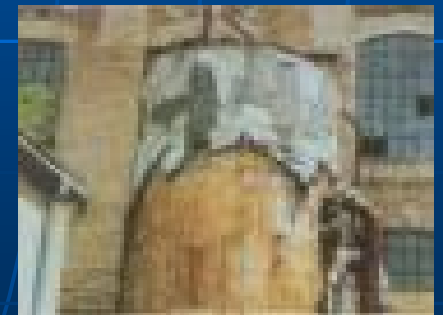
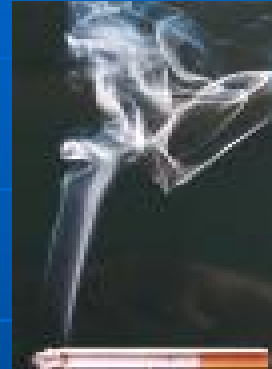


Safer Environments for Children: Homes, Child Care Settings & Schools

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Environmental Hazards

- Carbon monoxide (CO)
- Environmental tobacco smoke
- Mold
- Volatile organic compounds (VOCs)
- Radon
- Lead
- Pesticides
- Asbestos

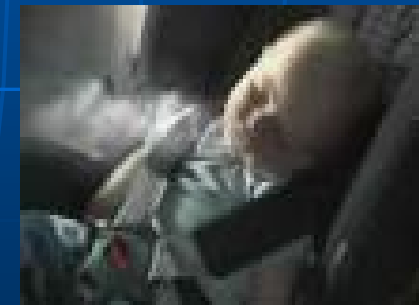


Sources of Carbon Monoxide

- Malfunctioning/improperly vented appliances
- Poorly maintained heating systems
- Exhaust outlets near air-intakes
- Idling vehicles-garages, parking lots, streets

Environmental Tobacco Smoke

- Smoking in home/building
- Residual effect when children are not in building
- Smoke from other part of building using common ventilation system

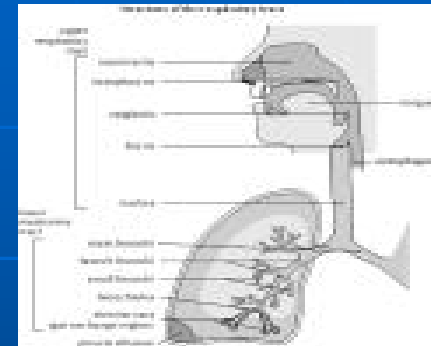


IAQ Some Facts

- Industrialized societies spend over 90% of their time indoors
- Importance: health, safety, comfort and efficient working environment
- "sick building syndrome" reduces productivity work environments such as schools and is current problems of poorly designed buildings.

Poor Indoor Air Quality (IAQ) Common Signs and Symptoms

- Headaches
- Fatigue
- Shortness of breath
- Nasal congestion
- Cough and sneezing
- Eye, nose, throat, and skin irritation
- Nausea and syncope
- Nosebleeds



Clues Suggesting IAQ Problems

- Stuffy or musty odor (particularly in mornings)
- Symptoms are widespread
- Symptoms disappear/diminish with sufficient time out of building or home
- Onset is sudden after some change (painting, remodeling, pesticide use)
- Affected persons have symptoms indoors, but not outdoors

Remedial Action IAQ Problems

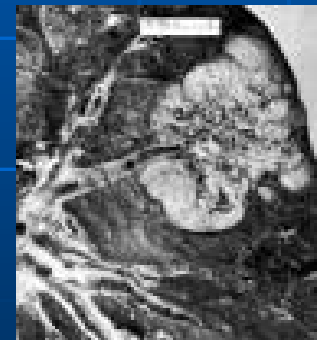
Absence of Readily Identifiable Problem

- Investigate (industrial hygienists, environmental health specialist)
- Examine HVAC design, operation, & maintenance
- Check relative humidity(30-50%)
- Airflow rate (between 15-20 cubic ft/min per person)
- Carbon dioxide level < 1000ppm
- Airflow rate for carbon dioxide (between 15-31 cubic ft/min per person)



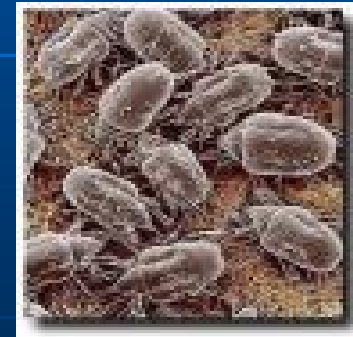
Mold

- Causes-high humidity, plumbing leaks, poor building design, flooding, excessively damp surfaces, water reservoirs (e.g. humidifiers, A/C units)
- Health impacts- may produce mycotoxins, fungal metabolites causing short-term irritation to immuno-suppression, and cancer.



Other Biological Agents

- Viruses & bacteria
- Animal dander (also from clothing)
- Insect that shed allergens
- Dust mites (waste)-
mattresses, pillows, box
springs, upholstered
furniture, stuffed toys,
carpets.



Diagnostic Clues

- Is relative humidity > 50%?
- Are humidifier used? How often cleaned?
- Have flooding or leaks occurred?
- Evidence of mold (visible growth/odors)?
- Carpet on damp/unventilated floors?
- Are there pets?
- Evidence of cockroaches or rodents?
- Are bacterial odors present-fishy/locker-room smells?
- Is adequate outdoor air provided?

Remedial Action/Biological Agents

- Provide adequate fresh air ventilation
- Eliminate standing water in A/C units
- Maintain HVAC, dehumidifiers
- Repair leaks & seepage
- Clean/dry water damage carpets & building materials < 24 hrs or replace
- Relative humidity at 30-50%
- Exhaust fans-bathrooms, pools, showers
- Remove or vacuum carpets regularly

Volatile Organic Chemical (VOCs)

- Chemicals as gases at room temp.
- Sources:
 - Paints
 - Adhesives
 - Building materials & furnishings
 - Office copiers
 - Permanent markers, arts, & crafts materials
 - Science room materials
 - Cleaning products
 - Air fresheners

Diagnostic Clues for VOCs

- Are toxic chemical cleaners used/stored?
- Is remodeling underway/completed?
- Has child used/exposed to solvent?
- Has child used or in room with art, craft, or photographic materials?
- Do fumes from print shops or auto welding share same ventilation system?

Remedial Action for VOCs

- Increase ventilation when using products emitting VOCs
- Do not store opened containers of unused paints/other similar materials
- Remove or reduce sources of formaldehyde by using sealants on cabinets, paneling, & other furnishings

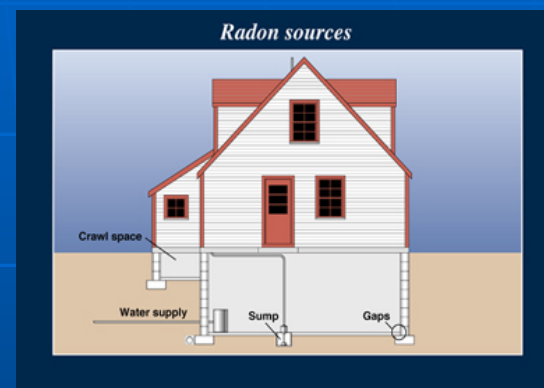
Prevention of IAQ Problems

- Education on sources/effects of pollutants
- Manage the sources: removal of substances; substitution; airing out; sealing off materials
- Maintain optimal HVAC system operation
- Control exposure:
 - Time of use (e.g. strip/wax floors after school of Friday)
 - Location of use (e.g. moving contaminate as far as possible from occupants)

Radon

Naturally occurring radioactive gas

- Source: cracks & openings in foundation
- EPA action level is 4 pCi/L (pico Curie/liter)
- 1992-EPA estimated 19.3% of US schools have at least one room > 4 pCi/L
- Site local residential level 1.3pCi/L
- EPA goal 2pCi/L
- Remediation: seal entry points & exhaust ventilation



Lead

- Indoors Sources:
 - Paints chips & dust (floors, windowsills, window wells, walls, renovations)
 - Furniture, toys, leaded ceramic dishware, plumbing (water), remedies
 - Arts & crafts supplies, paints
 - Food and water
 - Take home exposure, i.e. clothing

Lead

- Outdoor sources:
 - Leaded soil (exterior paint: building, fences, shed, playground equipment)
 - Soil contamination from prior industrial use
 - Improperly contained materials from renovations
 - Geological mineral deposits
 - Contents of accessible storage area

Lead Problem

- Current residential prevalence of lead paint in NE/VT?
- Washington state survey of schools, childcare-62% of 75 facilities build before 1979 had lead paint, 31% contained elevated leaded soil or dust
- Schools not required to meet 1991 EPA action level of 15ppb in water-volunteer program lead control/monitoring

Lead and Children

- Peak levels 1-3 years
- Prevalence & occurrence : inverse relationship to income/area of residence

Lead Facts

- Childhood lead poisoning – great strides/advances in the public health in the US.
- Numbers of exposures causing Encephalopathy-way down
- Zero deaths
- Marked decrease in high blood levels of lead(bPB).

More facts

- Median Blood Lead Levels Children 1-5:
15mcg/dl (1976-1980)
2.7 mcg/dl (1991-1994)
- Decreased prevalence 10mcg/dl or > *
1996 = 10.5%
1998 = 7.6%
- 890,000 children with levels of 10mcg/dl or greater- adverse neuro-cognitive affects.

* CDC's National Health & Nutrition Examination Survey 1999

CDC Guidelines

- 10mcg/dl now considered high
- Universal screening: ages 12-36mos
- Questionnaires: screening of high risk children
- Environmental assessment/intervention considered with bPB levels of 20mcg/dl or >

CDC Avoidance Measures

- Cover or paint over chipped paint
- Move cribs/playpens away from peeling paint
- Use high phosphate detergents window sills/flooring
- Avoid dry dusting and sweeping
- Wash children's hands regularly after play
- Use cold water for cooking
- Run tap water for 2-3 min in am
- Replace/repair old windows
- Professional paint removal-without family present.

Pesticides

- Residue indoor/outdoor use (found indoor air, surfaces, dust, soil)
- Pets
- Residues in food
- Playground structures-wood treated with copper chromium arsenate
- Lawn & garden products
- Insect repellents
- Poisoning when accessed by children

Pesticides and Children:Facts

- According to American Association of Poison Control Centers, in 2002, estimated 69,000 children involved in common household pesticide-related poisonings or exposures in the home
- An additional 26,338 children were exposed to or poisoned by household chlorine bleach.

According to EPA findings

- 47% of all households with children under age 5- at least one pesticide stored in unlocked cabinet, < 4 feet off the ground (i.e., within the reach of children).
- 75% of households without children under age 5 stored pesticides in an unlocked cabinet, < 4 feet off the ground (i.e., within the reach of children).
- Significance? 13% of all pesticide poisoning incidents occur in homes other than the child's home.

Children and Exposure

- Infants & children may be at higher health risk:
- Organs are still developing
- Enzymatic, metabolic, & immune systems are immature
- Dietary & fluid intake are high due to growth
- Pesticide residues in consumed foods as per ideal body weight is higher than that of adults.
- Exploring & playing on the floor/ground
- Touching & placing objects in mouth

EPA Recommendations

- Safe storage away from child's reach & secured
- Read labels, follow instructions & precautions
- Before applying pesticides (indoors or outdoors), remove children, toys & pets from the area & keep them away until the pesticide has dried
(Close windows when applying outdoors)
- Never transfer pesticides to other containers that children may associate with food or drink

ATSDR

The Comprehensive Environmental Response, Compensation, & Liability Act (CERCLA) requires that the Agency for Toxic Substances & Disease Registry (ATSDR) jointly with EPA, ascertain significant human exposure levels (SHELs) for hazardous substances in the environment, & the associated acute, sub-acute, & chronic health effects

Minimal Risk Levels

- MRL - estimate of daily human exposure to hazardous substances, likely to be without appreciable risk of adverse non-cancer health effects over a specified duration of exposure
- Substance specific estimates are intended to serve as screening levels, used by ATSDR health assessors & others to identify contaminants & potential health effects

Low level exposure of pesticides

- According to a study performed on biological monitoring of organ phosphorus pesticide exposure:
- The attribution of compound metabolite measurements to specific pesticides is difficult without detailed knowledge of exposure pathways
- There were no symptoms of acute intoxication associated with low level exposure
- There is a lack of scientific knowledge regarding the long-term health effects of low-level exposure to OP pesticides in children

Recommendations Cont...

- Place rodent or insect baits where small children cannot get to them
- Close child resistant packaging tightly.
- Alert others to the potential hazard of pesticides, especially caregivers & grandparents;
- Teach children that "pesticides are poisons" -- something they should not touch;
- Poison Control Center phone number 1-800-222-1222 keep on or near telephone.

Integrated Pest Management (IPM)

- Cost effective environmentally sensitive
- Knowledge of pest life cycles/interaction
- Block & seal entry points
- Keep area free of water & food
- Keep plants & trees away from building
- Use alternatives-boric acid-cockroaches
- Minimize use of pesticides-don't spray, target use of low toxic chemicals-cockroach baits
- Safe & proper storage.

Asbestos Hazard?

- Microscopic fibers become airborne
- Fibers can be inhaled contributing to health problems, fibers remain in the lung & cause damage to lung tissue
- No determined safe levels
- Longer the exposure/more the exposure = higher the risk

(www.EPA.GOV)

Problematic

- Asbestos is not particularly harmful unless the form/structure is disturbed (renovations/demolitions)
- ACM (asbestos containing materials) when damaged, fibers are separated & then become airborne

(www.EPA.GOV)

Health Problems

- Asbestosis–latency period 25-40 yrs
- Mesothelioma- 15-30 yrs * only known cause is asbestos exposures
- Lung cancer- 15-30 yrs
- Gastrointestinal cancer

(www.EPA.GOV)

Sources of Asbestos

- Steam pipes, boilers, & furnace ducts –asbestos coating
- Resilient floor tile - adhesives
- Patching & joint compounds/textured paints
- Asbestos containing cement , shingles, & siding
- Decorative Materials
- Ironing board covers & certain hairdryers
- Houses built between 1930-1950 may have asbestos insulation.
- Oil & coal furnaces – asbestos insulation

(www.EPA.GOV)

Safety in Schools

- AHERA- (Asbestos Hazardous Emergency Act- 1986)

“requires local educational agencies to inspect their schools for asbestos-containing building material & prepare management plans ... make recommendations for the reduction of asbestos hazards”.

- Inspections every three years
- Develop, maintain, update management plans
- Reports/inspections available to public
- Asbestos awareness and management training

(www.EPA.GOV)

Management/Prevention

- Inspect often-look for tears, abrasions, water damage
- Removal-done by professional (10% in schools)
- Containment-drywall, drop ceilings, other encloses (most common)
 - record locations of asbestos
- Operation & maintenance (watch & wait)
 - do nothing when no contact exists
 - record presence & condition
- Assess impact of planned renovations

Resources/References

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- www.ATSDR.org/minimal risk
- www.ATSDR.org/TOX FAQs
- www.epa.gov/radon
- <http://healthyamericans.org>