

Cardiogenic Shock & Machine Learning: A Systematic Review on Prediction Through Clinical Decision Support Softwares

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Abstract

Background & Aim Cardiogenic shock (CS) withholds a significantly high mortality rate between 40-60% despite advances in diagnosis and medical/surgical intervention. To-date, machine learning(ML) is being implemented to integrate numerous data to optimize early diagnostic predictions and suggest clinical courses. This systematic review summarizes the area under the curve (AUC) receiver operating characteristics (ROC) accuracy for the early prediction of CS. **Methods** A systematic review was conducted within databases of PubMed, ScienceDirect, Clinical Key/MEDLINE, Embase, GoogleScholar, and Cochrane. Cohort studies that assessed accuracy of early detection of CS using ML software were included. Data extraction was focused on AUC-ROC values directed towards early detection of CS. **Results** A total of 943 studies were included for systematic review. From the reviewed studies, 2.2% (N=21) evaluated patient outcomes, of which 14.3% (N=3) were assessed. The collective patient cohort (N=698) consisted of 314(45.0%) females, with an average age and body mass index (BMI) of 64.1years and 28.1kg/m², respectively. Collectively, 159 (22.8%) mortalities were reported following early CS detection. Altogether, the AUC-ROC value was 0.82 (alfa=0.05), deeming it of superb sensitivity and specificity. **Conclusions** From the present comprehensively gathered data, this study accounts the use of ML software for the early detection of CS in a clinical setting as a valid tool to predict patients at risk of CS. The complexity of ML and its parallel lack of clinical evidence implies that further prospective randomized control trials are needed to draw definitive conclusions prior to standardizing use of these technologies.

Running title: **Cardiogenic Shock & Machine Learning**

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Author contribution :

1. Concept and design: Rene Aleman
2. Administrative support: Nicolas Brozzi, Cedric Sheffield, and Jose Navia
3. Provision of study materials/patients: Rene Aleman, Jose Sleiman, and Sinal Patel
4. Data analysis and interpretation: Rene Aleman
5. Collection and assembly of data: Rene Aleman and Jose Sleiman
6. Manuscript writing: All authors
7. Final approval of manuscript: Nicolas Brozzi, Cedric Sheffield, and Jose Navia

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