

Modeling Emergency Department Crowding: Restoring the Balance between Demand for and Supply of Emergency Medicine

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ABSTRACT

Emergency Departments (EDs) worldwide are confronted with rising patient volumes causing significant strains on both Emergency Medicine and entire healthcare systems. Many EDs are in a situation where the number of patients in the ED is beyond capacity for which the ED is designed and resourced to manage —a phenomenon called Emergency Department (ED) crowding. ED crowding impairs the quality of care delivered to patients and lead to longer patient waiting times for ED doctor's consult and admission to the hospital ward. In Singapore, total ED attendance at public hospitals has grown roughly 5.57% per year between

2005 and 2016 and, as a consequence, emergency physicians have to cope with patient volumes above the safe workload. The purpose of this study is to create a virtual ED that closely maps the processes of a hospital-based ED in Singapore using system dynamics in order to simulate, visualize, and improve patient flows within the ED. Based on the simulation model, we analyze three policies: How ED manpower needs to be adjusted in order to dissolve congestions and smooth ED patient flows; co-location of general practitioners in the ED; and a more efficient patient transfer from the observation ward to the associated acute hospital.