Worksheet No. BLS-012A.doc

WORKSHEET for Evidence-Based Review of Science for Emergency Cardiac Care

Worksheet author(s)
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Date Submitted for review: original: 2/28/09, revision 9/23/09

Clinical question.

In rescuers performing CPR on adult or paediatric patients (out-of-hospital and in-hospital) (P), does the use of barrier devices (I) as opposed to no such use (C), improve outcome (O) (eg. lower infection risk)?

Is this question addressing an intervention/therapy, prognosis or diagnosis? Intervention/therapy

State if this is a proposed new topic or revision of existing worksheet: revision (Hypothesis A (H-A): Protective devices, including barrier devices, are safe, effective and feasible to protect a rescuer while performing CPR.)

Conflict of interest specific to this question

Do any of the authors listed above have conflict of interest disclosures relevant to this worksheet? no

Search strategy (including electronic databases searched).

Search 1: Ovid search of the following Mesh Headings:
1) Cardiopulmonary Resuscitation/(MeSH) and "Infectious Disease Transmission, Patient-to-Professional"/(MeSH) – 10 relevant articles found
2) Respiration, Artificial/(MeSH) and "Infectious Disease Transmission, Patient-to-Professional"/(MeSH) – 2 relevant articles found
3) Cardiopulmonary Resuscitation/(MeSH) and Respiratory Protective Devices/ no new items found
4) Respiratory Protective Devices/ and Respiration, Artificial/ - 1 relevant article found
5) Masks/ and "Infectious Disease Transmission, Patient-to-Professional"/(MeSH) – nothing new
6) Masks/ and Cardiopulmonary Resuscitation/(MeSH) – 6 relevant articles found

Ovid results:
<table>
<thead>
<tr>
<th>#</th>
<th>Searches</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cardiopulmonary Resuscitation/</td>
<td>6931</td>
</tr>
<tr>
<td>2</td>
<td>Infectious Disease Transmission, Patient-to-Professional/</td>
<td>2733</td>
</tr>
<tr>
<td>3</td>
<td>1 and 2</td>
<td>16</td>
</tr>
<tr>
<td>4</td>
<td>Respiration, Artificial/</td>
<td>30151</td>
</tr>
<tr>
<td>5</td>
<td>2 and 4</td>
<td>8</td>
</tr>
<tr>
<td>6</td>
<td>5 not 3</td>
<td>7</td>
</tr>
<tr>
<td>7</td>
<td>3 or 6</td>
<td>23</td>
</tr>
<tr>
<td>8</td>
<td>Respiratory Protective Devices/</td>
<td>1261</td>
</tr>
<tr>
<td>9</td>
<td>1 and 8</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>9 not 7</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>8 and 4</td>
<td>15</td>
</tr>
<tr>
<td>12</td>
<td>masks/</td>
<td>2742</td>
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<tr>
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<tr>
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<td>17 or 19</td>
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</tbody>
</table>

Ovid Search strategy repeated 9/23/09 164 articles identified by search no new relevant articles identified

Search 2: Google search general and scholar- 4 relevant articles found

Search 3: Cochrane search “barrier device” – 3 records found – none related to mouth to mouth, and “mouth-to-mouth” -16 records found – 1 related to barrier devices.

Search 4: AHA endnote database - searched “barrier device” in any abstract: identified 4 articles only 1 had not previously been found

Search 5: hand search all review articles for additional references – no additional references found

*State inclusion and exclusion criteria*

No exclusion criteria were applied to the search strategy. For the article review only studies whose title or abstract stated the article directly related to disease transmission during CPR were further evaluated. Articles whose full text was reviewed needed to describe original research and be directly related to the worksheet’s clinical question to be included in the evidence table.
• Number of articles/sources meeting criteria for further review:
  There were 30 articles suitable for further review.
## Summary of evidence

### Evidence Supporting Clinical Question

<table>
<thead>
<tr>
<th>Level of evidence</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Good</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fair</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Cydulka, 1991, E</td>
</tr>
<tr>
<td><strong>Poor</strong></td>
<td></td>
<td></td>
<td></td>
<td>Lightsey, 1992, E</td>
<td>Blenkharn, 1989, E</td>
</tr>
</tbody>
</table>

- A = Return of spontaneous circulation
- B = Survival of event
- C = Survival to hospital discharge
- D = Intact neurological survival
- E = Other endpoint

*Italics = Animal studies*
### Evidence Neutral to Clinical question

<table>
<thead>
<tr>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
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<tbody>
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</tbody>
</table>

**Level of evidence**

A = Return of spontaneous circulation  
B = Survival of event  
C = Survival to hospital discharge  
D = Intact neurological survival  
E = Other endpoint

*Italics = Animal studies*

### Evidence Opposing Clinical Question

<table>
<thead>
<tr>
<th>Good</th>
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</table>

**Level of evidence**

A = Return of spontaneous circulation  
B = Survival of event  
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D = Intact neurological survival  
E = Other endpoint

*Italics = Animal studies*

**Simmons, 1995, E**
REVIEWER’S FINAL COMMENTS AND ASSESSMENT OF BENEFIT / RISK:

There are several published case reports of infectious disease transmission attributed to mouth-to-mouth resuscitation. However, it is likely that the actual risk of infection from mouth-to-mouth is very low. Barrier devices are designed to reduce the risk of disease transmission during mouth-to-mouth. Published studies of these devices have used simulation models to study their protection against disease transmission. Due to the nature of this question it is unlikely that any other method of research could be conducted ethically.

Studies like the one conducted by Cydulka et al illustrate that devices placed on the market to protect providers should be carefully evaluated to ensure they sufficiently protect providers from transmission of infectious matter. However, given the findings of Harrison et al and Elling et al there is little risk that using a device will decrease a providers ability to provide ventilation, and there is no evidence that these items can cause harm. There is limited evidence that these devices provide complete protection, but there is weak evidence that they likely reduce the chance of disease transmission. Therefore, there appears to be no reason not to recommend the use of a barrier device.


Acknowledgements:

Citation List

Articles Reviewed and included as evidence:

LOE: 5 – testing of a single device
Quality: fair
Endpoint: Other

LOE: 5 – variety of barrier devices studied by having a single person exhale through them.
Quality: fair – measured the presence of bacteria from a single person’s exhalation, but does not measure the rate of disease transmission.
Endpoint: Other

LOE: 5 – variety of barrier devices studies conducted, all uncontrolled, some done in humans
Quality: poor – primary infection analysis did not use the device as intended. Further, author was the designer of the device.

Endpoint: Other


LOE: 5 – lab study of barrier devices

Quality: poor -- looked at backflow for three devices. May not mirror actual use in humans nor does it determine disease transmission.

Endpoint: Other

**Articles Reviewed but not used as evidence:**


No Abstract

Reviewer’s Comment: Letter to the editor. No research results reported.


No abstract:

**Reviewer’s Comment:** Review article which sites several case reports of infectious disease transmission during mouth-to-mouth.


No abstract.

**Reviewer’s comment:** Review article that identifies a series of case reports on disease transmission from mouth-to-mouth ventilation.


**Reviewer’s Comment:** This article describes an approach to encouraging providers to provide CPR despite fears of contracting HIV.


**Reviewer’s comment:** This study was a survey of physicians to determine willingness to perform mouth-to-mouth. It found that physicians were reluctant, but does not address the worksheet question.


**Reviewer’s Comment:** This study was a survey of house staff to determine willingness to perform mouth-to-mouth. It found that physicians were reluctant, but does not address the worksheet question.


**Reviewer’s Comment:** This study measured willingness to provide ventilation it did not examine infection rates.

**Reviewer's comment:** The patient described in this case report was immediately intubated. Neither a barrier device nor mouth-to-mouth ventilation was provided.


**Reviewer's comment:** This study describes the transmission of SARS while providing in-hospital CPR to a SARS patient. It is a case series that describes the effect on 9 responders. However, the patient received bag valve mask ventilation only and this report does not address barrier devices.


**Reviewer's Comment:** Study focuses on disease transmission through manikins, not during actual CPR.


**Reviewer's comment:** Provides directions for using a mask. There is no information on disease transmission or references.


**Reviewer’s Comment:** This study showed that EMT’s are better at using face masks. It did not address infection rates.


**Reviewer’s comment:** Nothing specific on barrier device did identify cases related to patient exposure during intubation even with what was thought to be appropriate precautions.


**Reviewer’s Comment:** This study showed that unskilled rescuers are better at using face masks. It did not address infection rates.


**Reviewer’s comment:** This study found that a significant proportion of EMS providers would not perform mouth-to-mouth resuscitation. One explanation was a fear of contracting an infectious disease.


**Reviewer’s Comment:** This study looked at disinfecting training manikins, it is outside the worksheet question.


No abstract.

**Reviewer’s Comment:** This is an editorial regarding the Fowler article. It does not discuss mouth-to-mouth ventilation.

**Reviewer’s Comment:** This was a review article.


**Reviewer’s comment:** This study found that when high school students were trained with mouth-to-mouth, mouth-to-mask or mouth-to-face shield the use of a face shield did not harm ventilation quality, and may have improved it. Infection rate was not studied.


**Reviewer’s Comment:** This is the first half of the study immediately above. Infection rate was not studied.


**Reviewer’s Comment:** This study is outside of the worksheet question.


**Reviewer’s Comment:** This is a review article.


**Reviewer’s Comment:** This is a review article.


**No Abstract**

**Reviewer’s Comment:** This is a letter to the editor regarding issues with the Lightsey study.