A Review of Acute Chemical Releases in School Settings

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BACKGROUND
Agency for Toxic Substances and Disease Registry (ATSDR)

- A federal agency of the U.S. Department of Health and Human Services
- Sister agency of the CDC, responsible for environmental health-related issues
- Co-located in Atlanta with CDC
Interstate Chemical Threats Workgroup (ICTW) webinars

- ICTW is a local, state, and federal health agencies network for sharing of knowledge, materials, and resources to define the role of state and local health agencies in a chemical terrorism event.
- Joint ATSDR/ICTW series of webinars about policies/strategies to reduce of chemical exposure in school settings
  - Mercury
  - Cleaning products
  - Pesticides
  - Chemicals in school labs
KEY MESSAGES FROM THE WEBINARS

Mercury and Schools: A Risky Combination

This is a true story. It could happen in your school or your community.

A 14-year-old student was intrigued by a mercury demonstration during science class. Without the teacher’s knowledge, she took the jar of silvery liquid and shared it with her friends, who played with the mercury in school hallways and classrooms.

Warning: Pesticides

Ecologo

Chemical bottles
Mercury

- A shiny, odorless liquid found in thermometers, barometers, batteries
- Good operating practices
  - Brochures-New York State Department of Health
  - Don’t Mess with Mercury-ATSDR
  - State Laws

Cleaning Products

• Some products have asthmagens (e.g. bleach, ammonia, acids, etc)

• Good operating practices
  ▪ California Dept. of Public Health: Cleaning for Asthma Safe Schools
  ▪ Green cleaning product school act
  ▪ State green cleaning policies

Pesticides

• Use to keep environments free of unwanted pest
• Some can be a health risk to students and school personnel
• Pesticide drift
• Good operating practices
  ▪ Integrated Pest Management (IPM)
  ▪ California County Agricultural Commissioners

School Labs

- Mercury – most commonly released in labs
- Other chemicals can be corrosive and cause respiratory, skin, and eye irritation
- Good operating practice
  - Integrated Chemical Management Program (ICM)

ASTDR FINDINGS

Hazardous Substance Emergency Events Surveillance (HSEES)/ National Toxic Substance Incidents Program (NTSIP)
HSEES to NTSIP

- **HSEES existed from 1990-2009**
  - Cooperative agreements with 14 states
  - Collect public health data for acute non-petroleum chemical releases (<=72 hours)
  - Entered in a web-based database

- **NTSIP began in 2010**
  - State partners
  - National database
  - Incident investigations: Assessment of Chemical Exposure

# Summary of Evacuations Comparing School Chemical Incidents With Non-School Incidents, HSEES/NTSIP, 2008-2013

<table>
<thead>
<tr>
<th>Category</th>
<th>School Chemical Incidents</th>
<th>Non-School Incidents</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total incidents</td>
<td>335</td>
<td>24,413</td>
<td>24,748</td>
</tr>
<tr>
<td>Evacuations ordered</td>
<td>192 (57.3%)</td>
<td>3,172 (13.0%)</td>
<td>3,364 (13.6%)</td>
</tr>
<tr>
<td>Total people evacuated</td>
<td>47,433</td>
<td>104,985</td>
<td>152,418</td>
</tr>
<tr>
<td>Average number of people evacuated (range)</td>
<td>516 (2-3,000 evacuees/incident)</td>
<td>80 (1-15,000 evacuees/incident)</td>
<td>108 (1-15,000 evacuees/incident)</td>
</tr>
<tr>
<td>Total evacuation hours</td>
<td>2,689</td>
<td>27,145</td>
<td>29,834</td>
</tr>
<tr>
<td>Average evacuation hours (range)</td>
<td>19 (15 min-1,392 hours)</td>
<td>7.1 (15 min-720 hours)</td>
<td>13.3 (15 min-1,392 hours)</td>
</tr>
</tbody>
</table>
1,362 Evacuation hours; What happened?

- In New York, 2009: 56 days and 18 hours
- Elementary school
- Beaker instrument fell from student and teacher’s hand, released mercury
- Students moved to another room
- HAZMAT team restricted room and section of hallway, ventilation shut down
- No injuries
- Classroom reopened 11/11/2009
### Summary of Injured Persons Comparing School Chemical Incidents With Non-School Incidents, HSEES/NTSIP, 2008-2013

<table>
<thead>
<tr>
<th>Category</th>
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<tr>
<td>Total incidents</td>
<td>335</td>
<td>24,413</td>
<td>24,748</td>
</tr>
<tr>
<td>Incidents with injured persons</td>
<td>119 (35.5%)</td>
<td>3,173 (13.0%)</td>
<td>3,292 (13.3%)</td>
</tr>
<tr>
<td>Injured persons</td>
<td>712</td>
<td>7,644</td>
<td>8,356</td>
</tr>
<tr>
<td>Average number of injured persons (range)</td>
<td>6 (1-61 injured persons/incident)</td>
<td>5 (1-54 injured persons/incident)</td>
<td>3 (1-61 injured persons/incident)</td>
</tr>
</tbody>
</table>
61 Injured Persons; What happened?

- Tennessee 1/14/2013 (Monday)
- Carbon monoxide released at a private school
- Evacuation ordered
- Students suffered from carbon monoxide poisoning
- Students and staff returned to school Friday
Top 5 Chemicals Released in School Settings, HSEES/NTSIP, 2008-2013, N=335

<table>
<thead>
<tr>
<th>Substance</th>
<th>Incidents</th>
<th>Incidents with evacuations</th>
<th>Total people evacuated</th>
<th>Incidents with injured persons</th>
<th>Injured persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural gas</td>
<td>73</td>
<td>66</td>
<td>13,738</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Mercury</td>
<td>61</td>
<td>32</td>
<td>7,362</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Carbon monoxide</td>
<td>21</td>
<td>16</td>
<td>6,754</td>
<td>7</td>
<td>143</td>
</tr>
<tr>
<td>Hydrochloric acid</td>
<td>14</td>
<td>4</td>
<td>650</td>
<td>11</td>
<td>43</td>
</tr>
<tr>
<td>Pepper spray</td>
<td>13</td>
<td>8</td>
<td>2,950</td>
<td>10</td>
<td>78</td>
</tr>
</tbody>
</table>
### Other Noteworthy Areas in School Settings, HSEES/NTSIP 2008-2013

<table>
<thead>
<tr>
<th>Substance</th>
<th>Incidents</th>
<th>Incidents with evacuations</th>
<th>Total people evacuated</th>
<th>Incidents with injured persons</th>
<th>Injured persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>School lab</td>
<td>41</td>
<td>20</td>
<td>2,160</td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td>Cleaning products/disinfectants</td>
<td>14</td>
<td>7</td>
<td>4,850</td>
<td>13</td>
<td>48</td>
</tr>
<tr>
<td>Pool chemicals</td>
<td>12</td>
<td>7</td>
<td>4,627</td>
<td>6</td>
<td>31</td>
</tr>
</tbody>
</table>
### Injured Person Disposition Comparing Students vs. Non-Students, HSEES/NTSIP, 2008-2013

<table>
<thead>
<tr>
<th>Disposition</th>
<th>Students # (%)</th>
<th>Non-Students # (%)</th>
<th>Total # (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treated at hospital (not admitted)</td>
<td>282 (63.8)</td>
<td>126 (46.7)</td>
<td>408 (57.3)</td>
</tr>
<tr>
<td>Treated on scene</td>
<td>62 (14.0)</td>
<td>27 (10.0)</td>
<td>89 (12.5)</td>
</tr>
<tr>
<td>Observation at hospital, no treat</td>
<td>47 (10.6)</td>
<td>4 (1.5)</td>
<td>51 (7.2)</td>
</tr>
<tr>
<td>Treated at hospital (admitted)</td>
<td>22 (5.0)</td>
<td>40 (14.8)</td>
<td>62 (8.7)</td>
</tr>
<tr>
<td>Treated at hospital (unk. admittance)</td>
<td>17 (3.9)</td>
<td>55 (20.4)</td>
<td>72 (10.1)</td>
</tr>
<tr>
<td>Seen by private physician</td>
<td>8 (1.8)</td>
<td>10 (3.7)</td>
<td>18 (2.5)</td>
</tr>
<tr>
<td>Injury reported by officials</td>
<td>4 (0.9)</td>
<td>8 (2.9)</td>
<td>12 (1.7)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>442 (100.0)</td>
<td>270 (100.0)</td>
<td>712 (100.0)</td>
</tr>
</tbody>
</table>
## Top Injuries/Symptoms Reported Comparing Students vs. Non-Students, HSEES/NTSIP, 2008-2013

<table>
<thead>
<tr>
<th>Injury/symptom type</th>
<th>Students # (%)</th>
<th>Non-Student # (%)</th>
<th>Total # (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory irritation</td>
<td>174 (27.8)</td>
<td>155 (39.9)</td>
<td>329 (32.5)</td>
</tr>
<tr>
<td>Gastrointestinal issues</td>
<td>107 (17.1)</td>
<td>21 (5.4)</td>
<td>128 (12.6)</td>
</tr>
<tr>
<td>Eye irritation</td>
<td>98 (15.7)</td>
<td>67 (17.3)</td>
<td>165 (16.3)</td>
</tr>
<tr>
<td>Headache</td>
<td>56 (9.4)</td>
<td>33 (8.5)</td>
<td>89 (8.8)</td>
</tr>
<tr>
<td>Dizziness/ central nervous issues</td>
<td>54 (8.6)</td>
<td>31 (8.0)</td>
<td>85 (8.4)</td>
</tr>
<tr>
<td>Burns</td>
<td>29 (4.6)</td>
<td>23 (5.9)</td>
<td>52 (5.1)</td>
</tr>
</tbody>
</table>
ATSDR FUTURE STEPS TO MITIGATING CHEMICAL RELEASES IN SCHOOLS
Raise Awareness Opportunities

• **Webinar proceedings report**
• **Acute school chemical release manuscript**
  - Summarize National Toxic Substance Incidents Program (NTSIP) data about acute chemical releases in school settings
• **Commentary**
  - Effective strategies to prevent acute chemical release in school settings
• **Workgroup possibility?**
• **White paper?**
Thank you

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For more information please contact Agency for Toxic Substances and Disease Registry

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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Agency for Toxic Substances and Disease Registry.