Predictive Factors for Massive Transfusion in Trauma: A Novel Clinical Score from an Italian Trauma Center and German Trauma Registry

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Abstract: Early management of critical bleeding and coagulopathy can improve patient survival. The aim of our study was to identify independent predictors of critical bleeding and to build a clinical score for early risk stratification. A prospective analysis was performed on a cohort of trauma patients with at least one hypotensive episode during pre-hospital (PH) care or in the Emergency Department (ED). Patients who received massive transfusion (MT+) (≥4 blood units during the first hour) were compared to those who did not (MT–). Hemodynamics, Glasgow Coma Score (GCS), diagnostics and blood tests were evaluated. Using multivariate analysis, we created and validated a predictive score for MT+ patients. The predictive score was validated on a matched cohort of patients of the German Trauma Registry TR-DGU. One hundred thirty-nine patients were included. Independent predictors of MT+ included a prehospital (PH) GCS of 3, PH administration of tranexamic acid, hypotension and tachycardia upon admission, coagulopathy and injuries with significant bleeding such as limb amputation, hemoperitoneum, pelvic fracture, massive hemothorax. The derived predictive score revealed an area under the curve (AUC) of 0.854. Massive transfusion is essential to damage control resuscitation. Altered GCS, unstable hemodynamics, coagulopathy and bleeding injuries can allow early identification of patients at risk for critical hemorrhage.

Keywords: trauma; bleeding; blood transfusion; score

1. Introduction

Critical bleeding secondary to trauma occurs rapidly after injury [1,2] and remains a common cause of potentially avoidable deaths [3]. The Advanced Trauma Life Support (ATLS) class three and four shock represent life threatening conditions due to loss of 30% or more of circulating blood [4]. Hemorrhage after trauma is often associated with the progressive onset of coagulopathy due to a combination of factors such as hemodilution, consumption of coagulation factors, hypothermia, acidosis and liberation of cellular mediators with activation of the neuroendocrine axis. Trauma-induced coagulopathy (TIC) [5] is associated with a greater need for transfusions, an increase in complications and mortality [6].