MEDINFO 2007
HISA Ltd Australia
© 2007 The authors. All rights reserved.

Developing A Paper-Based Surviving Sepsis Campaign Guidelines Compliance Support and Outcome Predicted System

Ying-Che Huang[ab], Wen-Hsien Tseng[a], Polun Chang[a]

[a] *Institute of Health Informatics and Decision Making, National Yang-Ming University, Taipei, Taiwan*
[b] *Department of Anesthesiology and Critical Care, Veteran General Hospital Taipei, Taiwan*

Abstract

In 2003, 11 international organizations had a consensus committee created and published an evidence-based guidelines - Surviving Sepsis Campaign (SSC) guidelines- for the management of severe sepsis and septic shock.

Keywords:

sepsis, outcome, artificial neural network, intensive care Uuit, decision support system

Introduction

In 2003, 11 international organizations had a consensus committee created and published an evidence-based guidelines -Surviving Sepsis Campaign (SSC) guidelines- for the management of severe sepsis and septic shock. SSC had provided tools and website to help interested hospital and teams to improve to meet the standard care outlined in the guidelines. Meanwhile the product of computer industry, such like IBM® CDI (clinical decision intelligence) system, had tried to provide different solution. These methods are not fitted to every situation, either cost too much time (to audit whole care procedure) or too much money (to integrate the whole hospital computer system) and they also lacked for outcome (mortality) prediction system. Trying to resolve above problems, we have developed a Surviving Sepsis Campaign Guidelines Compliance Support and Outcome Predicted System especially for an Intensive Care Units (ICU) that has basic bedside monitoring machines but lacked for integrated clinical information system (CIS) and still paper-based working.

Method

A 22 beds surgical ICU, lacking for integrated clinical information system, still uses paper-based method to collect patient data. First step we transformed Surviving Sepsis Campaign guidelines into one-page document. There are checkboxes on this document represented the data we want to collect for helping treating the sepsis patient. This document will be scanned later in our OMR (Optical Mark Recognition) system. In second step we developed OMR system included three primary modules which are "Document Positioning Generator (DPG)", "Guideline Document Recognition Engine (GDRE)", and "Correction and Statistic Tools (CST)". The output of our system is in XML-format which makes the data easily transferable to customize designed SCC guidelines rule engine based decision support system. In the same time, XML-format data would be randomly allocated to either the training or validation set for constructing and validating artificial neural network (ANN) using a back-propagation algorithm which will be used to predict patient's outcome. (Figure 1 demonstrated our system architecture)

Results

Our results can be divided into three parts. First part is about error rate of document recognition. The error rate in preliminary study is 0.19% (1 error in 531 scanned checkboxes), after changing automatic scan documents to scan document one by one, the error rate can be reduced to 0.057%(1 error in 1754 scanned checkboxes). Second part is the raise of the rate that adherence to guideline-based care, from 25% to 54% (immediate adherence rate). The third part is mortality prediction. After collecting enough case number (near 200 cases), the prediction result will gain soon.

For the cost issue, the whole system hardware cost less than 6,000 US dollars. Compared to build integrated clinical information system in studied ICU, it cost more than 600,000 US dollars.

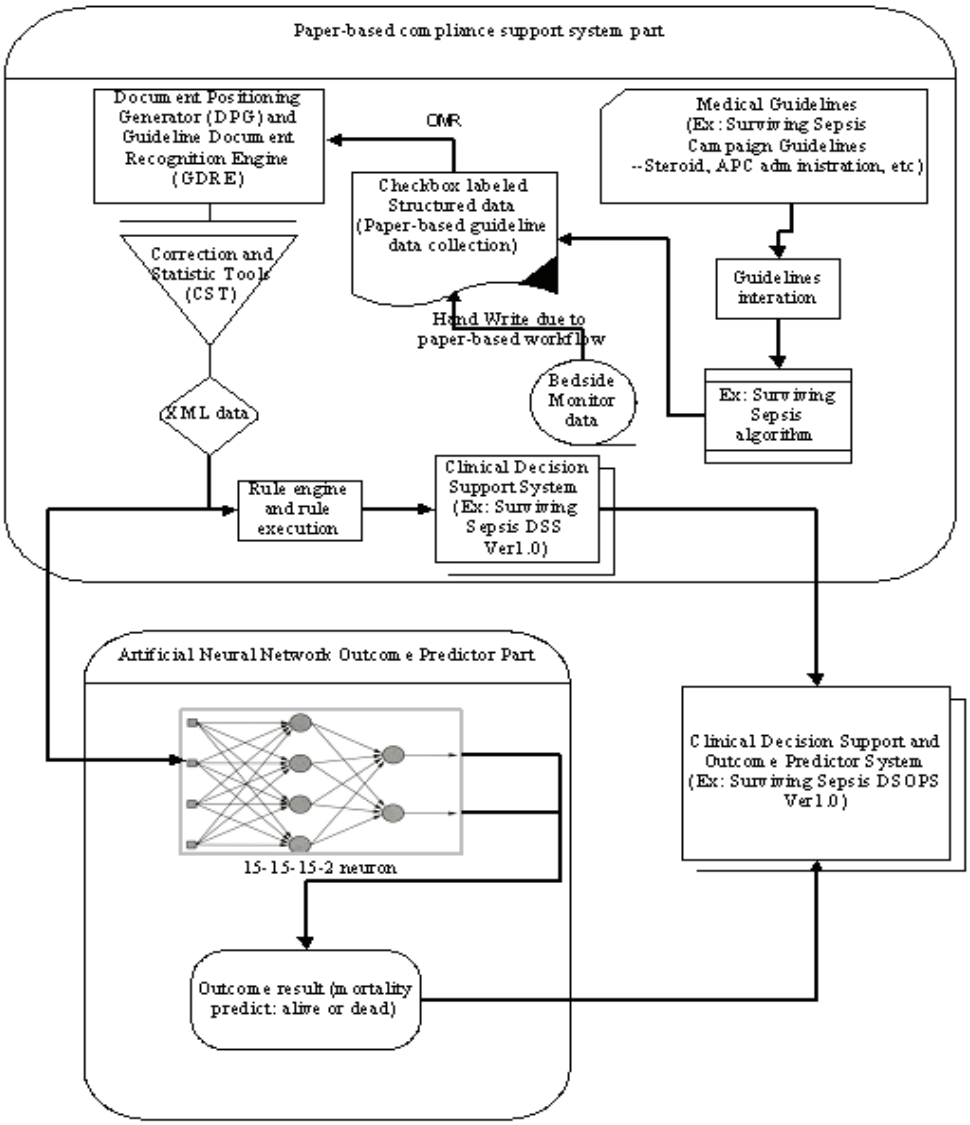

Figure 1 - System architecture

Conclusion

Not only the ICU owning the advanced and integrated CIS could take the advantage of guideline implementation and quality improvement, we proved that using our system has the chance to do the same thing; especially in the ICU that still using paper-based method to collect patient data and the cost of whole system could be minimized.