

in each study cohort. **Results:** The derivation and validation cohorts had 7-day MI rates of 5.7, 8.6 and 9.1%. In the derivation cohort, a score ≤ 0 ruled out MI in 35% of patients, with a sensitivity for 7-day MI of 99.5% (95% CI 98-100), NPV of 99.9% (95% CI 98.4-99.9), LR- of 0.02 (95% CI 0.01-0.05) and AUC of 0.88. In the first validation cohort, a score ≤ 0 ruled out MI in 45% of patients, with a sensitivity for 7-day MI of 97% (95% CI 90-100%), NPV of 99% (95% CI 98-100%), LR- 0.06 (0.02-0.18) and AUC of 0.89. In the second validation cohort, a score ≤ 0 ruled out MI in 20% of patients, with a sensitivity for 7-day MI of 96% (95% CI 93-99%), NPV of 98% (95% CI 96-100%), LR- of 0.16 (95% CI 0.07-0.39) and AUC of 0.78. **Conclusion:** We developed and validated a simple scoring system to adjust hs-cTnT concentrations for a patient's kidney function that enables MI to be ruled out in a large proportion of chest pain patients using a single measurement on ED presentation.

Keywords: kidney disease, myocardial infarction, troponin

LO02

Development of the HEARTRISK6 Scale for emergency department patients with acute heart failure

I. Stiell, MD, MSc, A. McRae, MD, PhD, B. Rowe, MD, MSc, J. Dreyer, MD, L. Mielniczuk, MD, B. Borgundvaag, MD, PhD, J. Yan, BSc, MD, MSc, S. Sibley, MD, M. Nemnom, MSc, C. Clement, J. Brinkhurst, C. Sheehan, BA, J. Perry, MD, MSc, M. Taljaard, PhD, University of Ottawa, Department of Emergency Medicine, Ottawa, ON

Introduction: We previously derived (N = 559) and validated (N = 1,100) the 10-item Ottawa Heart Failure Risk Scale (OHFRS), to assist with disposition decisions for patients with acute heart failure (AHF) in the emergency department (ED). In the current study we sought to use a larger dataset to develop a more concise and more accurate risk scale. **Methods:** We analyzed data from the prior two studies and from a new cohort. For all 3 groups we conducted prospective cohort studies that enrolled patients who required treatment for AHF at 8 tertiary care hospital EDs. Patients were followed for 30 days. The primary outcome was short-term serious outcome (SSO), defined as death within 30 days, intubation or non-invasive ventilation (NIV) after admission, myocardial infarction, or relapse resulting in hospital admission within 14 days. The fully pre-specified logistic regression model with 13 predictors (where age, pCO₂, and SaO₂ were modeled using spline functions) was fitted to 10 multiple imputation datasets. Harrell's fast stepdown procedure reduced the number of variables. We calculated the potential impact on sensitivity (95% CI) for SSO and hospital admissions, and estimated a sample size of 2,000 patients. **Results:** The 1,986 patients had mean age 77.3 years, male 54.1%, EMS arrival 41.2%, IV NTG 3.3%, ED NIV 5.4%, admission on initial visit 49.5%. Overall there were 236 (11.9%) SSOs including 61 deaths (3.1%), meaning that current admission practice sensitivity for SSO was only 59.7%. The final HEARTRISK6 scale is comprised of 6 variables (points) (C-statistic 0.68): Valvular heart disease (2) Antiarrhythmic medication (2) ED non-invasive ventilation (3) Creatinine 80-150 (1); ≥ 150 (3) Troponin $\geq 3 \times$ URL (2) Walk test failed (1). The probability of SSO ranged from 4.8% for a total score of 0 to 62.4% for a score of 10, showing good calibration. Choosing a HEARTRISK6 total point admission threshold of ≥ 3 would yield sensitivity of 70.8% (95% CI 64.5-76.5) for SSO with a slight decrease in admissions to 47.9%. Choosing a threshold of ≥ 2 would yield a sensitivity of 84.3% (95% CI 79.0-88.7) but require 66.6% admissions. **Conclusion:** Using a large prospectively collected

dataset, we created a more concise and more sensitive risk scale to assist with admission decisions for patients with AHF in the ED. Implementation of the HEARTRISK6 scale should lead to safer and more efficient disposition decisions, with more high-risk patients being admitted and more low-risk patients being discharged.

Keywords: heart failure, risk scale, safety

LO03

Validation of The Ottawa Troponin Pathway

B. Lam, BSc, J. Li, BSc, M. Mukarram, MPH, MBBS, M. Nemnom, MSc, R. Booth, BSc, MSc, PhD, V. Thiruganasambandamoorthy, MSc, MBBS, University of Ottawa, Department of Emergency Medicine, Ottawa, ON

Introduction: Our team developed "The Ottawa Troponin Pathway" (OTP) for Non-ST Elevation Myocardial Infarction (NSTEMI) diagnosis using serial conventional troponin (cTnI) 3 hours apart to aid in safe and early disposition of ED patients. The primary objective of this study is to validate the diagnostic accuracy of the OTP in the cohort of patients with cTnI values above the 99th percentile ($> 45 \text{ ng/L}$).

Methods: This study is a health records review conducted at the Civic and General Campuses of The Ottawa Hospital from August 2017 to December 2017. Adults (≥ 18 years) who presented to the ED with symptoms of ACS, and who had serial cTnI (at least two values 3 hours ± 15 minutes apart) performed for diagnosis of NSTEMI and at least one cTnI value $> 45 \text{ ng/L}$ were included. Patients with cardiac arrest, STEMI, unstable angina or those with TnI values $\leq 45 \text{ ng/L}$ were excluded. The outcomes were death due to unknown cause or NSTEMI adjudicated by two blinded investigators within 30 days. Data collected include baseline characteristics, ED management, length of stay, cTnI values and times of measurement, disposition, and outcome. We used descriptive statistics and test diagnostic characteristics to analyze our data. **Results:** We screened 53,077 patients, of whom 635 patients were included in the study (mean age 71.6 years; 57.6% males; 59.7% hospitalized; median ED length of stay 4.7 hours). 107 patients (16.9%; 95% CI 14.1%-20.0%) were diagnosed with NSTEMI within 30 days. Among patients with TnI values above the 99th percentile, the OTP did not miss any patients diagnosed with NSTEMI. The sensitivity and the specificity of the OTP were 100% (95% CI 96.6%-100%) and 32.2% (95% CI 28.2%-36.4%) respectively. **Conclusion:** Our results show that the OTP is diagnostically accurate in ruling out NSTEMI among patients with cTnI values above the 99th percentile with symptoms concerning for ACS. Using the OTP will allow for early referral to consulting services for management, safe and early discharge home, and improve ED crowding.

Keywords: chest pain, non-ST elevated myocardial infarction (NSTEMI), troponin

LO04

Canadian best practice diagnostic algorithm for acute aortic syndrome

R. Ohle, MBChB, MSc, S. McIsaac, MBChB, MEd, J. Yan, MD, MSc, K. Yadav, MD, MSc, P. Jetty, MD, R. Atoui, MD, N. Fortino, MD, B. Wilson, MD, N. Coffey, MD, T. Scott, BN, A. Cournoyer, MD, F. Rubens, MD, D. Savage, MD, PhD, D. Ansell, MD, J. Middaugh, MD, A. Gupta, MD, B. Bittira, MD, Y. Callaway, MD, S. Bignucolo, MD, B. Mc Ardle, MD, E. Lang, MD, Health Science North, Sudbury, ON

Introduction: Acute aortic syndrome (AAS) is a time sensitive aortic catastrophe that is often misdiagnosed. There are currently no

Canadian guidelines to aid in diagnosis. Our goal was to adapt the existing American Heart Association (AHA) and European Society of Cardiology (ESC) diagnostic algorithms for AAS into a Canadian evidence based best practices algorithm targeted for emergency medicine physicians. **Methods:** We chose to adapt existing high-quality clinical practice guidelines (CPG) previously developed by the AHA/ESC using the GRADE ADOLPMENT approach. We created a National Advisory Committee consisting of 21 members from across Canada including academic, community and remote/rural emergency physicians/nurses, cardiothoracic and cardiovascular surgeons, cardiac anesthesiologists, critical care physicians, cardiologist, radiologists and patient representatives. The Advisory Committee communicated through multiple teleconference meetings, emails and a one-day in person meeting. The panel prioritized questions and outcomes, using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach to assess evidence and make recommendations. The algorithm was prepared and revised through feedback and discussions and through an iterative process until consensus was achieved. **Results:** The diagnostic algorithm is comprised of an updated pre test probability assessment tool with further testing recommendations based on risk level. The updated tool incorporates likelihood of an alternative diagnosis and point of care ultrasound. The final best practice diagnostic algorithm defined risk levels as Low (0.5% no further testing), Moderate (0.6-5% further testing required) and High (>5% computed tomography, magnetic resonance imaging, trans esophageal echocardiography). During the consensus and feedback processes, we addressed a number of issues and concerns. D-dimer can be used to reduce probability of AAS in an intermediate risk group, but should not be used in a low or high-risk group. Ultrasound was incorporated as a bedside clinical examination option in pre test probability assessment for aortic insufficiency, abdominal/thoracic aortic aneurysms. **Conclusion:** We have created the first Canadian best practice diagnostic algorithm for AAS. We hope this diagnostic algorithm will standardize and improve diagnosis of AAS in all emergency departments across Canada.

Keywords: guidelines, acute aortic syndrome, diagnostic algorithm

LO05

Influence du délai avant le retour de circulation spontanée sur la survie des patients souffrant d'un arrêt cardiaque extrahospitalier

A. Cournoyer, MD, S. Cossette, PhD, R. Daoust, MD, MSc, J. Morris, MD, MSc, J. Chauny, MD, MSc, B. Potter, MD, MSc, L. de Montigny, PhD, D. Ross, MD, L. Londei-Leduc, MD, Y. Lamarche, MD, MSc, J. Paquet, PhD, M. Marquis, MSc, É. Notebaert, MD, MSc, M. Albert, MD, É. Piette, MD, MSc, Y. Cavayas, MD, MSc, A. Denault, MD, PhD, Université de Montréal, Montréal, QC

Introduction: Parmi les patients souffrant d'un arrêt cardiaque extrahospitalier (ACEH), ceux ayant un retour de circulation spontanée (RCS) durant la phase préhospitalière de leur réanimation ont un meilleur taux de survie. Il est plausible que les patients ayant un RCS plus précocement durant leur réanimation préhospitalière aient de meilleur taux de survie que les patients ayant un RCS plus tardif. Cette étude visait à décrire l'association entre la survie et la durée de la réanimation par les paramédics avant le RCS préhospitalier. **Methods:** La présente étude de cohorte a été réalisée à partir des bases de données collectées de la Corporation d'Urgences-santé dans la région de Montréal entre 2010 et 2015. Tous les patients

adultes avec un RCS préhospitalier suite à un ACEH d'origine médicale ont été inclus. Les patients ayant eu un arrêt devant les paramédics ont été exclus, tout comme ceux avec un RCS avant l'arrivée des services préhospitaliers. L'association entre la survie et le temps de réanimation avant le RCS a été évaluée à l'aide d'une régression logistique multivariée ajustant pour les variables sociodémographiques et cliniques pertinentes (âge, sexe, rythme initial, heure de l'appel initial, arrêt témoigné, manœuvre par témoin, présence de premiers répondants ou de paramédics de soins avancés, délai avant l'arrivée des intervenants préhospitaliers). **Results:** Un total de 1194 patients (818 hommes et 376 femmes) d'un âge moyen de 64 ans (± 17) ont été inclus dans l'étude, parmi lesquels 433 (36%) ont survécu jusqu'à leur congé hospitalier. Le délai moyen avant leur RCS était de 17 minutes (± 12). Nous avons observé une association indépendante entre la survie au congé hospitalier et le délai avant le RCS préhospitalier (rapport de cotes ajusté = 0,91 [intervalle de confiance à 95% 0,89-0,92], $p < 0,001$). Plus de 50% des survivants avaient obtenu un RCS moins de 9 minutes après l'initiation des manœuvres de réanimation par les intervenants préhospitaliers, et plus de 95% avant 26 minutes. Aucun (0%) des 17 patients ayant eu un RCS plus de 56 minutes après l'initiation de la réanimation préhospitalière n'a survécu. **Conclusion:** Un RCS précoce semble être un facteur de bon pronostic parmi les patients souffrant d'un ACEH. La majorité des patients avec un RCS préhospitalier allant survivre à leur hospitalisation ont obtenus leur RCS dans les 9 minutes suivant l'initiation des manœuvres de réanimation.

Keywords: out-of-hospital cardiac arrest, prehospital return of spontaneous circulation, prognosis

LO06

Évolution du rythme en fonction du délai avant l'initiation des manœuvres de réanimation chez des patients souffrant d'un arrêt cardiaque extrahospitalier

A. Cournoyer, MD, S. Cossette, PhD, R. Daoust, MD, MSc, J. Morris, MD, MSc, J. Chauny, MD, MSc, B. Potter, MD, MSc, L. de Montigny, PhD, D. Ross, MD, L. Londei-Leduc, MD, Y. Lamarche, MD, MSc, J. Paquet, PhD, M. Marquis, MSc, É. Notebaert, MD, MSc, F. Bernard, MD, M. Albert, MD, É. Piette, MD, MSc, Y. Cavayas, MD, MSc, A. Denault, MD, PhD, Université de Montréal, Montréal, QC

Introduction: Les patients dont l'arrêt cardiaque extrahospitalier (ACEH) n'a pas été témoigné sont généralement exclus des protocoles de réanimation par circulation extracorporelle puisque le délai avant l'initiation de leur réanimation est inconnu. Il a été proposé que la présence d'un rythme initial défibrillable (RD) est fortement suggestif une très courte période avant l'initiation des manœuvres de réanimation. La présente étude vise à décrire l'association entre la durée avant l'initiation de la réanimation et la présence d'un RD chez des patients souffrant d'un ACEH. **Methods:** Cette étude de cohorte a été réalisée à partir des bases de données collectées de la Corporation d'Urgences-santé dans la région de Montréal entre 2010 et 2015. Les patients dont l'arrêt était témoigné, mais dont les témoins n'ont pas entamé de manœuvres de réanimation, ont été inclus. Nous avons également inclus les patients dont l'arrêt était témoigné par les paramédics comme groupe contrôle (durée avant l'initiation de la réanimation = 0 minute). Les patients avec un retour de circulation spontanée avant l'arrivée des services préhospitaliers ont été exclus, tout comme ceux dont le rythme initial était inconnu. Nous avons décrit l'évolution de la proportion de chacun des rythmes et construit une