Review of New Platforms for Blood Prime

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Blood (Custom) Prime

Objectives

• The participant will recognize the basic steps in performing a blood prime of apheresis instruments

• The participant will be able to recite advantages of the new custom prime feature in the Spectra Optia and Amicus apheresis instruments
Blood Prime Necessary?

- Extracorporeal volume (ECV) is the blood outside the body
- Machine ECV + warmer volume >15% of patient TBV
- Machine ECV + warmer volume >10% of patient TBV
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Major Considerations - TBV

• Patient total blood volume (TBV)
  • Patient weight >25 kg (55 lbs):
    Use machine algorithm (Nadler formula) except boys <10 years and < 30 kg (66 lbs) have a smaller TBV*
  • Patient weight ≥ 9.1 kg - <25 kg (20-55 lbs):
    Use 80 ml/kg x patient weight in kg = TBV of patient
  • Patient weight <9.1 kg (20 lbs):
    Use 90 ml/kg x patient weight in kg = TBV of patient

• Machine extracorporeal volume (ECV)
  • From operator’s manual

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Major Considerations – RBC Volume

- Patient RBC volume
  Patient HCT x patient total blood volume = patient RBC volume

- Machine extracorporeal RBC volume
  From operator’s manual

- RBC prime necessary?
  - Acceptable peripheral HCT while on machine
    \[ \frac{(\text{Pt HCT} \times \text{TBV}) - \text{RBC in machine}}{\text{TBV}} = \text{new pt HCT} \]
  - Up to 30% acceptable, if isovolemia is maintained*

- Variable RBC content – Amicus MNC collection

### Blood (Custom) Prime

#### Machine Volumes (without warmer)

<table>
<thead>
<tr>
<th>Machine Type</th>
<th>Total ECV (mL)</th>
<th>RBC ECV (mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optia Exchange</td>
<td>185</td>
<td>185 x patient HCT</td>
</tr>
<tr>
<td>Optia Collection</td>
<td>191</td>
<td>191 x patient HCT</td>
</tr>
<tr>
<td>Amicus TPE</td>
<td>160</td>
<td>73</td>
</tr>
<tr>
<td>Amicus MNC</td>
<td>163</td>
<td>79-122</td>
</tr>
<tr>
<td>Spectra Exchange</td>
<td>285</td>
<td>68</td>
</tr>
<tr>
<td>Spectra WBC</td>
<td>285</td>
<td>114</td>
</tr>
</tbody>
</table>
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Major Considerations – Prime Solution

• Blood with RBC
  • Blood with preservative solution (≈ 53% HCT)
  • Packed RBC (≈ 80% HCT)
  • Customized HCT blood (≈ patient HCT)
• Normal serum albumin
  • Protein rather than crystalloid replacement
  • Consider not diverting prime
• Plasma
  • Source of clotting factors (pre surgery)
  • Source of other plasma proteins
  • Consider not diverting prime
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**Basic Steps**

- Determine if prime will be needed
- Determine the prime fluid - blood, plasma, albumin
- If blood, select and crossmatch the appropriate unit of blood
  - Correct volume
  - HCT adjusted (if needed)
- Determine the anticoagulant type
  - ACD-A with calcium supplement
  - Heparin with ACD-A, with or without calcium supplement
  - Heparin only (primarily filtration)
Blood (Custom) Prime Supplies
Blood (Custom) Prime

Basic Steps (cont. 1)
• Prime the machine normally with normal saline and AC
• Prepare waste bag
  • Seal off line close to bag
  • Attach a sampling site coupler (needle or needle-less)
• Attach a sampling site coupler to blood bag
• Attach inlet line to blood bag
  • Use lever lock cannula to needle-less coupler
  • Use large needle for needle coupler
• Attach return line with warmer to waste bag
  • Use lever lock cannula for needle-less coupler
  • Use large needle for needle coupler
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Basic Steps (cont. 2)

• Open clamps and start “procedure”
  • Can increase speed for blood prime by changing patient data
  • Process until return line same color as inlet line or blood bag empty
  • Stop “procedure”
• Clamp lines, disconnect inlet line and attach to patient
• Clamp lines, disconnect return line with warmer to patient
• Correct patient data if previously changed
• Record inlet volume, AC volume, replacement volume (TPE), procedure time
• Ready to start actual procedure on patient
• Usually do not reinfuse or rinseback
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**Amicus MNC Considerations**

- All storage plasma and transfer plasma collected early
- Usually not all is collected before prime done
- Collected “plasma” is actually RBC preservative solution
- RBC preservative solution will be used for cycle transfers
- RBC preservative solution could be used for freezing
- RBC used to transfer cells for each cycle (about 35 ml)
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Amicus MNC – Addition of RBC During Transfer

- Patients ≤ 10 kg
- 1 unit pRBC + 200 ml 5% NSA as RBC source
- 2-6 cycles, average 3 cycles
- Primed with RBC source
- During each cycle “RBC collection”, opened stopcock to RBC source
- During entire “mini-cycle” opened stopcock to RBC source
- Transfused about 36 ml pRBC with each cycle
- “Mini-cycle” processed about 160 ml

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**Amicus MNC Collection Alternative**

- Program realistic number of cycles, no storage plasma
- After plasma collection is complete, program storage plasma
- Program 10 ml/kg patient weight plus 20 ml storage
- Storage plasma will be collected after minicycle – few platelets
- Stop storage plasma transfer at 20 ml
- Send product and plasma to processing lab
- Lab spins down product, removes and discards the RBC preservative plasma
- Storage plasma is used for cryopreservative
- Benefits fluid balance – plasma removed vs AC given
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Fenwal Amicus Custom Prime Benefits

• Need version 4.5 or greater software
• Machine recommends custom prime when indicated by kit volume and TBV
• Machine knows it is a separate prime procedure
• Once 85 ml pumped, “stop custom prime” is enabled, once 200 ml pumped, pumps stop, can continue prime or stop prime
• Faster speeds used for prime (100 ml/min for 200 ml)
• Machine will zero all numbers when start patient
• Machine will default to no reinfusion, can be changed
• RBC preservative solution returned to patient, plasma is collected after initial processing
Blood (Custom) Prime

Spectra Optia Custom Prime Benefits

• Machine recommends custom prime when indicated by RBC volume and TBV of patient data entered
• Machine knows it is a separate prime procedure
• Machine will pump at least 200 ml and warmer volume of priming solution, but can be extended
• Faster speeds will be used for the prime
• Machine will zero all numbers when start patient
• Machine will default to no rinseback, but can be changed
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Reinfuse or Not?

• Will add to positive fluid balance
• Depends on need of RBC for patient
• Patient will receive their own RBC, not banked blood
• Could do partial reinfusion/rinseback
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Partial Reinfusion on Amicus

• TPE
  • Complete Reinfusion= about 170 ml + warmer
  • When the right lower pump stops, most of the concentrated RBC have been returned

• MNC
  • Complete reinfusion= about 263ml + warmer
  • Approx 40 ml in the lines drain by gravity; 125 ml saline +blood from waste bag, middle cassette, and cent pack are pumped(about 2 min after return pump starts if using 50ml/min rate); would be about 165 ml.
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Partial Rinseback on Optia

• TPE
  • Complete Rinseback = about 110 ml + warmer
  • Go to Rinseback, first 60ml is undiluted RBC, monitor fluid balance on screen, stop manually (press Pause)

• MNC
  • Complete Rinseback = unknown
  • Go to Rinseback, first 60ml undiluted RBC, monitor fluid balance on screen stop manually (press Pause)
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**Fluid Balance**

- TPE – Can adjust with replacement fluids
- MNC – Large volume AC, low volume product
- Reinfusion adds to positive fluid balance
- Optia: Could collect plasma intermittently during collection
- Amicus: Collect plasma at end of procedure (10 ml/kg patient weight)
Conclusions

• Blood prime allows small patients to be eligible for apheresis procedures
• Performance of a blood prime is not difficult
• The new custom prime programs help simplify the priming process
Questions & Discussion