Background
- The percentage of under-5 mortality attributable to early neonatal mortality is increasing globally (31.9% in 2013)\(^1\).
- 27% of early neonatal deaths are due to perinatal asphyxia\(^2\).
- India has the highest absolute number of neonatal deaths in the world (795,000 in 2012)\(^3\) and an early neonatal mortality rate (22.4 per 1000 live births) comparable to sub-Saharan Africa\(^4\).
- Bihar has one of the highest neonatal mortality rates in India (32.2 per 1000 live births)\(^5\).
- The odds of neonatal death in Bihar are more than double (OR 2.17) with the presence of maternal intrapartum complications (32.2 per 1000 live births) comparable to sub-Saharan Africa (790,000 in 2012)\(^6\).
- Mortality is increasing globally (31.9% in 2013)\(^7\).

Aims
- To assess the impact of PRONTO simulation training on health worker competency in NR in Bihar, India in Round 1 of an ongoing implementation evaluation.
- To capture the unique mission of the PRONTO training curriculum and teaches trainees to simultaneously attend to maternal and neonatal emergencies.

Methods

Study Population
- 658 nurse trainees from 80 primary health centers (PHC)

Nurse Mentor Training
- CARE India and the government of Bihar are implementing a quality improvement project, called AMANAT, with the goal of reducing maternal and neonatal mortality.
- Nurses from the AMANAT program were selected to serve as mentors in the implementation of the PRONTO training.

PRONTO Simulation Training
- Nurse mentor pairs visited PHCs across Bihar on average of 7 times (for one week at a time) over a 9-month period.
- Week 1: Team building
- Week 2: Normal spontaneous vaginal delivery (NSVD)
- Week 3: PRONTO + post partum hemorrhage (PPH)
- Week 4: Level 1 - delivery to warmer
- Week 5: Level 2 - delivery to baby dried

Simulation Video Monitoring
- All simulations were videotaped to assist with debriefing.
- Selected videos from weeks 3, 5, 7 of training period were coded using Studecode software for predetermined clinical skills.
- Ethics approval was granted from the University of California San Francisco and the Indian Institute of Health Management Research.

Results

Table 1: Percent Completion of Key Steps of Newborn Care and Neonatal Resuscitation Algorithm by Simulation Difficulty

<table>
<thead>
<tr>
<th>Level</th>
<th>Step</th>
<th>n</th>
<th>Mean &amp; SD</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Key NR Step</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Baby moved to warmer</td>
<td>282</td>
<td>94.4 &amp; 92.1</td>
<td>2.48 &amp; 3.67</td>
</tr>
<tr>
<td></td>
<td>Baby stimulated and dried</td>
<td>282</td>
<td>94.4 &amp; 84.2</td>
<td>2.69 &amp; 3.75</td>
</tr>
<tr>
<td></td>
<td>Breathing assessed</td>
<td>282</td>
<td>9.3 &amp; 10.4</td>
<td>0.47 &amp; 0.50</td>
</tr>
<tr>
<td></td>
<td>Heart rate assessed</td>
<td>282</td>
<td>13.9 &amp; 10.0</td>
<td>0.47 &amp; 0.50</td>
</tr>
<tr>
<td></td>
<td>pppv</td>
<td>282</td>
<td>9.4 &amp; 8.9</td>
<td>0.30 &amp; 0.30</td>
</tr>
</tbody>
</table>

Table 2: Time to Completion of Key Steps of Newborn Care and Neonatal Resuscitation by Simulation Difficulty

<table>
<thead>
<tr>
<th>Level</th>
<th>Step</th>
<th>n</th>
<th>Mean &amp; SD (in sec)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Key NR Step</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time - delivery to warmer</td>
<td>225</td>
<td>71 (45-73)</td>
<td>54 (48-53)</td>
</tr>
<tr>
<td></td>
<td>Time - delivery to PPH</td>
<td>225</td>
<td>38 (16-42)</td>
<td>20 (17-24)</td>
</tr>
</tbody>
</table>

Table 3: Time to Completion of Key Steps of Newborn Care and Neonatal Resuscitation in Simulations with 1-2 Participants

<table>
<thead>
<tr>
<th>Level</th>
<th>Step</th>
<th>n</th>
<th>Mean &amp; SD (in sec)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Key NR Step</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time - delivery to warmer</td>
<td>108</td>
<td>61 (32-101)</td>
<td>56 (47-63)</td>
</tr>
<tr>
<td></td>
<td>Time - delivery to PPH</td>
<td>108</td>
<td>37 (16-60)</td>
<td>24 (17-50)</td>
</tr>
</tbody>
</table>

Conclusion
- As the complexity of simulations increased from level 1, requiring care of the infant only, to level 3, requiring co-management of maternal and neonatal emergencies:
  - There was no change in the percentage of simulations in which trainees completed key NR steps suggesting maintenance of skills despite increased clinical complexity.
  - True even with only 1-2 participants in the simulation.
  - Trends indicated trainees performed key steps of NR with increased efficiency.
  - Infants moved to warmer an average of 17 sec faster in level 3 simulations compared to level 1.
  - Infant dried 19 sec faster.
  - PPV initiated 20 sec faster.
  - Similar trends with only 1-2 participants in the simulation.

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