Combination of easily measurable real time variables to predict ED crowding

Introduction:
Almost every domain of quality is reduced in crowded emergency departments (ED), with significant challenges around the definition, measurement and interventions for ED crowding. The most widely known tool to measure crowding is NEDOCS; this is a validated score. In Saint John, there is a local tool based on NEDOCS, known locally as the ED Saturation Calculator. We wished to determine if a combination of 3 easily measurable variables could perform as well as these standard tools (NEDOCS score and a NEDOCS-derived LOCAL tool) in predicting ED crowding in the Saint John Regional Hospital, a tertiary hospital with 57,000 visits per year.

Methods:
Over a 2 week period, we recorded ED crowding predictor variables and calculated NEDOCS and LOCAL scores. These were compared every 2 hours to a reference standard Physician Visual Analog Scale (range 0 to 10) impression of crowding to determine if any combination of variables outperformed NEDOCS and LOCAL (crowded =5 or greater). Five numeric variables performed well under univariate analysis: i) Total ED Patients; ii) Patients in ED beds + Waiting Room; iii) Boarded Patients; iv) Waiting Room Patients; v) Patients in beds To Be Seen. These underwent multivariate, log regression with stratification and bootstrapping to account for incomplete data and seasonal and daily effect.

Results:
143 out of a possible 168 observations were made. Two different combinations of 3 variables outperformed NEDOCS and LOCAL. The most powerful combination was: Boarded Patients; plus Waiting Room Patients; plus Patients in beds To Be Seen. These underwent multivariate, log regression with stratification and bootstrapping to account for incomplete data and seasonal and daily effect.

Conclusion:
Emergency department crowding has multiple adverse effects in the ED, the hospital and in the community. A combination of 3 easily measurable ED variables (Boarded Patients; plus Waiting Room Patients; plus Patients in beds To Be Seen) performed better than the validated NEDOCS tool and a NEDOCS-derived LOCAL tool at predicting ED crowding, when compared against our clinicians’ own sense of crowding and safety within the department. Work is on going to design a simple tool that can predict crowding in real time and facilitate early interventions. Correlation with ED system and clinical outcomes should be studied in different ED environments.

References