

P113**Presentations for hypoglycemia associated with diabetes mellitus to emergency departments in a Canadian province: a database and cost analysis**

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Introduction: Diabetes mellitus (DM) is a common chronic disease. The Canadian Diabetes Association (CDA) estimated that the national direct cost of DM accounts for approximately 3.5% of public healthcare spending. The economic burden has been estimated to be \$12.2 billion in 2010 and projected to increase by \$4.7 billion (38%) by 2020. For the province of Alberta, the estimated cost was \$1.3 billion in 2015 and \$1.7 billion for 2025. The cost of lesser complications of DM like hypoglycemia is not as well understood. The objective of this study was to estimate the health system cost of presentations by adults to Alberta emergency departments (ED) for hypoglycemia associated with type 1 (T1DM) or type 2 (T2DM) diabetes. **Methods:** A retrospective cohort study was conducted using administrative data for Alberta for a five-year period (fiscal years 2010/11-2014/15). Data were sourced from an administrative database: National Ambulatory Care Reporting System (NACRS). Records of interest were those for ED patients with an ICD-10-CA diagnosis of DM-associated hypoglycemia. A top-down approach was used to estimate costs, excluding physician and ambulance fees. This involved resource intensity weight (RIW), cost of a standard hospital stay (CSHS), and adjustment for inflation (to average value of Canadian dollar for Alberta for January-September 2015). A descriptive analysis was conducted. **Results:** Data extraction yielded 7,835 presentations by 5,884 patients. The median RIW was 0.0547. RIWs are centered at 1, thus the resource-use/cost of these presentations is well below that of the “average” case. Estimated costs per episode ranged from \$108.63 to \$4,136.59 with median of \$431.11 (IQR: 369.40-639.50). Median episodic subgrouped costs were as follows: sex: \$427.72 for males, \$439.20 for females; DM type: \$411.61 for T1DM, \$511.63 for T2DM; date period: \$835,862.09/year, \$69,655.17/month, \$16,030.23/week, and \$2,288.78/day. **Conclusion:** Using population-based administrative data, we identified median costs for DM-associated hypoglycemia of approximately \$430/case. Given the frequency, this condition incurs significant healthcare resource use and costs; continued efforts to reduce these ED visits seem worthwhile.

Keywords: diabetes, hypoglycemia, cost

P114**Considering perceptions of patients and knowledge users in the design of an emergency-based acute asthma educational trial**

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Introduction: Educational interventions driven by the needs of users can help move evidence into practice. This study considered the perceptions of patients and knowledge users in the design of an educational intervention in acute asthma directed from Emergency Departments (EDs). **Methods:** A mixed methods design with two phases was used. In phase I, convenience samples of asthmatics presenting to the University of Alberta Hospital ED and primary care providers (PCPs) from Edmonton were invited to participate in a survey. Perceptions with respect to: a) an ideal local opinion leader (OL) in ambulatory asthma care; and b) content, style and delivery methods of OL educational interventions in acute asthma were collected. In phase II, focus-group

discussions were conducted to further explore preferences and expectations for such interventions; self-perceived barriers and facilitators for implementation were assessed. **Results:** Overall, 54 patients completed the survey; 39% preferred receiving guidance from a Respiriologist, 44% during their ED visit and 56% through individual discussions. In addition, 55% expressed interest in having PCP follow-up within a week of discharge. A Respiriologist was identified as an OL in ambulatory asthma by 59% of the 39 responding PCPs. All expressed interest in receiving notification of their patients' ED presentation, most within a week and including diagnosis and ED/post ED-treatment. Personalized and guideline-based recommendations were considered to be the ideal content by the majority; 39% requested this guidance through an educational pamphlet faxed to their offices. In the focus groups, patients and PCPs recognized the importance of health professional liaisons in the ED to PCP transition of care; patient anxiety and time constraints were identified as potential barriers for ED-educational information uptake and proper post-ED follow-up, respectively. **Conclusion:** Messages arising from patients and PCPs help tailoring study interventions to meet local needs and expectations. Overall, patients and physicians are seeking ways to mitigate problems with transitions in care. This contact with the practice environment also facilitates the identification of potential determinants to implementation and knowledge uptake.

Keywords: respiratory, education, knowledge translation

P115**An analysis of current and forecasted patient visits to Ontario's emergency departments and its effect on hospital admissions**

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Introduction: The number of emergency department (ED) visits across Ontario has increased annually over the past two decades leading to overcrowding and longer wait times. ED volume forecasting may provide insight to strategic planners regarding future patient volumes and the effects on health care resources. We investigated the pattern of ED use at the local health integration network (LHIN) level and developed forecasts using historical data. The forecasts were then used to examine the effect on acute care hospital bed requirements and the number of full time equivalent physicians needed. **Methods:** Aggregated data from the Canadian Institute for Health Information for the period 2003 to 2013 was obtained for each of Ontario's LHINs. The total number of ED visits per year was first quantified by LHIN and then simple linear regression was used to forecast patient volumes in 2018 and 2023. The rate of hospital admission by LHIN was also calculated. We then used the forecasted volume, admission rate and the total number of acute care hospital beds by LHIN to predict the total number of beds needed by LHIN. Based on the forecasted patient volumes and the hours of coverage model, the total number of full-time equivalent physicians needed was calculated. **Results:** Over the study period, the number of patients increased from 4 to 37% among LHINs. Admission rates generally decreased from 2003 to 2013. Based on historical trends, all EDs across Ontario are expected to experience increased patient visits in the future but at different rates of growth. Depending on the rate of growth in ED visits, the number of acute care beds needed by LHIN is somewhat variable and affected by the proportion of alternate level of care patients. Given, the forecasted increase in patient volume, the hours of coverage model suggests that approximately 320 additional full-time equivalent ED physicians are needed across the province by 2023. **Conclusion:** Although all forecasts inherently have a degree of error associated with their estimates, strategic planners require some

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