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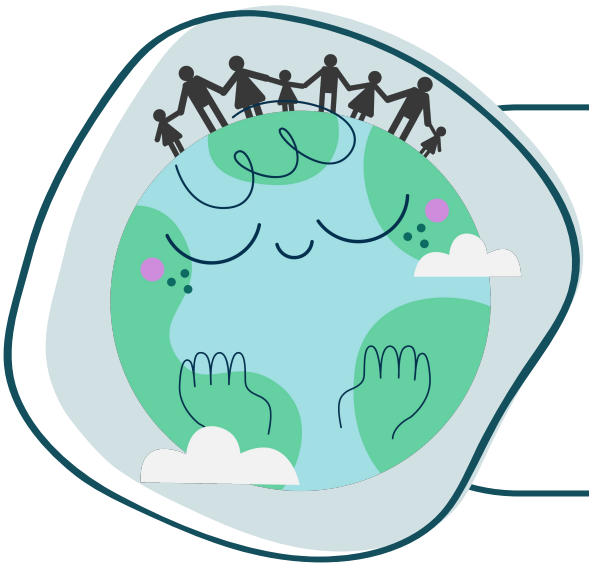

Introduction to Occupational Health

Objectives

- Define Occupational Health.
- Enlist major diseases related to occupational hazards.
  - Physical hazards such as heat, light, pressure, noise, radiation, electricity, and mechanical factors.
  - Chemical hazards such as gases, fumes, dust, metals and solvents.
  - Others including biological agents, occupational cancers and dermatosis.
- Understand signs and symptoms and diagnosis of occupational diseases of public health importance.
- Discuss the scope of occupational health and safety.

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Editing File

Occupational Health Definitions

Occupational Health

- It is the promotion and maintenance of the highest degree of physical, mental, and social Well-being of workers in all occupations by preventing departures from health, controlling risks and the adaptation of work, and people to their jobs.

Industrial Hygiene

- Activities directed to **identifying**, **assessing**, **preventing**, and **managing hazards** to the worker. In the working environment, falls in the domain of Occupational Safety and Health (OSH).[1]
- These activities should be systematic and scientific.

Ergonomics

- Stress evaluation occurring in a work environment and the ability of people to cope with these stresses. [2]
- Designing suitability, the facilities, furniture, equipment, tools, and job demands to make them compatible with the work-force capabilities and limitations.
- Example: having a rest support under the wrist can prevent carpal tunnel syndrome

Aims of Occupational Health and Safety:

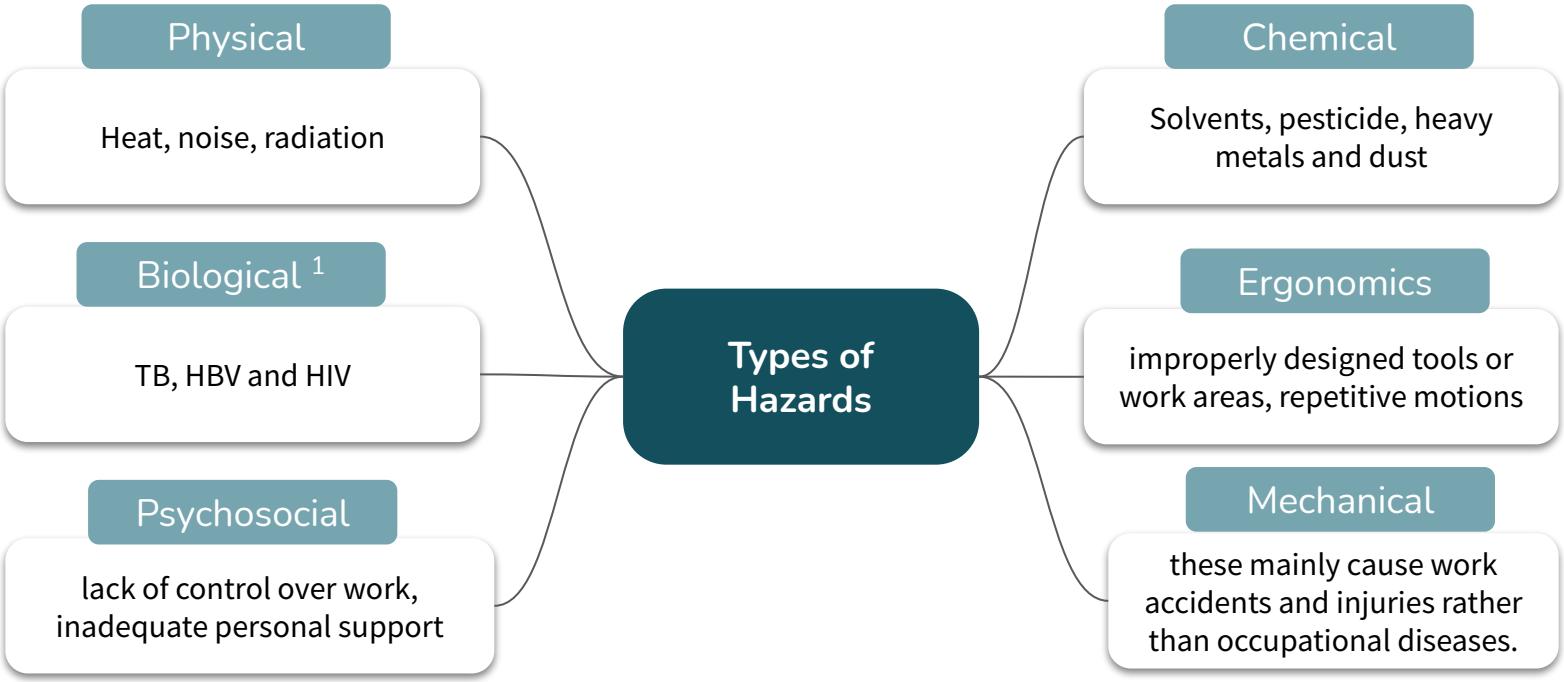
1. Ensure the highest degree of Physical, mental, and social well-being of workers in their occupations
2. Preventing adverse effects on health due to workplace hazards
3. Preventing and controlling hazards of occupations
4. Matching health and safety needs with suitable occupational environment
5. Continued adaptation of workers to work and vise-versa

1. OSH is a new domain that his its full set of protocols, policies, procedures and assessment criterias to ensure the protection of workers.
2. Ergonomics (or 'human factors' as it is referred to in North America) is a branch of science that aims to learn about human abilities and limitations, and then apply this learning to improve people's interaction with products, systems and environments. It is the process of designing or arranging workplaces, products and systems so that they fit the people who use them.

Occupational Diseases

Definition

- Occupational diseases are adverse health conditions in the human being, the occurrence or severity of which is related to exposure to factors on the job or in the work environment.



Characteristics of Occupational Diseases:

1 The **clinical and pathological presentation** are **identical** to that of non-occupational diseases;
Example: asthma

2 Occupational disease may **occur after the termination of exposure**.
Example: asbestos-related mesothelioma (a cancer affecting the lung and abdomen) which can occur 30 or 40 years after the exposure.

3 The clinical manifestations of occupational disease are related to the **dose** and **timing of exposure** [2]
Example: at very high airborne concentrations, elemental mercury is acutely toxic to the lungs and can cause pulmonary failure, while at lower levels of exposure, elemental mercury has no pathologic effect on the lungs but can have chronic adverse effects on the central and peripheral nervous systems.

4 Occupational factors can **act in combination** with non-occupational factors to produce disease
Example: exposure to asbestos (five-fold increase in lung cancer); and the long-term smoking of cigarettes (increases the risk by 50 and 70 fold.

1. Health care providers are at a greater risk against biological hazards
2. COVID-19 is a time dependant. For someone to have an increased risk of getting COVID-19, 20 mins of direct exposure is required to get the infection.

Types of Hazards

Physical Agents	
Factor	**Description**
Heat [1]	Heat hyperpyrexia, exhaustion, syncope, cramps, burns
Cold	Trench foot, frostbite
Light	Occupational cataracts, miner's nystagmus
Pressure	Caisson disease [2], air embolism, blast (explosion)
Noise	Occupational deafness
Radiation	Cancers, leukemias, aplastic anemia, pancytopenia
Mechanical Factors	Injuries, accidents
Electricity	Burns
Chemical Agents	
Gases	CO2, CO, HCN, N2,NH3,HCL
Dusts (pneumoconiosis)	Coal dust (anthracosis), silica (silicosis), asbestos (asbestosis, Ca lung), iron (siderosis) Cane fiber (bagassosis), cotton dust (byssinosis), tobacco (tobacossosis), hay or grain dust (farmer's lung)
Metals and their compounds	Toxicity from Lead, mercury, cadmium, mercury, arsenic
Chemicals	Acids, alkalis, pesticides
Other Agents	
Biological agents	Brucellosis, leptospirosis, anthrax, tetanus, encephalitis, fungal infections
Occupational cancers	Skin, lung, bladder
Occupational dermatosis	Dermatitis and eczema
Psychological origin	Industrial neurosis, hypertension, peptic ulcer

1. Construction workers, chefs and other workers have a greater risk of hyperpyrexia and heat strokes especially here in KSA
2. Decompression sickness (also known as divers' disease) describes a condition arising from dissolved gases coming out of solution into bubbles inside the body on depressurisation (as someone goes back up after deep dives)

Pulmonary Dust Disease

Pneumoconiosis

- Pneumoconiosis is a disabling pulmonary fibrosis that results from the inhalation of various types of inorganic dust, such as silica, asbestos, coal, talc and china clay.

Example: silicosis and asbestosis (the two most important causes of pneumoconiosis)

Types of Pneumoconiosis:

1 Asbestosis

Description	Inhalation of asbestos fibres
Occupations	• Mining and extraction • Exposure to asbestos (insulation) • making of asbestos cloth (soldiers clothes) • manufacture of asbestos cement pipes and other products, - Such as vinyl floor tiles, in brake and cloth lining
Presentation	• Interstitial fibrosis of the lungs, pleural thickening, calcification. • Bronchogenic carcinoma, pleural and **peritoneal mesothelioma** • Progressive dyspnoea on exertion frequently out of proportion to the clinical signs in the lungs, cough, expectoration, chest pain, cyanosis and **clubbing of the fingers**
Diagnosis	• Asbestos bodies in **sputum** (asbestos fibres coated with fibrin) • X-ray shows **ground-glass appearance** in the lower 2/3 of the lung →
Progression	Progressive disease
Prevention	Prevention and periodic examinations

Long time ago, insulators were made of asbestos. Asbestos is an important risk factor for mesothelioma which can present with chest pain (pleuritic) and SOB with unexplained weight loss.

Asbestos is of two types - serpentine or chrysolite variety (90%) and the amphibole type. Asbestos is used in the manufacture of asbestos cement, fireproof textiles, roof tiling, brake lining , gaskets and several other items. Asbestos enters the body by inhalation, and fine dust may be deposited in the alveoli. The fibres are insoluble. The dust deposited in the lungs causes pulmonary fibrosis (due to mechanical irritation), leading to respiratory insufficiency and death; carcinoma of the bronchus; mesothelioma of the pleura or peritoneum; and cancer of the gastrointestinal tract.

Pulmonary Dust Disease

2 Silicosis

Description	Absorption of high amount of crystalline silica (SiO_2)
Occupations	• Mining - Coal, mica, gold, silver, lead, zinc • Stone cutting and shaping, sandblasting - Building and construction areas • Glass manufacture • Iron and steel industry • **Ceramic workers and manufacturers**
Time	7–10 years, sometimes less. Prolonged exposure to higher concentrations of dust
Presentation	• Dyspnoea on exertion, irritant cough and chest pain • Pulmonary tuberculosis (silicosis can activate latent TB) • Cardiac or respiratory failure • Impaired TLC (total lung capacity) in advanced disease
Diagnosis	• X-ray shows snow storm appearance (Scattered micro-opacities and might also present with cavitation in upper lobe of the lung because of TB activation)
Progression	Progressive (irreversible) disease and converts to TB "silico-tuberculosis"
Prevention	Prevention and regular physical examinations - Education about the importance of protection →

Lead Poisoning (Plumbism)

Definition:

- Defined as **lead level of 70 µg/ 100 ml** with clinical signs and symptoms
- Occupational usage (Industrial):
  - Storage batteries, glass, ship building, printing and potteries, rubber
- Non-occupational :
  - **Gasoline**, drinking water via **lead pipes**, **paints** (shine in paints), toys

Modes of absorption:

Inhalation of fumes and dust | **Ingestion** through food or drink | **Skin absorption** "tetraethyl lead" (only organic lead)

Clinical features:

Organic Lead	Insomnia, headache, mental confusion and delirium
Inorganic Lead	Plumbism (lead poisoning), abdominal colic, obstinate constipation (very severe), loss of appetite, blue lines on the gum, anemia and wrist and foot drop

Lead Poisoning

Lab diagnosis:

- Coproporphyrin in urine (screening test)
- Amino levulinic acid in urine
- Lead levels in blood and urine
- Basophilic stipling of RBCs (very sensitive)

Methods of prevention:

1. Substitution (with other materials)
2. Isolation (segregate procedures with risk)
3. Local exhaust ventilation
4. Personal protection (should be disposed of after finishing)
5. Periodic examinations (through coproporphyrin in urine)
6. Health education and personal hygiene (handwashing)

Occupational Cancers★

Carcinogenic agent	Organ affected
Arsenic	Skin and lung
Chromium compounds, hexavalents	Lung
Nickel	Lung and nasal sinus
Polycyclic aromatic hydrocarbons	Skin
Coal tars	Skin, scrotum, lung and bladder
Benzol	Blood (leukaemia)
B-naphthylamine	Bladder
Ionizing radiation	Skin, bone, lung and blood (leukaemia)
Asbestos	Lung, pleura, peritoneum

Occupational Dermatitis

Causes:

- Heat, cold and moisture
- Friction and pressure
- X-rays
- Acids, alkalis, solvents, grease, tar and pitch
- Bacteria and fungi
- Leaves, vegetables and fruits

Classification

Primary Irritants | **Sensitizing Substances**

Prevention:

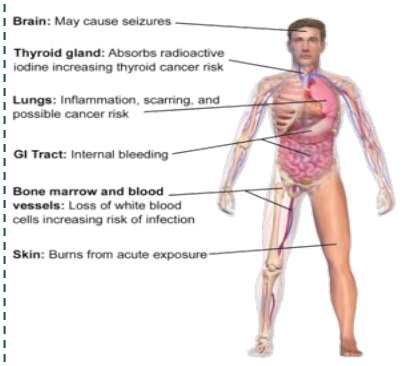
1. Pre-selection (pre-employment check)
2. Protection (protective equipment)
3. Personal hygiene
4. Periodic assessment (usually every 6 months)

Radiation Hazards

Industrial Exposures:

- Manufacture of radioactive paints
- Painting of luminous dials for watches
- Mining of radioactive ores and sand workers
- X-rays rooms

Extra!!



Selected Risks from Radiation Sickness

Effects of Radiation:

Acute	Acute burns, dermatitis and blood dyscrasias
Chronic	Malignancies (carcinogenic effect) and genetic effects

Prevention:

1. Shielding in x-ray areas, monitoring 6 monthly, for their film badge or pocket electronic device, adequate workplace ventilation, replacement and periodic exams. (badges are available)
2. Pregnant ladies should not be allowed to work in the area.

1. Primary irritants (e.g. acids, alkalies, dyes, solvents, etc.) cause dermatitis in workers exposed in sufficient concentration and for a long enough period of time.
2. Sensitizing or allergic dermatitis occurs only in small percentage of cases, due to sensitization of the skin to certain materials

Prevention of Occupational Disease

Prevention of occupational diseases should be addressed by different measures including: medical measures, engineering measures and legislations.

Field	Measurements
Medical	• Pre-placement exams • Periodic examinations • Medical and health care services • Notifications, employees should notify the employer with all diseases he has • Supervision of working environment • Maintenance and analysis of records • Health education and counseling
Engineering	• Designing of the buildings build good exhaust systems • Good housekeeping • General ventilation ACs, windows, ...etc. • Substitution any harmful substance used should be replaced • Dusts • Enclose • Isolate • Local exhausts ventilations • Protective devices based on the occupation • Environmental monitoring • Research
Legislations	• Policies and regulations for factories, work places, health of the workers Example: insurance, sickness policies and disability benefits

Dr. Hafsa recommended reading about the measurements from the book. Link here

Quiz

MCQ

1- A lead miner was admitted to the hospital complaining of irritant cough and shortness of breath particularly whenever he exerts some effort. X-ray showed patchy areas of nodular opacities. History showed the that the patient never performed an periodic occupational examination. What is your diagnosis?

A- Anthracosis
B- Lead poisoning
C- Silicosis
D- Asbestosis

2- Which of the following cancers is most likely to occur in workers dealing with hydrocarbon containing gasoline?

A- Skin and lung cancers
B- Skin, scrotum, lung and bladder cancers
C- Blood cancer (leukemia) only
D- Skin cancer only

3- All of the following are characteristics of occupational diseases EXCEPT

A- Identical to non-exposed disease
B- Can be prevented if the person quits his job
C- Related to the dose of exposure
D- Related to the length of exposure

4- Which of the following terms best defined the following statement: “It is the promotion and maintenance of the highest degree of physical, mental, and social well-being of workers in all occupations”?

A- Occupational Health
B- Occupational Safety and Health (OSH)
C- Industrial hygiene.
D- Ergonomics

5- Which of the following tests is the best screening test for occupational workers in lead industries?

A- Blood smear to check for basophilic stipling
B- Amino levulinic acid levels in urine
C- Direct lead levels in blood
D- Coproporphyrin in urine

Answers

Q1	Q2	Q3	Q4	Q5
C	D	B	A	D

Thank You and Good Luck

Community Medicine
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