


Lesson 14. Occupational Health



Industrial Hygiene & Safety

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Hazardous Work

- ❖ What make's work dangerous?
- ❖ What jobs are dangerous?
- ❖ Why?

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Definitions and Overview

- A. Goal of the Occupational Health & Safety Professions: to *recognize, evaluate and control* hazards to health and safety in the work place.
- B. Current Perspectives: Current rates of occupational injury and illness are declining, but still not acceptable:
- C. Trends in demographics - work force includes more women, more ethnic diversity
 - > Nature of work in USA changing toward service, high technology
 - > Growing use of temporary or contract workers: limited benefits and employer responsibility
 - > Emerging work-related health problems: musculo-skeletal disorders, work performance monitoring (eg, by computer), social isolation

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The Problem

Occupational Injuries and Illness, 2004

U S Workforce	140,400,000 full-time equivalent (FTE) workers
Fatal Injuries*	5,703 total 4.1 cases/100,000 FTE workers
	* Highway accidents, intentional assaults, struck by object, falls from elevation

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Occupational Injuries and Illness, 2004

- ❖ Total Injuries and Illness:
 - > 4.8 cases/100 FTE workers
 - > Manufacturing, construction, agriculture (includes fisheries and forestry)
 - > This statistic excludes government employees, self-employed workers, and farms with < 11 employees)
- ❖ Illnesses:
 - > 249,000 total newly diagnosed cases
 - > 20/10,000 FTE workers
 - > Manufacturing, agriculture, transportation
 - > Noise-induced hearing loss, skin disease, asthma

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Occupational Injuries and Illness, 2004

- ❖ Data Quality:

It is widely agreed that these data underestimate the true incidence rate, especially for continuing chronic illnesses, but the extent of the error is not known.

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Hazard Recognition



- A. **Product identification:** labeling (what's in that tank rumbling down the highway?), material safety data sheets (MSDS - everything causes cancer, or everything is safe)
- B. **Hazard communication:** effectiveness of worker education is highly variable
- C. **Risk assessment:** how do we balance magnitude of health hazard against cost and ease of prevention? Must we accept work-related hazards as "just part of the job?"

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Hazard Evaluation



- A. **Air sampling:** one principal function of the Industrial Hygienist
- B. **Biological monitoring:** evaluates the workers' total exposure by all routes, and from all sources

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Hazard Evaluation



- C. **Standards (Limits) for Occupational Exposure:** present status and controversies. OSHA, Washington Department of Labor & Industries
- D. **Exposure measurement for epidemiologic studies -**
retrospective: is exposure that occurred 20 years ago associated with illness occurring today?
Prospective: will today's exposures be associated with illness in 20 years?

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Occupational Exposure Standards and Guidelines

1. General Characteristics:

- a. Assume that there is a threshold below which harmful biological effects are not detected
- b. Reflect the quality of the data used by the standard setting agency
- c. May not protect all people in all situations
 - 1. Individual health status
 - 2. Work rate
 - 3. Work environment (temperature, humidity, multiple exposures)
- d. Compliance measurements may be imprecise, inaccurate

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Occupational Exposure Standards and Guidelines

2. Basis for Standards:

- a. Biological
 - 1. Irritation
 - 2. Asphyxiation
 - 3. Anesthesia, narcosis
 - 4. Systemic poisoning
 - 5. Carcinogenesis, mutagenesis, teratogenesis
 - 6. Other reproductive effects
- b. Economic and political considerations, e.g., noise exposure
- c. Analytical convenience, e.g., asbestos

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Occupational Exposure Standards and Guidelines

3. Sources of the Standards:

- a. ACGIH (American Conference of Governmental Industrial Hygienists) -- TLV
- b. OSHA (Occupational Safety & Health Administration) -- PEL
- c. State agencies (Washington Dept. of Labor & Industries) -- State PEL
- d. NIOSH (National Institute for Occupational Safety and Health) -- Proposes standards for OSHA adoption, publishes criteria documents
- e. Other: US Dept. of Energy, National Council on Radiological Protection and Measurement

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Hazard Control

A. Legislative Basis: Occupational Safety and Health Act (OSHA) of 1970; built upon state workers' compensation and federal contract requirements begun early in 20th Century

B. Strategies: Control at the:
source
transmission pathway
receptor

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Hierarchy of Methods for Exposure Control

1. Emission Control

- a. Administrative
 - 1. Emission permits, inspections
 - 2. Management practices
 - 3. Fees and penalties
- b. Technological
 - 1. Collection Efficiency: mass removed/mass presented
 - 2. Exhaust gas control

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Hierarchy of Methods for Exposure Control

2. Transmission Controls

- a. Ambient Contaminant Levels
- b. Dilution or Local Exhaust

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Hierarchy of Methods for Exposure Control

3. Receptor Controls
 - a. Clothing
 - b. Personal Protective Equipment
 - c. Time, Distance, Shielding
 - d. Behavior and Education
 - e. Medical and Epidemiological surveillance

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Current Status / Controversies

1. Workplace vs. Environmental Regulation: occasionally priorities are in conflict and workers suffer
2. International differences in control practices and regulations: corporations migrate to areas with less stringent controls
3. Most economic analyses are short-sighted: benefits of workplace hazard control are only realized after 3-10 years, but costs are borne now
4. People need jobs, but should they be forced to take dangerous or unhealthy jobs.


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Questions



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Lesson 14b. Accidents



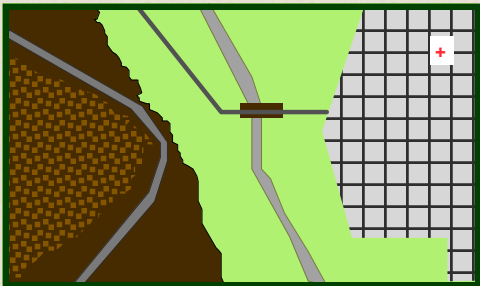
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Unintentional Injuries

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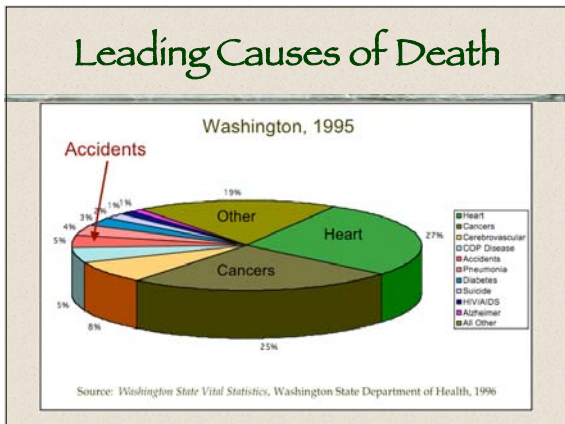
Accidents

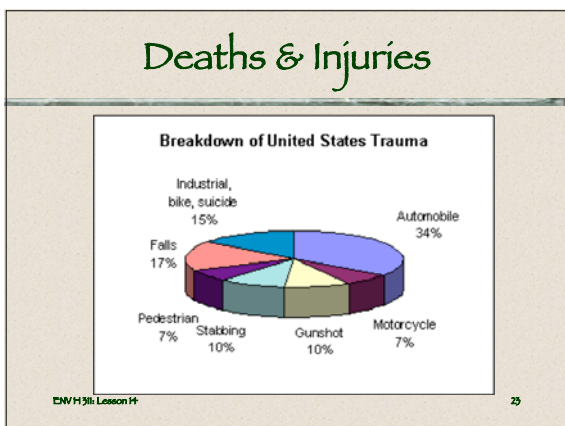


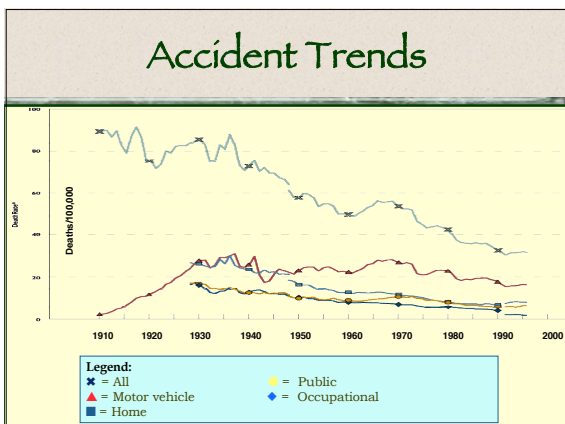
Definition

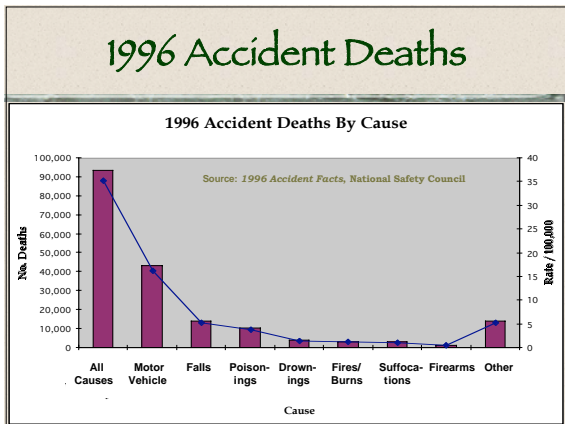
- ❖ An unintentional, unforeseen event resulting in death or injury.
- ❖ If this definition is correct, then . . .
 - 85-90% of all incidents that we typically call accidents do not meet this definition.

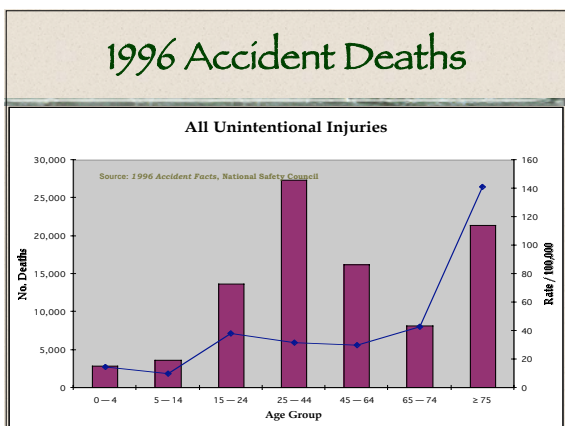
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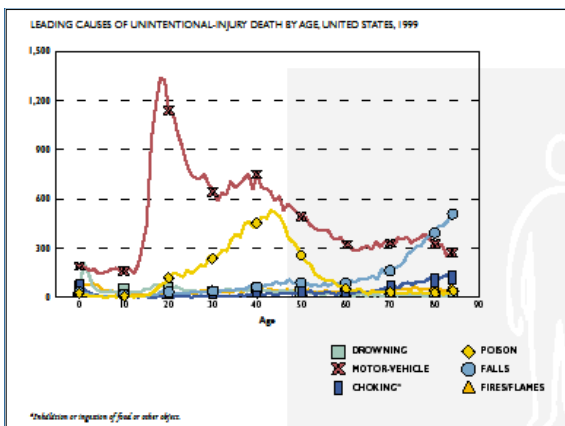












Accident Facts

- ❖ Every week 52 Washington residents die from injuries:
 - > 15 in motor vehicle crashes
 - > 5 from falls
 - > 3 from drowning
 - > 1 from fire or scalding
 - > 12 from poisoning, bicycle crashes or other accidental injuries

Source: *The Injury Epidemic*, Washington State Department of Health, 1992

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Accident Facts

- ❖ The other 16 deaths from injury each year are intentional
 - > 12 by suicide
 - > 4 from homicide
- ❖ And, another 535 people are hospitalized from injuries.

Source: *The Injury Epidemic*, Washington State Department of Health, 1992

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Injuries are Expensive

- ❖ In Washington, 1990 Medical treatment cost more than \$82 million in public funds
 - > \$40,482,864 – State Medicare and Medicaid payments
 - > \$41,399,720 – Federal Medicare and Medicaid payments
 - > One half were paid directly by Washington taxpayers
 - > \$210,555,216 = Estimated that private sector payments

Source: *The Injury Epidemic*, Washington State Department of Health, 1992

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Costs of Injuries

Direct costs = only 29% of the actual costs of injuries

- ❖ Physician Care
- ❖ Hospital Care
- ❖ Radiology
- ❖ Medicine/ Pharmacy
- ❖ Medical Rehabilitation
- ❖ Nursing Facility
- ❖ Laboratory
- ❖ Other

Source: *The Injury Epidemic*, Washington State Department of Health, 1992

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Costs of Injuries

- ❖ Indirect costs account for 71% of the costs of injuries:
 - > Disability payments
 - > Chore services or homemaker support
 - > Loss of income
 - > Lost productivity
 - > Lost taxes
 - > Other

Source: *The Injury Epidemic*, Washington State Department of Health, 1992

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Years of Potential Life Lost

United States, 1983

Cause	YPLL		YPLL Ratio
	Male	Female	
Motor Vehicle	953.1	354.3	2.9
Drownings	156.7	33.7	4.7
Fires & Burns	73.9	47.8	1.5
Poisonings	81.7	33.4	2.4
Falls	59.5	16.1	3.7
Firearms	49.0	7.8	6.3
Air Transport	29.3	5.9	5.0
Water Transport	32.7	3.8	8.6

Accident Occurrence

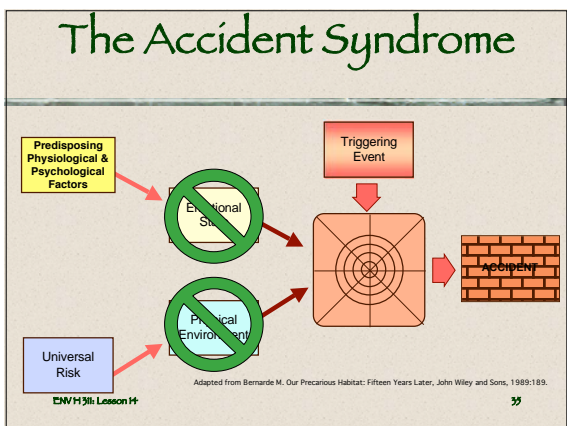
Injuries do NOT occur at random.

Injuries occur:

- ✓ In highly predictable patterns
- ✓ with recognized risk factors
- ✓ among identifiable populations

Source: *The Injury Epidemic*, Washington State Department of Health, 1992

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Questions



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