Follow that Microbe! Understanding viral exposures during complex PPE doffing

The PEACH research team
Complex pathways
Dependent events
Challenging to observe under real conditions
Difficult to evaluate interventions that interrupt transmission
Surrogate organisms
SEQUENCE FOR REMOVING PERSONAL PROTECTIVE EQUIPMENT (PPE)

Except for respirator, remove PPE at doorway or in anteroom. Remove respirator after leaving patient room and closing door.

1. GLOVES
   - Outside of gloves is contaminated!
   - Grasp outside of glove with opposite gloved hand; peel off
   - Hold removed glove in gloved hand
   - Slide fingers of ungloved hand under remaining glove at wrist
   - Peel glove off over first glove
   - Discard gloves in waste container

2. GOGGLES OR FACE SHIELD
   - Outside of goggles or face shield is contaminated!
   - To remove, handle by head band or ear pieces
   - Place in designated receptacle for reprocessing or in waste container

3. GOWN
   - Gown front and sleeves are contaminated!
   - Unfasten ties
   - Pull away from neck and shoulders, touching inside of gown only
   - Turn gown inside out
   - Fold or roll into a bundle and discard

4. MASK OR RESPIRATOR
   - Front of mask/respirator is contaminated — DO NOT TOUCH!
   - Grasp bottom, then top ties or elastics and remove
   - Discard in waste container

PERFORM HAND HYGIENE IMMEDIATELY AFTER REMOVING ALL PPE
Simulation approaches

- Understanding complex exposures
- Understanding exposures as processes
- Understanding how real people do real things
Focus: PPE doffing

- Contamination during wearing
- Doffing: protective gear becomes a fomite
- Examination of a complex process
- Are recommendations working?
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   - Pull away from neck and shoulders, touching inside of gown only
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PERFORM HAND HYGIENE IMMEDIATELY AFTER REMOVING ALL PPE
Ramping up the complexity: Ebola

- Multiple overlapping items of PPE
- Many not routinely worn in healthcare
- Goal: No exposed skin or mucus membranes
- Doffing becomes an even more complex process
<table>
<thead>
<tr>
<th>Step</th>
<th>Required Action</th>
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<tbody>
<tr>
<td>1</td>
<td>Wash gloved hands with water and chlorhexidine (CHG)</td>
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</table>
| 2    | Step into Chlorine Bath  
|      | • one minute contact time  
|      | • step off to absorbent pad |
| 3    | Perform PPE integrity check in designated doffing area |
| 4    | Remove 1st set of gloves  
|      | • Check integrity of inner glove |
| 5    | Clean gloved hands with Alcohol Based Hand Rub (ABHR). |
| 6    | Remove impervious blue gown  
<p>|      | • Grab impervious blue apron at the shoulder and pull forward to remove |
| 7    | Clean gloved hands with ABHR |</p>
<table>
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<tr>
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<tbody>
<tr>
<td>8</td>
<td>Remove Tyvek Suit</td>
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<tr>
<td></td>
<td>• HCP should locate naval and follow along zipper line until they locates “pull tie” on the suit</td>
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<tr>
<td></td>
<td>• Unzip fully</td>
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<td>• Grab the suit on the shoulders, or bend forward and grab chest area of the suit, and pull it off shoulders.</td>
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<td>• Take caution to minimize touching the outside of the suit</td>
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<td>• Push the suit down past the top of the boots touching only the inside of the suit and not the boots.</td>
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<td></td>
<td>• Stand up and step out of the suit - Without letting the suit touch your scrubs, pick it up, touching only a place on the inside where you did not step and place in the waste container.</td>
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<tr>
<td>9</td>
<td>Clean gloved hands with ABHR</td>
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| 10   | Remove Hood, mask and face shield  
  • During the following step, please keep eyes and mouth closed.  
  • After removal immediately join hands together and do not touch your skin, face or clothing.  
  • Reach gloved hands to either side of the back of the Tyvek hood.  
  • Gripping both elastic ties and hood, bend forward and gently pull until Tyvek hood, N95, face-shield & bouffant cap (if worn) are off. |
| 11   | Clean gloved hands with ABHR |
| 12   | Remove inner gloves using aseptic technique |
| 13   | Clean hands with ABHR |
| 14   | Step into Chlorine Bath  
  • one minute contact time  
  • step off to absorbent pad |
| 15   | Remove boots  
  • boots should remain in the Hot Zone |
| 16   | Clean hands with ABHR |
What are we learning?

- Viral contamination
- Human factors
- Built environment