Service Priorities and Programmes

Electronic Presentations

Convention ID: 1180
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Assessing the Potential Benefit of ICU Care with Mortality Prediction Model-III (MPM0-III)

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Keywords:
Intensive Care
Triage
Mortality

Introduction

ICU care is an expensive resource and should be offered to patients whom may benefit the most. MPM0-III is a disease severity model for ICUs in the United States (US). It estimates hospital mortality from patients' age, and the presence or absence of 15 acute and chronic clinical states. We hypothesized that MPM0-III was applicable to Hong Kong's critically ill patients, whose attending clinicians considered ICU admission was necessary. Such generalization was reasonable as these patients would have received ICU care if it was at the discretion of the attending clinicians, similar to the "open" ICU system in US. With this assumption, insight could be gained on the effect of ICU care, as only some of these patients actually received ICU care.

Objectives

To evaluate the performance characteristics of MPM0-III model and identify specific groups of patients whom might benefit the most with ICU admission.

Methodology

A retrospective review of the electronic ICU consultation databases of Tuen Mun Hospital, Pamela Youde Nethersole Eastern Hospital and Pok Oi Hospital was conducted. The databases contained all emergency ICU consultations. Elective ICU admission for post-operative care was not included.

Result

A total of 1,714 potential ICU patients were assessed from 1 July to 31 October 2015. 1,331 patients (77.7%) had complete MPM0-III data and discharged from hospital. Among them, 653 (49.1%) were admitted to ICU. The discrimination of the MPM0-III was fair for ICU-treated patient (c=0.73) and good for those without ICU care (c=0.85). The calibration of MPM0-III was unsatisfactory (p=0.00), with an under-estimated risk of death for those without ICU care. Using logistic modelling, such mis-fitting was rectified (p=0.66) after considering "not given ICU care" as a risk factor for mortality, carrying an adjusted odds ratio of 10.5 (p=0.00). The benefit of "ICU care" was the

greatest when the MPM0-III predicted risk was 0.24, where the mortality reduction was 0.53 and the number needed to treat was 1.9. To conclude, a disease severity model appeared to be useful in identifying patient subgroup whom would benefit the most from intensive care.