Addressing school IAQ issues is a very important public health issue:

Asthma epidemic – High rate of asthma in Hartford

Asthma – biggest health reason for absenteeism

Important staff health issue – educators have have highest rate of IAQ related occupational disease

-We have a program that really works – Hartford has made much headway, still needs work

-Hartford received a Good Start Award from EPA last year

-State Law
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What is Indoor Air Quality?

in-door (in’dør’) adj. air (er,ar) n. quality (kwo’i’tē) n.

1. the temperature, humidity, ventilation, and chemical or biological contaminants of the air inside a building.

Read the definition, say main focus of problem is contaminants, ventilation issues and temp/humidity
EXPLAIN the following points:

- As a result of poor IAQ, health problems can include coughing, asthma episodes, bronchitis, headaches, allergic reactions, toxic poisoning, and the spread of infectious diseases.

- Students don’t learn as well and teachers don’t teach as well when they are suffering health effects of poor IAQ.

- When schools aren’t aware of IAQ problems, and don’t act to prevent them, the eventual costs may be much higher than would have been the case otherwise. Identifying and fixing a problem early, or taking preventive measures, may save many dollars in the long run. For example, if schools must be closed for repair, if substitute teachers must be hired to replace sick ones, or if equipment must be replaced rather than maintained, large costs may be incurred.

- Negative publicity resulting from poor IAQ may have parents and community members upset, generating lack of trust for the school system.

- The school system may even be sued for damages caused by poor IAQ.
• Building materials and furnishings—like paneling, draperies, or desks—contain components like resins, adhesives, and solvents. These products can emit volatile organic compounds (VOCs) that cause irritating symptoms.

• Maintenance products—such as paints, caulk, and adhesives, emit contaminants while in use or storage.

• Office equipment such as copiers, trade equipment in industrial shops, and science equipment in labs contain formaldehyde and other VOCs, such as ozone, phenols, and methanol.

Microbiological pollutants include bacteria, viruses, allergens such as pollen, insect parts, and fungi such as mold. Wet carpeting and building materials resulting from leaks, cooling towers, humidifiers, drains, and ducts are incubators of these types of pollutants.

• Common outdoor pollutants that can be sources of indoor air pollution are bus and automobile exhaust, pollen, pesticides, and dust. Dumpsters are also a source of outdoor pollution.

• Radon is a naturally occurring radioactive soil gas that cannot be seen, smelled, or tasted. It is also the second leading cause of lung cancer.
Indoor Air Pollutant Sources

Dirt & Dust!
EXPLAIN that HVAC systems may contribute to IAQ problems in several ways:

- As stated before, they may not have been designed to supply sufficient outdoor air or to remove indoor pollutants sufficiently through ventilation. Sometimes people deliberately block the flow of outdoor air.

- Sometimes ventilation controls are broken or deliberately disconnected.

- Filters, if not changed on schedule, become dirty and prevent proper ventilation.

Without regular cleaning, microbiological growth may occur in drip pans, duct work, coils, and humidifiers.
• There are no appropriate standards for use in indoor environments such as schools and residences. There are some industrial standards for permissible exposure limits for certain chemicals used in manufacturing and other work place settings, but these standards should not be used for children, sensitive populations such as pregnant women, the elderly, or people with certain illnesses. There are no standards for indoor levels of molds so mold testing is not recommended:

• Find and fix the moisture source, kill and remove mold spores

• Testing as a first response does not usually lead to an answer or solution. Very often air testing is conducted as a knee-jerk reaction to a reported IAQ problem. Such testing done in the absence of a hypothesis, or as part of a well-planned investigation, usually produces data that raises more questions that it answers. It can raise expectations that a solution will follow, and subsequently raises suspicions if no answer is found.

• Refer participants to fact sheet:
  Indoor Air Quality Testing Should Not Be The First Move

  • in coordinators folder
  • on DPH CD
• Suggest that fact sheet be posted on district web site
IAQ Tools for Schools Action Kit

Video: Taking Action and Ventilation Basics
TfS Building Team Members

Teacher

Parent

Administrative Staff

School Nurse

Custodian
Video:
“Taking Action”
Beyond Tools for Schools

Information for Custodians & Maintenance Personnel
Today’s Topics

- Virtual Walkthrough
- Green Cleaning
- Cleaning and Disinfecting Surfaces to Help Prevent the Spread of H1N1 Flu Virus
- Resources

Note that we may or may not get to the last two topics… can select dependant on interest
You Are on the Front Line

- You See Everything
- Staff Report Their Concerns to You
- As a Tools for Schools Team Member You Build Cooperation and Improve Communication
Virtual Walk-through:

What’s Wrong with this Picture?
Hazardous chemical cleaners, insecticides etc
Clutter… can’t clean
Sources- friable insulation (asbestos?) mercury
Occupied buildings under construction
Water incursion
….. A risk factor for mold and other microbial agents
Carpet- slab on grade
Pests......
Air intake for ventilation system at grade
Idling vehicles…
Unit ventilators- hard to maintain with limited staff
Clutter on unit ventilator, air purifier- ozone?
Issues Identified

- Ventilation- Can Provide Dilution & Thermal Comfort If Properly Designed & Maintained

- Chemical Sources Need Controls

- Moisture Incursion- a Risk Factor for Biological Agents
Routes of entry

- Inhalation...
- Absorption...
- Ingestion...
Have Group list their opinions on a flip chart before you respond……
News release: Connecticut Governor M. Jodi Rell has signed legislation that requires local and regional school districts to use green cleaning products in schools. The helping to ensure a healthier air quality for students, faculty and staff. School districts must have a green cleaning program in place by July 1, 2011. The environmentally preferable products must meet nationally certified guidelines and be approved by the state Department of Administrative Services. They include products used for general-purpose cleaning; bathroom, glass and carpet cleaners; hand cleaners and soaps; floor finishers and strippers.
The 3 Step Program

- Step One - Choose “Green” Cleaning Products (Environmentally Preferable, When Possible)

- Step Two - Practice State-of-the-art Cleaning Methods (“Best Practices”)

- Step Three – Use Appropriate Materials and Updated Equipment
Activity: MSDS review
Criteria for “Green” Cleaners

- Health-based
  No Carcinogens, Reproductive Toxins, Skin Sensitizers; Low Vocs, Skin Absorption; AOEC Asthmagens

- Environmental Properties
  Biodegradability, Toxicity to Aquatic Organisms, Combustibility, Recyclable Packaging

- Verifies Performance
Task-Based Cleaning

- One Heavy-duty Cleaning Product
- One Concentrate Diluted for Several Tasks
- Specialty Cleaning Products (Graffiti Remover)
Step 2: Cleaning for Health Best Practices

- Clean From the Top Down
- Maintain Flooring/Replace Carpets
- Clean up Spills Right Away
- Cleaning With Detergent Removes Most Germs. Disinfect Only Target Areas
- Avoid Aerosol Sprays
- Vacuum Instead of Dust Mopping
Walk-off Mats

- Up to 80% of Soil in Buildings Tracked by Feet

- 15-20’ of Multi-level Scrubber Matting
Project Recommendations:
For your routine disinfecting protocol, we recommend using a liquid disinfectant and microfiber mops or cloths. The advantages of each type of disinfection application process and equipment are detailed below. We list other types of application processes and equipment to enable you to compare them to our recommendations and because there may be certain applications where they are the best option, e.g., using disinfecting wipes after cleaning up vomit on a school bus. Remember all of the following types of applications require that you clean the surface with detergent and rinse prior to using a disinfectant.

Application Options

Bucket and Mops

**Disadvantages**
- The mopping procedure actually can spread heavy microbial contamination throughout a facility.
  - Mops and cloths must be adequately cleaned and disinfected, and water-disinfectant mixture must be changed regularly at least every hour after every three to four rooms. Since these guidelines are often not followed, there are problems with cross contamination and germs breeding on mop and cloths. You could use color coded mops and buckets. If you do use a mop and bucket, we recommend using buckets that separate clean and dirty water, so you are not dipping back into the dirty water.
  - It is hard to disinfect a mop. In one study, standard laundering provided acceptable decontamination of heavily contaminated mop heads, but chemical disinfection with a phenolic (which is a type of disinfectant too strong to use in a school setting) was less effective. Thus, the recommendation is daily laundering of mops. Single-use disposable towels impregnated with a disinfectant also can be used for low-level disinfection for spot-disinfection.

**Advantages**
- Can cover large areas.
- Can use existing equipment.

Pre-Saturated Microfiber Mop Head

**Advantages**
- Prevents cross contamination if changed for each room.
- Microfiber has been found to capture over 90% of bacteria in a hospital setting.

**Disadvantages**
- Need one for each room.
- Must be laundered.
Floor Care Equipment

- High-filtration Vacuum Cleaners

- Vacuum Attachments for Buffers/burnishers

- Autoscrubbers With Stripping Pads
New Equipment: Autoscrubbers

- Close edge cleaning
If multiple schools are present, ask a representative from each school to summarize their program for the group.
What are your Challenges?

- Classrooms Not Ready for Cleaning
- Teachers, Staff, or Children Supplying Cleaning Products From Home
- Staffing
- Custodial Closet (With a Custodian)/14-18,000 Ft²
- Communication Issues
- Demand for Disinfection
Take a Break!
Cleaning and Disinfecting Surfaces to Help Prevent the Spread of H1N1 Flu Virus

Note- although the focus of this presentation is on H1N1, the general infection control principles apply for other agents (MRSA, GI illnesses etc)…. If schools develop a careful protocol, this will be of benefit throughout the year.

Other types of illnesses:
Common cold
Mononucleosis
Strep throat
Other flues
Diarrhea illnesses
Disclaimer

- The Information Provided in This Section of the Presentation Is Based on Current Guidance

- The Sources Referenced in This Section Should Be Consulted Frequently to Obtain the Most Up-to-date Information.
Droplets from a cough or sneeze from an infected person move through the air and make contact with the mouth or nose of people nearby.
How long can influenza virus remain viable on objects (such as books and doorknobs)?
Studies have shown that influenza virus can survive on environmental surfaces and can infect a person for up to 2-8 hours after being deposited on the surface.

IFMA Pandemic preparedness manual (2006): influenza viruses may live on hard surfaces for up to two days.
School Custodial and Nursing Staff are on the Front Line for Infection Control

Although beyond the scope of this talk, this is where I would mention that the CDC states that alcohol based hand sanitizers (>60%) are effective against H1N1. Non-alcohol based hand sanitizers may be.
Although beyond the scope of this talk, this is where I would mention that the CDC states that alcohol based hand sanitizers (>60%) are effective against H1N1. Non-alcohol based hand sanitizers may be effective.
Disinfection is not the recommended method for controlling the spread of H1N1…. If a school chooses to use disinfectants, must do so carefully. Clean surfaces and items that are more likely to have frequent hand contact with cleaning agents that are usually used in these areas. Additional disinfection beyond routine cleaning is not recommended.

Hand rails
Door knobs
Elevator buttons
Sinks and faucets
Counter tops
Window sills
Light switches
Equipment controls
Cabinet and file drawer knobs/handles
Vending machines
Chair arms
Copier/printer/fax control buttons
Cleaners don’t disinfect and disinfectants don’t clean
Sanitizers reduce microorganisms to levels considered safe as determined by public
health codes or regulations.

general all purpose cleaning products can remove germs but are not disinfectants; EPA
prohibits disinfectants from
being labeled 'green', meaning having a reduced effect on health and the environment;
Green Seal criteria for cleaning products include
Environment and health effects, as well as product efficacy, and have for many years;
Green Seal recently updated its green cleaning product criteria to strengthen
protections for sensitive populations through an extensive
process that engaged 399 stakeholders over 20 months; the details of the new standard
were published in August 2008

We recommend the judicious use of disinfectants and sanitizers consistent with CDC
and state public health agency
guidelines; further, the use of green cleaning products does not supercede specific
needs, such as the OSHA blood borne pathogen rule or appropriate mold
remediation.
Both sanitizers and disinfectants are products regulated by the Environmental Protection Agency (EPA). The EPA establishes the rules that govern these products including their testing, claims and direction for use. A disinfectant must completely eliminate all the organisms listed on its label. These organisms are not limited to bacteria but could include viruses and fungi. Sanitizers need not eliminate one hundred percent of all organisms to be effective. Nor are fungi or viruses ever included in a sanitizing claim. For food contact surfaces, a sanitizer must reduce the bacterial count by 99.999%.

A **Disinfectant** is a product which completely destroys all specific test organisms in 10 minutes under conditions of the AOAC Use Dilution Test.

A **Sanitizer** is a product which destroys 99.999% of specified test bacteria in 30 seconds under conditions of the Official Detergent Sanitizer Test (sometimes called Weber & Black Test).

**What’s the difference between cleaners, sanitizers, and disinfectants?**

**Cleaners or detergents** are products that are used to remove soil, dirt, dust, organic matter, and germs (like bacteria, viruses, and fungi). Cleaners or detergents work by washing the surface to lift dirt and germs off surfaces so they can be rinsed away with water. The same thing happens when you wash your hands with soap and water or when you wash dishes. Rinsing is an important part of the cleaning process. Use these products for routine cleaning of surfaces.

**Sanitizers** are used to reduce germs from surfaces but not totally get rid of them. Sanitizers reduce the germs from surfaces to levels that considered safe.

**Disinfectants** are chemical products that destroy or inactivate germs and prevent them from growing. Disinfectants have no effect on dirt, soil, or dust. Disinfectants are regulated by the U.S. Environmental Protection Agency (EPA). You can use a disinfectant after cleaning for surfaces that have visible blood or drainage from infected skin.

All Purpose Cleaners

- Select Green, Third Party Certification
- Use Microfiber/ Friction
- Avoid Cross- Contamination
### TEST SUBSTANCE IDENTITY

**Test Substance Name**: Activion Pro Sanit. in 670/901/27

**STUDY DATES**
- **Research Start Date**: March 26, 2009
- **Research End Date**: March 30, 2009
- **Study Conducted**: April 1, 2009

### MEDIA CULTURE COLLECTION

- **Medium**: tryptic soy broth (TSB)
- **Atmosphere**: anaerobic

### MEDIUM COUNT RESULTS

<table>
<thead>
<tr>
<th>Test Substance</th>
<th>Average Cell Count</th>
<th>% Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activion Pro Sanit. in 670/901/27</td>
<td>12345678</td>
<td>10%</td>
</tr>
</tbody>
</table>

### ENVIRONMENTAL DESIGN

A series of experiments was conducted on a randomly selected sample set to determine the effectiveness of the test substance. The medium was inoculated with an approximately 1:2 dilution from the sample. After incubation, the samples were assayed to determine the extent of reduction. The results are summarized in the table above.

**Note**: All counts were taken at room temperature and in a sterile environment.

### CALCULATED VALUES

<table>
<thead>
<tr>
<th>Organism</th>
<th>Control</th>
<th>Test Substance</th>
<th>% Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Escherichia coli O157:H7</td>
<td>12345678</td>
<td>12345678</td>
<td>10%</td>
</tr>
<tr>
<td>Listeria monocytogenes</td>
<td>12345678</td>
<td>12345678</td>
<td>10%</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>12345678</td>
<td>12345678</td>
<td>10%</td>
</tr>
<tr>
<td>Enterobacter aerogenes</td>
<td>12345678</td>
<td>12345678</td>
<td>10%</td>
</tr>
</tbody>
</table>

**Note**: All values are calculated using the公式: % Reduction = (Control - Test Substance) / Control * 100.
Products currently registered as effective against “influenza A virus” should be effective against novel H1N1 on hard, non-porous surfaces
Usually considered to be the most environmentally preferable

This list is in the decending order of toxicity
Health Hazards of Disinfectants

- Chlorine or Hypochlorite - Corrosive
- Phenolics - Rashes
- Quaternary Ammonium Compounds [Quats] - Work Related Asthma
- Alcohols - CNS Symptoms
- Hydrogen Peroxide - Slight Irritation
After dwell time wipe/rinse off or allow to air dry according to manufacturer’s directions.
Carefully select the product

- Review Product Labels
- Use With the Appropriate Dilution
- Use Appropriate Dwell Time
**Specifications**

<table>
<thead>
<tr>
<th>Specification</th>
<th>VIREX II 128</th>
<th>VIREX II 256</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume</td>
<td>1.136 L</td>
<td>1.256 L</td>
</tr>
<tr>
<td>Active Ingredient:</td>
<td>0.447% quaternary ammonium</td>
<td>0.8945% quaternary ammonium</td>
</tr>
<tr>
<td>% Diluted in One Solution</td>
<td>660 ppm</td>
<td>660 ppm</td>
</tr>
<tr>
<td>EPA Reg. No.</td>
<td>70003701</td>
<td>70003704</td>
</tr>
<tr>
<td>Enrichment</td>
<td>Nonionic and cationic</td>
<td>Nonionic and cationic</td>
</tr>
<tr>
<td>Fragrance</td>
<td>Mild</td>
<td>Mild</td>
</tr>
<tr>
<td>pH (concentrate)</td>
<td>10.0 ± 0.5</td>
<td>10.0 ± 0.5</td>
</tr>
<tr>
<td>(pH solution)</td>
<td>9.0 ± 0.0</td>
<td>9.0 ± 0.0</td>
</tr>
<tr>
<td>Solubility in Water</td>
<td>Complete</td>
<td>Complete</td>
</tr>
<tr>
<td>Drying Performance</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Reliability</td>
<td>Excellent</td>
<td>Excellent</td>
</tr>
<tr>
<td>Forming</td>
<td>Liquid moderate</td>
<td>Liquid moderate</td>
</tr>
<tr>
<td>Specific Gravity (v/v: 1:1)</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Alcohols</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Freezing Point</td>
<td>None (TCL)</td>
<td>None (TCL)</td>
</tr>
<tr>
<td>Chemical Stability</td>
<td>Chemically stable from 40°F to 100°F</td>
<td></td>
</tr>
<tr>
<td>Shelf Life (concentrate)</td>
<td>1 year</td>
<td>1 year</td>
</tr>
<tr>
<td>(pH solution)</td>
<td>Up to one year</td>
<td>Up to one year</td>
</tr>
</tbody>
</table>

**Efficacy Summary**

- **VIREX II 128** contains 66% percent active quaternary ammonium, making it highly effective against a wide variety of pathogens, microorganisms, and chlorinated bacteria.
- **VIREX II 256** contains 33% percent active quaternary ammonium, making it highly effective against a wide variety of pathogens, microorganisms, and chlorinated bacteria.

**Applications:**
- Porous or non-porous surfaces, non-porous surfaces, treated surfaces must remain wet for 10 minutes. Allow surfaces to remain wet for 1 minute to kill HIV-1.
- Effective against viruses, fungi, Mycobacterium species, and other microorganisms.
Organic soil in the test is simulated with 5% blood serum.
Health and Safety

- Do Not Mix Disinfectants With Some Cleaners (eg: Bleach [Chlorine]) With Ammonia/Quaternary Ammonia
- Never Spray Disinfectant in a Room
- Use Appropriate PPE
- Use With Adequate Ventilation
The new green law requires this....
You Are the Head Custodian for a School in Connecticut. Your School District Has Cases of H1N1. The BoE Has Asked You to Share Your Cleaning Protocol With Them. Use the Activity to Develop an SOP.
Second Swine Flu Case Confirmed In Connecticut

By DON STACOM | The Hartford Courant
5:16 PM EDT - May 2, 2009

A Middlefield child has been confirmed as the second person in Connecticut to have swine flu, and five more students at Fairfield University and a Wethersfield child have been identified with "probable" cases of the virus.

State health officials this afternoon emphasized that both of the Connecticut people infected - and all 13 of those with "probable" swine flu diagnoses - have suffered only mild or moderate symptoms.

"They have all recovered or are recovering, and there haven't been any hospitalizations," said Diana Lejardi, spokeswoman for the public health department, which released results of a new round of flu tests today.

Officials are disclosing almost no information about the individuals who've been sickened, but Lejardi said the Middlefield child had been to Mexico with relatives recently.

Lejardi did not say whether the Wethersfield child or any of the five Fairfield University students had links to Mexico; two other students at the university who were listed as "probable" swine flu cases earlier this week had not been to Mexico or been in contact with anyone who had.

At least some of the seven Fairfield University students know each other, said Sandi Cleary, health director for the town of Fairfield. Six live on campus and one lives in town.

The number of flu students showing up each day at Fairfield University's...
School Response

- School Communicated With CT DPH & Local Health Director
- School Was Not Closed
- Cleaning Protocols Enhanced
  - Cleaned the School Thoroughly Using Best Practices
  - Used All Purpose Cleaner During Day for High Touch Points
  - Used Virex Disinfectant at End of Day Without Occupants in the School (See Technical Sheet)
  - Observed Dwell Time
  - Used Microfiber Cloths
  - Wore Gloves As Part of Best Practices (Normal Routine)
Facility Director Asks...

- What Is the Organism? How Long Does It Live?
- Is It Airborne?
- What Cleaning Protocols Are Needed to Address This Outbreak?
- How Do I Protect My Custodial Staff During Cleaning? Do They Need to Wear a Mask?
- What Is the Best Source for Information?

...Guidance and resources needed for custodians & cleaning staff
**Additional Resources**

US Centers for Disease Control and Prevention  
http://www.cdc.gov/h1n1flu/guidance/guidelinescolleges.htm

CT Department of Health and Local Health Departments  
http://www.ct.gov/dph

National Cleaning for Healthier Schools and Infection Control Workgroup  
Infection Control Handbook:  
http://www.informedgreensolutions.org/?q=publications/school

Informed Green Solutions:  
www.informedgreensolutions.org
Acknowledgements

Marian Heyman, Kenny Foscue, Joan Simpson
Environmental & Occupational Health Assessment Program
Indoor Environmental Quality Unit
Environmental Health Section
Connecticut Department of Public Health

Telephone: 860-509-7740

http://www.dph.state.ct.us/BRS/EOHA/iaqcm.htm
Carol Westinghouse
Informed Green Solutions
Cleaning for Health
802-626-8643
westies@ecoisp.com
www.informedgreensolutions.org

CSIERT
Connecticut School Indoor Environment
Resource Team
http://csiert.tfsiac.com/index.html
National Collaborative Work Group on Green Cleaning and Chemical Policy Reform in Schools
www.cleaningforhealthyschools.org
UCONN Health Center
Center for Indoor Environments and Health
Anne Bracker, Nancy Simcox and Paula Schenck
Division of Occupational and Environmental Medicine
(860) 679-2368

Yale University
Occupational and Environmental Medicine Program
Judy Sparer, CIH
Yale School of Medicine
Occupational and Environmental Medicine
(203) 737-4030
EVALUATIONS

Thank You!