TITLE: Personal Protective Equipment for the Containment of Biohazards in the Pre-Hospital Setting: Guidelines

DATE: 14 October 2014

RESEARCH QUESTION

What are the evidence-based guidelines regarding the use of personal protective equipment (PPE) by medical personnel for the containment of biohazards in the pre-hospital setting?

KEY FINDINGS

Three evidence-based guidelines regarding the use of PPE by medical personnel for the containment of biohazards in the pre-hospital setting were identified.

METHODS

A limited literature search was conducted on key resources including PubMed, The Cochrane Library (2014, Issue 9), University of York Centre for Reviews and Dissemination (CRD) databases, Canadian and major international health technology agencies, as well as a focused Internet search. No filters were applied to limit the retrieval by study type. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2009 and September 26, 2014. Internet links were provided, where available.

The summary of findings was prepared from the abstracts of the relevant information. Please note that data contained in abstracts may not always be an accurate reflection of the data contained within the full article.

SELECTION CRITERIA

One reviewer screened citations and selected studies based on the inclusion criteria presented in Table 1.

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### Table 1: Selection Criteria

<table>
<thead>
<tr>
<th>Population</th>
<th>Health care personnel in the pre-hospital setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention</td>
<td>Personal protective equipment (PPE) (e.g., gloves, gowns, masks, face shields)</td>
</tr>
<tr>
<td>Comparator</td>
<td>None</td>
</tr>
<tr>
<td>Outcomes</td>
<td>Evidence-based guidelines</td>
</tr>
<tr>
<td>Study Designs</td>
<td>Health technology assessment reports, systematic reviews, meta analyses, evidence-based guidelines</td>
</tr>
</tbody>
</table>

### RESULTS

Rapid Response reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, systematic reviews, and meta-analyses are presented first. These are followed by evidence-based guidelines.

Three evidence-based guidelines regarding the use of PPE by medical personnel for the containment of biohazards in the pre-hospital setting were identified. No relevant health technology assessment reports, systematic reviews, or meta-analyses were identified.

Additional references of potential interest are provided in the appendix.

### OVERALL SUMMARY OF FINDINGS

Three evidence-based guidelines\(^1\)\(^-\)\(^3\) regarding the use of PPE by medical personnel for the containment of biohazards in the pre-hospital setting were identified.

The guidelines provide instructions and recommendations regarding: appropriate circumstances for PPE use,\(^1\)\(^-\)\(^3\) point-of-care assessment for selection of appropriate PPE,\(^1\)\(^-\)\(^3\) hand hygiene measures necessary during PPE use,\(^2\)\(^-\)\(^3\) PPE use during transport and transfer of patients to receiving facilities,\(^2\) droplet and airborne precautions specific to PPE use,\(^2\) and specific recommendations for the selection, use, and disposal of gloves,\(^1\)\(^-\)\(^3\) regular\(^1\)\(^-\)\(^3\) or fluid repellant\(^1\)\(^-\)\(^3\) long sleeved gowns, plastic aprons,\(^1\)\(^-\)\(^3\) face protection,\(^1\)\(^-\)\(^3\) and respiratory protective equipment.\(^1\)\(^-\)\(^3\)

### General

- PPE use is necessary when in contact with patients, materials, or equipment that may contaminate worker’s skin, uniforms, or clothing with infectious agents (e.g. blood, body substances, secretions or excretions).\(^3\)
- Selection of PPE should take into account risk of transmission of microorganisms to the patient, and risk of contamination of workers clothing and skin by infectious agents.\(^1\)\(^-\)\(^3\)
- Point of care assessment should determine PPE use and PPE should be applied prior to contact with patient and environment when appropriate.\(^2\)
- All PPE should be used in accordance with local policies and health and safety legislation.\(^3\)
- All PPE should be single use (unless specified as reusable), changed between patients and disposed of correctly (e.g. in a manner that prevents contamination of clothing or skin\(^3\)) immediately after use in no-touch receptacles.\(^1\)\(^-\)\(^3\)
- Hand hygiene measures should be performed before and after use and disposal of PPE.\(^2\)
- Reusable PPE should be properly cleaned and disinfected before reuse.\(^2\)\(^,\)\(^3\)
Transfer of Patients

- Single patient transport is preferred and a risk assessment should be completed if multi-patient transport is considered.\(^2\)
- The receiving facility should be notified of any indicated precautions (e.g. droplet or airborne).\(^2\)
- Clean clothing, bedding, and dressings should be provided and biohazards contained upon transfer to healthcare facilities.\(^2\)
- All pre-hospital surfaces and equipment should be cleaned and disinfected and linens changed between patients.\(^2\)
- When treating a patient with antibiotic-resistant microorganisms routine practices for contact precautions are sufficient when applied properly and consistently.\(^2\)

Droplet and Airborne Precautions

- In addition to routine practices and droplet or airborne precautions, a method for identifying patients pre-hospital with known or suspected infections warranting droplet or airborne (e.g. tuberculosis) precautions should be established.\(^2\)
- For patients with droplet precautions, the number of potential contacts should be limited and single patient transport should be used if possible.\(^2\)
- A surgical mask should be applied for patients with droplet or airborne precautions if possible and further precautions (e.g. filtered oxygen mask) should be used if necessary.\(^2\)
- If airborne risks are present, vehicle ventilation systems used to create a negative pressure environment should be used or natural ventilation if not possible.\(^2\)

Gloves

- Gloves should be put on prior to contact, changed between patients or different treatments for the same patient, and should be worn for:
  - Invasive procedures.\(^1\)
  - Contact with sterile sites.\(^1\)
  - Contact with non-intact skin mucous membranes.\(^1\)
  - Activities with risk of exposure to biohazards or sharps and contaminated instruments.\(^1,3\)
- Gloves should be the appropriate material, fit and durability for the task and anticipated contact with infectious or chemical agents (e.g. latex alternatives should be provided and polythene gloves should not be used for clinical interventions).\(^1,3\)
- Glove use is not required for minimal contact with intact skin, but must be used if health care worker has cuts on hands.\(^2\)
- When gloves are worn in combination with other PPE they should be put on last.\(^3\)

Long-sleeved Gowns and Aprons

- Disposable plastic aprons should be worn if there is a risk of infectious agent contact with uniforms or clothing, and skin.\(^1,3\)
- Volume, extent and type of infectious agents, probable type and route of transmission, potential for fluid penetration, and requirement for sterility should be considered when choosing type of gown.\(^2,3\)
• Long sleeved gowns should be cuffed and covered with gloves, and should cover anterior and posterior surfaces of worker from neck to mid-thigh.²
• Wet long sleeved gowns should be removed immediately to prevent passage of microorganisms.²
• Long sleeved fluid repellant gowns should be worn in the event of potential splashing of infectious agents¹,³, and should be worn with gloves and other PPE when indicated.³

Face Protection

• Face masks and eye protection should be worn if there is a risk of contact of infectious agents with these areas.¹-³
• Workers should avoid touching face with hands.²
• Facial protection should be worn for activities where splashing of infectious materials and respiratory secretions is likely, or for procedures involving the respiratory tract (e.g. intubation).²,³
• Facial protection is not required for routine care unless patient is on droplet or airborne precautions.³
• Facial protection should be worn over prescription glasses when applicable.²
• If surgical masks become wet or soiled they should be changed immediately.³
• Facial protection should never be left hanging around the neck.³
• Children should wear a child-specific mask.³
• Respiratory protective equipment should be used when clinically indicated.¹,³
REFERENCES SUMMARIZED

Health Technology Assessments
No literature identified.

Systematic Reviews and Meta-analyses
No literature identified.

Guidelines and Recommendations

   See: 1.1.3 Use of personal protective equipment, pages 15-16.
   Summarized at: http://www.guideline.gov/content.aspx?id=36680

   See: Use of personal protective equipment, pages 58-60; Modifications of contact precautions for prehospital care, page 74; Modifications of droplet precautions in prehospital care, pages 80-81; Modifications of airborne precautions for prehospital care, page 89.

   See: B1.2 Personal protective equipment, pages 46-61.

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APPENDIX – FURTHER INFORMATION:

Non-Randomized Studies


Guidelines and Recommendations – Unclear Methodology

See: Personal Protective Equipment, pages 10-15; Appendices L and M, pages 70-73.

See: Part B Equipment Standards, especially 090 Coveralls/Gowns, Disposable, page 42; 115 Eyewear, Protective (Safety), page 47; 120 Face Shield, page 48; 130 Gloves, Non-sterile, page 51; 135 Gloves, Safety, page 52; 140 Gloves, Sterile, page 53; 290 Particulate Respirator Mask, page 83.

Additional References

See: Section 5 Engineering and Work Practice Controls and Personal Protective Equipment, pages 35-36.