characteristics using sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) with 95% confidence intervals (CI). The potential time saved was calculated from consultation to bed request for admitted patients. **Results**: Characteristics for the 454 included patients were: mean age 60.1 years, 48.4% male, 46.9% evening presentation, 69.4% were admitted (most commonly by Internal Medicine 26.9%), and median consult to bed request time was 3.5 hours (interquartile range 2.0 – 5.3 hours). Overall EP prediction sensitivity, specificity, PPV and NPV were 90.5% (95% CI 86.7-93.5), 84.2% (95%CI 77.0-89.8), 92.8% (95%CI 89.8-95.0) and 79.6% (95%CI 73.4-84.7) respectively. In other words, EPs correctly predicted 92.8% of patient admissions. The PPV for Internal Medicine was 95.7% (95%CI 89.7-98.4) and ranged from 78.9% (95%CI 53.9-93.0) for Psychiatry to 100% (95%CI 78.1-100) for Family Medicine. A total of 1113.5 hours of ED stretcher time (37.1 hours per shift) could have been saved if EPs initiated a concurrent bed request at time of consultation. **Conclusion**: EPs correctly predicted 92.8% of patient admissions across a broad field of disciplines. We estimate 1113.5 hours of ED stretcher time could have been saved over the study period if EPs triggered an inpatient bed request at the time of consultation, rather than waiting for the consultants' disposition decision.

Keywords: admission delay, crowding

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The impact of snowfall on patient attendance at an urban academic emergency department

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Introduction: Accurate forecasting of emergency department (ED) patient visits can inform better resource matching. Calendar variables such as day of week and time of day are routinely used as predictors of ED volume. Further improvement in forecasting will likely come from dynamic variables. The effect of snowfall on ED volumes in colder climates remains poorly understood. We sought to determine whether accounting for snowfall improves ED patient volume forecasting. Our secondary objective was to characterize the magnitude of effect of snowfall on ED volume. **Methods**: This was a retrospective observational study using historical patient volume data and local snowfall records from April 1st, 2011 to March 31st, 2018 (2,542 days) at a single urban ED. We fit a series of four generalized linear models: a baseline model which included calendar variables and three different snowfall models which contained the variables in the baseline model plus an indicator variable for modelling snowfall. Each snowfall model had a different daily threshold for its indicator variable: any snowfall (>0cm), moderate snowfall (> = 1 cm), or high snowfall (> = 5 cm). We modeled daily ED volume as the dependent variable using a Poisson distribution. To evaluate model fit, we examined the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) in each of the four models. In both cases, a lower number indicates better model fit. Incident rate ratios were calculated to determine the effect of snowfall. We used the delta method to calculate confidence intervals. **Results**: A total of 2542 days were used to develop the model. All three snowfall models demonstrated improved model fit compared to the baseline model with lower AIC and BIC values. The best fitting model included a binary variable for moderate snowfall (> = 1cm/day). This model showed a statistically significant decrease in ED volume of 2.65% (95% CI: 1.23% -4.00%) on snowfall days, representing 5.4 (95% CI: 2.5 -8.2) patients per day at our hospital with an average daily volume of 205 patients. **Conclusion**: The addition of a snowfall variable results in improved forecasting model performance in ED volume forecasting with optimal threshold set at 1 cm of snow in our setting. Snowfall is associated with a modest, but statistically significant reduction in ED volume.

Keywords: forecasting, patient volume, weather

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Impact of high emergency department occupancy on time to physician initial assessment: a traffic theory analysis

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Introduction: Emergency department (ED) congestion is an ongoing threat to quality care. Traditional measures of ED efficiency use census and wait times over extended time intervals (e.g. per year, per day), failing to capture the hourly variations in ED flow. Borrowing from the traffic theory framework used to describe cars on a freeway, ED flow can instead be characterized by three fundamental parameters: flux (patients traversing a care segment per unit time), density (patients in a care segment per unit time), and duration (length of stay in a care segment). This method allows for the calculation of near-instantaneous ED flux and density. To illustrate, we examined the association between stretcher occupancy and time to physician initial assessment (PIA), seeking to identify thresholds where flux and PIA deteriorate. **Methods**: We used administrative data as reported to government agencies for 115,559 ED visits from April 1, 2014 to March 31, 2016 at a tertiary academic hospital. Time stamps collected at triage, PIA, and departure were verified by nosologists and used to define two care segments: awaiting assessment or receiving care. Using open-source software developed in-house, we calculated flow measures for each segment at 90-minute intervals. Graphical analysis was supplemented by regression analysis, examining PIA times of high (CTAS 1-3) or low (CTAS 4-5) acuity patients against ED occupancy (=density/staffed stretchers) adjusting for the day of the week, season and fiscal year. **Results**: At occupancy levels below 50%, PIA times remain stable and flux increases with density, reflecting free flow. Beyond 50% occupancy, PIA times increase linearly and flux plateaus, indicating congestion. While PIA times further deteriorate above 100% occupancy, flow is maintained, reflecting care delivery in non-traditional spaces (e.g. hallways). An inflection point where flux decreased with increased crowding was not identified, despite lengthening queues. **Conclusion**: The operational performance of a modern ED can be captured and visualized using techniques borrowed from the analysis of vehicular traffic. Unlike cars on a jammed roadway, patients behave more like a compressible fluid and ED care continues despite high degrees of crowding. Nevertheless, congestion begins well below 100% occupancy, presumably reflecting the need for stretcher turnover and saturation in subsegmental work processes. This methodology shows promise to analyze and mitigate the many factors contributing to ED crowding.

Keywords: congestion, flow, traffic

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Assessing the long-term emergency physician resource planning for Nova Scotia, Canada

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