Caring for Precious Cargo

Part 1:
Emergency Aircraft Evacuations With Infants Onto Inflatable Escape Slides

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Protection and Survival Laboratory
Moving Kids Safely

★ FAA is committed to one level of safety for every occupant in an aircraft.

★ How should adults with infants evacuate airliners when emergencies occur?

★ Information obtained from this study is intended for use in developing pre-evacuation briefings.
Participants

★ Six groups of 32 adult evacuees
  ♦ Military personnel
  ♦ Airline industry representatives
★ 8 from each group were selected to carry an anthropomorphic dummy on 6 trials
  ♦ 27 males, 21 females
  ♦ Mean age 29.32 years
<table>
<thead>
<tr>
<th>Dummy number</th>
<th>Weight/lb</th>
<th>Length/in</th>
<th>Estimated age representation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10.91</td>
<td>16.75</td>
<td>2 months</td>
</tr>
<tr>
<td>2</td>
<td>10.51</td>
<td>16.75</td>
<td>2 months</td>
</tr>
<tr>
<td>3</td>
<td>17.04</td>
<td>24.50</td>
<td>6 months</td>
</tr>
<tr>
<td>4</td>
<td>18.06</td>
<td>26.00</td>
<td>6 months</td>
</tr>
<tr>
<td>5</td>
<td>24.76</td>
<td>33.00</td>
<td>18 months</td>
</tr>
<tr>
<td>6</td>
<td>25.65</td>
<td>31.00</td>
<td>18 months</td>
</tr>
<tr>
<td>7</td>
<td>28.96</td>
<td>31.00</td>
<td>24 months</td>
</tr>
<tr>
<td>8</td>
<td>29.92</td>
<td>31.00</td>
<td>24 months</td>
</tr>
</tbody>
</table>
★ Aircraft Cabin Evacuation Facility (ACEF)
- Right front Type I exit
- Boeing 737 evacuation slide
- Sill height 9’ 6”
Carry infant dummy vertically or horizontally
Jump or sit on slide to board
Speed of Egress Multivariate Analysis of Variance

Boarding Maneuver Main Effect

Boarding $p < .001$

<table>
<thead>
<tr>
<th>Carrying Orientation/Boarding Maneuver</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertical/Sit</td>
<td>2.0</td>
<td>2.2</td>
</tr>
<tr>
<td>Vertical/Jump</td>
<td>1.5</td>
<td>1.7</td>
</tr>
<tr>
<td>Horizontal/Sit</td>
<td>1.5</td>
<td>1.7</td>
</tr>
<tr>
<td>Horizontal/Jump</td>
<td>1.5</td>
<td>1.7</td>
</tr>
</tbody>
</table>

Subject
Gender
- Male
- Female
Speed of Egress Multivariate Analysis of Variance
Boarding Maneuver and Group Type Main Effects

Boarding p < .001
Group p = .01

Mean Individual Egress Time in Seconds

Group Type
- Military
- Workshop

Carrying Orientation/Boarding Maneuver
- Vertical/Sit
- Vertical/Jump
- Horizontal/Sit
- Horizontal/Jump
Degree of Ease of Carrying Orientation and Boarding Maneuvers
Subject Gender by Dummy Size Interaction

<table>
<thead>
<tr>
<th>Dummy Size</th>
<th>Newborn</th>
<th>6-months</th>
<th>18-months</th>
<th>24-months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Subject Gender
- Male
- Female
Degree of Ease of Carrying Orientation and Boarding Maneuvers
Boarding by Group Type by Dummy Size Interaction

Military Groups

Workshop Groups

Boarding Maneuver

Average Score

Dummy Size
- Newborn
- 6-months
- 18-months
- 24-months

Sit Jump Sit Jump

Newborn
6-months
18-months
24-months
Distribution of responses to “Which maneuver would you recommend to parents?”

<table>
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<th>Carrying/Boarding Maneuver</th>
<th>Dummy Size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Newborn</td>
</tr>
<tr>
<td>Vertical/Sitting</td>
<td>2</td>
</tr>
<tr>
<td>Vertical/Jumping</td>
<td>5</td>
</tr>
<tr>
<td>Horizontal/Sitting</td>
<td>0</td>
</tr>
<tr>
<td>Horizontal/Jumping</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>12</strong></td>
</tr>
</tbody>
</table>
“No instruction” Trials

★ 64% of those who held dummy vertically and 75% of those who held the dummy horizontally jumped onto the slide on both first and final trials.

★ Majority of those who changed positions changed from vertical to horizontal orientation, but still jumped.

★ Only four infant carriers changed to the sitting position.
Conclusions

★ Results suggest that jumping onto the slide *should be* the favored boarding maneuver.

★ Carrying orientation should provide most protection for the child.

★ It is critical to consider how a parent might react in an emergency.

★ Instruct parents about properly boarding the slide to increase their confidence and proficiency.