A Queuing Model of Ambulance Offload Delays

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ABSTRACT

Emergency Medical Services (EMS) refers to an “offload” time as the time taken to transfer a patient from an ambulance stretcher into an emergency department. If an emergency room department (ER) cannot accept transfer of care for an incoming patient, an “offload delay” results, and the paramedic team must stay with the patient until the ER is ready to accept care. While the ambulance is on offload delay, the EMS vehicle and its staff are unavailable to respond to emergency calls. This is a serious impediment to the provision of EMS services.

Offload delays are common across Ontario, and are a growing concern to both the public and healthcare providers. The reasons for offload delays are many, most of which can be characterized by downstream congestion in patient care: ER overcrowding, a shortage of hospital beds, a lack of alternative level of care options. While the reasons for offload delays are well known, there are few analytical models available to assist decision-makers with understanding the implications of various resource allocation policies. This talk will present a queueing model an EMS-ER system whose results facilitate a deeper understanding of how changes in the hospital system or EMS capacity affect offload delays.

BIO

Beth Jewkes is a professor of applied operations research, and is chair of the Department of Management Sciences at the University of Waterloo. Her research interests are in stochastic models of supply chain systems. This work stems from recently initiated projects with the Region of Waterloo EMS and several of the Regional hospitals dealing with offload delay issues and ambulance deployment strategies. Her teaching interests include Discrete Event Simulation, Supply Chain Management, and Queueing Models; she is on the author team of “Engineering Economics in Canada”, soon to come out in its 4th edition.