### Occupational Health (Community Medicine Practical)

#### Definition
It is a branch of public health, medicine, engineering & sciences which deals with the protection & promotion of the health of the workers in different occupations, through recognition, evaluation & measures of prevention and control of occupational hazards, by engineering & medical techniques by the union of large number of professionals.

#### Occupational Hazards & Examples

<table>
<thead>
<tr>
<th>Hazards</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical</td>
<td>Dust, fumes, liquids, fibers, gases, vapor</td>
</tr>
<tr>
<td>Physical</td>
<td>Noise, heat, radiation, pressure, light, vibration</td>
</tr>
<tr>
<td>Biological</td>
<td>Bacteria, viruses, fungi, parasite</td>
</tr>
<tr>
<td>Mechanical</td>
<td>Accidents</td>
</tr>
<tr>
<td>Psycho – social</td>
<td>Stress, worry</td>
</tr>
</tbody>
</table>

#### Pneumoconiosis

**Definition**
Presence of inhaled dust in lung and tissue reaction to it.

**Factors affecting lung reaction to inhaled dust**
1. Type of dust.
2. Duration of exposure.
3. Concentration of dust in breathing zone.
4. Size of dust particles.

**Environmental measures**
1. Elimination or Substitution.
2. Containment by segregation or isolation.
4. Maintenance of equipment.
5. Local exhaust ventilation.
6. Filtration and disposal (general environment).

**Personal measures**
1. Medical surveillance programs:
   - pre-employment medical examination
   - periodic medical examination
   - health education.
2. Employee Work Practices
3. Respiratory protective equipment (Respirators).

#### Spirometer

**Definition**
It is a device used to measure timed expired and inspired lung volumes.

It is used in diagnosis of occupational lung disease such as Pneumoconiosis.
Spirometer

**Pneumoconiosis**

Is defined as the presence of dust in the lung and tissue reaction against it.

**Measurement**

Measurements which are made are:

1. **VC** (Vital Capacity): is the maximum Volume of Air which can be inspired and expired during either a Forced (FVC) or a Slow (VC) Maneuver.
2. **FEV1** (Forced Expired Volume In One Second): is the volume expired in the first second of maximal expiration after a maximal inspiration and is a useful measure of how quickly full lungs can be emptied.
3. **FEV1/FVC**: is the FEV1 expressed as a percentage of the VC or FVC and gives a clinically useful index of airflow limitation.

**Nb**

Forced Vital Capacity (FVC): the volume of air exhaled during a forced maximal expiration following a forced maximal inspiration.

**Indications to use spirometer**

1. Give baseline readings of the pulmonary functions of workers at the pre-employment medical examination.
2. Screening of the pulmonary functions of the workers at periodic medical examinations to detect any deviation from baseline readings as early as possible.
3. Diagnosis of the occupational lung diseases together with other methods.
4. Disability evaluation for compensation purposes.
6. Used as a challenge test to diagnose occupational asthma and help in identification of the offending agent.

**Interpretation of results**

<table>
<thead>
<tr>
<th>Obstructive ventilation defects</th>
<th>Restrictive ventilation defects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduction of FEV1 % of predicted value for age and gender.</td>
<td>Reduction of both FEV1 and FVC % of predicted value for age and gender.</td>
</tr>
<tr>
<td>Low FEV1 / FVC ratio.</td>
<td>Normal or high FEV1 / FVC ratio (typically &gt; 80%).</td>
</tr>
<tr>
<td>Eg: Asthma, byssinosis, chronic bronchitis, bronchiectasis &amp; emphysema</td>
<td>E.g. Interstitial lung diseases as asbestosis, and silicosis</td>
</tr>
</tbody>
</table>

**Grade of Byssinosis**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 0:</td>
<td>Normal – no symptoms of chest tightness or cough.</td>
</tr>
<tr>
<td>Grade 1/2:</td>
<td>Occasional chest tightness or cough or both on first day of working week.</td>
</tr>
<tr>
<td>Grade 1:</td>
<td>Chest tightness on every first day of the working week.</td>
</tr>
<tr>
<td>Grade 2:</td>
<td>Chest tightness on every first day and other days of the working week.</td>
</tr>
<tr>
<td>Grade 3:</td>
<td>Grade 2 symptoms, accompanied by evidence of permanent incapacity from ventilatory capacity.</td>
</tr>
</tbody>
</table>

**Personal Protective Equipment**

**Definition**

Personal protective equipment (PPE) is designed to protect employees from serious workplace injuries or illnesses resulting from contact with chemical, radiological, physical, electrical, mechanical, or other workplace hazards.

**Requirements for P.P.E**

1. Safe design and construction.
2. Maintained in a clean and reliable fashion.
3. Fit well and comfortable to wear.

**Respiratory personal equipment**

A respirator: is a protective device that covers the nose and mouth or the entire face or head to guard the wearer against hazardous atmospheres.

Respirators may be:

- **Tight-fitting**: That is, half masks, which cover the mouth and nose and full face pieces that cover the face from the hairline to below the chin.
- **Loose-fitting**: Such as hoods or helmets that cover the head completely.

There are two major classes of respirators:

- **Air-purifying**: Which use filters or sorbents to remove harmful substances from the air.
- **Atmosphere - supplying**: Provide clean, breathable air from an uncontaminated source.

**Indications for use**:

1. Insufficient oxygen.
2. Harmful dust, fogs, smokes, mists, fumes & gases.
3. Toxic substances present in the workplace.
**Biological hazard**

<table>
<thead>
<tr>
<th>Definition</th>
<th>Refer to microbial agents present in the work environment, including bacteria, viruses, fungi, and parasites, that can cause occupational disease. Because of their invisible and frequently undetectable nature, biohazards are considered “silent hazards”.</th>
</tr>
</thead>
</table>

**Occupational infections** Infectious diseases acquired in the workplace as a result of unsafe work practice and/or unsafe work environment.

<table>
<thead>
<tr>
<th>Classification of occ. Infections</th>
<th>Mode of infections</th>
<th>Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Air-borne/droplet infections</td>
<td>TB-influenza-meningococcal meningitis</td>
</tr>
<tr>
<td></td>
<td>Fecal-oral infections</td>
<td>HAV-salmonella-shigella</td>
</tr>
<tr>
<td></td>
<td>Blood-borne infections</td>
<td>CMV-HBV-HCV-HIV</td>
</tr>
<tr>
<td></td>
<td>Direct or indirect contact with the animal (Zoonotic infections)</td>
<td>anthrax-brucellosis</td>
</tr>
<tr>
<td></td>
<td>Arthropod-borne infections</td>
<td>yellow fever-malaria-Japanese encephalitis-rift valley fever</td>
</tr>
</tbody>
</table>

**Main source of occ. infections**

<table>
<thead>
<tr>
<th>Type of contact</th>
<th>Agent</th>
<th>Infections from human sources</th>
<th>Infections from environmental sources.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percutaneous inoculation</td>
<td>HB, C, and delta, HIV</td>
<td>Gloves, needle stick prevention programs</td>
<td></td>
</tr>
<tr>
<td>Airborne transmission/ Respiratory droplets</td>
<td>TB, measles, SARS, Neisseria meningitidis, influenza virus.</td>
<td>Respiratory isolation, air filtration (for TB), respiratory droplet precautions</td>
<td></td>
</tr>
<tr>
<td>Fecal-oral transmission</td>
<td>Salmonella, Shigella, Vibrio, hepatitis A, rotavirus,</td>
<td>Hand washing, gloves</td>
<td></td>
</tr>
<tr>
<td>Direct contact</td>
<td>HSV, staphylococci, ectoparasites,</td>
<td>Gloves, protective clothing</td>
<td></td>
</tr>
</tbody>
</table>

**Occ. Illness acquired through contact with human sources**

<table>
<thead>
<tr>
<th>Workers at risk for infections from human source</th>
<th>Type of contact</th>
<th>Agent</th>
<th>Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Healthcare workers</td>
<td>• Social care workers</td>
<td>• Sewage workers</td>
<td>• Laboratory workers</td>
</tr>
</tbody>
</table>

**Zoonotic infections**

Zoonotic infections include anthrax, brucellosis and psittacosis.

Workers at risk:

- Farmers and other agricultural workers
- Veterinary surgeons
- Poultry workers
- Butchers and fishmongers
- Abattoir workers and slaughter men
- Forestry workers
- Researchers and laboratory workers—those is, animal handlers
- Sewage workers

**Bacterial disease acquired through direct or indirect contact with animals**

<table>
<thead>
<tr>
<th>Type of contact</th>
<th>Disease</th>
<th>Animal exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airborne transmission</td>
<td>Anthrax</td>
<td>Cattle, goats, donkeys, wild herbivores</td>
</tr>
<tr>
<td></td>
<td>Brucellosis</td>
<td>Cattle, goats, swine, dogs</td>
</tr>
<tr>
<td></td>
<td>Plague</td>
<td>Urban and domestic rats, ground squirrels, prairie dogs, rabbits</td>
</tr>
<tr>
<td>Direct contact with infected animal or tissue</td>
<td>Anthrax</td>
<td>Cattle, goats, donkeys, various other wild herbivores</td>
</tr>
<tr>
<td></td>
<td>Brucellosis</td>
<td>Cattle, goats, swine, dogs</td>
</tr>
</tbody>
</table>

**Infection from environment source**

Examples include legionellosis and tetanus.

Workers at risk:

- Construction workers
- Engineering workers
- Military staff
- Overseas worker
## Prevention of exposure to biological hazard

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Screening and immunization.</strong></td>
<td><strong>Engineering controls.</strong></td>
<td><strong>Administrative controls.</strong></td>
</tr>
<tr>
<td><strong>Personal measures.</strong></td>
<td><strong>Infection control measures and waste handling.</strong></td>
<td><strong>Surveillance and outbreak response.</strong></td>
</tr>
</tbody>
</table>

### Specific preventive measures

<table>
<thead>
<tr>
<th>Disease</th>
<th>Preventive measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cholera</td>
<td>Vaccine</td>
</tr>
<tr>
<td>HAV</td>
<td>Vaccine, Ig</td>
</tr>
<tr>
<td>HBV</td>
<td>Vaccine</td>
</tr>
<tr>
<td>Malaria</td>
<td>Chemoprophylaxis</td>
</tr>
<tr>
<td>N. meningitidis</td>
<td>Vaccine</td>
</tr>
<tr>
<td>Poliomyelitis</td>
<td>Vaccine</td>
</tr>
<tr>
<td>S. Typhi</td>
<td>Oral live attenuated vaccine-or parenteral vaccine</td>
</tr>
<tr>
<td>Tetanus-Rabies-anthrax</td>
<td>Vaccine-seroprophylaxis-post exposure prophylaxis</td>
</tr>
</tbody>
</table>

### Engineering controls

Workplace controls are intended to contain biohazards at their source, reduce their airborne concentration, and limit their movement through the work site.

1. Proper ventilation of workroom
2. Appropriately designed and maintained.
3. Can be further decontaminated by filtration.
4. Sharp containers
5. Needleless systems, and retractable needles
6. In research and clinical laboratories, handling infectious agents in a biological safety cabinet (BSC) AND(HEPA) filter.
7. Sharp containers
8. Needleless systems, and retractable needles.

### Administrative controls

Administrative control focuses on maintaining good work habits to minimize exposures due to spills, accidental releases, or other causes.

- Work surfaces should be decontaminated properly.
- Access to biohazard work areas should be restricted.
- Work practice: In laboratories, mouth pipetting should be prohibited-overcrowding of work areas.

### Personal measure

- Personal protective equipment (PPE)
- Personal hygiene measures
- Hand washing (when)
- Mouth covered while sneezing or coughing
- No food, beverages or tobacco products stored or consumed in the same work area.
- Health education
- Vaccination of workers at risk

### Waste handling

- The proper handling, decontamination or containment, and disposal of biological waste is an important infection control measure in all work settings.
- Adopt of well known policy and procedures for cleaning and disinfection of spills.

### Medical surveillance

Early disease detection contributes to successful treatment of disease and enables precautionary measures to break disease transmission, including isolation of infectious disease cases.

### Outbreak measures

- Prompt investigation to determine the source, control of the source.
- Prompt and effective treatment.
- Isolation of the affected workers is essential (when needed).

### Protection of workers exposed to zoonotic infections

- Stock certification and vaccination: Anthrax or brucellosis
- Quarantine measures: Psittacine birds
- Infection free feeds: Salmonella free feed for poultry
- Avoidance of contamination of animal drinking water
- Test and slaughter policies: Bovine tuberculosis
- Good standards of hygiene in stock housing
- Regular stock health checks by vets
- Meat inspection