UPDATE IN PREDICTIVE SCORING SYSTEMS IN THE INTENSIVE CARE UNIT

Essay

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List of Tables

Abbreviations

ABG	Arterial Blood Gases
ACS	Acute Coronary Syndrome
A. F.	Atrial Fibrillation
AIDS	Acquired Immune Deficiency Syndrome
AIS	Abbreviated Injury Score
AMI	Acute Myocardial Infarction
APACHE	Acute Physiology and Chronic Health Evaluation
APS	Acute Physiology Score
ARDS	Acute Respiratory Distress Syndrome
ARF	Acute Renal Failure
B.C.	Before Christ
B.P.	Blood Pressure
BSA	Body Surface Area
BUN	Blood Urea Nitrogen
CCU	Coronary Care Unit
CHF	Congestive Heart Failure
CNS	Central Nervous System
COPD	Chronic Obstructive Pulmonary Disease
CPAP	Continuous Positive Airway Pressure
CPIS	Clinical Pulmonary Infection Score
CPR	Cardio-Pulmonary Resuscitation
CSF	Cerebro-Spinal Fluid

C.T.	Computerized Tomography
CTC	Child Turcotte Classification
CVA	Cerebro-Vascular Accident
CVS	Cardio-Vascular System
EEG	Electro-Encephalo Gram
GCS	Glasgow Coma Scale
ICU	Intensive Care Unit
I.M.	Intra muscular
IMV	Invasive Mechanical Ventilation
INR	International Normalized Ratio
ISS	Injury Severity Score
I.V	Intra venous
MAP	Mean Arterial Pressure
MELD	Model of End-stage Liver Disease
MET	Medical Emergency Team
MEWS	Modified Early Warning Score
MMCC	Modified Moemen Child Classification
MODS	Multiple Organ Dysfunction Score
MPM	Mortality Prediction Model
OAC	Oral Anti-Coagulation
OSF	Organ System Failure
ODIN	Organ Dysfunction and/or Infection
PCWP	Pulmonary Capillary Wedge Pressure
PEEP	Positive End Expiratory Pressure
PELD	Pediatric End-stage Liver Disease

PGCS	Pediatric Glasgow Coma Scale
PRISM	Pediatric Risk of Mortality
PTS	Pediatric Trauma Score
RIP	Riyadh Intensive Protocol
RRT	Rapid Response Team
rTS	revised Trauma Score
SAPS	Simplified Acute Physiology Score
SBP	Systolic Blood Pressure
SOFA	Sequential Organ Failure Assessment
SS	Sickness Score
TIA	Transient Ischemic Attack
TISS	Therapeutic Intervention Scoring System
TS	Trauma Score
U.K.	United Kingdom
U.S.A	United States of America
WBC	White Blood Cells

CONTENTS

INTRODUCTION

The purpose of intensive care medicine is to diagnose and treat patients with acute life threatening illness, and to restore their previous health and quality of life. Care of critically ill patients has become increasingly complex over the last two decades. Modern technological advances now enable us to manage previously terminal conditions and patient can be kept alive for weeks or months, even when their prognosis is dismal. As reasonable hope of recovery fades, the health care team confronts another obligation : to help the dying achieve a peaceful and dignified death ***(Suter et al.,1994).***

Over the past 20 years, substantial resources were committed to the development of scoring systems that would provide objective prognostic estimates for critically ill patients. A common goal was to produce systems flexible enough to predict outcome among heterogeneous groups of patients who share the misfortune of being critically ill through repeated testing with large numbers of patients. These refined scoring systems have reached a point at which they represent the scientific foundation for describing severity of illness in critical care research and for describing and comparing groups of critically ill patients treated in different hospitals and countries ***(Becker and Zimmerman,2005)***.

The evaluation of severity of illness in the critically ill patients is made through the use of severity scores and prognostic models. Severity scores are instruments that aim at stratifying patients basedon the severity of illness, assigning to each patient an increasing score as their severity of illness increases. Prognostic models , apart from their ability to stratify patients according to their severity, predict a certain outcome (usually the vital status at hospital discharge) based on a given set of prognostic variable and a certain modelling equation ***(Marino and Metnitz,2005).***

Scoring systems essentially consist of two parts: a severity score, which is a number (generally the higher this is the more severe the condition) and a calculated probability of mortality. Most commonly, this is the risk of in-hospital mortality through other outcome measures (e.g. survival to 28 days post hospital discharge) can be modeled ***(Lemeshow and Le gall,1994).***

Physicians use scoring systems because they believe that these models offer more accurate mortality predictions ***(Cullen et al.,1998).***

The ideal scoring system would have the following characteristics :
1- On the basis of easily recordable variables.
2- Well calibrated.
3- A high level of discrimination.
4- Applicable to all patient populations.
5- A true estimate of presenting risk of death.
6- Can be used in different countries ***(Selker,1993).***

There is no agreed classification of the scoring systems that are used in the critically ill patients. Score can be applied either to a single set of data or repeated over time ***(Radly,1998).***

AIM OF THE WORK

This essay aims to evaluate the scoring systems and their ability to predict outcome in critically ill patients.

CHAPTER I : SPOT LIGHT ON ICU HISTORY

Intensive care today is the composite of a cohort of a critically ill patients nursed in one environment that facilitates the support of organs to maintain physiological normality. Although we think of intensive care as a modern concept , organ support dates back thousands of years ago. Ancient Egyptians had documented procedures resembling tracheostomies to treat airway obstruction from as early as 1500 BC, and Hippocrates had commenced a form of organ support by cannulating the airway to allow "air to be drawn into lungs" one thousand years later ***(Szmuk P et al.,2008).***

Florence Nightingale made a revolutionary step towards modern critical care during the Crimean War in the 1850s by separating wounded soldiers depending on the severity of their injuries. A key component to intensive care of a patient is the frequency and intensity of monitoring by a designated nurse, a system that Florence recognized by monitoring the sickest soldiers more regularly by more nurses. Although she remained unconvinced about germ theory, her emphasis on cleanliness had a significant impact on reducing the mortality of the soldiers from 40% to 2%. Additionally her innovative data collection related to hospital acquired infections allowed comparisons between hospitals and initiated the evidence based practice that we continue today ***(Munro and Cindy L, 2010).***

A pioneering event occurred in 1950, which heralded a new age for care of the acutely unwell. *Dr. Peter Safar*, an Austrian anesthesiologist established the concept of "Advanced Support of Life" , keeping patients sedated and ventilated in an intensive care environment. Safar is considered to be the first practitioner of intensive care medicine as a speciality. After two years in Copenhagen, when the city's population experienced one of the world's worst polio epidemics. Many patients were dying from respiratory failure as the disease caused increasing muscle weakness and paralysis. *Dr. Bjorn Ibsen* a Danish anesthesiologist, proposed a theory that the patient could be supported by inserting a tracheostomy, manually clearing their secretions and ventilating them with an oxygen/nitrogen mix using positive pressure. He also recognized the importance of carbon dioxide clearance and recommended that carbon dioxide absorbers were placed into the circuit. This led to the manual ventilation of up to 70 patients at any one time by a team of doctors, and resulted in reduction in mortality from polio from 80 to 25%. *Ibsen* went on to open the first intensive care unit in 1953, which was replicated around the world ***(Caroline Richmond, BMJ, 2007).***

Since the 1950s, intensive care has grown into a speciality in its own right. Significant technological advances have allowed us to develop sophisticated ventilators, renal replacement therapy and cardiovascular monitoring. Intensive care units can now even be supervised via tele or remote ICU systems, providing surveillance and support to a large number of ICUs in distant or remote sites by a centralized multi-disciplinary critical care team ***(Goran SF, 2010).***