Simulation to Predict Effect of Citywide Events on Emergency Department Operations

Visit Article

ABSTRACT: Summary: Medical emergency preparedness has been an issue of medical relevance since the advent of hospital care. Studies have simulated emergency department (ED) overcrowding but not yet characterized effects of large-scale, planned events that drastically alter a city's demography, such as in Philadelphia, Pennsylvania during the 2015 World Meeting of Families. A discrete event simulation of the ED at the Children's Hospital of Philadelphia was designed and validated using past data. The model was used to predict the patient length of stay (LOS) and number of admitted patients if the arrival stream to the ED were to change by 50% from typical arrivals in either direction. We compared the model's estimations with data produced during the papal visit that had 39.65% fewer patient arrivals. For validation, the simulated mean LOS was 226.1 ± 173.3 minutes (mean ± SD) for all patients and 352.1 ± 170.3 minutes for admitted patients. Real-world mean LOSs for the fiscal year 2014 were 230.6 ± 134.8 for all patients and 345.0 ± 147.7 for admitted patients. For the estimation of the World Meeting of Families, the simulation accurately estimated the LOS of both patients overall and admitted patients within 10%. These results show that it is possible to use simulations to project the patient flow effects in EDs in case of large-scale events. Providing efficient care is essential to emergency operations, and projections of demand are crucial for targeting appropriate changes during large-scale events. Analysis of validated computer simulations allows for evidence-based decision making in a complex clinical environment.

Journal:

Pediatric Quality & Safety
Authors: Eugene Day

Related Content

- The Value of Negative Results in Quality Improvement: A Simulation Perspective
  Article
  Jul 2016
- Incorporating discrete event simulation into quality improvement efforts in health care systems.
  Article
  Jan 2015