Improving medical student knowledge and competence in paediatric cardiopulmonary resuscitation – Is E-Learning the answer?

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Background

- Need identified for CPR teaching to students
- Limited space in curriculum
- E-learning module available at CHW
Welcome to Paediatric Resuscitation

On successful completion of this course you will be able to:

1. Perform emergency paediatric assessment using the SAFE approach.
2. Perform Basic Life Support procedures, including Mouth-to-Mouth resuscitation and Cardiac Compression.
3. Perform basic "choking child" manoeuvres.
4. Perform Advanced Airway Life Support procedures, using a range of devices including:
   - self inflating bag & mask
   - nasopharyngeal airways
   - oropharyngeal airways
   - needle cricothyroidotomy
5. Correctly identify the three main cardiac arrest rhythms.
6. Perform Advanced Life Support using defibrillation, drugs and intraosseous access.

Click the Next button to continue with the Introduction, or click the Menu button to go to the main tutorial Menu.
Paediatric Resuscitation Course Menu

- Precourse Test
- Paediatric Resuscitation Overview Video
- Basic Life Support
- Rescue Breathing & CPR
- The Choking Child
- Advanced Airway Support
- Cardiac Life Support
- Post Training Test
Infants and children have very different airway anatomy compared to adults. It is particularly important to remember that tilting an infant's head back, as you would in an adult, will actually close the child's airway.

Neutral Position

Move the arrow up and down the bar to see how a slight tilt of an infant's head can affect the airway.

Click the next button to continue.
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**Rescue Breathing & CPR**

<table>
<thead>
<tr>
<th></th>
<th>&lt; 1 year old</th>
<th>1 year to adult</th>
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</thead>
<tbody>
<tr>
<td>Head Position</td>
<td></td>
<td></td>
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<tr>
<td>Effective Breaths</td>
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<td>Pulse Point</td>
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<td>Compression Technique</td>
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<td>Compressions per Minute</td>
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<tr>
<td>Compressions to Breaths - One Rescuer</td>
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<tr>
<td>Compressions to Breaths - Two Rescuers</td>
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</tbody>
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Click and drag each of the two descriptions at the bottom of the screen to the corresponding age column in the table.

- Sniffing
- Neutral
Objectives

• To determine whether an E-learning package improves medical students’ knowledge and competence in paediatric cardiopulmonary resuscitation in a simulation environment.
Methods

- Prospective before and after study
- Medical students rotating through CHW
- Baseline standardised mock scenario
- Paediatric CPR E-learning module with pre + post MCQ
- Final mock standardised scenario
Methods

Primary Outcomes

• The ability to successfully perform BLS
• The ability to successfully perform ALS

Secondary Outcomes

• Time to each individual step of mock scenario
• MCQ scores
• Subjective data
Statistical Methods

- Power calculation – 35 students needed to detect 50% difference in primary outcomes
- McNemar’s test for change used on paired categorical data
- Paired t test used on continuous data
Results

• 28 students enrolled, 26 retested (92.9%)
• Analysis on 26 sets of paired data
## Results

<table>
<thead>
<tr>
<th></th>
<th>Before E-learning (%)</th>
<th>After E-learning (%)</th>
<th>95% Confidence Interval (%)</th>
<th>% improvement</th>
<th>p =</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLS ok</td>
<td>8 (30.8)</td>
<td>23 (88.5)</td>
<td>34.9 – 80.5</td>
<td>57.7</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>ALS ok</td>
<td>0 (0)</td>
<td>21 (80.8)</td>
<td>61.8 – 99.8</td>
<td>80.8</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
Results – Secondary Outcomes

Time (secs)

- Help time
- Response time
- Airway time
- Time to ventilation
- Pulse time
- CPR time
- Rhythm id time
- Time to first shock

Pre test mean (secs)
Post test mean (secs)
Results – MCQs

- Maximum score 23
- All improved
- Mean improvement of 27.8% or 6.4 marks (95%CI 5.3-7.5, p<0.001)
Subjective Data

Number of students

- Improvement in Knowledge
- Improvement in Confidence

Not improved ➔ Greatly Improved
Discussion

• Scenarios used VF/VT rhythms\(^1\)
• Test limited to one scenario
• Low numbers – no control group
• No students ALS competent prior to study

\(^{1}\)Nadkarni et al; First documented rhythm and clinical outcome from in-hospital cardiac arrest among children and adults. *JAMA* Jan 2006
Conclusion

- The CHW E-learning package does improve medical student knowledge and competence at paediatric CPR in a mock clinical scenario.

- More work is needed to decide where and how often it should be used in the curriculum.
Acknowledgements

• Fenton O’Leary
• Diane Campbell
• Greta Ridley and Declan Stewart
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Questions?

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