Predicting Factors for Occurrence of Cardiac Arrest in Critical, Emergency and Urgency Patients in an Emergency Department

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Abstract : Background: A key aim of triage is to identify the patients with high risk of cardiac arrest because they require intensive monitoring, resuscitation facilities, and early intervention. We aimed to identify the predicting factors such as initial vital signs, serum pH, serum lactate level, initial capillary blood glucose, and Modified Early Warning Score (MEWS) which affect the occurrence of cardiac arrest in an emergency department (ED). Methods: We conducted a retrospective data review of ED patients in an emergency department (ED) from 1 August 2014 to 31 July 2016. Significant variables in univariate analysis were used to create a multivariate analysis. Differentiation of predicting factors between cardiac arrest patient and non-cardiac arrest patients for occurrence of cardiac arrest in an emergency department (ED) was the primary outcome. Results: The data of 527 non-trauma patients with Emergency Severity Index (ESI) 1-3 were collected. The factors found to have a significant association ($P < 0.05$) in the non-cardiac arrest group versus the cardiac arrest group at the ED were systolic BP (mean [IQR] 135 [114,158] vs 120 [90,140] mmHg), oxygen saturation (mean [IQR] 97 [89,98] vs 82.5 [78,95]%), GCS (mean [IQR] 15 [15,15] vs 11.5 [8.815]), normal sinus rhythm (mean 59.8 vs 30%), sinus tachycardia (mean 46.7 vs 21.7%), pH (mean [IQR] 7.4 [7.3,7.4] vs 7.2 [7,7.3]), serum lactate (mean [IQR] 2 [1.1,4.2] vs 7 [5,10.8]), and MEWS score (mean [IQR] 3 [2,5] vs 5 [3,6]). A multivariate analysis was then performed. After adjusting for multiple factors, ESI level 2 patients were more likely to have cardiac arrest in the ER compared with ESI 1 (odds ratio [OR], 1.66; $P < 0.001$). Furthermore, ESI 2 patients were more likely than ESI 1 patients to have cardiovascular disease (OR, 1.89; $P = 0.01$), heart rate < 55 (OR, 6.83; $P = 0.18$), SBP < 90 (OR, 3.41; $P = 0.006$), SpO2 < 94 (OR, 4.76; $P = 0.012$), sinus tachycardia (OR, 4.32; $P = 0.002$), lactate > 4 (OR, 10.66; $P = < 0.001$), and MEWS > 4 (OR, 4.86; $P = 0.028$). These factors remained predictive of cardiac arrest at the ED. Conclusion: The factors related to cardiac arrest in the ED are ESI 1 patients, ESI 2 patients, patients diagnosed with cardiovascular disease, SpO2 < 94, lactate > 4, and a MEWS > 4. These factors can be used as markers in the event of simultaneous arrival of many patients and can help as a pre-state for patients who have a tendency to develop cardiac arrest. The hemodynamic status and vital signs of these patients should be closely monitored. Early detection of potentially critical conditions to prevent critical medical intervention is mandatory.
Keywords : cardiac arrest, predicting factor, emergency department, emergency patient

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