Health and Safety Essentials

Lecture 13 – Occupational Health Challenges and Control Measures –

Epidemiology & Occupational Hygiene

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✅ Recap Question 1

Which statement BEST describes the purpose of a Safety Management System (SMS)?

- A. To eliminate all workplace accidents through procedures
- B. To ensure legal compliance only
- C. To provide a structured, systematic approach to managing health and safety risks through continuous improvement
- D. To replace risk assessments with policies

✅ Recap Question 2

Which Safety Management System model is MOST closely associated with the Plan–Do–Check–Act (PDCA) cycle and was published by the UK regulator?

- A. ILO-OSH 2001
- B. POPMAR
- C. HSG65
- D. OHSAS 18801

✅ Recap Question 3

One of the KEY differences between OHSAS 18001 and ISO 45001 is that ISO 45001:

- A. Focuses only on physical hazards
- B. Introduces stronger leadership accountability, worker participation, and risk-based thinking
- C. Removes the need for risk assessment
- D. Applies only to large organisations

Objectives

- Understand epidemiology's role in identifying occupational health challenges.
- Apply epidemiological methods in the workplace.
- Apply occupational hygiene principles to manage risks.
- Analyse case studies to implement control measures effectively.

Introduction to Occupational Health

- What is Occupational Health?
  - Defined by WHO as the promotion of physical, mental, and social well-being at work.

  - Key focus areas:
    - Identifying workplace health risks.
    - Preventing work-related illnesses and injuries.
    - Promoting worker health.

Understanding Epidemiology in Occupational Health

Definition: Study of disease patterns in populations.

Lillienfeld & Lillienfeld, 1980 define it as:
"...the study of patterns of disease occurrence in human populations and the factors that influence these patterns"

- Applications in workplace health:
  - Identifying causal relationships (e.g., smoking, asbestos and mesothelioma).
  - Understanding disease distribution.
  - Evaluating interventions.

Origins of Epidemiology
From Ancient Observations to Modern Science

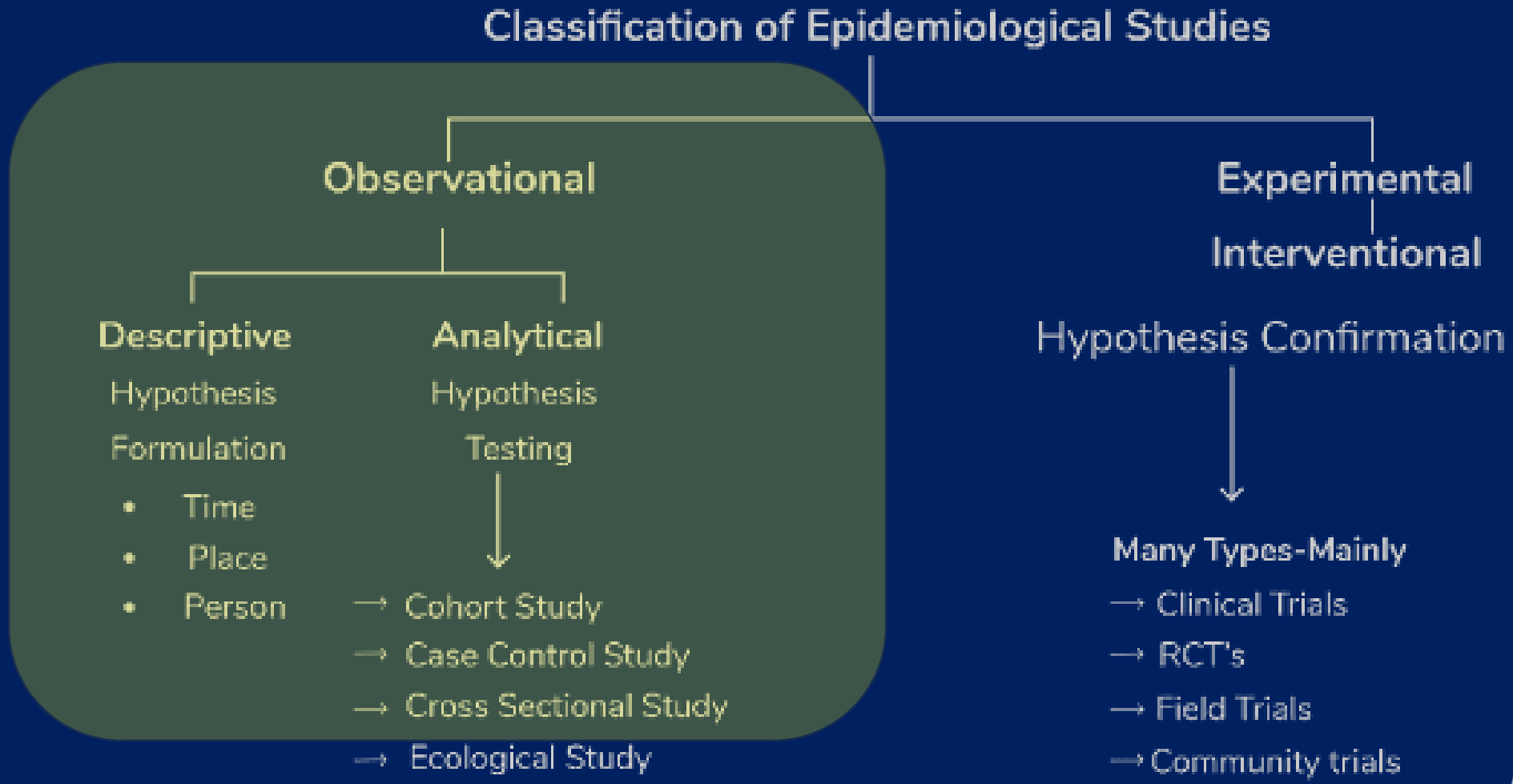
- Hippocrates (c. 460 – c. 370 BC)
  - the first to regard disease as a natural rather than a supernatural phenomenon, encouraging doctors to look at physical causes of illness and to use objective observation and critical deductive reasoning.
  - distinction between “epidemic” and “endemic”
- Girolamo Fracastoro (1478-1553)
  - the first to propose a theory that these very small, unseeable, particles that cause disease were alive.
  - able to spread by air, multiply by themselves and to be destroyable by fire.
  - 1543 wrote ‘De contagione et contagiosis morbis’, in which he was the first to promote personal and environmental hygiene to prevent disease
- John Snow (1813-1858)
  - one of the founders of modern epidemiology
  - tracing the source of a cholera outbreak in London's Soho

Modern Application of John Snow's Methods from the Cholera Outbreak

- Watch: https://www.youtube.com/watch?v=lNjrAXGRda4
- Activity: Applying John Snow's Methods
- Instructions:
  - Reflect on John Snow's approach:
    - Gathering data.
    - Mapping cases geographically.
    - Identifying patterns and root causes.
    - Implementing interventions.

Discussion:
How can you apply similar methods to identify and mitigate work place health hazards today?

Types of Epidemiological Studies



Types of Epidemiological Studies

Descriptive Studies

- These are foundational and widely applicable for OHS managers to monitor workplace health trends.
- Purpose:
  - Describe patterns of injuries or illnesses within a workplace.
  - Identify trends over time or between groups.
- Examples in OHS:
  - Monitoring the incidence of musculoskeletal injuries in different departments.
  - Tracking the prevalence of respiratory conditions in workers exposed to dust.
- Why It's Feasible:
  - Uses easily collected workplace data (e.g., injury logs, absenteeism records).
  - No advanced analytical tools required.

Types of Epidemiological Studies

Cross-Sectional Studies

- Also known as "snapshot studies," these are useful for identifying relationships at a specific point in time.
- Purpose:
  - Assess the prevalence of health outcomes and exposures simultaneously.
- Examples in OHS:
  - Surveying workers about ergonomic practices and self-reported back pain.
  - Studying noise levels in various sections of a factory and hearing loss reports.
- Why It's Feasible:
  - Relatively quick and inexpensive.
  - Data can be gathered through questionnaires or workplace audits.

Break

Types of Epidemiological Studies

Case-Control Studies

- These are effective when investigating specific incidents or clusters of health problems.
- Purpose:
  - Compare workers with a specific health issue (cases) to those without (controls) to identify potential causes.
- Examples in OHS:
  - Investigating a cluster of dermatitis cases in a factory and comparing their chemical exposure to unaffected colleagues.
  - Examining reports of repetitive strain injuries and correlating them with job roles or equipment use.
- Why It's Feasible:
  - Focuses on a small sample size.
  - Requires a logical approach to selecting cases and controls but minimal statistical e .

Types of Epidemiological Studies

Retrospective Cohort Studies

- These involve analysing past data to explore links between exposures and outcomes.
- Purpose:
  - Evaluate whether certain exposures in the past correlate with health problems observed now.
- Examples in OHS:
  - Reviewing exposure records to determine if workers exposed to solvents over 10 years developed higher rates of headaches.
  - Analysing accident logs to identify patterns tied to shifts, roles, or tools.
- Why It's Feasible:
  - Uses existing workplace records (e.g., exposure data, medical reports).
  - Avoids the need for long-term follow-ups.

Types of Epidemiological Studies

Informal Surveillance

- Though not strictly epidemiological, it is highly practical in day-to-day OHS management.
- Purpose:
  - Continuously monitor health trends and hazards in the workplace.
- Examples in OHS:
  - Tracking reports of discomfort or injuries informally through regular staff meetings.
  - Observing absenteeism spikes linked to specific tasks or departments.
- Why It's Feasible:
  - Relies on observation, informal data collection, and regular communication.
  - Can act as an early warning system to trigger more formal studies.

Challenges in Epidemiological Studies

- Limitations of Epidemiology
  - Healthy worker effect.
  - Data Protection
  - Poor data quality or incomplete histories.
  - Difficulties in linking exposure to outcomes.

Introduction to Occupational Hygiene

- Occupational or Industrial Hygiene?
- Industrial hygiene and occupational hygiene are terms that are sometimes used interchangeably, but they can have slightly different connotations depending on the context

Industrial Hygiene

- Focus: Primarily focuses on workplace environments in industries, such as manufacturing, construction, or chemical plants, where there are significant risks due to exposure to physical, chemical, and biological hazards.
- Scope: Often associated with large-scale industries and factories.
- Examples:
  - Measuring air quality in a chemical plant.
  - Ensuring proper ventilation in a factory where toxic fumes are present.
  - Monitoring noise levels in a production facility.

What is Occupational Hygiene?

- Occupational hygiene, also known as Industrial hygiene, is the science and art of protecting and enhancing the health and well-being of workers and citizens of the community. The field of industrial hygiene tackles a wide range of job-related hazards, including environmental, chemical, physical, and ergonomic hazards.

Key Differences - Occupational vs Industrial Hygiene

- Industrial Hygiene is more commonly associated with industrial settings and physical, chemical, and biological hazards.
- Occupational Hygiene has a broader application to all types of workplaces, covering both industrial and non-industrial environments.

- However, the two fields overlap significantly, and the distinction often depends on how the terms are used in specific countries or professional standards.

Types of Hygiene Hazards in the Workplace

- Environmental Hazards
  - Environmental hazards in the workplace refer to any conditions or substances that can potentially harm the health and safety of employees. These hazards can include exposure to particulate contaminants or gas or vapour contaminants such as mists, fumes, fibres, aerosols, gases, etc.
- Chemical Hazards
- Biological Hazards
- Physical Hazards
- Ergonomic

Key Differences of OHS vs OH

1. Specificity: Occupational hygiene is a specialised area within OHS, focusing on environmental and workplace exposure risks, while OHS covers all aspects of workplace safety and health.
2. Scope: OHS is broader, encompassing hygiene, safety procedures, mental health, ergonomics, and accident prevention.
3. Approach:
    1. Occupational hygiene takes a more scientific and technical approach (e.g., air sampling, exposure analysis).
    2. OHS includes both technical and managerial aspects, such as policy-m and training.

5 Principles of Occupational Hygiene

1. Anticipate:

- Think ahead to predict potential hazards before they become problems.
  Example: A factory planning to use a new chemical should predict risks like spills or fumes.

2. Recognise:

- Identify hazards already present in the workplace.
  Example: Spotting excessive noise levels in a manufacturing area.

3. Evaluate:

- Measure the level of risk posed by the hazard to determine its impact.
  Example: Using sound meters to check if noise exceeds safe levels.

4. Control:

- Implement solutions to reduce or eliminate the risk.
  For example, install noise dampeners/acoustic baffles, provide ear protection for workers, or install quieter machines.

5. Interdisciplinary Approach:

- Occupational hygiene combines biology (understanding health impacts), chemistry (ide toxic substances), and engineering (designing safer systems).
  Example: Engineers designing better ventilation systems for chemical labs.

Emerging Challenges

- Nanotechnology: The long-term health effects of working with nanoparticles are not yet fully understood.
  - Nanoparticles may enter the body through inhalation, skin contact, or ingestion and could harm organs over time.
  - Workers in factories producing nano-enabled products like sunscreen, paints, or electronics might inhale particles without realising their risks.

- Climate change: Global warming is causing higher temperatures, more heatwaves, and extreme weather events.
  - Workers in outdoor jobs (e.g., construction, agriculture) face increased risks of heat exhaustion and dehydration.
  - Extreme weather: Storms, floods, and other events disrupt workplaces, leading to injuries and stress.

- Automation/AI: Machines and artificial intelligence (AI) are replacing some jobs and changing how others are done.
  - Psychological impacts: Workers may feel anxious about losing their jobs or struggle to adapt to working with AI systems.
  - Deskilling: Over-reliance on AI might reduce workers' skills and sense of purpose.

Discussion

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