Personal protective equipment, hygiene behaviors and occupational risk of illness after 2 July 2011 flood

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Background

• Increase in respiratory infections and gastrointestinal illness following flooding previously observed

• Hygienic precautions and personal protective equipment (PPE) should be used to avoid direct skin contact with flood waters to decrease risk of becoming ill and to reduce spread of diseases
Objectives

• Investigate PPE use and hygiene behaviors of professionals

• Describe symptoms of illness associated with 2 July flood

• Identify risk and protective factors associated with becoming ill
Methods - Study design

• 25 professional firms/organizations
  – Identified in Copenhagen through yellow pages and human resource representatives

• Information sent by email to human resources department describing study
  – Employees physically involved in aftermath of flood asked to participate

• Participants included insurance agents, cleaners, engineers, maintenance workers, garbage workers, pest controllers, fire/rescue workers, and police officers
Methods - Questionnaire

• Pilot study: 29 July-5 August
• Main study: 25 August-7 September
  – Information collected
    • Demographics
    • Flood water/sediment exposure
    • PPE use and hygiene behaviors
    • Symptoms of illness
Methods - Case definition

- Worker in Copenhagen who experienced diarrhea, vomiting, common cold/sore throat, allergic reaction, fever, or two or more of the following symptoms: severe muscle ache, headache, abdominal pain, nausea, or rash between July 2-25

- Exclusions:
  - Not present in Copenhagen July 2-July 9
  - Travel history outside of Denmark before illness
  - History of chronic illness with symptoms similar to reported symptoms
Overall results

- ~47% response rate
- 257 respondents
- Average age 43
- 87% males
- 17% of those who ate or drank did not wash hands before
- 49% performed no hand hygiene after contact with water/sediment
Overall results

• 28% used same clothes next day
• 40% used rubber gloves
  – 29% did not wash hands after glove use
• 46% wore boots or waders
  – 39% did not wash or disinfect after use
• 2% wore a face mask
• 4% wore protective glasses
Description of ill

• 56 (22%) of 257 respondents
• 16% went to GP
• 7% missed work because of symptoms
• Symptoms:
  54% diarrhea          45% cold/sore throat
  45% headache          25% allergic reaction
  25% abdominal pain    20% nausea
  20% muscle pains      9% fever
  5% rash               5% vomiting
Comparing ill to non-ill

• Ill more likely to:
  – Have food/drink (59%) when in contact with flood water/sediment than non-ill (40%)
  – Be smokers (34%) than non-ill (17%)
  – Not perform hand hygiene after contact with flood water/sediment (64%) than non-ill (44%)
  – Use same work clothes the next day (41%) than non-ill (24%)
Comparing ill to non-ill

- Ill more likely to use gloves (49%) than non-ill (36%)
  - **BUT** less likely to wash hands after glove use (60% versus 75%)

- Ill less likely to wear boots/waders (37%) than non-ill (48%)
  - **AND** more likely to not clean or disinfect boots after use (58% versus 35%)
Results

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>Risk Ratio (95% CI)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No hand hygiene after contact with flood water</td>
<td>1.80 (1.08-2.99)</td>
<td>0.01</td>
</tr>
<tr>
<td>Smoking</td>
<td>1.81 (1.13-2.91)</td>
<td>0.03</td>
</tr>
</tbody>
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- 80% increased risk of illness for persons performing no hand hygiene after contact with flood water/sediment and smokers
Recommendations

• Stress the need for workers to use PPE when in contact with flood water/sediment left by the flood water

• Proper hand hygiene after use of PPE and before smoking (or eating/drinking) also needs reinforcement

• Washing clothes and rubber boots after use also needs to be stressed
Thank you for your collaboration!