Neonatal Mock Code: Reviewing Trainees’ Performance

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For the Mock Code Working Group
ICRE September 23, 2011
Quebec City, Quebec
Disclosures...

- The members of the mock code working group have nothing to disclose
Neonatal Mock Code Working Group

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- Dr. Thierry Daboval
- Dr. Emanuela Ferretti
- Dr. Sarah Lawrence
- Dr. Gregory Moore
- Dr. Nicole Rouvinez-Bouali
Background

- Up to 1/10 newborns need some form of resuscitation after birth\(^1\)
- Success = knowledgeable and skilled resuscitation team
- Mock codes could maintain skills and improve resuscitations
- At our center ~3 neonatal mock codes/month

Objectives

- To evaluate and improve our mock code curriculum
- To identify strengths and weaknesses of our trainees in neonatal mock code performance
- To compare year of training and previous mock code experience with success rate on a mock code
Methods

- Retrospective review
- Trainees assessed using 2006 NRP Megacode Assessment form (Advanced) – Canadian Adaptation
- Demographic data collected
- Performance on key (bolded) steps between 2008 and 2010 was collected
- Data analyzed
# Megacode Assessment Form (Advanced) - Canadian Adaptation

**Learner:**

**Evaluator:**

**Lessons completed:** 1, 2, 3, 4, 5, 6

**Date:**

<table>
<thead>
<tr>
<th>Lesson</th>
<th>Possible Points</th>
<th>Item</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>Checks Bag, Mask, and Oxygen Supply</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Ask 4 Assessment Questions (Term? Meconium? Breathing? Ileus?)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 optional</td>
<td></td>
<td>If meconium, determines if endotracheal suction is indicated</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Positions head, suction mouth then nose</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Cleans, removes wet towels and repositions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Requests description of breathing, heart rate, and color</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Indicates need for positive-pressure ventilation (Apnea, heart rate &lt;70 beats per minute (bpm), central cyanosis despite supplemental O2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Provides positive-pressure ventilation correctly (48-60 breaths/min)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No score</td>
<td>Administers oxygen appropriately.</td>
<td>No score</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Checks for improvement in heart rate (Instructor note: Heart rate does not improve.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Takes corrective action when heart rate not rising and chest not moving (Resuscitation, lift jaw forward, reposition head, check secretions, open mouth, increase pressure if necessary)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Reevaluates heart rate (Instructor note: Heart rate remains &lt;80 bpm.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>Demonstrates correct respiratory technique (Assess correct finger or thumb placement, compress one third of the anterior-posterior diameter of the chest.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Demonstrates correct rate and coordination with ventilation (Ask student and assistant to switch positions)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>Identifies need for intubation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Intubates or assists intubation correctly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>Identifies need for epinephrine (Heart rate &lt;60 bpm despite positive-pressure ventilation and compressions)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Identifies need for intubation (Heart rate &lt;60 bpm despite positive-pressure ventilation and compressions)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No score</td>
<td>Prepares correct doses of epinephrine in appropriate-sized syringe (0.1 mL/kg IV and 1.0 mL/kg ET)</td>
<td>No score</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Administers ET dose while umbilical catheter being prepared</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Prepares umbilical venous catheter for insertion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Prepares umbilical venous catheter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Administers epinephrine via umbilical venous catheter and/or endotracheal tube</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 optional</td>
<td>(optional) Identifies need for volume administration</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**Closure:**

Continuous/discontinuous positive-pressure ventilation appropriately or weans free-flow oxygen.

**X .85**

Total of all circled points (38 points maximum) Multiply total by .85 = minimum acceptable passing score

**Student's Total Score (add subtotals):**

<table>
<thead>
<tr>
<th>Performed all 5 bold items correctly?</th>
<th>Y</th>
<th>N</th>
<th>Reevaluate</th>
</tr>
</thead>
</table>

(1) Drying the skin does not apply to babies < 28 weeks; these babies should be placed wet into a food-grade polyethylene bag below the neck.

(2) Ventilates with 21% oxygen if < 90 seconds of age; with supplemental O2 if > 90 seconds of age.

For use in Canada.
Results
# Demographics

<table>
<thead>
<tr>
<th>Trainee Type</th>
<th>Number of trainees</th>
<th>Number of Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pediatric residents</td>
<td>43</td>
<td>70</td>
</tr>
<tr>
<td>Neonatal Fellows</td>
<td>9</td>
<td>13</td>
</tr>
<tr>
<td>Other subspecialty residents</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>65</strong></td>
<td><strong>96</strong></td>
</tr>
</tbody>
</table>
## Performance on Key Steps

<table>
<thead>
<tr>
<th>Item</th>
<th>Done correctly (% codes)</th>
<th>Done correctly first attempt (% trainees)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Checks Bag, and Oxygen Supply</td>
<td>84/94 (89%)</td>
<td>55/65 (85%)</td>
</tr>
<tr>
<td>Indicates need for positive-pressure ventilation</td>
<td>81/95 (85%)</td>
<td>51/64 (80%)</td>
</tr>
<tr>
<td>Provides positive pressure ventilation correctly</td>
<td>68/94 (72%)</td>
<td>42/63 (66%)</td>
</tr>
<tr>
<td>Takes corrective action when heart rate not rising and chest not moving</td>
<td>46/94 (49%)</td>
<td>30/64 (47%)</td>
</tr>
<tr>
<td>Demonstrates correct compression technique</td>
<td>48/76 (63%)</td>
<td>33/53 (62%)</td>
</tr>
</tbody>
</table>
## Performance on additional important steps

<table>
<thead>
<tr>
<th>Item</th>
<th>Done correctly (% codes)</th>
<th>Done correctly first attempt (% trainees)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administers oxygen appropriately</td>
<td>15/49 (30%)</td>
<td>11/40 (27%)</td>
</tr>
<tr>
<td>Administers epinephrine with appropriate route and dosage</td>
<td>23/48 (48%)</td>
<td>14/35 (40%)</td>
</tr>
</tbody>
</table>
### Pass rate based on year of training

<table>
<thead>
<tr>
<th>Year of Training*</th>
<th>First attempt</th>
<th>Subsequent attempts**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pediatric resident PGY1</td>
<td>5/30 (17%)</td>
<td>7/11 (64%)</td>
</tr>
<tr>
<td>Pediatric resident PGY2-4</td>
<td>4/13 (31%)</td>
<td>0/2 (0%)</td>
</tr>
<tr>
<td>NICU fellow</td>
<td>2/9 (22%)</td>
<td>0/3 (0%)</td>
</tr>
<tr>
<td>Other subspecialty resident</td>
<td>0/13 (0%)</td>
<td>0/0 (0%)</td>
</tr>
</tbody>
</table>

* Mock code attempted for the first time during this year
** Subsequent attempts after failed first attempt
Pass rate based on number of attempts

<table>
<thead>
<tr>
<th>Number of attempts</th>
<th>Pass rate N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Attempt</td>
<td>11/65 (17%)</td>
</tr>
<tr>
<td>Second Attempt*</td>
<td>4/10 (40%)</td>
</tr>
<tr>
<td>Subsequent Attempts**</td>
<td>3/6 (50%)</td>
</tr>
</tbody>
</table>

* Passed on second attempt after failing first  
** Passed on attempts #3-5 after failing first two attempts  
Progression from first attempt to second not significant (p=0.1)
Conclusion

- There is a wide variety in scores in several key steps in neonatal resuscitation
  - <50% successfully took corrective action when heart rate not rising and chest not moving
  - Administering oxygen and epinephrine appropriately also poorly done
- Very few pediatric residents or fellows pass mock code on first attempt
- There is an improvement in success rate on subsequent attempts
- There is an improvement in success rate with resident year of training
Next steps

- Needs assessment survey completed
- New Mock Code Program implemented
  - Video of well done mock code
  - 1 hour interactive teaching session
  - Weekly mock codes during perinates rotation
Future plans…

- Videotaping mock code with more detailed debriefing
- Multidisciplinary mock codes
- High fidelity simulation
Thank you

- Neonatal Mock Code Working Group
- Pediatric and subspecialty residents (Neonatology, MFM, OB/GYN, Anesthesiology, Genetics)