Personal Hygiene Measures to Prevent Influenza Transmission
Dr. Elaine Larson, Columbia University
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Personal Hygiene Measures
to Prevent Transmission of
URIs and Influenza
Elaine Larson RN, PhD, FAAN, CIC

Hosted by Paul Webber paul@webbertraining.com
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Principles of Transmission*
• Influenza viruses are highly contagious and transmitted easily by large-particle droplets from infected people and via direct contact
• Precautions to stop droplet transmission are the cornerstone of influenza prevention (besides vaccination)
• Transmission requires close contact because droplets do not remain suspended in the air and generally travel only short distances, usually 1 meter or less, through the air

– Adapted from the Draft WHO Guidelines on Hand Hygiene in Health Care, part of the Global Patient Safety Challenge, 1/06

So what’s the evidence?

Handwashing Trial in Pakistan
• 25 neighborhoods randomized to handwashing intervention; 11 neighborhoods were control
• One year trial
• Children <5 yrs in intervention homes had 50% reduction in pneumonia (all causes) (95% CI: -6% to -41%)
• No difference between plain or antibacterial soap


Studies in Child Care Centers

<table>
<thead>
<tr>
<th>Study</th>
<th>Intervention</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butz, 1990</td>
<td>Alcohol hand sanitizer, diapering pads and gloves</td>
<td>NS difference in URI symptoms</td>
</tr>
<tr>
<td>Krilov, 1996</td>
<td>Environmentally cleaning, particularly toys</td>
<td>Decreased URI (0.67 vs 0.42/child/mth, p&lt;0.07)</td>
</tr>
<tr>
<td>Niffenegger, 1997</td>
<td>Instructional program on hand hygiene and germs</td>
<td>Fewer URIs in intervention group (p&lt;0.05)</td>
</tr>
<tr>
<td>Carabin, 1999</td>
<td>Hygiene program and coliform counts on hands</td>
<td>Reduced rates of URIs (RR=0.8, 95% CI: 0.68–0.93)</td>
</tr>
</tbody>
</table>

Studies in Child Care Centers

(n=6)

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### Studies in Child Care Centers

<table>
<thead>
<tr>
<th>Author, Year</th>
<th>Study Details</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roberts, 2000</td>
<td>23 large child care centers (Australia)</td>
<td>Handwashing, aseptic nose wiping, Fewer URIs in children ≤24 mths (11.4 vs. 13/child year, p=0.01)</td>
</tr>
<tr>
<td>Ponka, 2004</td>
<td>60 child care centers (Finland)</td>
<td>Handwashing, environmental cleaning, washing toys and linens, ~26% fewer URIs in children &lt;3 years (p=0.05)</td>
</tr>
</tbody>
</table>

### Studies in Schools (n=6)

<table>
<thead>
<tr>
<th>Author, Year</th>
<th>Study Details</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master, 1997</td>
<td>One school, Scheduled handwashing throughout day</td>
<td>NS difference in absence due to URI</td>
</tr>
<tr>
<td>Dyer, 2000</td>
<td>One school, cross-over design</td>
<td>Benzalkonium rinse-free hand hygiene product, Reduced URIs by 30.9% (p=0.02) and 76% (p=0.001)</td>
</tr>
<tr>
<td>Hammond, 2000</td>
<td>16 schools</td>
<td>Alcohol hand hygiene product, URI absenteeism reduced 19.8% (p&lt;0.05)</td>
</tr>
</tbody>
</table>

### Other Study Settings

<table>
<thead>
<tr>
<th>Author, Year</th>
<th>Study Details</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Falsey, 1999</td>
<td>One senior day care center</td>
<td>Alcohol hand hygiene product, Non-significant difference in URI rates</td>
</tr>
<tr>
<td>White, 2005</td>
<td>As above</td>
<td>Alcohol hand hygiene product, 40% reduction in absences from illness (p&lt;0.001)</td>
</tr>
</tbody>
</table>

### Studies in Homes (n=2)

<table>
<thead>
<tr>
<th>Author, Year</th>
<th>Study Details</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Larson, 2004</td>
<td>238 households</td>
<td>Antibacterial cleaning and soap products, NS difference in URI symptoms</td>
</tr>
<tr>
<td>Santora, 2005</td>
<td>292 homes with child in day care</td>
<td>Alcohol hand hygiene product, 40% reduction in absences from illness (p&lt;0.001)</td>
</tr>
</tbody>
</table>

### Alcohol-based Hand Sanitizer Reduction in Respiratory Illness (n=4)

<table>
<thead>
<tr>
<th>Author (Year) Group</th>
<th>% Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kotch et al., (1994) US, Daycare</td>
<td>15%</td>
</tr>
<tr>
<td>Falsey et al., (1999) US, Elderly Daycare</td>
<td>17%</td>
</tr>
<tr>
<td>White et al., (2001) US, University</td>
<td>20%</td>
</tr>
<tr>
<td>Sandora et al., (2005) US, Families</td>
<td>14%</td>
</tr>
</tbody>
</table>

*P < 0.05, statistically significant

**Not statistically significant
Summary

• Results for hand hygiene are equivocal but promising, perhaps due to level of adherence to intervention or the intervention only addressed one of the two major modes of transmission
• Effective practices must target modes of transmission
  – Alcohol to sanitize hands (direct contact)
  – Respiratory etiquette (droplet spread)

To prevent direct contact spread

Rubbing hands with an alcohol-based formulation is the first choice:
• Fast-acting and broad-spectrum activity
• Excellent microbicidal characteristics
• Lack of potential emergence of resistance
• No sinks, running water or towels needed
• Reduces the time required to perform the action

Other Precautions to Prevent Direct Contact Transmission

• ‘Aseptic’ nose wiping (plastic around the tissue)
• Frequent washing of toys and other objects, particularly those handled by children
• Don’t go to work when ill!

To prevent droplet spread

• Common sense measures such as
  – In case of coughing or sneezing:
    Use a single-use handkerchief or paper tissue
    Cough etiquette (cough into your upper arm)
  – Keep persons with respiratory infections at a distance > 1 meter
• Mask/eye protection?

Herbs and Vitamins?

• Vitamin C
• Vitamin E
• Echinacea
• Zinc
• Ginseng

Educational Materials: Hands

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**Education: Droplet Spread**

**Stopping URIs and Flu in the Family: The Stuffy Trial**
CDC U01 CI000442

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**Specific Aims**

- To compare the impact of three household-level interventions on six outcomes
- Intervention groups:
  - Culturally appropriate educational materials
  - Educational material and alcohol-based hand sanitizer
  - Educational materials, alcohol-based hand sanitizer AND face masks

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**Study Outcomes**

- Incidence and types or strains of virologically confirmed influenza
- Rates of symptoms of influenza and viral URIs
- R0, i.e. the number of secondary cases generated by a single infected person in a fully susceptible household
- Self-reported antibiotic use practices for symptoms of influenza and other viral URIs
- Household member knowledge of prevention and treatment strategies
- Rates of influenza vaccination among household members.

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**Influenza vaccination rates, National Health Interview Survey, 2003**

<table>
<thead>
<tr>
<th>Risk Group</th>
<th>Influenza Vaccination Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aged &gt;65 years</td>
<td>65.5%</td>
</tr>
<tr>
<td>Persons with high risk conditions (e.g. diabetes, emphysema, heart diseases, cancer)</td>
<td>15.8-46.3%</td>
</tr>
<tr>
<td>Pregnant women</td>
<td>12.8%</td>
</tr>
<tr>
<td>Healthcare professionals</td>
<td>40.1%</td>
</tr>
<tr>
<td>Household contacts of persons at high risk</td>
<td>14.9-38.4%</td>
</tr>
<tr>
<td>Children aged 6-23 months</td>
<td>Data not provided</td>
</tr>
</tbody>
</table>

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**Log counts on hands of homemakers using antimicrobial (AM) or plain soap for handwashing**

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Rates of at least one infectious disease symptom/household month

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Unadjusted Rate</th>
<th>Adjusted Rate</th>
<th>P-value</th>
<th>RR</th>
<th>95% CI</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antibacterial group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fever</td>
<td>10.2 (142/1396)</td>
<td>11.9 (159/1341)</td>
<td>0.21</td>
<td>0.84</td>
<td>0.63</td>
<td>1.12</td>
</tr>
<tr>
<td>Sore throat</td>
<td>10.0 (140/1396)</td>
<td>10.3 (138/1341)</td>
<td>0.83</td>
<td>0.95</td>
<td>0.71</td>
<td>1.26</td>
</tr>
<tr>
<td>Runny nose</td>
<td>26.8 (374/1395)</td>
<td>25.6 (343/1341)</td>
<td>0.57</td>
<td>1.03</td>
<td>0.81</td>
<td>1.32</td>
</tr>
<tr>
<td>Cough</td>
<td>23.2 (324/1396)</td>
<td>23.6 (316/1341)</td>
<td>0.86</td>
<td>0.97</td>
<td>0.79</td>
<td>1.18</td>
</tr>
</tbody>
</table>

* GEE logistic regressions adjusted for number of children under 6, number of people rating health as poor/fair or had chronic conditions, size of the household and number of people spending 40 hours or more outside of house per week.

Precede-Proceed Model:
Conceptual underpinnings to identify barriers and facilitators to use of antimicrobials for viral URIs

Study Design

Volunteer Households (n=450)

Randomize

Control (education only)
Alcohol hand hygiene product
Alcohol + Face masks

15 month follow-up: Daily symptom reports, bimonthly visits, cultures if symptomatic

Components of interventions using the Green model

<table>
<thead>
<tr>
<th>Group</th>
<th>Model Component</th>
<th>Intervention Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Group</td>
<td>Pamphlet and information sheet on where to get flu vaccine</td>
<td></td>
</tr>
<tr>
<td>Both Intervention Groups</td>
<td>Preferring factors (knowledge, attitudes, beliefs)</td>
<td></td>
</tr>
<tr>
<td>Hygiene group</td>
<td>Alcohol-based hand sanitizer provided to household members</td>
<td></td>
</tr>
<tr>
<td>Hygiene and face mask</td>
<td>Alcohol-based hand sanitizer and face masks provided to household members for use among household contacts of persons with symptoms of influenza</td>
<td></td>
</tr>
<tr>
<td>All study groups</td>
<td>Reinforcing factors</td>
<td></td>
</tr>
</tbody>
</table>

Setting

- Northern Manhattan
- About 80% Hispanic, half born outside U.S.
- Lower income, often without health insurance
- Crowded housing (average: 4.5 persons/one bedroom apartment)

Initial Home Visit

- Obtain written consent
- Administer questionnaires:
  - a demographic questionnaire
  - a knowledge and attitude survey regarding causes, prevention strategies and treatments for colds and flu
  - a questionnaire about antibiotic practices
- Orient household members

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Data Collection

- Daily telephone reporting using ecological momentary assessment technology
- Bimonthly home visits
- Calls to participants not reporting for 48 hours

Algorithm for screening persons with influenza-like illness

- Influenza-like illness: 45 individuals/month (450 over 10 months)
- Rapid Test (for Flu A, Flu B), assume ~ 70% sensitivity
  - POSITIVE (up to 315)
  - NEGATIVE (True - and False -) (Up to ~135 false negatives expected)

Subtype of influenza positive

Algorithm:

1. Culture to confirm
2. Subtype

Subtype of influenza positive

Influenza-like illness: ~ 45 individuals/month (450 over 10 months)

The Next Few Teleclasses

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Presenter/Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 25</td>
<td>Twenty First Century Plagues</td>
<td>Prof. Robert Pratt, Thames Valley University</td>
</tr>
<tr>
<td>February 8</td>
<td>Influenza – Of Poultry, Pets and People</td>
<td>Dr. Corrie Brown, University of Georgia</td>
</tr>
<tr>
<td>February 15</td>
<td>Fresh Produce and Human Pathogenicity</td>
<td>Prof. Keith Warriner, Guelph University</td>
</tr>
<tr>
<td>February 21</td>
<td>Infection Control in the Endoscopy Clinic</td>
<td>Dr. Richard Everts, Nelson Marlborough Health Service</td>
</tr>
<tr>
<td>February 22</td>
<td>Best Practice for Hospital Construction Management</td>
<td>Andrew Streifel, University of Minnesota</td>
</tr>
</tbody>
</table>

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