P102

A quality improvement project: identifying and managing latent safety threats though a zone wide emergency department in-situ multidiscipline simulation program

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Introduction: High fidelity in-situ simulation has been found to detect system deficiencies, equipment failures, and conditions predisposing to medical errors, also known as latent safety threats (LST). What is not well reported is whether these LSTs are effectively managed. As a part of an ongoing quality improvement project, multidisciplinary, in-situ simulations were conducted across emergency departments (ED) in the Edmonton zone with the aim to identify LST and subsequently manage them to improve patient care. **Methods:** In 2017 simulations were conducted at EDs in the Edmonton Zone (N = 10). Following each simulation, a cross sectional, survey based assessment tool, was completed by participants to identify LST. These LST were shared with the site clinical nurse educator and/or site manager and a management plan made. Two to six months follow-up was made to track progress. For reporting, LST were grouped into themes, progress on LST were coded as either resolved, ongoing, or not managed. **Results:** A total of 112 LST were identified through 18 separate simulations. The most commonly identified LTS were: resuscitation resource required (n 23), lack of staff training (21), equipment not immediately available (20), IT resource required (8), medication not immediately available (6), staff requiring familiarization (5), medication resource required (5), IT issue (4), large equipment needed (4), small equipment needed (4), lack of staff resource (3), medication needed, (3), equipment malfunction (2), Environment cluttered (2), non-appropriate resource removed (2). Site follow-up identified a total of 52 LST that where resolved, and 60 LST that had ongoing work to manage them. No occurrences of LST not being managed were identified. **Conclusion:** Simulation was used to effectively identify LST. Creating a structured plan and follow up allowed many LST to be resolved and effectively managed. In 2018 simulation will reassess if LST remain.

Keywords: quality improvement and patient safety, simulation, latent threats

P103

Performance characteristics of the modified Sgarbossa criteria for diagnosis of acute coronary occlusion in emergency department patients with ventricular paced rhythm and symptoms of acute coronary syndrome

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Introduction: The ECG diagnosis of acute coronary occlusion (ACO) in the setting of ventricular paced rhythm (VPR) is purported to be impossible. However, VPR has a similar ECG morphology to LBBB. The validated Smith-modified Sgarbossa criteria (MSC) have high sensitivity (Sens) and specificity (Spec) for ACO in LBBB. MSC consist of 1 of the following in 1 lead: concordant ST Elevation (STE) 1 mm, concordant ST depression 1 mm in V1-V3, or ST/S ratio < -0.25 (in leads with 1 mm STE). We hypothesized that the MSC will have higher Sens for diagnosis of ACO in VPR when compared to the original Sgarbossa criteria. We report preliminary findings of the Paced Electrocardiogram Requiring Fast Emergency Coronary Therapy (PERFECT) study **Methods:** The PERFECT study is a retrospective, multicenter, international investigation of ED patients from 1/2008 - 12/2016 with VPR on the ECG and symptoms suggestive of acute coronary syndrome (e.g. chest pain or shortness of breath). Data from four sites are presented. Acute myocardial infarction (AMI) was defined by the Third Universal Definition of AMI. A blinded cardiologist adjudicated ACO, defined as thrombolysis in myocardial infarction score 0 or 1 on coronary angiography; a pre-defined subgroup of ACO patients with peak cardiac troponin (cTn) >100 times the 99% upper reference limit (URL) of the cTn assay was also analyzed. Another blinded physician measured all ECGs. Statistics were by Mann Whitney U, Chi-square, and McNemars test. **Results:** The ACO and No-AMI groups consisted of 15 and 79 encounters, respectively. For the ACO and No-AMI groups, median age was 78 [IQR 72-82] vs. 70 [61-75] and 13 (86%) vs. 48 (61%) patients were male. The median peak cTn ratio (cTn/URL) was 260 [33-663] and 0.5 [0-1.3] for ACO vs. no-AMI. The Sens and Spec for the MSC and the original Sgarbossa criteria were 67% (95% CI 39-87) vs. 46% (22-72; p = 0.25) and 99% (92-100) vs. 99% (92-100; p = 0.5). In pre-defined subgroup analysis of ACO patients with peak cTn >100 times the URL (n = 10), the Sens was 90% (54-100) for the MSC vs. 60% (27- 86) for original Sgarbossa criteria (p = 0.25). **Conclusion:** ACO in VPR is an uncommon condition. The MSC showed good Sens for diagnosis of ACO in the presence of VPR, especially among patients with high peak cTn, and Spec was excellent. These methods and results are consistent with studies that have used the MSC to diagnose ACO in LBBB. **Keywords:** Sgarbossa's criteria, acute coronary occlusion, ventricular paced rhythm

P104

Evaluating the use of the pulmonary embolism rule-out criteria in the emergency department

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Introduction: Diagnosing pulmonary embolism (PE) can be challenging because the signs and symptoms are often non-specific. Studies have shown that evidence-based algorithms are not always adhered to in the Emergency Department (ED), which leads to unnecessary CT scanning. The pulmonary embolism rule-out criteria (PERC) can identify patients who can be safely discharged from the ED without further investigation for PE. The purpose of this study is to evaluate the use of the PERC rule in the ED and to compare the rates of testing for PE if the PERC rule was used. **Methods:** This was a health records review of ED patients investigated for PE at two emergency departments over a two-year period (April 2013-March 2015). Inclusion criteria were ED physician ordered CT pulmonary angiogram, ventilation-perfusion scan, or D-dimer for investigation of PE. Patients under the age of 18 were excluded. PE was considered to be present during the emergency department visit if PE was diagnosed on CT or VQ (subsegmental level or above), or if the patient was subsequently found to have PE or deep vein thrombosis during the next 30 days. Trained researchers extracted anonymized data. The rate of CT/VQ imaging and the negative predictive value was calculated. **Results:** There were 1,163 patients that were tested for PE and 1,097 patients were eligible for our analysis. Of the total, 330/1,097 (30.1%; 95% CI 27.4-32.3%) had CT/VQ imaging for PE, and 48/1,097 (4.4%; 95% CI 3.3-5.8%) patients were diagnosed with PE. 806/1,097 (73.5%; 95% CI 70.8-76.0%) were PERC positive, and of these, 44 patients had a PE (5.5%; 95% CI 4.1-7.3%). Conversely, 291/1,097 (26.5%; 95% CI 24.0-29.2%) patients were PERC negative, and of these, 4 patients had a PE (1.4%; 95%