School Nurses have responsibilities

Part II
PEOSH
Indoor
Air Quality
Training for
School Nurses

Alicia Curtis Stephens, MS
Occupational Health Surveillance Unit
Work-Related Asthma
Nurse’s Role

- **Asthma Episodes/Triggers**
  - Track Episodes
  - Evaluate Triggers

- **Green Cleaning**
  - Selection of Cleaning Agents
  - Cleaning vs Disinfecting
  - Choose Safer Products (choose GREEN)

- **IAQ Team/Walkthrough**
  - Encourage Team Approach
  - Participate in Prompt Walkthrough
### Building Related Symptoms

<table>
<thead>
<tr>
<th>Sick Building Syndrome</th>
<th>Building Related Illness</th>
</tr>
</thead>
<tbody>
<tr>
<td>No pattern of any particular illness</td>
<td>Distinct illness – causes known</td>
</tr>
<tr>
<td>Difficult to trace to a specific source</td>
<td>Accompanied by expected physical signs*, symptoms, lab findings</td>
</tr>
<tr>
<td>Relief occurs upon leaving the building</td>
<td>Relief from illness may not occur upon leaving the building</td>
</tr>
</tbody>
</table>

*respiratory tract irritation, rashes, chills, fever, muscle aches, cough, chest tightness, congestion

In both categories, the symptoms are real!
Asthma Episodes/Triggers

Episodes
- tightness in the chest
- difficulty in breathing or shortness of breath
- wheezing; coughing (particularly at night)

Triggers
- A “trigger” is an allergen or irritant that provokes or causes asthma symptoms.
- Asthma triggers are as individual as the person.
- Not all factors affect all people.
Provide a clear procedure to report symptoms

Encourage ‘first report of injury’ (school district)

Prioritize cases (history of asthma – priority)

Encourage follow-up to primary physician
Evaluate Asthma Triggers

- Asthma Triggers
  Types: Allergens/Irritants
  Management of Triggers

- Common Triggers in Schools
  Nationwide
  New Jersey
Asthma Triggers

- Infections in the upper airways, such as colds
- Changes in weather and temperature
- Exercise
- Physical expressions of strong feelings (crying or laughing hard, yelling)
**Allergens such as:**

- Furred and feathered animals
- Dust mites
- Cockroaches
- Pollens from grass and trees
- Molds (indoors and outdoors)

National Heart Lung & Blood Institute
Irritants such as:

• Tobacco smoke

• Scented products

• Outdoor air pollution

• Strong fumes or odors
# Common Asthma Triggers (schools)

<table>
<thead>
<tr>
<th>Asthma Triggers</th>
<th>Asthma Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dust mites</td>
<td>Remove habitat-dust/vacuum regularly, remove clutter</td>
</tr>
<tr>
<td>Mice</td>
<td>Exclude from building-Store food in tightly sealed containers; place dumpsters away from building</td>
</tr>
<tr>
<td>Cockroaches/Ants</td>
<td>Sanitation-baits/gels</td>
</tr>
<tr>
<td>Animal Dander</td>
<td>Remove animals, if possible; keep away from sensitive students/ventilate systems</td>
</tr>
<tr>
<td>Mold</td>
<td>Fix leaks, dry wet areas; Clean hard, moldy surfaces with water and detergent and dry</td>
</tr>
<tr>
<td>Tobacco Smoke</td>
<td>Enforce no-smoking policy</td>
</tr>
<tr>
<td>Odors/Fumes</td>
<td>Use less toxic products, ventilate, clean when no one is around</td>
</tr>
<tr>
<td>Outside Air Pollution</td>
<td>Do not allow into the ventilation system-monitor location of intakes; no vehicle idling</td>
</tr>
</tbody>
</table>
Top Categories of Agents Associated with WRA Cases, Educational Services, 1993–2000

- Poor indoor air quality or lack of ventilation
- Graffiti remover, floor strippers, bleach, carpet cleaners, disinfectants, and ammonia
- Mostly dust, NOS
- Paint, acetone, asphalt

Acknowledgement: Jacek Mazurek, MD, MS (NIOSH,DRDS)
### Top Categories of Agents in NJ Associated with WRA Cases, Educational Services (1993-2008)

<table>
<thead>
<tr>
<th>Agent</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mold, NOS</td>
<td>7</td>
<td>1.79</td>
</tr>
<tr>
<td>Air Pollutant, Indoor</td>
<td>4</td>
<td>0.85</td>
</tr>
<tr>
<td>Inorganic Dust, NOS</td>
<td>2</td>
<td>0.42</td>
</tr>
<tr>
<td>Chemicals, NOS</td>
<td>2</td>
<td>0.42</td>
</tr>
<tr>
<td>Capsicum</td>
<td>2</td>
<td>0.42</td>
</tr>
<tr>
<td>Wood Dust, NOS</td>
<td>2</td>
<td>0.42</td>
</tr>
<tr>
<td>Disinfectants, NOS</td>
<td>1</td>
<td>0.21</td>
</tr>
<tr>
<td>Gasoline</td>
<td>1</td>
<td>0.21</td>
</tr>
<tr>
<td>Asphalt</td>
<td>1</td>
<td>0.21</td>
</tr>
<tr>
<td>Ethylene Glycol</td>
<td>1</td>
<td>0.21</td>
</tr>
<tr>
<td>Methylene Biphenyl Diisocyanate</td>
<td>1</td>
<td>0.21</td>
</tr>
<tr>
<td>Bleach plus Acid (mixture)</td>
<td>1</td>
<td>0.21</td>
</tr>
<tr>
<td>Cleaners, Floor Stripper</td>
<td>1</td>
<td>0.21</td>
</tr>
<tr>
<td>Cleaning Mixtures (excluding Bleach plus Acid or Ammonia)</td>
<td>1</td>
<td>0.21</td>
</tr>
<tr>
<td>Smoke</td>
<td>1</td>
<td>0.21</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>28</td>
<td>6.21</td>
</tr>
</tbody>
</table>

Source: NJ WRA Registry, 2012
Green Cleaning

- Selection of Cleaning Agents
- Cleaning vs Disinfecting
- Choose Safer Products (choose GREEN)
Selection of Cleaning Agents

Who choses these at your school?

- Disinfectant
- General Purpose Cleaner
- Carpet Spotter
- Sanitizer
- Floor Finish Stripper
- Toilet Bowl Cleaner
Asthma/Respiratory Disease Related Ingredients

- Cleaners
- Disinfectants
- Volatile organic compounds – VOC’s
  - Known or suspected to cause cancer
  - Propellants in aerosol containers - butane, benzene, propane, etc.
- Solvents
- Fragrances – air fresheners
- Do not allow staff to bring in or use home products!
Cleaning versus Disinfecting

What kind of cleaning does the surface need?

GUIDING PRINCIPLE

REMOVE microbes if possible
(through general surface cleaning)

rather than kill them
(with a sanitizer or disinfectant).
3 Levels of Microbe Control

- **Cleaning**
  - Removes Microbes
  - Up to 99%
  - Dirt, most organisms

- **Sanitizing**
  - Destroys Bacteria
  - 99.9 to 99.999%
  - Bacteria, (e.g. MRSA)

- **Disinfecting**
  - Destroys almost all microbes except their spores
  - Bacteria, viruses (e.g. influenza)
Disinfectants

- Are formulated to kill organisms
  - Can be toxic to humans as well as microbes
- Consider alternatives to chlorine bleach
  - Check requirements for safe & effective use
- May be corrosive
  - Require special handling!
- Keep away from children:
  - Mixing or using
  - No children in room!
  - No routine use of disinfectant wipes in classrooms
- Follow the label!
  - The label is the law!

Disinfectants are pesticides, not cleaners.

Cide = Kill
Choose Safer Products

Common Misconceptions

- Green Chemicals Are Hard To Get
- Green Chemicals Are Too Expensive
- Standardization Does Not Matter
NOT Green Ingredients

- No high or low pH levels and no known carcinogens
- No APEOs (alkylphenoxyethoxyethanol) Surfactants
- No EDTAs (Ethylenediaminetetraacetic Acid Sodium Salts) chelate or water softener
- No Phosphates, Includes all potassium salts
- No “Butyl”: 2-Butoxy-Ethanol
- No or Low VOC (Volatile Organic Compounds)
### Recommended Green Ingredients

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Recommended Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disinfectants●</td>
<td>-- Accelerated Hydrogen Peroxide</td>
</tr>
<tr>
<td></td>
<td>-- Botanicals</td>
</tr>
<tr>
<td></td>
<td>-- Silver Hydrogen Citrate</td>
</tr>
<tr>
<td>Hard Surface Sanitizers●</td>
<td>-- Envirox Concentrate 118 [H1N1]</td>
</tr>
<tr>
<td>Hand Sanitizers ●▲</td>
<td>Products without added fragrances</td>
</tr>
<tr>
<td>Antimicrobial Soaps/Cleansers▲</td>
<td>Soap and water cleaning is sufficient</td>
</tr>
<tr>
<td>Furniture Polish</td>
<td>Use Microfiber Cloths, Mops (to eliminate need for polish)</td>
</tr>
<tr>
<td>General Purpose Cleaners▲</td>
<td>See 3rd Party Certification Lists</td>
</tr>
</tbody>
</table>

● Must be EPA Registered  
▲ 3rd Party Certification
Environmentally Preferable Cleaning Chemicals

- Less-toxic chemicals from manufacturers and distributors
  - Third-party certification is important to ensure quality
- Common third-party programs are:
  - EcoLogo – Canada [www.ecologo.org](http://www.ecologo.org/)
- Also, other sources of information:
  - American Lung Association; other non-profits
  - INFORM – Cleaning for Health [www.informinc.org](http://www.informinc.org)
  - Industry standards: paints, carpets, etc.
Encourage Team Approach

Persons most often involved in IAQ in School Districts

Participate in Walkthrough
Management of IAQ and asthma prevention is a coordinated effort.

Encourage a sense of shared responsibility.
IAQ Team

Persons most often involved in IAQ in School Districts

IAQ Designated Person

Indoor Air Quality Teams at each building
- Principal
- School Nurse
- Union Representatives
- Chief Custodian

Facilities and Custodial Staff
- Chief custodians
- Contract custodians
- HVAC/Plumbers
The Walkthrough

PEOSH IAQ Standard Inspection Checklist

- General Requirements
- Controls of Specific Contaminants
- Renovation/Remodeling
- Recordkeeping
General Requirements

Maintain acceptable IAQ indicators in mechanically ventilated areas

Temperature
If temperature in the indoor environment is outside the range of 68 – 79 F

Carbon Dioxide
Carbon dioxide concentration exceeds 1000 parts per million

Employer must “check to make sure that ventilation system is operating as designed.”
Basic Ventilation System

mechanical ventilation systems should be “positively pressured” to avoid pulling in outside contaminants.
Buildings without mechanical ventilation, make sure the following are operable:

- Windows
- Doors
- Vents
- Stacks
- Any portals designed for natural ventilation
Eliminate sources of contamination from air supply

Use local exhaust where housekeeping and maintenance activities could release chemicals/dusts above permissible limits.

Common Locations for Local Exhaust

- Lab
- Kitchen
Day to day operation of the unit vents or air handling units

Who controls the thermostats?

Can units be accessed easily for servicing?

Are air flow grates and air return grates unobstructed?
Control Specific Contaminants

Water Intrusion – Focus on correcting the source

- Water intrusion
  - Growth of biological agents
  - Possible health problems

All water-damaged ceiling tiles should be replaced promptly!
Wet Carpeting

Carpet cleaning is rarely effective in removing microbial contamination.

Remove and Replace all water-damaged carpeting if it can’t be completely dried within **48 hours**.

**Microbial growth may begin to occur with a potential to disseminate into the air.**
Mold

- Remove visible microbial contamination

- Remove and discard all porous materials containing visible mold.

- Clean hard surfaces of mold with detergent.

- Follow clean-up guidelines from PEOSH/EPA to protect workers depending on size of project.

For MOLD & ASBESTOS Call the PROS!
Renovation & Remodeling

- Evaluate chemicals for health hazards BEFORE they are selected for use - obtain MSDS sheets
- Notify employees 24 hours prior to any construction
- Isolate construction areas to confine dust, debris and air contaminants
- Use local exhaust ventilation to move dust and contaminants outside and away from occupied areas
- Clean and air-out construction area prior to re-occupancy
Isolate and ventilate the area being renovated
Make Systems Automatic

Build requirements for MSDS sheets satisfactory cleanup into bid specs / contracts

Have adequate numbers of local exhaust fans available if not supplied by contractors

Consistently inform employees about planned renovations.

NOTICE

Dear Employee:

In accordance with the requirement of the NJ Indoor Air Quality Standard (N.J.A.C. 12:100-13)(2007), you are hereby notified that a construction/renovation project will take place at ____________ from ____________ through ____________. Materials utilized will be utilized which contain ingredients that may be potentially offensive or harmful.
Record Keeping

- Preventive maintenance schedule/log
- Record Retention (3 years)
- Records available for inspection
Work **WITHIN** the District’s system to address employees’ IAQ concerns **BEFORE** complaint filed with PEOSH

### Your response to IAQ complaints
- Conduct employee interviews
- Review building operations & maintenance procedures
- Walk-through inspection
- Inspect HVAC system
- Review as-builts
- Conduct sampling, if necessary
- Complete IAQ checklist

### PEOSH’s response to IAQ complaints
- Conduct employee interviews
- Review building operations & maintenance procedures
- Walk-through inspection
- Inspect HVAC system
- Review as-builts
- Conduct sampling, if necessary
- Complete IAQ checklist
Asthma-Friendly School Award

- PEOSH Designated Person’s Training has been completed by:
  - the school nurse and
  - the IAQ Designated Person for the school district

- Identify the initial person to report to in each school – An Indoor Air Quality TEAM has been established at the school.
IAQ Tools for Schools Action Kit

- IAQ Coordinator's Guide
- IAQ Reference Guide
- IAQ Backgrounder
- Checklists and Topic Backgrounders
- Managing Asthma in the School Environment
- The Framework for Effective School IAQ Management
- Managing Radon in Schools
- Problem Solving Tool
IAQ Tools for Schools Action Kit

IAQ Backgrounder

The goal of the Checklist is to provide clear and easily applied activities that you can use to help prevent indoor air quality problems and resolve any problems promptly if they do arise. Once you understand the basic principles and factors that influence indoor air quality in your school, you will note that the specific activities involve two major actions - the management of pollutant sources, and the use of ventilation for pollutant control. This guidance is based on the following principles:

- Many IAQ problems can be prevented by school staff and students.
- When IAQ problems do arise, they can often be resolved using the skills of school staff.
- The expense and effort required to prevent most IAQ problems is much less than the expense and effort required to resolve problems after they develop.

Why IAQ is Important to Your School

Most people are aware that outdoor air pollution can damage their health, but many do not know that indoor air pollution can also have significant harmful effects. U.S. Environmental Protection Agency (EPA) studies of human exposure to air pollutants indicate that indoor levels of pollutants may be 2-5 times, and occasionally more than 100 times, higher than outdoor levels. These levels of indoor air pollutants may be of particular concern because it is estimated that most people spend about 90% of their time indoors. Comparative risk studies performed by EPA and its Science Advisory Board have consistently linked indoor air pollution among the top five environmental health risks to the public.

Failure to prevent indoor air problems, or failure to respond promptly, can have consequences such as:

- Increasing the potential for long-term and short-term health problems for students and staff
- Impacting the student learning environment, comfort, and attendance
- Reducing performance of teachers and staff due to discomfort, sickness, or absenteeism
- Accelerating deterioration and reducing efficiency of the school physical plant and equipment
- Increasing the potential that schools will have to be closed, or occupants temporarily relocated
- Creating negative publicity that could damage a school’s or administration’s image and effectiveness
- Creating potential liability problems

Indoor air problems can be subtle and do not always produce easily recognized impacts on health, well-being, or the physical plant. Children may be especially susceptible to air pollution. For this and the reasons noted above, air quality in schools is of particular concern. Proper maintenance of indoor air is more than a “quality” issue; it encompasses safety and stewardship of our investment in the students, staff, and facilities.

Understanding IAQ Problems and Solutions

Over the past several decades, exposure to indoor air pollutants has increased due to a variety of factors, including the construction of more tightly sealed buildings.

IAQ Checklists Available

- Teacher’s
- Administrative Staff
- School Official’s
- Health Officer’s
- Ventilation
- Building Maintenance
- Waste Management
- Food Service
- Renovation and Repairs
- Integrated Pest Management
- Walkthrough
During the walkthrough, use your senses:

- **Look** at the general level of cleanliness.

- **Smell** for unique or objectionable odors—including mold, mildew, and “chemical” smells—as you move from room to room. Note any potential sources of these odors.

- **Feel** for uncomfortable air temperatures, drafts, and high or low humidity. Check for air flowing into and out of grilles and air vents.

- **Listen** to the concerns of school occupants regarding IAQ. Do they experience any IAQ-related symptoms in classrooms?
## TYPICAL SOURCES OF INDOOR AIR POLLUTANTS

<table>
<thead>
<tr>
<th>Outdoor Sources</th>
<th>Building Equipment</th>
<th>Components/Furnishings</th>
<th>Other Potential Indoor Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Polluted Outdoor Air</strong></td>
<td><strong>HVAC Equipment</strong></td>
<td><strong>Components</strong></td>
<td></td>
</tr>
<tr>
<td>• Pollen, dust, mold spores</td>
<td>• Mold growth in drip pans, ductwork, coils, and humidifiers</td>
<td>• Mold growth on or in soiled or water-damaged materials</td>
<td>• Science laboratory supplies</td>
</tr>
<tr>
<td>• Industrial emissions</td>
<td>• Improper venting of combustion products</td>
<td>• Dry drain traps that allow the passage of sewer gas</td>
<td>• Vocational art supplies</td>
</tr>
<tr>
<td>• Vehicle and nonroad engine emissions (cars, buses, trucks, lawn and garden equipment)</td>
<td>• Dust or debris in ductwork</td>
<td>• Materials containing VOCs, inorganic compounds, or damaged asbestos</td>
<td>• Copy/print areas</td>
</tr>
<tr>
<td><strong>Nearby Sources</strong></td>
<td><strong>Other Equipment</strong></td>
<td><strong>Furnishings</strong></td>
<td>• Food prep areas</td>
</tr>
<tr>
<td>• Loading docks</td>
<td>• Emissions from office equipment (volatile organic compounds (VOCs), ozone)</td>
<td>• Emissions from new furnishings and floorings</td>
<td>• Smoking lounges</td>
</tr>
<tr>
<td>• Odors from dumpsters</td>
<td>• Emissions from shop, lab, and cleaning equipment</td>
<td>• Mold growth on or in soiled or water-damaged furnishings</td>
<td>• Cleaning materials</td>
</tr>
<tr>
<td>• Unsanitary debris or building exhausts near outdoor air intakes</td>
<td></td>
<td></td>
<td>• Emissions from trash</td>
</tr>
<tr>
<td><strong>Underground Sources</strong></td>
<td></td>
<td></td>
<td>• Pesticides</td>
</tr>
<tr>
<td>• Radon</td>
<td></td>
<td></td>
<td>• Odors and VOCs from paint, caulk, adhesives</td>
</tr>
<tr>
<td>• Pesticides</td>
<td></td>
<td></td>
<td>• Occupants with communicable diseases</td>
</tr>
<tr>
<td>• Leakage from underground storage tanks</td>
<td></td>
<td></td>
<td>• Dry-erase markers and similar pens</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Insects and other pests</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Personal care products</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Stored gasoline and lawn and garden equipment</td>
</tr>
</tbody>
</table>
The Road to Success for Your IAQ Team

EPA Tools for Schools IAQ Management Plan:

1. Fix existing IAQ problems.

2. Instill IAQ awareness that leads to preventive actions.

3. Resolve IAQ complaints and incidents as they occur.

Encourage a sense of shared responsibility and cooperative effort
Virtual School Walkthrough

Walkthrough Basics

Checklist(s)

Walk-Through Checklist

<table>
<thead>
<tr>
<th>OK</th>
<th>See Notes</th>
<th>Major Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Entries &amp; Hallways</td>
</tr>
<tr>
<td>✓</td>
<td></td>
<td>Classrooms &amp; Portables</td>
</tr>
<tr>
<td>✓</td>
<td></td>
<td>Ventilation &amp; Mechanical</td>
</tr>
<tr>
<td>✓</td>
<td></td>
<td>Staff Lounge/ Workroom</td>
</tr>
<tr>
<td>✓</td>
<td></td>
<td>Science Labs &amp; Shops</td>
</tr>
<tr>
<td>✓</td>
<td></td>
<td>Custodial &amp; Storage</td>
</tr>
<tr>
<td>✓</td>
<td></td>
<td>Basements, Crawl, Tunnels</td>
</tr>
<tr>
<td>✓</td>
<td></td>
<td>Exterior &amp; Roof</td>
</tr>
</tbody>
</table>

Floor Plan

Basic Map of Facility

Fire Escape Plan

Edgewater Middle School
8003 Daisy Lane
Cary
Walkthrough Basics

Pollutant Source/Location

Direction of Air Flow

Virtual School Walkthrough
Summary of Nurse’s Role

- Asthma Episodes/Triggers
- Green Cleaning
- IAQ Team/Walkthrough
Resources

PAIPM Program/Penn State Extension
extension.psu.edu/ipm

National Heart Lung & Blood Institute
http://www.nhlbi.nih.gov/health/prof/lung/asthma/basics_schools

Whitney-IAQ Tools for Schools National Symposium

Virtual Walkthrough
http://www.nwcleanair.org/aqPrograms/indoorAir.htm