

Bleeding news



The thrombelastometry parameter CT_{EXTM} as an independent risk factor for mortality in bleeding patients

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Severe haemorrhage causes **alterations in the extrinsic pathway** of coagulation, which may be detected using **ROTEM**, by measuring the **clotting time (CT_{EXTM})**, or time it takes for the clot to start forming. In order to prove this, Bomberg et al. conducted the study commented below.

Although this was a retrospective, single-centre study (Saarland Hospital – Germany), it followed the right methodology, a correct data standardization, and a very appropriate statistical analysis.

The **sample size** is large (n=2035 patients), but patients were distributed and analysed in three independent groups: **Group 1** (n=1103): who underwent coronary revascularization surgery (**CPB**); **Group 2** (n=206): **trauma patients**, and **Group 3** (n=1076): classified as **medical** bleeding, but including cirrhotic patients as well as general surgery or neurosurgery patients. Therefore, the most homogeneous group, with an optimal sample size, is Group 1 (CPB), and so the most reliable conclusions will be those emerging from its analysis.

The **goals** of the study and **statistical analysis** applied were:

- 1. Correlating CT_{EXTM} with raw mortality after 30 days.**
- 2. Finding the cut-off point that best predicts that mortality.**

These two goals were achieved by analysing the groups using C-statistic and the graphic representation of ROC curves. C-statistic represents the odds that the model assigns a higher score to an individual who experiences the event than to someone who does not. Its value ranges between 0.5 (pure chance) and 1 (perfect discrimination).

- 3. Correlating CT_{EXTM} with 30-day adjusted mortality (adjusted HR).**

This analysis was carried out using comorbidity-adjusted **Cox models**, baseline characteristics and other ROTEM parameters.

- 4. Assessing the effect of administering prothrombin complex concentrate (PCC) on mortality**, pairing individuals with similar chances of receiving PCC, regardless of the group, and using the *propensity score* analysis.

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The **results** are summarized in the table below:

	Group 1 CPB (n=753)	Group 2 Trauma (n=206)	Group 3 Medical (n=1076)
C-statistic for 30-day mortality	0.62	0.65	0.63
Best 30-day mortality cut-off point	110 seconds	98 seconds	99 seconds
30-day mortality based on CT _{EXTEM} cut-off point	110 < CT _{EXTEM} ≥ 110 9% vs 26% (p<0.001)	98 < CT _{EXTEM} ≥ 98 11% vs 41% (p<0.001)	99 < CT _{EXTEM} ≥ 99 22% vs 41% (p<0.001)
30-day mortality adjusted HR	2.5	3.9	1.8
30-day mortality based on whether the patient has received PCC or not	pns		

Discussion - Conclusions

A **0.62–0.65 C-statistic** indicates that the **CT_{EXTEM}** parameter has a **moderate predictive power**, but **far from excellent**, to discriminate between patients who will die and those who will survive after 30 days.

The most frequently used **transfusion algorithms**, such as Görlinger's or Weber's, recommend administering PCC in case of severe haemorrhages, after having corrected fibrinogen, when **CT_{EXTEM} > 80** seconds. Studies such as this one may lead to reconsidering that value and suggesting an adjustment based on the type of patient to which it is applied. Thus, Bomberg et al., authors of the article, adjusted their transfusion algorithm to the new findings, suggesting PCC administration when **CT_{EXTEM} > 100** seconds.

Furthermore, the authors concluded that using PCC was safe in cases of massive haemorrhage, since 30-day mortality did not increase. However, it could also be argued that PCC administration neither did decrease it, since, after *propensity score matching*, treated and untreated patients were comparable.