

quantitative prediction of future events to develop initial plans. Through research, these predictions can be focused and refined. The results suggest that many hospitals will experience increased demand for services and will have to do resource allocation planning accordingly to ensure patient demand is met appropriately.

Keywords: patient flow, health human resources, admission

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An analysis of pediatric visits to a tertiary care centre in Northern Ontario, Canada

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Introduction: The Thunder Bay Regional Health Sciences Centre (TBRHSC) Emergency Department (ED) has experienced an all patient increase in visits ranging from 1.5 to 6% per year since 2004. As a regional referral centre with no dedicated pediatric ED, TBRHSC is the sole emergency provider. Given the rising visits, we have investigated the pattern of pediatric visits, rates of admission to hospital and for a subset of years the investigations completed. **Methods:** Pediatric visits from 2004 to 2014 were summarized for the TBRHSC ED. The pattern of visits was examined along with the rate of admission to hospital. We also investigated the trend in acuity over the study period. Laboratory and imaging data are purged 1 year after each visit and were not available prior to 2011 but were summarized for the remainder of the years to identify the rates of all investigations completed. **Results:** From 2004 to 2014 there was a total increase in visits of 7.5% with the average annual admission rate ranging from 5 to 6.3%. The month to month variability in visits over the study period was high with a minimum of 1292 in August 2004 and a maximum of 2488 in October 2009. Nearly all patients were either CTAS II, III or IV, with level III having the highest occurrence. The mean investigation rate was approximately 16, 0.8, 24, and 2.3% of patients having laboratory, CT, x-ray and ultra-sound completed, respectively. **Conclusion:** Pediatric patients are an important subset of all patients visiting the ED. They often require special resources and at the TBRHSC use specific treatment spaces. In addition, there is a limited number of pediatric inpatient hospital beds. Managers could use the timing of visits, number of visits and admission rates to examine resource use and the probability of exceeding capacity. This study also provides baseline information on the rates of investigations, especially imaging such as CT which can have long-term radiological consequences.

Keywords: pediatrics, patient flow, diagnostic investigations

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Does an age-adjusted D-dimer threshold provide adequate sensitivity in ED patients investigated for pulmonary embolism?

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Introduction: The D-dimer assay is a high sensitivity, low specificity test used to rule out pulmonary embolism (PE) in low risk ED patients. Patients with a positive D-dimer result will likely undergo CT imaging to confirm the diagnosis. Given the time, cost, and radiation exposure associated with CT, and the higher false-positive rate in older patients, an age-adjusted D-dimer threshold may be preferred. Our objective was to evaluate the sensitivity and specificity of an age-adjusted D-dimer and approximate the downstream effect on CT imaging utilization. **Methods:** This was a retrospective cohort study conducted using administrative data from Calgary emergency departments between

July 2013 and January 2015. Eligible patients were individuals aged 50 and older who were undergoing PE workup including D-dimer testing. Outcomes were ascertained using CT imaging reports and by searching the regional administrative database for subsequent diagnosis of PE within 30 days of the index visit. These data were used to calculate the sensitivity, specificity, positive predictive value, and negative predictive value of the D-dimer test using the standard threshold (500 ng/mL) and an age-adjusted threshold (10 ng/mL x patient age as an integer). From this, the potential reduction in CT imaging use and missed PE diagnoses were modeled. **Results:** Of 6669 patients aged 50 or older who had D-dimer testing for possible PE, 1504 (22.6%) underwent a CT scan, and 217 (14.4% of CT) received a discharge diagnosis of pulmonary embolism, which was confirmed on chart review. When test results were re-interpreted using an age-adjusted threshold, D-dimer specificity increased from 63.9% to 75.4%, while sensitivity decreased from 96.5% to 89.9%. This translates to 888 new true negatives, representing CT scans potentially avoided (a 59% reduction in CT utilization), but with 18 new missed PE diagnoses. **Conclusion:** The age-adjusted threshold may reduce use of CT imaging among older patients suspected of PE, but at the cost of more missed PE diagnoses.

Keywords: pulmonary embolism, D-dimer, diagnostic imaging

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The utility of serum markers for diagnosing septic arthritis in the emergency department: do rigid cut-offs improve diagnostic characteristics?

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Introduction: Septic arthritis represents one of the most severe diagnoses for a presentation of an acutely swollen joint, with a high level of morbidity and mortality associated with delayed management. There is continued interest in the utility of serum markers of inflammation in diagnosing this dangerous condition, however there is a lack of clear consensus for cut-offs that optimize diagnostic performance for these tests. The objective of this study was to perform a systematic search of the literature to identify optimal cut-offs for commonly ordered serum markers and to assess how these cut-offs perform in a cohort of patients with a diagnosis of septic arthritis. **Methods:** We performed a systematic literature search aimed at identifying optimal cut-offs for serum makers (white blood cell count (WBC), erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP)) used for diagnosing septic arthritis. We assessed the use of these markers within a retrospective cohort (n = 87) of patients diagnosed with septic arthritis (based on positive gram stain, culture, or treatment with a prolonged antibiotic course and/or surgical intervention) that presented to one of four emergency departments in Calgary over a two-year period. We then compared published values to local data. **Results:** We identified 10 articles that evaluated diagnostic characteristics for serum markers. Although there was variability for cut-offs reported in the literature, classically WBC >11 x 10⁹/L, ESR >30 mm/h, and CRP >100 mg/L were reported to modestly increase the likelihood ratio of diagnosing septic arthritis. In our cohort, a complete blood count was ordered in the emergency department in 97% (n = 84) subjects. ESR and CRP were ordered in 66% (n = 57) and 85% (n = 74) of patients, respectively. When comparing the classic literature based cut-offs to our population group, a WBC <11 x 10⁹/L was found in 38% (n = 32), ESR <30 mm/h in 51% (n = 38), and CRP <100 mg/L in 30% (n = 17). Sensitivity was found to be poor (61% for WBC >11 x 10⁹/L; 70% for ESR >30 mm/h; 48% for CRP >100 mg/L). **Conclusion:** Data collected from the Calgary Emergency Department supports the published literature suggesting that serum tests are not helpful in the