infrastructure, routines and training for critical care. In contrast, a majority of the necessary equipment and drugs were available. Single danger signs, both at admission to hospital and to ICU were associated with mortality and were as useful as the more complex compound scoring systems. Danger signs were common among patients on ICU and the identification of a danger sign was rarely followed by an acute treatment. The in-hospital mortality rate for patients cared for on ICU was 50%. The VSDT protocol led to improvements in the care given for deranged vital signs. The mortality rate for patients admitted with hypotension was reduced following the implementation of VSDT, but not for all patients.

Conclusions: There is a lack of good quality critical care in low resource settings. Single deranged vital signs identify critical illness and introducing a vital signs directed therapy protocol can improve the acute treatment of critically ill patients and reduce mortality rates for some patients.

Keywords: Critical Care; Vital Signs; Developing Countries; Emergency Treatment; Hospital Mortality; Global Health; Quality of Health Care