

Pediatric Environmental Health



APPROACH TO THE ENVIRONMENTAL HEALTH HISTORY

Debra Cherry, MD, MS

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Southwest Center for Pediatric Environmental Health at the University of Texas Health Center at Tyler

Supported by

**Association of Occupational and
Environmental Clinics**

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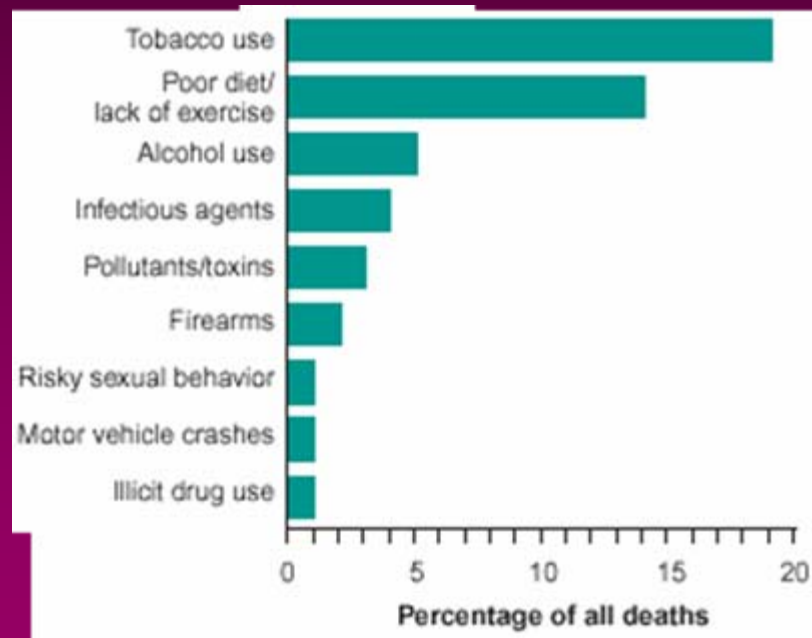
Environmental Protection Agency

OBJECTIVES

- Obtain a pediatric environmental health history
- List key local resources for investigating environmental complaints
- Identify and discuss some common environmental toxins

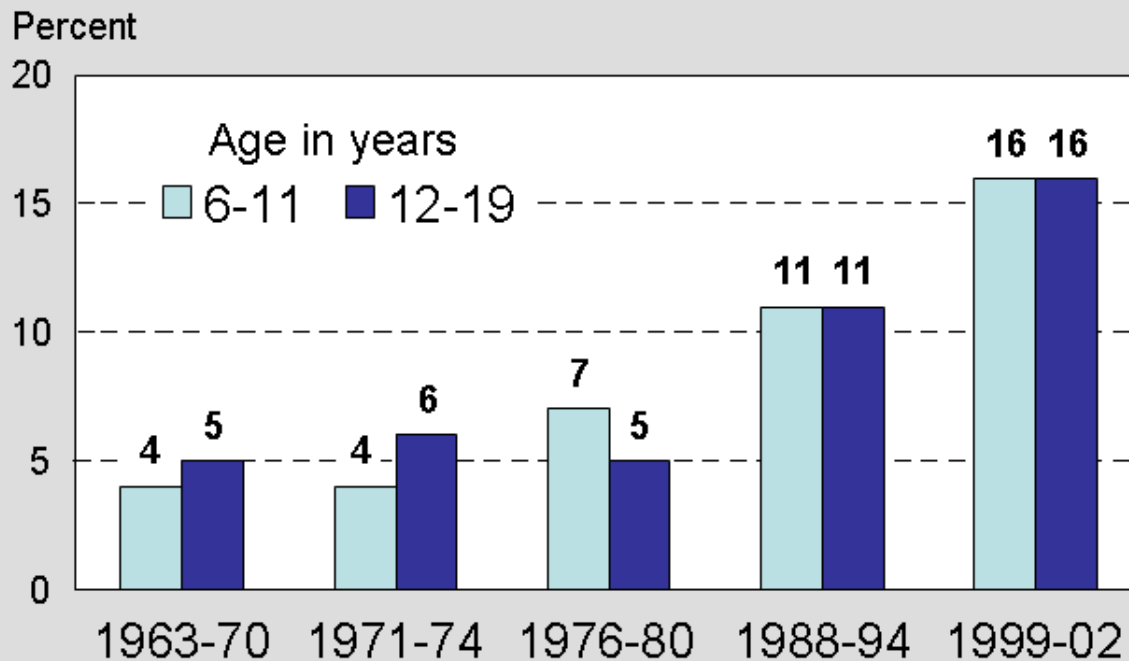
Perspective

Percentage of deaths attributable to various risk factors, U.S., 1990; from CDC, Chronic Disease Prevention



Greatest Threat to Children's Health: Obesity

Figure 1. Prevalence of overweight among children and adolescents ages 6-19 years



NOTE: Excludes pregnant women starting with 1971-74. Pregnancy status not available for 1963-65 and 1966-70. Data for 1963-65 are for children 6-11 years of age; data for 1966-70 are for adolescents 12-17 years of age, not 12-19 years.
SOURCE: CDC/NCHS, NHES and NHANES

When to Consider an Environmental Etiology

- Rare: A disease caused by a single, specific environmental agent (acrodynia / mercury)
- More likely: An environmental contributor to a disease with complex etiology
 - Asthma (dust mites and ozone)
 - Headache, fatigue- inadequate ventilation
- Unusual or recalcitrant illness: consider environment

CASE PRESENTATION

A woman who is 2 months pregnant brings her 8 year old son, John, to the pediatrician because of symptoms he has been experiencing over the last month.

CASE PRESENTATION (cont.)

This fall, he has been complaining of headache, fatigue, and less interest in school. His teacher says he appears sleepy, although he begins to perk up somewhat in the afternoon. His mother tried putting him to bed earlier, but it did not seem to help.



CASE PRESENTATION (cont.)

At first his mom thought that John's symptoms were related to her pregnancy-she has been more fatigued and irritable, and a bit more short with him. She complains of considerable "morning sickness" - headache and vomiting in the morning. Her husband has been traveling more this month as well.

CASE PRESENTATION (cont)

Recently, though, John's headaches have become worse, and she wondered if he has a medical problem, like sinusitis, or eye problems. So she decided to come in and get him checked out.

CASE PRESENTATION (cont.)

- What do you think?
- What additional questions would you ask of John and his mom?



CASE PRESENTATION (cont.)

- Any fever, nasal congestion, cough?
- Any abdominal pain, vomiting, or change in appetite?
- Any problems with vision or balance? LOC?
- Is anyone else in the family ill?
- Is there a family history of headaches?
- How is John adjusting to the new school year, and also to the news of the pregnancy?

CASE: Additional Information

His mother says that John has not had fever, vomiting, nasal congestion or rash. His appetite has been good. He occasionally has blurred vision but no dizziness or LOC. The teacher did not mention problems with his classmates or adjustments to the new class at school.

CASE: additional information

- When asked, John reports feeling a bit nauseous, but no abdominal pain.
- But he thinks the house has been “stuffy” since his mom turned on the heat

CASE: Additional Information

Family history

There is no history of migraine headaches. Mother denies family problems with alcohol, drugs or domestic violence.

ENVIRONMENTAL HISTORY: KEY SCREENING QUESTIONS

- Where does the child live or spend time?
 - Indoor and outdoor environment
- What are the parents' occupations? Are the children employed?
- Does anyone in the home smoke?

Environmental History: Sick Visits

- Do symptoms subside or worsen in a particular location? On weekdays or weekends? At a particular time of day?
- Are symptoms worse during hobbies, arts, or crafts?
- Are playmates having similar symptoms?

WHERE DOES THE CHILD LIVE OR SPEND TIME?

Indoor environment:

- Buildings - Home, school, daycare, etc.
 - Type of dwelling (radon, asbestos, formaldehyde)
 - Age and condition (lead, friable asbestos)
 - Trigger: Built before 1950

INDOOR ENVIRONMENT, CONTINUED

- Ongoing or planned renovation (lead, asbestos)
- Any sign of water damage (mold)
- Hobbies (oil-based painting and solvents, furniture refinishing and strippers)

TIME IN THE OUTDOOR ENVIRONMENT

- Use of pesticides, gardening
- Outdoor sports and ultraviolet radiation
- Nearby dumps or hazardous waste sites?
- Nearby industrial plants? (Lead, mercury, solvents)



OCCUPATIONS OF PARENTS AND CHILDREN

- Consider take-home exposures
- Construction or renovation (lead, asbestos)
- Pesticide application
- Agriculture and farm workers (pesticides, farm safety)

ENVIRONMENTAL TOBACCO SMOKE (ETS)

- Are there smokers in the household?
- ETS associated with respiratory disease and persistent middle ear effusion



WATER SUPPLY AND DIET

- Well water: Nitrates and methemoglobinemia in infants
- Tap water: May leach lead from pipes if warm
- Pesticide residues: Rinse fruits and vegetables
- Breast milk: DDT and PCB's

INTERVIEW: Including the Environmental History



Home

- Dwelling: single family, old house built before 1950, with old paint, a little peeling. Family has lived here for 5 yrs.

INTERVIEW: Including the Environmental History (cont.)

- Heating sources:
 - Forced hot-air gas furnace. Duct work repaired few months ago.
 - Fire place in the living room. Chimney has not been checked.



INTERVIEW: Including the Environmental History (cont.)

- Family has smoke detectors but no carbon monoxide detectors
- No current renovation, but they are planning to fix up a room for the new baby.
- No history of water damage
- No use of indoor and outdoor pesticides

INTERVIEW: Including the Environmental History (cont.)

Hobbies & other activity locations

John likes to put together model trains-but only rarely uses glues. He also likes to play baseball and frequently plays at the nearby field.



INTERVIEW: Including the Environmental History (cont.)

Outdoor environment of home

The home is in a predominately residential area. 2 blocks away, however, a company is currently digging an underground parking lot. The neighbors say there are leaking chemical barrels buried there.

INTERVIEW: Including the Environmental History (cont.)

Parents' hobbies

- Mother paints with acrylics. Cleans up with soap and water, not with solvents.
- Father plays tennis.



INTERVIEW: Including the Environmental History (cont)

Father's job

Father works in an administrative job in a biotechnology company. His job involves working at a desk with a computer terminal.

INTERVIEW: Including the Environmental History (cont.)



Mother's job

She has been working half time as a graphic designer at a local company.

INTERVIEW: Including the Environmental History (cont.)

School

John went to the same elementary school for first grade last year. It is a public school that was built about 10 years ago. He attends after-school at his school. His symptoms are not better on weekends.

PHYSICAL EXAM

- VS: HR-90, BP-90/60, RR-16, afebrile
- Ht: 50" (50%), Wt: 25.3 kg (50%)
- GEN: WDWN. Not ill-appearing.
- HEENT: Head atraumatic. PERRLA. EOMI. Pink conjunctivae. TM's WNL. Nose clear. O/P was unremarkable.
- Neck: supple. No thyromegaly or masses.
- Chest: CTA. No rales or wheezes.

PHYSICAL EXAM

- CV: nl S1 and S2 without murmur. Pulses equal.
- ABD: no HSM. No masses or tenderness.
- GU: nl circ male with descended testes.
- Neuro: alert, oriented. CNs intact. Vision 20/20. NI gait and balance. Good FTNP. Neg Romberg. No focal deficits.
- Skin: Very pink. No lesions.

CASE: Assessment

- What are the diagnostic possibilities?
- What would be the initial laboratory tests to order?
- How could you go about investigating home or neighborhood contamination?

CASE: Assessment (cont.)

Diagnostic possibilities include:

- Social adjustment reaction to new school, mom's pregnancy
- Carbon monoxide poisoning
- Lead poisoning
- Allergies/sinusitis

CASE: Assessment (cont.)

Other diagnostic possibilities:

- Anemia
- Brain tumor
- Vision problem
- Migraine headaches
- Solvent exposure from leaking barrels
- Child abuse
- Childhood depression

CASE: Assessment

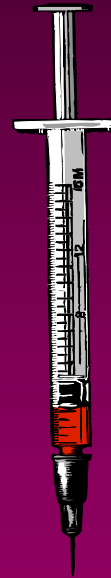
What testing would you now obtain?



CASE: Assessment

Patient laboratory testing

- CBC
- Lead level
- Carboxyhemoglobin



CASE: Assessment (cont.)

John's Laboratory Test Results:

- Carboxyhemoglobin level
Drawn following morning, immediately after awakening: 15%
- Lead level: 4 ug/dl
- CBC: unremarkable

Interpretation of COHb levels

<u>COHb (%)</u>	<u>Symptoms</u>
0-10	Usually none in healthy pts; 3-8% typical for smokers
10-20	Headache, inc. angina, dyspnea with mild exertion
20-30	Throbbing headache, nausea, fatigue, irritability
60-70	Frequently fatal

CASE: Assessment (cont.)

- *Environmental Assessment: home*
 - Check of home furnace
- *Environmental Assessment: Neighborhood*



CASE: Assessment (cont.)

Environmental Assessment: home

John and his family left the home until the source of CO was revealed.

A home inspection revealed a faulty furnace as the source CO.

CASE: Diagnosis, Treatment & Intervention

- Diagnosis: Carbon monoxide poisoning from a faulty furnace at home
- John was treated with oxygen until his carboxyhemoglobin came down to normal
- The furnace was promptly shut off, and then repaired, in order that all exposure to CO cease immediately.

CASE: Treatment & Intervention

What other investigations would you do now?



CASE: Treatment & Intervention

- Get carboxyhemoglobin levels on the mother
- Follow-up on the additional problem of possible chemical contamination from nearby leaking barrels



CASE: Additional Follow-up

Environmental Assessment- consider calling:

- TD State Health Services (TDSHS)/Regions 4 and 5, (903) 533-5241, contact Cecil Fambrough, Indoor Air Quality Division, for residential testing
- TCEQ, Region 5 office (Tyler), (903) 535-5100 for community investigation dealing with water, fire, or hazardous waste

More Environmental Resources

- ATSDR, Region VI, Dallas, Jennifer Lyke: 214-665-8362
 - Federal agency, hazardous waste
- Poison Control Centers – National Network
 - 1-800-222-1222; any acute poisoning or information about toxic substances
- Pediatric Environmental Health Units
 - Tyler unit covers TX, NM, AR, LA, OK; Dial 1-888-901-5665, connect to El Paso Poison Center; URL: <http://www.swcpeh.org>

CASE: Follow-up on barrels

- The TCEQ had no reports of leaks, but sent an investigator to examine the site.
- The investigator met with company representatives who stated there were a couple of buried barrels of chemicals, but were not leaking. They had done local soil testing which did not show increase in volatile organic compounds.

Summary: Results of Environmental Investigation

- Most susceptible victim of CO poisoning: the fetus
- As for John: Arrange follow-up visit; COHb of 15 may not explain all the symptoms
- Leaking barrels: You helped the community by examining the suspicious barrels; help communicate the results

ABOUT THIS CASE

- The specific case presented is fictitious, but represents a composite of real cases seen by the authors.
- The names are fictitious and are not related to the photos
- The source of photos are personal collection, and from Printmaster 8.0 (Broderbund) and are not related to any real cases of carbon monoxide poisoning.

CREDITS

- These slides were developed by Drs. Rose Goldman, Michael Shannon, and Alan Woolf, faculty of the Pediatric Environmental Health Unit at Cambridge Hospital and Children's Hospital, Boston, with support from our mutual sponsor, AOEC via a cooperative agreement with EPA and ATSDR

CH2OP from Canada

- Community (urban, rural, neighborhood)
- Home and Hobbies
- Occupations
- Personal Habits (drugs, alternative medicines)

Environmental History: Establishing Causation

- How specifically can the problem be identified?
- Have any environmental factors been associated with the problem in others?
- Could the identified hazards cause this problem?
- Has the dose been sufficient to result in an illness?

Environmental History: Establishing Causation

- Does the temporal relationship make sense?
 - Long latency for cancer
- How does the environmental contribution compare in overall likelihood to other etiologies under consideration?

Worried Parent/Well Child: Questions for the HCP

- Have the identified environmental exposures been associated with health effects in people? If so, how convincingly?
- How does the dose compare with known dose-response relationships?
- What are existing exposure standards?
- What factors might increase or decrease the child's susceptibility?

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- This presentation represents the views of the authors and does not constitute endorsement of any specific item or instrumentation.
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