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Healthcare utilization among homeless and/or substance using adults presenting to the ED

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Introduction: Substance use and unstable housing are associated with heavy use of the Emergency Department (ED). This study examined the impact of substance use and unstable housing on the probability of future ED use. **Methods:** Case-control study of patients presenting to an urban ED. Patients were eligible if they were unstably housed for the past 30 days, and/or if their chief complaint was related to substance use. Following written informed consent, patients completed a baseline survey and health care use was tracked via electronic medical records for the next six months. Controls were enrolled in a 1:4 ratio. More than 2 ED visits during the follow-up was pre-specified as a measure of excess ED use. Descriptive analyses included proportions and medians with interquartile ranges (IQR). Binomial logistic regression models were used to estimate the impact of housing status, high-risk alcohol use (AUDIT) and drug use (DUDIT), and combinations of these factors on subsequent acute care system contacts (ED visits + admissions). We controlled for age, gender, comorbidities at baseline, and baseline presenting acuity. **Results:** 41 controls, 46 substance using, 91 unstably housed, and 31 both unstably housed and substance using patients were enrolled ($n = 209$). Median ED visits during follow up were 0 (IQR: 0-1.0) for controls, 1.0 (IQR: 0-3.3) for substance using, 1.0 (IQR: 0-4.0) for unstably housed and 4 (IQR: 2-12.3) for unstably housed and substance using patients. The median acute care system contacts over the same period was 1.0 (IQR 0-2.0) for controls, 1.0 (IQR: 0-4.0) for substance using, 1.0 (IQR: 0-5.0) for unstably housed and 4.5 (IQR: 2.8-14.3) for unstably housed and substance using patients. Being unstably housed was the factor most strongly associated with having > 2 ED visits ($b = 3.288$, $p < 0.005$) followed by high-risk alcohol and drug use ($b = 2.149$, $p < 0.08$); high risk alcohol use alone was not significantly associated with ED visits ($b = 1.939$, $p < 0.1$). The number of comorbidities present at baseline was a small but statistically significant additional risk factor ($b = 0.478$, $p < 0.05$). The model correctly predicted 70.1% of patients' ED utilization status. **Conclusion:** Unstable housing is a substantial risk factor for ED use; high-risk alcohol and drug use, and comorbidities at baseline increased this risk. The intensity of excess ED use was greatest in patients who were unstably housed and substance using.

Keywords: substance use, homelessness, utilization

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Does the use of bedside ultrasound to identify intrauterine pregnancy in the emergency department shorten the length of stay of patients presenting with 1st trimester vaginal bleeding or pelvic pain?

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Introduction: The use of point of care ultrasound (POCUS) has increased rapidly in the emergency department (ED) over the last 10 years. This study seeks to determine whether the use of POCUS to identify intrauterine pregnancy in the ED shortens the length of stay of patients presenting with first trimester pregnancy-related complaints at The Scarborough Hospital (TSH). **Methods:** A prospective chart review of

women seen at TSH ED for first trimester pregnancy-related complaints was conducted from March 1, 2014 to December 30, 2014. ED physicians were asked to record the names of patients assessed using POCUS in the ED along with their findings during the study period (experimental group). Health Records data was used to find all patients seen in the emergency department during the study period with the chief triage complaint of "Pregnancy Issues < 20 weeks" (control group). **Results:** A total of 378 patients were identified in the control group and 61 patients were recorded in the experimental group. The outliers were removed from both groups. The POCUS identified an intra-uterine pregnancy (POS IUP) in 47.5% and no definite intrauterine pregnancy (NDIUP) in 52.5%. In the control group, 82.0% proceeded to obtain a formal ultrasound (FUS) after the POCUS. Patients found to have a POS IUP on the POCUS spent 141.48 ± 100.95 minutes in hospital, while patients found to have NDIUP spent 197.10 ± 132.48 minutes in hospital ($p = 0.07$). The POS IUP group spent statistically significantly less time in hospital when compared to the control group ($p = 0.001$). In the POCUS group, patients seen between 1700 and 0800 (i.e. when FUS is not available) spent significantly less time ($p = 0.02$) in hospital (113.13 ± 118.07 minutes, $n = 24$) when compared to patients seen between 0800 and 1700 (208.28 ± 106.35 minutes, $n = 36$). **Conclusion:** For first-trimester pregnancy-related complaints, POCUS has been shown to be effective in reducing the time that patients spend in hospital at TSH. This difference was especially apparent when POCUS was used at times when FUS was not available. Despite the apparent reluctance of many ED physicians to discharge patients without a FUS, even after identifying a POS IUP on the POCUS, it was evident that this technology was saving time for both physicians and patients.

Keywords: ultrasound, point-of-care ultrasound (PoCUS)

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Identifying patients who may benefit from extracorporeal membrane oxygenation (ECMO) after cardiac arrest in the urban emergency departments of Saskatchewan

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Introduction: Emergency physician-initiated Extracorporeal Membrane Oxygenation (ECMO/ECPR/ECLS) is gaining critical mass as a successful rescue strategy for patients requiring resuscitation. Wang et al. (2014), Bellezzo et al. (2012) and others have demonstrated promising results of survival to discharge with good neurological function in patients who were resistant to existing treatment protocols after out-of-hospital cardiac arrest. As Saskatchewan does not yet utilize ECMO for cardiac arrest, the objective of this study was to examine the number of adult cardiac arrest patients in the urban emergency departments (EDs) of Saskatchewan who may benefit from the use of ECMO. **Methods:** Using a retrospective review, we identified 401 patients who died after presenting with cardiac arrest between January 1st, 2013 and December 31st, 2014. Of the original 401, 136 were female and 264 were male, with a mean age of 60.1 ± 20.2 years. The charts of 22 (5.5%) trauma patients were excluded because the suitability of ECMO in these patients is uncertain. **Results:** For the 379 non-trauma patients, the mean resuscitation length was 41.6 ± 32.8 minutes (median = 42 minutes) and 125 of these patients received prehospital mechanical CPR. We applied Bellezzo et al.'s (2012) inclusion and exclusion criteria to identify prospective candidates for ECMO. In total, 53 patients (14.0%) with a mean age of 57.1 ± 13.4 years old, represent suitable candidates for ECMO. 260 (68.6%) were deemed unsuitable either because they failed the inclusion criteria or met explicit exclusion criteria. The remainder (66 [17.4%]) were

unsuitable because of age. **Conclusion:** With 1 in 7 patients potentially representing suitable candidates for ECMO, this is a technique that warrants consideration for implementation in the EDs of Saskatchewan.

Keywords: resuscitation, extracorporeal membrane oxygenation, cardiac arrest

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Relapse in patients managed in the emergency department for acute asthma: a systematic review

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Introduction: Despite the provision of evidence-based care, approximately 15% of patients discharged from the emergency department (ED) after being treated for asthma exacerbations will relapse within two weeks. This study summarizes the evidence regarding relapses and factors associated with increased relapse in patients discharged from EDs after being treated for asthma exacerbations.

Methods: Comprehensive literature searches were conducted in seven electronic databases; manual and grey literature searches were performed. Studies tracking outcomes for adults after ED management and discharge were included. Methodological quality was assessed using the Newcastle-Ottawa Scale (NOS) and the Risk of Bias (RoB) tools. Studies were summarized using medians and interquartile ranges (IQR) or mean and standard deviation (\pm SD), as appropriate. **Results:** From 793 potentially relevant citations, 178 articles underwent full text review and 10 studies involving 32,923 patients were included. The majority of the studies were of high quality according to NOS and RoB tools. Relapse proportions were $8 \pm 3\%$, $12 \pm 4\%$, and $14 \pm 6\%$ at one, two, and four weeks, respectively. Female sex was the most common statistically significant reported factor associated with an increased risk of relapse within 4 weeks of ED discharge for acute asthma. Other factors significantly associated with relapse were past healthcare utilization and symptom duration. **Conclusion:** After ED management and discharge of acute asthma, a considerable proportion of patients will relapse within the first four weeks. Factors such as female sex, past healthcare utilization, and symptom duration were commonly and significantly associated with relapse occurrence. Identifying patients with these features could provide guidance to clinicians during the ED-discharge decision-making.

Keywords: asthma, relapses, knowledge synthesis

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

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Introduction: Diabetes mellitus (DM) is a major chronic disease. Prevalence of diabetes was 9% globally in 2014 and 9.3% in Canada and 7.2% in Alberta in 2015. Complications of the disease are numerous and frequent. Hypoglycemia is one complication of diabetes treatment. The objective of this study was to quantify and characterize presentations by adults to Alberta emergency departments (EDs) for hypoglycemia associated with type 1 (T1DM) or type 2 (T2DM) diabetes. **Methods:** A retrospective cohort study was conducted using 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 with an ICD-10-CA

diagnosis of DM-associated hypoglycemia (i.e., E10.63, E11.63, E13.63, or E14.63). A descriptive analysis was conducted. **Results:** Data extraction yielded 7,835 presentations by 5,884 patients. The majority of presentations were by males (56.2%) and median patient age was 62. These episodes constituted 0.08% of presentations to Alberta EDs and they occurred at an event rate of 0.67 episodes per 100 patient-years (95% CI: 0.66-0.69). The annual rate of presentations decreased by 11.8% during the five-year period. Most presentations (63.4%) involved transportation to the ED via ambulance. Relative to LOS for ED presentations for all reasons, average length-of-stay (LOS) was 3.2x longer and 1.4x longer for discharged and admitted patients, respectively. For 27.5% of presentations, an X-ray was obtained. Most hypoglycemic episodes (65.2%) were considered to be of moderate severity while 34.3% were considered to be severe. None were mild because all involved access to an ED. The condition mainly (absolute terms) afflicted people with T2DM and urban areas; however, it disproportionately afflicted people with T1DM and rural areas. **Conclusion:** For a condition that is largely preventable with effective blood glucose management, DM-associated hypoglycemia incurs significant healthcare resource use. People with DM would be better served with more effective and safer euglycemic agents.

Keywords: diabetes, hypoglycemia, epidemiology

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Cost of hypoglycemia associated with diabetes mellitus: a systematic review of the literature

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Introduction: Diabetes mellitus (DM) is a major chronic disease. Many patients with DM suffer hypoglycemic episodes that may be mild, moderate or severe, requiring ambulance and emergency department (ED) services. The cost of these DM-associated hypoglycemic episodes in the ED is not well understood. This study identified literature on DM-associated hypoglycemia costs that were incurred in acute care settings, with particular interest in the ED setting. **Methods:** The methods of this systematic review were based on an *a priori* protocol. The literature searches involved 12 databases. Study selection and quality assessment were conducted independently by two reviewers. Costs from included studies were standardized to year 2014 Canadian dollars. Mean with standard deviation (SD) and median costs with interquartile range (IQR) were calculated whenever possible. **Results:** The systematic search yielded 1,164 studies and 62 were included. The largest proportion of studies (45%) originated from USA data. Quality of included studies varied widely. Although none of the studies were purely a cost analysis of DM-associated hypoglycemia in the ED, 15 studies reported some ED costs. Median DM-associated hypoglycemic episode costs were \$1,187.15 in the ED and \$1,288.92 irrespective of setting. More severe episodes were more costly; costs were 8.5 times higher in the inpatient setting than in the ED. Episode costs were 18-45% higher for patients with Type 2 DM than Type 1. Direct costs comprised 80% of total costs. **Conclusion:** Acute episodes of DM-associated hypoglycemia are costly. These episodes also often require hospitalization; the highest costs are incurred by admitted patients with Type 2 DM. More studies are needed to better understand the costs associated with ED use by patients with DM-associated hypoglycemia.

Keywords: diabetes, hypoglycemia, cost