Background

- The rapid administration of fluid may be required to provide life-saving care in various clinical scenarios, including shock and trauma.
- Techniques for increasing the speed of fluid administration have included use of larger tubing, pressure devices, and hand pumps.
- The current study prospectively evaluates gravity, pressure-assisted, and hand-pump methods for the rapid administration of fluid using an in vitro model.

Methods

Thirty anesthesia providers were asked to deliver 500 mL of fluid using each of 6 set-ups:

1. Standard blood tubing with gravity administration (SBT-gravity)
2. Standard blood tubing with pressure bag maintained at 300 mmHg (SBT-PB 300 mmHg maintained)
3. Standard blood tubing with pressure bag inflated to 300 mmHg and left to flow (SBT-PB set at 300 mmHg)
4. Blood tubing with in-line bulb pump (BT with hand pump)
5. Blood tubing with in-line bulb pump and pressure bag (BT with hand pump and PB)
6. Standard blood tubing with 20 mL syringe attached to the stopcock for a push and pull technique using. (SBT with syringe push-pull)

Results

- The blood tubing with an in-line bulb pump to allow manual acceleration of the administration of fluid along with a pressure bag achieved the fastest flow rate, requiring an average of 98 seconds to deliver 500 mL of fluid (Table 1).
- The second fastest method was the pressure bag maintained at 300 mmHg.

<table>
<thead>
<tr>
<th>Study phases</th>
<th>Drainage time (seconds)</th>
<th>Flow rate (mL/min)</th>
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</thead>
<tbody>
<tr>
<td>1. SBT-gravity</td>
<td>283 ± 11</td>
<td>106 ± 4</td>
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<tr>
<td>2. SBT-PB 300 mmHg maintained</td>
<td>109 ± 4</td>
<td>277 ± 11</td>
</tr>
<tr>
<td>3. SBT-PB set at 300 mmHg</td>
<td>151 ± 28</td>
<td>203 ± 23</td>
</tr>
<tr>
<td>4. BT with hand pump</td>
<td>130 ± 11</td>
<td>232 ± 21</td>
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<tr>
<td>5. BT with hand pump and PB</td>
<td>98 ±12</td>
<td>309 ± 36</td>
</tr>
<tr>
<td>6. SBT with syringe (push-pull)</td>
<td>151 ± 22</td>
<td>203 ± 30</td>
</tr>
</tbody>
</table>

Figure 1. Y type blood set with in-line bulb pump for the administration from blood bag or IV solution container (black arrow showing the bulb pump).

References