Fresh frozen plasma – balancing its use, misuse and waste

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Differences from red cells and platelets

- Minimal clinical indications for transfusion
- Minimal or No role for a prophylactic transfusion
- No standard triggers for transfusion
- Misuse is more
- Wastage is more because once this is thawed it cannot be refrozen
  component therapy
- Shelf life is for one year
WHY DO WE NEED TO BALANCE IT’S USE

- Blood component – potential hazard
- Allergy
- TRALI
- TACO
- TTI
Balancing the use – following guidelines and indications

- Guidelines for the use of fresh-frozen plasma, cryoprecipitate and cryosupernatant
- British Committee for Standards in Haematology, Blood Transfusion Task force 2004
Indications for FFP transfusion

1. Replacement of a single factor deficiency where that particular factor is not available

2. Multiple coagulation factor deficiency especially congenital

3. DIC: FFP is transfused when there is bleeding with coagulation factor deficiency. No evidence that FFP given prophylactically could prevent DIC or reduce transfusion requirements

4. Any clinical condition with bleeding and documented PT and aPTT > 1.5 times the normal ie > 18sec and 55 sec or coagulation factor assay < 25%

5. TTP: Thrombotic Thrombocytopenic Purpura
   Single volume exchange at presentation and daily exchanges until remission
6 Reversal of warfarin: FFP has partial effect and is not the optimal treatment and should be used only if there is evidence of bleeding.

7. ICU patients: with prolonged coagulation parameters: vit K must be administered and not FFP.

8. Prior to liver biopsy: no role of FFP for normalisation of INR, PT & aPTT.
8. Surgical bleed and massive transfusion:

Whether and how much FFP should be used for treating a patient with massive blood loss should be guided by timely tests of coagulation including near-patient tests. (TEG)

1:1:1 of packed cells : FFP: Platelets
PAEDIATRIC INDICATIONS

- Hemolytic disease and bleeding: prothrombin concentrate, Vit K and FFP
- A neonate /child who is bleeding undergoing invasive procedures must receive both Vit K and FFP because of very low coag factors
- Prophylactic FFP in premature infants to prevent periventricular hge - is not indicated
- Dose: 12-15ml/kg
Principles of selection of fresh-frozen plasma according to donor and recipient blood group (ABO).

<table>
<thead>
<tr>
<th>Recipient group</th>
<th>O</th>
<th>A</th>
<th>B</th>
<th>AB</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st choice</td>
<td>O</td>
<td>A</td>
<td>B</td>
<td>AB</td>
</tr>
<tr>
<td>2nd choice</td>
<td>A</td>
<td>AB</td>
<td>AB</td>
<td>A</td>
</tr>
<tr>
<td>3rd choice</td>
<td>B</td>
<td>-</td>
<td>-</td>
<td>B</td>
</tr>
<tr>
<td>4th choice</td>
<td>AB</td>
<td>-</td>
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</table>
**DO NOT REFREEZE THE THAWED FFP**

Haemostatic factor content

<table>
<thead>
<tr>
<th>Factor</th>
<th>Freshly thawed</th>
<th>24 hours storage at 4°C</th>
<th>levels at 5 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fibrinogen g/l</td>
<td>2.67</td>
<td>2.25</td>
<td>2.25</td>
</tr>
<tr>
<td>FII (iu/ml)</td>
<td>80</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>FV</td>
<td>80</td>
<td>75</td>
<td>66</td>
</tr>
<tr>
<td>FVII</td>
<td>90</td>
<td>80</td>
<td>72</td>
</tr>
<tr>
<td>FVIII</td>
<td>92</td>
<td>51</td>
<td>41</td>
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<tr>
<td>FIX</td>
<td>100</td>
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<td></td>
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<tr>
<td>FX</td>
<td>85</td>
<td>85</td>
<td>80</td>
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<tr>
<td>FXI</td>
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<td></td>
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</tr>
<tr>
<td>FXII</td>
<td>83</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FXIII</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antithrombin III</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VWF</td>
<td>80</td>
<td></td>
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</tr>
</tbody>
</table>
Misuse of FFP

- Analysis of FFP administration with suggestion for ways to reduce usage – TR med 1992  Shanberge et al

- Not indicated in
- 40 % of patients under medical ward
- 46% in surgical patients
- 56% in obstetric
- 33% in paediatric
• A survey of physicians’ reasons to transfuse plasma and platelets in the critically ill: a prospective single-centre cohort study. Vlaar et al Tr med 2009
Weigand K, Encke J, Meyer FJ, et al. Low levels of prothrombin time, INR and platelets do not increase the risk of significant bleeding when placing central venous catheters.

**Conclusion:** Intensivists express the need for more evidence on the prophylactic use of FFP in coagulopathic critically ill patients. However, lack of knowledge about FFP and personal beliefs about the preferable transfusion strategy among clinicians, resulted in premature termination of a clinical trial.
Transfusion of fresh-frozen plasma in critically ill patients with a coagulopathy before invasive procedures: a randomized clinical trial

CONCLUSION: In critically ill patients undergoing an invasive procedure, no difference in bleeding complications was found regardless whether FFP was prophylactically administered or not
Misuse of FFP

- Is rampant
- One FFP BD / TDS ??
- Instead of albumin ?
- Volume replacement
- Wound healing
- Post surgical
What do the tests for coagulation tell us?

- Bleeding time? Does not predict surgical hemostasis

- PT, aPTT, INR do not predict who will bleed! However, this remains the core of the decision to transfuse FFP still!

- INR: good for anticoagulation study

- Minute changes in coag parameters change these parameters and tests are extremely sensitive
Plasma Concentration, Levels Recommended for Surgical Support (mg/l) (Principles and practice of Transfusion medicine E C Rossi )

<table>
<thead>
<tr>
<th></th>
<th>Plasma Concentration</th>
<th>Recommended</th>
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<tbody>
<tr>
<td>Fibrinogen</td>
<td>2800</td>
<td>1 mg/ml</td>
</tr>
<tr>
<td>Prothrombin</td>
<td>130</td>
<td>40-50%</td>
</tr>
<tr>
<td>Factor V</td>
<td>68</td>
<td>‘10-30%</td>
</tr>
<tr>
<td>Factor X</td>
<td>12</td>
<td>10-40%</td>
</tr>
<tr>
<td>Factor VII</td>
<td>0.5</td>
<td>10-20%</td>
</tr>
<tr>
<td>Factor VIII</td>
<td>0.24</td>
<td>30-100%</td>
</tr>
<tr>
<td>Factor IX</td>
<td>5</td>
<td>20-60%</td>
</tr>
<tr>
<td>Factor XI</td>
<td>6</td>
<td>20-30%</td>
</tr>
<tr>
<td>Factor XIII</td>
<td>29</td>
<td>10%</td>
</tr>
<tr>
<td>Von Willebrand’s factor</td>
<td>6</td>
<td>20-50%</td>
</tr>
</tbody>
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Waste

- Requests for thawing and not transfusing FFPs
  - (Thawed FFP cannot be refrozen)
- Paediatric doses such as 50 ml or 75 ml – rest is wasted
- Avoid wastage by giving all the extra FFPs to fractionation centres
TAKE HOME MESSAGE

• Balancing FFP transfusions is by following guidelines and monitoring the patient for bleeding

• Misuse of FFP is quite prevalent inspite of so called evidence based practices ,best practices !! – probably coagulation parameters like PT,aPTT,INR do not predict bleeding in a patient

• Wastage of FFP can be prevented by giving excess FFPs to Fractionation centres