Environmental And Occupational Health Part II + Heat Stroke

KSU Dept of Family & Community Medicine

435 Lecture Notes by Qusay Ajlan

Original Content | **Titles** | Additional Notes | **Important**

Examples of famous industrial accidents

1-Oppau explosion in Germany inSeptember 21, 1921: Occurred when a tower silo storing 4,500 tonnes of a mixture of ammonium sulfate and ammonium nitrate fertilizer exploded at a BASF plant in Oppau, now part of Ludwigshafen, Germany, killing 500–600 people and injuring about 2,000 more.

2- The Minamata disaster 1932-1968: was caused by the dumping of mercury compounds in Minamata Bay, Japan. the cause of Minamata disease is Methylmercury an organic mercury compound released in factory wastewater it is estimated that over 3,000 people suffered various deformities, severe mercury poisoning symptoms or death from what became known as Minamata disease. is a medical specialty dealing with **disorders of the nervous system**.

3-The Bhopal disaster in India in December 3, 1984: ***is the largest industrial disaster*** on record..A faulty tank containing poisonous methylisocyanate leaked at a Union Carbide plant. About 20,000 people died and about 570,000 suffered bodily damage.

4-Chernobyl disaster. April 26, 1986: At the Chernobyl Nuclear Power Plant in Ukraine a test on reactor number four goes out of control, resulting in a nuclear meltdown.

The ensuing steam explosion and fire killed up to 50 people with estimates that there may be up to 4,000 additional cancer deaths over time among the approximately 600,000 most highly exposed people.

5-Texas City Refinery explosion March 23, 2005: An explosion occurred at a British Petroleum refinery in Texas City, Texas.

6-Deepwater Horizon oil spill in April 20, 2010: in the Gulf of Mexico.

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Occupational health Divisions

Occupational health can be divided into many divisions and the integration of those divisions is very important. These divisions are:

1. Occupational diseases.
2. Occupational safety.
3. Occupational toxicology.
4. Occupational environment.
5. Analysis of biological samples
6. Occupational Ergonomics. making it easier for the worker to do the task physically, cognitively, and/or organizationally.
7. Air pollution. (related to factories)
8. Occupational Legislation. (law)

Internal factors affect Workers:

-Internal factors affect Workers are including the worker health, age, genetics, and physical fitness.

-Workers with family history of certain diseases are not encourages expose to chemicals and radiation hazards. Even at low exposure level.

-Also a young worker of highly physical fitness shows much resistant to occupational diseases than aged one.

external factors affect Workers:

-**Physical factors**: such as the exposure to **heat stress noise vibration** electromagnetic fields, and radiation.

-**Chemical factors**: exposure to dust, gases, and acid vapors.

-**Biological factors**: such as food deficiency, vitamin deficiency, Anthrax for wool industries, Cowpox for cow farms, Schistosomiasis for agricultural fields.

-**Occupational social factors**: for workers how immigrants seeking jobs from rural area to urban areas which may cause social problems.

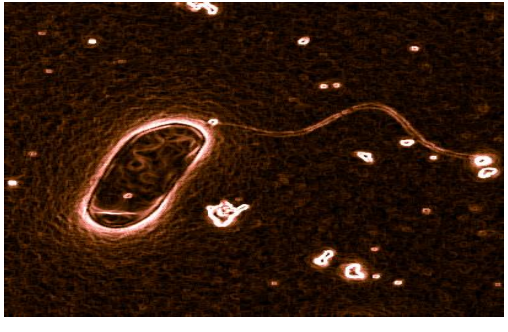
Occupational hazards

1-Physical hazards may include **noise, temperature extremes, illumination extremes, ionizing or non-ionizing radiation, and ergonomics.**

2-Chemical hazards related to Dangerous Goods or Hazardous Substances are frequently investigated by **Occupational Hygienists.**

Other related areas including **Indoor air quality (IAQ) and safety** may also receive the attention of the Occupational Hygienist.

3-Biological hazards may stem from the potential for **legionella exposure** at work or the investigation of biological injury or effects at work, such as dermatitis may be investigated.**Legionella** is a pathogenic **Gram negative bacterium**, including species that cause legionellosis or Legionnaires' disease



control of occupational hazards

Appropriate controls are selected from the hierarchy of control: by

1-Elimination, MUSCUT (instead of creating batteries for cars we buy it from other places)

2-Substitution;(replacing of items and substances with others less dangerous)

3-Engineering.

Like using robots

cont.

Substitution the doctor skipped this table

Substitution of a More Hazardous Chemical by a Less Hazardous Chemical		
Task	Hazardous Chemical	Substitute
Extraction solvents	Ethyl ether; Methyl-t-butyl ether (MTBE)1	Hexanes1
Oxidation of organic compounds	Chromate ion	Hypochlorite ion1
Qualitative test for heavy metals	Sulfide ion	Hydroxide ion1
Freezing point lowering	Benzene	Cyclohexane; Sodium chloride solution

Heavy metal exposure

Heavy metal exposure occurs through three primary routes:

1-Inhalation. Common examples include workers scraping or sanding lead paint and workers in factories where heavy metals are melted and processed.
In the days before leaded gasoline was banned, those living alongside heavily traveled roads faced significant exposure through tailpipe emissions.

2-Ingestion. The leading cause of lead poisoning in children is eating old paint chips.
A major source of elevated mercury levels in humans comes from eating contaminated fish. And people can drink arsenic from wells contaminated by arsenic-containing pesticides.

3-Skin absorption. Day to day contact with heavy metals can cause poisoning.
Dermal exposure is a serious concern for workers in fields where the irrigation water contains naturally-occuring arsenic (such as Asian rice paddies).

Occupational disease:

The term "occupational disease" refers to those illnesses caused by exposures at the workplace.
They should be separated, conceptually, from injuries that may also occur at workplaces due to a variety of hazards.
Occupational diseases may occur in varying time frames, from the instantaneous development of illness following exposure to toxic chemicals to decades between onset of exposure and the development of disease, as occurs with many occupationally related cancers.
Occupational disease is associated with time while occupational injury doesn't

Examples of varying time frames include

1. instantaneous reactions to exposure to chemicals such as chlorine or ammonia gas;
2. a delay of some six to twelve hours with fumes of aerosolized zinc, as occurs when welding on galvanized steel;
3. a delay of weeks to months with lead poisoning;
4. a delay of decades with occupational carcinogens;
5. the finding of congenital malformations in children whose parents may have been exposed to hazardous materials. In short the effect doesnt necesserliy appear it could wait til the next generation

cont.

-Although not all occupational exposures that cause illness lead to death, considerable numbers of deaths each year are associated with workplace exposures.

-While it is relatively easy to count deaths due to occupational ***injuries***, it is much more difficult for delayed illnesses.

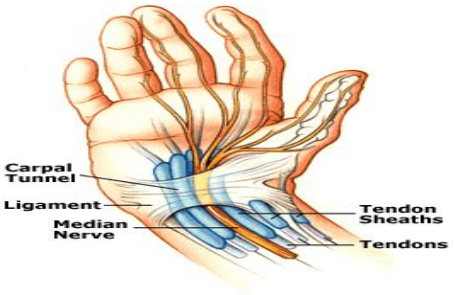
-More than 6,200 fatal occupational injuries occur in the United States each year, with more than 40 percent associated with transportation, and most of these related to motor-vehicle fatalities.

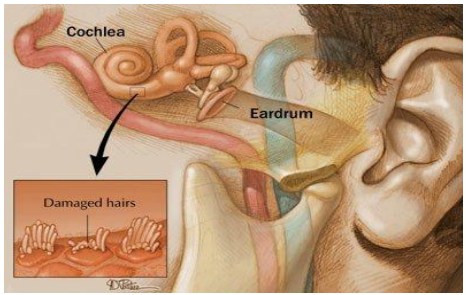
-As noted above, deaths from occupational illness for most diseases are hard to enumerate.

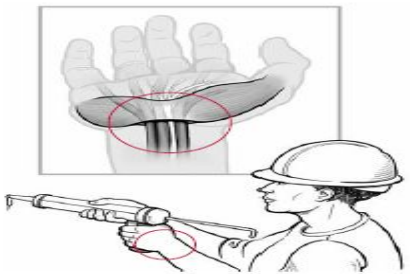
-The only diseases for which reasonably good data exists are the pneumoconiosis, such as asbestosis, coal-workers pneumoconiosis, and silicosis. Asbestosis and silicosis are irreversible and could lead to cancer

cont.

-For many other diseases, such as those from chemical exposure, various occupational cancers, and other problems, individual fatalities are difficult to recognize and record.
-Among the occupational diseases most commonly reported, those relating to repeated trauma, such as :
1-carpal tunnel syndrome.
2-tendonitis.
3-noise induced hearing loss.
-For those cases of carpal tunnel syndrome with workplace absence, half needed twenty-five or more days away from work.







cont.

Skin diseases represented about 13 percent of work related illnesses. Occupational Dermatitis is often an inflammatory skin reaction caused by occupational contact factors.Dermatitis, or inflammation of the skin cases required time away from work.

Occupational diseases cont.

1. Noise: Noise is an unwanted sound; its intensity ('loudness') is measured in decibels (dB). The decibel scale is logarithmic, so a three-decibelincrease in the sound level already represents a doubling of the noise intensity.

-Noise is most obviously a problem in industries such as manufacturing and construction, it can also be an issue in a wide range of other working environments

-One in five of Europe's workers have to raise their voices to be heard for at least half of the time that they are at work and 7% suffer from work-related hearing difficulties.

-Noise induced hearing loss is the most common reported occupational disease in the EU.

Noise Cont.

-For example, a normal conversation may be about 65 dB and someone shouting typically can be around 80dB.

-The difference is only 15 dB but the shouting is 30 times as intensive

-The duration of exposure is also very important. To take this into account, time-weighted average sound levels are used. For workplace noise, this is usually based on an 8-hour working day.

-What problems can noise cause?

1.Increasing the risk of accidents by masking warning signals;

2.Physiological effects.

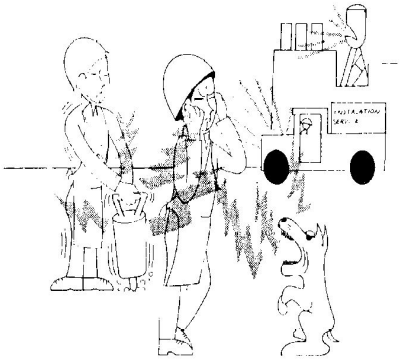
3.Increase the risk of hearing loss.

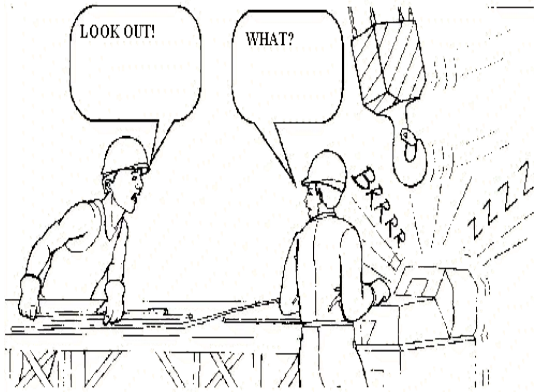
4.Being a causal factor in work-related stress.

Who is at risk?Anyone who is exposed to noise is potentially at risk.

-The higher the noise level, and the longer you are exposed to it, the more risk you have of suffering harm from noise.

PERMISSIBLE NOISE EXPOSURES	
Duration per day, hours	Sound level dBA slow response
8	90
6	92
4	95
3	97
2	100
1 1/2	102
1	105
1/2	110
1/4 or less	115





Noise Cont.

Noise is being recognized as a problem in service sectors such as education and healthcare, bars and restaurants.

-A study of noise in kindergartens found some averaging noise levels over 85dB

-During a performance of Swan Lake, a conductor was recorded as being exposed to 88dB

-Truck drivers can be exposed to 89dB

-Noise on pig farms has been measured up to 115dB

2. Heat Stress

Workers who are exposed to extreme heat or work in hot environments may be at risk of heat stress.

Exposure to extreme heat can result in occupational illnesses and injuries. Heat stress can result in

1. heat stroke, could lead to death + dry skin
2. heat exhaustion, same as heat stroke but doesnt lead to death
3. heat cramps, or
4. heat rashes.

Heat can also increase the risk of injuries in workers as it may result in :

1. sweaty palms,
2. fogged-up safety glasses,
3. dizziness.

Burns may also occur as a result of accidental contact with hot surfaces or steam.

Heat stress cont.

-Workers at risk of heat stress include outdoor workers and workers in hot environments such as -firefighters, bakery workers, farmers (in gulf area farmers are at higher risk MCQ), construction workers, miners, boiler room workers, factory workers, and others.

-Types of Heat Stress :

1-Heat Stroke: It occurs when the body becomes unable to control its temperature:

-the body's temperature rises rapidly, the sweating mechanism fails, and the body is unable to cool down.

-When heat stroke occurs, the body temperature can rise to 106 degrees Fahrenheit (41 oC) or higher within 10 to 15 minutes.

-Heat stroke can cause death or permanent disability if emergency treatment is not given.

Heat stress cont.

Symptoms of heat stroke include:

- Hot, **dry skin** or profuse sweating
- Hallucinations
- Chills
- Throbbing headache
- High body temperature
- Confusion/dizziness
- Slurred speech

Take the following steps to treat a worker with heat stroke:

-Call 911 and notify their supervisor.

-Move the sick worker to a cool shaded area.

-Cool the worker using methods such as:

-Soaking their clothes with water.

-Spraying, sponging, or showering them with water.

-Fanning their body.

Heat Stress cont.

2-Heat exhaustion is the body's response to an excessive loss of the water and through excessive sweating.

Workers most prone to heat exhaustion are those that are elderly, have high blood pressure, and those working in a hot environment.

Symptoms of heat exhaustion include:

1.Heavy sweating
2.Extreme weakness or fatigue
3.Dizziness, confusion
4.Nausea
5.Clammy, moist skin
6.Pale or flushed complexion
7.Muscle cramps
8.Slightly elevated body temperature
9.Fast and shallow breathing

Treat a worker suffering from heat exhaustion with the following:

-Have them rest in a cool, shaded or air-conditioned area.
-Have them drink plenty of water or other cool, nonalcoholic beverages.
-Have them take a cool shower, bath, or sponge bath.

Heat stress cont.

3-Heat cramps usually affect workers who sweat a lot during strenuous activity.
-This sweating depletes the body's salt and moisture levels. Low salt levels in muscles causes painful cramps. Heat cramps may also be a symptom of heat exhaustion.
Workers with heat cramps should:
1.Stop all activity, and sit in a cool place.
2.Drink clear juice or a sports beverage.
3.Do not return to strenuous work for a few hours after the
4.cramps subside because further exertion may lead to heat exhaustion or heat stroke.

Seek medical attention if any of the following apply:
-The worker has heart problems.
-The worker is on a low-sodium diet.
-The cramps do not subside within one hour.

Heat Rash

-Heat rash is a skin irritation caused by excessive sweating during hot, humid weather.

-Symptoms of heat rash include:

- Heat rash looks like a red cluster of pimples or small blisters.
- It is more likely to occur on the neck and upper chest, in the groin, under the breasts, and in elbow creases.

In industries dust with heat + no removal of dust (doesnt take showers frequently) > lead to Heat rash

Very imp
dont forget to check asbestos and silicosis videos in the slides