

Introduction: Acute aortic dissection (AAD) is a rare but fatal condition where over-investigation and missed diagnosis are common. Our objectives were to derive a highly sensitive clinical risk score for AAD and perform pilot validation. **Methods:** We started with two independent systemic reviews to firstly identify clinical variables associated with AAD and secondly to determine reasons for missed diagnosis. We searched Medline, Embase and the Cochrane database (1968-July 2016). Two reviewers screened articles and extracted data. Agreement was measured by Kappa and study quality by the QUADAS-2 tool. Bivariate random-effects meta-analyses (Revman 5 and SAS 9.3) were performed. Due to sampling bias found in the systematic reviews a matched case control study confirming the strength and direction of predictor variables was performed. The cases (2002-2014) included new emergency department (ED) or in-hospital diagnosis of non-traumatic AAD confirmed by computed tomography (CT). The controls (2010-2011) were a random age/sex matched sample of patients triaged with undifferentiated acute truncal pain (<14 days). Finally, we used the beta coefficients derived from multivariate logistic regression of our case control study to assign a numerical strength of association to predictor variables. To mitigate the bias inherent in case control studies we adjusted the beta coefficient for each variable by the diagnostic odds ratio calculated from each systematic review. Pilot validation was performed on a retrospective sample of all those undergoing CTA to rule out AAD at two tertiary care ED over 12 months. Two abstractors were blinded to the final diagnosis. **Results:** We derived a two-step risk score based on the derivation sample which included 4960 patients (Clinical variables systematic review -9 studies, N=2400, low risk of bias, Kappa 0.9 & Reasons for missed diagnosis systematic review - 11 studies, N=800, low-moderate risk of bias, Kappa 0.89 & Case control study -194 AAD, 776 Controls). Step one is a RAPID assessment for AAD 1) Risk factors 2) Alternative diagnosis in the differential that mimics AAD- ACS, PE, Stroke 3) Physical exam- hypotension, pulse deficit 4) Impression- clinical suspicion of AAD and 5) Discomfort-migrating, tearing, pleuritic, thunderclap, severe pain. If any of the above factors are present proceed to step two. Step two stratifies patients based on history (low, moderate, high suspicion), physical exam (hypotension/pulse deficit) and risk factors. In the pilot validation (N=375, AAD=16) sensitivity was 100% (95% CI 79.4-100) and specificity 36.5% (95% CI 31.5-41.7%). Patients were successfully stratified into low (<2, 0% AAD), moderate (2, 2.2% AAD), high (>2, 19.6% AAD) and critical probability (>3, 62.5% AAD), with up to 36% reduction in imaging. **Conclusion:** We derived a highly sensitive new clinical risk score with the potential to reduce missed cases of AAD, reduce unnecessary imaging and expedite care.

Keywords: aortic dissection, clinical decision rules

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Do electrocardiogram rhythm findings predict cardiac activity during cardiac arrest? A SHoC series study

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Introduction: Electrocardiographic (ECG) rhythms are used during resuscitation (ACLS) to guide resuscitation, and often to determine futility. Survival rates to hospital discharge have been reported to be higher for patients with PEA than asystole in out-of-hospital cardiac arrest. This study examines how well the initial ECG cardiac rhythm represents actual cardiac activity as determined by point of care ultrasound (PoCUS). **Methods:** A database review was completed for

patients arriving to a tertiary ED in asystole or PEA arrest, from 2010 to 2014. Patients under 19y or with a previous DNR were excluded. Patients were grouped into those with cardiac activity (PEA) and asystole on ECG; as well as whether cardiac activity was seen on PoCUS during the arrest. Data was analyzed for visualized cardiac activity on PoCUS. **Results:** 186 patients met the study criteria. Those with asystole on ECG were more likely to have no cardiac activity than those with PEA (Odds 7.21 for initial PoCUS; 5.45 for any PoCUS). The sensitivity of ECG rhythm was 80.49% and 82.12%, specificity was 77.91% and 54.28%, positive predictive value was 94.28% and 88.57%, and negative predictive value was 30.43% and 41.30% for cardiac activity on initial PoCUS and on any PoCUS respectively. The positive and negative likelihood ratios for ECG were 3.47 and 0.25 for activity on initial PoCUS. The positive and negative likelihood ratios for activity on any PoCUS were 1.78 and 0.33. **Conclusion:** Our results suggest that although most patients with asystole on ECG demonstrate no cardiac activity, a small number actually had activity on PoCUS. This supports the use of PoCUS during cardiac arrest, in addition to ECG, to identify patients with ongoing mechanical cardiac activity.

Keywords: cardiac arrest, resuscitation outcomes, electrocardiogram

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Does utilization of an intubation safety checklist reduce dangerous omissions during simulated resuscitation scenarios?

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Introduction: One of the most high-risk tasks regularly performed by emergency medicine (EM) physicians is airway management. Many studies identify an increase in adverse events associated with airway management outside of the operating theatre. Errors of omission are the single most common human error type. To address this risk, the checklist is becoming a common pre-intubation tool. Simulation is a safe setting in which to study the implementation of a new airway checklist. The purpose of this study was to determine if a novel airway checklist decreases practitioners rates of omission of important tasks during simulated resuscitation scenarios. **Methods:** This was a dual-centre, randomized controlled trial of a novel airway checklist utilized by EM practitioners in a simulated environment. The 29-item peri-intubation checklist was derived by experienced EM practitioners following a review of airway checklists in published and gray literature. Participants were EM residents or EM physicians who work more than 20 hours/month in an emergency department. Volunteers were recruited from two academic health centres to complete three simulated scenarios (two requiring intubation, one cricothyroidotomy), and were randomized to either regular care or checklist use. A minimum of two assessors documented the number of omitted tasks deemed important in airway management and the time until definitive airway management. Discrepancies between assessors were resolved by single-assessor video review. **Results:** Fifty-four EM practitioners participated. There was no significant difference in baseline characteristics between the two study groups. The average percentage of omitted tasks over the three scenarios was 45.7% in the control group (n=25) and 13.5% in the checklist group (n=29) an absolute difference of 32.2% (95% CI: 27.8%, 36.6%). Time to intubation (normally distributed) was significantly longer in the checklist group for the first two scenarios (mean difference 114.10s, 95% CI: 48.21s, 179.98s and 76.34s, 95% CI: 31.35s, 121.33s), but there was no statistical difference in the third scenario where cricothyroidotomy was required (mean difference 33.75s, 95% CI: -28.14s, 95.65s). **Conclusion:** In a simulated setting, use of an airway