Reducing patient ER wait times mathematically

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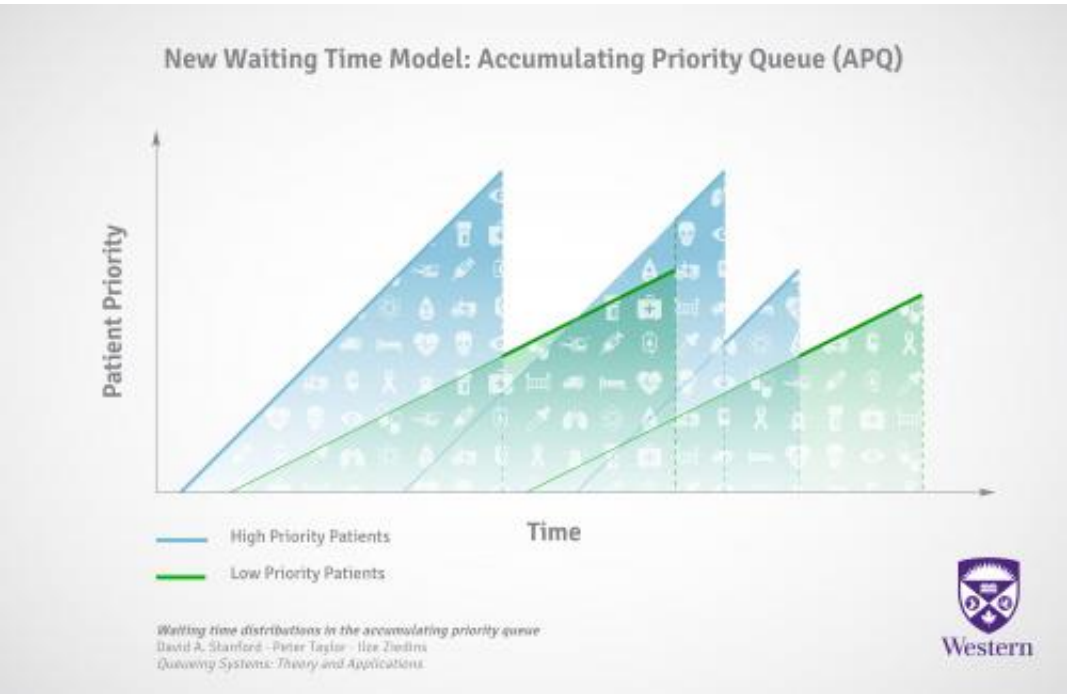

A new mathematical finding by an international research team provides the health care system with a more balanced approach to how patients are selected for treatment, which will consequently decrease wait times. Led by Western's David Stanford, the tri-national team includes Peter Taylor from the University of Melbourne and Ilze Ziedins from the University of Auckland.

In an article published by the journal *Queueing Systems: Theory and Applications*, Stanford and his collaborators have found the formulas needed to calculate waiting time distribution for each priority class, naming the model the Accumulating Priority Queue (APQ).

"Many waiting time standards are stated as a series of Key Performance Indicators (KPIs) for each of the different patient classes. Each KPI usually takes the form of a waiting time target and a corresponding compliance target, representing the fraction of patients that are to be seen by the targeted time," said Stanford, a Statistical and Actuarial Sciences professor at Western's Faculty of Science. "The greater the patient acuity, or perceived severity, the shorter the time target and the higher the compliance target. APQ can be used to seek out the best priority points for each class, maximizing the chance of meeting all KPIs at the same time."

KPIs are often set according to clinical need, such as with the Canadian Triage and Acuity Scale (CTAS) on which Canadian emergency rooms operate. According to Stanford, one major problem with CTAS is the standards may not conform to the rates at which patients present themselves in a health care setting. CTAS is based upon the Australasian Triage Scale (ATS) used in Australia and New Zealand, which is why the authors collaborated.

"An ordinary priority queue which serves all the highest-priority patients first, and then the next class, and so on, may produce results at variance with some of the stated KPIs," Stanford said. "The APQ responds to this challenge by letting customers accumulate priority points while they wait, at a rate that depends upon their priority classification. The accumulation rates can be fine-tuned to afford the best chance at compliance for all KPIs – assuming that staffing levels are sufficient."

Stanford says the APQ model can be modified as some medical

conditions and cases will always take priority in an emergency room.

"A doctor would never delay resuscitation or an emergency case for the sake of a lower-acuity patient. But among lower priority classes, one might move down the priority list for a patient that has waited a very long time. Emergency doctors I have spoken with have indicated that this is already being done implicitly. APQ can make the matter more explicit, in terms of an extra column on an emergency room information board, for example, that a doctor can factor into his or her decision making."

Provided by University of Western Ontario