Labile Blood Products:
Current Practice and Effectiveness
Mr. Robert Decelis BSc(Hons)MLS
(Article first appeared in the July Issue (no 14) of InfoLab, The Pathology Department electronic Magazine)

Today on the Maltese Islands approximately, 17,000 units of blood are donated each year of which 15,000 are transfused. Each unit contains about 450 mL of whole blood, which is then separated by centrifugation into its various components. The advantages of separation are that one donated unit can serve multiple patients, only the required component will be transfused (e.g. a patient suffering from anaemia is transfused with red blood cells (RBC’s)) and also there will be reduced risks that result from whole blood transfusions such as circulatory overload. The effectiveness of blood component transfusion depends on: (1) Availability of good quality components, (2) Evaluation of blood component transfusion indices e.g. changes in the haemoglobin (Hb) levels, platelet count, etc.

<table>
<thead>
<tr>
<th>Blood Component</th>
<th>Indications for Transfusion</th>
<th>Therapeutic Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Blood Cells</td>
<td>Low Haemoglobin and Haematocrit levels, inadequate tissue oxygen delivery</td>
<td>Increase per unit transfused: Haematocrit: 3 – 4 % Haemoglobin: 1 gram/Dl</td>
</tr>
<tr>
<td>Platelets</td>
<td>Thrombocytopenia</td>
<td>1 unit containing at least 120 x 10^9 platelets should increase the platelet count by 10 – 20 x 10^9</td>
</tr>
<tr>
<td>Fresh Frozen Plasma</td>
<td>Factor deficiencies, immediate reversal of warfarin effect, Acute disseminated intravascular coagulation</td>
<td>INR, APTT &amp; APTT ratio decrease after transfusion, Most clotting factors increase by 1%</td>
</tr>
</tbody>
</table>

Study
The study (June to December 2002) aimed to determine the quality of the blood components to be transfused, and the degree to which an expected outcome was achieved in a general patient population transfused with these blood components.

Methodology
The study was divided in two parts:
(1) Quality Evaluation: where the products under study (i.e. RBC’s, FFP, Pooled Donor Platelets) were subjected to specific tests according to the Council of Europe (CoE) recommendations to ensure that the products were up to standards, and if not, measures were to be taken to improve the quality.
(2) The effectiveness evaluation part: where the in vivo effect of the above mentioned products was observed in patients of St. Luke’s Hospital by gathering data from specific pre- and post-transfusion tests.

Quality Control Criteria
Red blood cells and plasma are prepared using either of two systems: the triple bag (TB) system (RBC’s in additive solution, buffy coat removed) and the quadruple bag (QB) system (RBC’s in additive solution). The two systems were compared.

Effectiveness
Patient data as regards to effectiveness was gathered utilising a questionnaire designed by the W.H.O. Data to be collected on the questionnaire included, clinical details, and pre-transfusion and post-transfusion test parameters depending on the type of component to be transfused.

It was concluded that the products in this study were according to recommendations by the CoE with the exception of RBC’s in additive solution (TB) that had a slightly lower than recommended level of Hb and platelets that had a lower than recommended pH. Preparing RBC’s by the QB system seems to yield a better product with a higher Hb than the TB system. The reason is that when preparing the buffy coat from the TB’s, some RBC’s are lost during the process. This does not happen with the QB system.

It is a fact that the haemoglobin level of Maltese donors is lower than in other countries, in fact a mini-study conducted among 100 donors during March 2003 showed that the mean Hb level in the Maltese population is 13.25 g/dL and the mean haematocrit is 39.77%. Even a minimal loss of RBC’s during preparation will results in a low Hb level. With regards to effectiveness, all products under study were effective in reaching the transfusion targets.