TRAUMA INDUCED COAGULOPATHY
KNOWNS AND UNKNOWNS

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Royal London Major Trauma Centre
Barts Health NHS Trust
NATIONAL TRAUMA HAEMORRHAGE MORTALITY

Mortality

<table>
<thead>
<tr>
<th>Time</th>
<th>4+ Units</th>
<th>10+ Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;3 hr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;24 hr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Year</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
20th Century

All About the Shock
21st Century
All About the Bleeding
HAEMOSTATIC RESUSCITATION
HAEMOSTATIC RESUSCITATION
Prioritizes Coagulation over Perfusion 
(while bleeding)
HEMOSTATIC Resuscitation

1. Early haemorrhage control
2. Permissive hypotension
3. Limit fluid infusions (dilution)
4. Target coagulopathy
TRAUMA-INDUCED COAGULOPATHY
TRAUMA-INDUCED COAGULOPATHY

Acute Traumatic Coagulopathy
+
Resucitation Coagulopathy
TRAUMA-INDUCED COAGULOPATHY
TRAUMA-INDUCED COAGULOPATHY

ATC
TIME ATC RESUSCITATION

TRAUMA-INDUCED COAGULOPATHY
TRAUMA-INDUCED COAGULOPATHY

ATC

RESUSCITATION

PROTHROMBOTIC

TIME
TRAUMA-INDUCED COAGULOPATHY

RESUSCITATION

TIME
750 ml crystalloid

1U PRBC
750 ml crystalloid

4U PRBC
2 FFP
4500 ml crystalloid
500 colloid
8U PRBC
7U FFP
1 PLT, 2 CRYO
7500 ml crystalloid
1000 colloid
12U PRBC
8U FFP
1 PLT, 2 CRYO
PREHOSPITAL MORTALITY

2009: 34%
2015: 18%
ACUTE TRAUMATIC COAGULOPATHY

ATC

TIME
Thrombin + Fibrinogen → Fibrin
Thrombin + platelet + Fibrinogen -> Fibrin + FDPs

XIIa Xla + IXa Xa + VIIa -> Thrombin

Fibrinogen + Plasmin + tPA -> FDPs
COMPOSITION
Each 5 ml. Ampoule contains:
Tranexamic acid B.P. .......... 500 mg.

DOSAGE & ADMINISTRATION
As directed by the physician.
For details see the enclosed leaflet.

Keep all medicines out of the reach of children.
ACUTE TRAUMATIC COAGULOPATHY
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TRAUMA-INDUCED COAGULOPATHY

ATC

RESUSCITATION
<table>
<thead>
<tr>
<th><strong>ROTEM</strong></th>
<th><strong>TEG</strong></th>
<th><strong>LABS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIBRINOGEN</strong>&lt;br&gt; If FIBTEM CA5 &lt; 10 mm&lt;br&gt;Give additional 4g equivalent of fibrinogen&lt;br&gt;(as cryoprecipitate or concentrate)</td>
<td><strong>FIBRINOGEN</strong>&lt;br&gt; If FF TEG MA &lt; 20 mm&lt;br&gt;Give additional 4g equivalent of fibrinogen&lt;br&gt;(as cryoprecipitate or concentrate)</td>
<td><strong>FIBRINOGEN</strong>&lt;br&gt; If Fibrinogen &lt; 2 g/L&lt;br&gt;Give additional 4g equivalent of fibrinogen&lt;br&gt;(as cryoprecipitate or concentrate)</td>
</tr>
<tr>
<td><strong>PLATELETS</strong>&lt;br&gt; If (EXTEM CA5 – FIBTEM CA5) &lt; 30 mm&lt;br&gt;Give 1 additional pool of platelets</td>
<td><strong>PLATELETS</strong>&lt;br&gt; If (rTEG MA – FF TEG MA) &lt; 45 mm&lt;br&gt;Give 1 additional pool of platelets</td>
<td><strong>PLATELETS</strong>&lt;br&gt; If platelets &lt; 100 x 10⁹ /L&lt;br&gt;Give 1 additional pool of platelets</td>
</tr>
<tr>
<td><strong>PLASMA</strong>&lt;br&gt; If EXTEM CA5 &gt; 40 mm AND EXTEM CT &gt; 80 s&lt;br&gt;Give 4 additional units of plasma</td>
<td><strong>PLASMA</strong>&lt;br&gt; If rTEG MA &gt; 65 mm AND rTEG ACT &gt; 120 s&lt;br&gt;Give 4 additional units of plasma</td>
<td><strong>PLASMA</strong>&lt;br&gt; If INR &gt; 1.2 AND Fibrinogen ≥ 2 g/L&lt;br&gt;Give 4 additional units of plasma</td>
</tr>
<tr>
<td><strong>TRANEXAMIC ACID</strong>&lt;br&gt; If EXTEM LI30 &lt; 85 %&lt;br&gt;Give additional 1g tranexamic acid</td>
<td><strong>TRANEXAMIC ACID</strong>&lt;br&gt; If rTEG LY30 &gt; 10 %&lt;br&gt;Give additional 1g tranexamic acid</td>
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</table>
Targeted Action for Curing Trauma Induced Coagulopathy (TACTIC)

iTACTIC Recruitment

- Recruitment per month
- Cumulative total
- Projected recruitment

<table>
<thead>
<tr>
<th>Month</th>
<th>Jun-16</th>
<th>Jul-16</th>
<th>Aug-16</th>
<th>Sep-16</th>
<th>Oct-16</th>
<th>Nov-16</th>
<th>Dec-16</th>
<th>Jan-17</th>
<th>Feb-17</th>
<th>Mar-17</th>
<th>Apr-17</th>
<th>May-17</th>
<th>Jun-17</th>
<th>Jul-17</th>
<th>Aug-17</th>
<th>Sep-17</th>
<th>Oct-17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>18</td>
<td>14</td>
<td>17</td>
<td>25</td>
<td>15</td>
<td>12</td>
<td>4</td>
<td>9</td>
<td>15</td>
<td>17</td>
<td>19</td>
<td>22</td>
<td>18</td>
<td>20</td>
<td>22</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Cumulative total:

- 18
- 32
- 49
- 64
- 89
- 101
- 105
- 114
- 123
- 138
- 147
- 156
- 174
- 192
- 202
- 224
- 246
- 268
- 290
- 312

Projected recruitment:

- 0
- 2
- 4
- 6
- 8
- 10
- 12
- 14
- 16
- 18
- 20
- 22
- 24
- 26
- 28
- 30
- 32
- 34
- 36
- 38
- 40
- 42
- 44
- 46
- 48
- 50
CRYOPRECIPITATE
CRYOSTAT

![Graph showing fibrinogen level (g/L) with PRBC units after admission.](image)
CRYOSTAT Mortality

Standard: 6/21 : 28%
Early CRYO: 2/20 : 10%
CRYOSTAT-2
TRAUMA-INDUCED COAGULOPATHY

- ATC
- RESUSCITATION
- PROTHROMBOTIC

TIME