Occupational Safety & Health: An Overview

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PH: 212 Man’s Impact on the Environment
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Learning Objectives
- OSHA
- NIOSH
- Workplace Risk Factors
- High Risk Industries
- Hazardous Communications (HAZCOM)

Historical Events in Occupational Health and Safety (OHS)

- 370 BC: Hippocrates identified lead poisoning in miners and metallurgists
- 50 AD: Plinius Secundus (Pliny the Elder) identified the use of animal bladders to prevent inhalation of dust and lead fume
- 1500: Georgius Agricola, “all substances are poisons…the right dose differentiates a poison and a remedy.”
- 1700: Bernardino Ramazzini “Father of Occupational Medicine”
- 1775: Percival Pott described occupational cancer among English chimney sweeps
- 1830: Charles Thackrah authored the first book on occupational diseases to be published in England
- 1900s: Dr. Alice Hamilton, first woman faculty at Harvard University, “Exploring the Dangerous Trades”
- 1902-1911: Federal and State legislation covering workers compensation
- 1912: National Safety Council organized
- 1922: Harvard established the first industrial hygiene program
- 1928-1932: Bureau of mines conducted toxicological research on solvents, vapors, and gases
- 1936: Walsh Healy Act required companies supplying goods to government to maintain safe and healthful workplaces
Historical Events in Occupational Health and Safety (OHS):

- 1939: American Industrial Hygiene Association (AIHA) organized
  - American Governmental Industrial Hygienists (ACGIH) and the
  - America Standards Association
  - First list of standards (maximum allowable concentrations) for chemical exposures in industry
- 1941: Bureau of Mines authorized to inspect mines
- 1969: Coal Mine Health and Safety Act
- 1970: Occupational Safety and Health Act

History of OSHA:

- Late 1960s Congress became concerned with the comprehensive problems of occupational safety and health in the workplace
  - LBJ: “the shame of a modern industrial nation”
  - 14,000 deaths/2.2 million injuries
- Occupational Safety and Health Act (OSH Act) signed by President Richard Nixon on December 29, 1970

OSH Act (1970):

- Congress passed the Occupational Safety and Health Act of 1970, (OSH Act), "to assure so far as possible every working man and woman in the Nation safe and healthful working conditions and to preserve our human resources."
  - Title 29 of the Code of Federal Regulations (CFR), Parts 1902-1990, contains OSHA regulations and standards

OSH Act (1970):

- Established Three Permanent Agencies:
  - Occupational Safety & Health Administration (OSHA)
    - Sets and enforces workplace and health standards
  - National Institute for Occupational Safety & Health (NIOSH)
    - Conducts research on occupational safety and health
  - Occupational Safety & Health Review (OSHRC)
    - Adjudicates enforcement actions challenged by employers
Who is Covered by the OSH Act?

- The OSH Act covers all employees except workers who are self-employed and public employees in state and local governments.
- In states with OSHA-approved state plans, public employees in state and local governments are covered by their state’s OSHA-approved plan.
- Federal employees are covered under the OSH Act’s federal employee occupational safety and health programs, see 29 CFR Part 1960.
  - United States Postal Service employees, however, are subject to the same OSH Act coverage provisions as are private sector employers.

Who is Not Covered by the OSH Act?

- Self-employed persons
- Farms at which only immediate members of the farm’s family are employed
- Working conditions regulated by other federal agencies under other federal statutes
  - Mining
  - Nuclear Energy
  - Transportation (certain sectors)

OSHA’s Authority:

- Issue safety and health standards
- Conduct inspections and investigations, issue citations and impose penalties
- Require employers to keep records pertinent to safety and health
- Petition courts to restrain imminent danger situations
- Approve or reject state programs

Responsibilities of the Employer:

- Provide:
  - Well-maintained tools and equipment & appropriate PPE
  - Medical examinations
  - Training as required by OSHA standards
- Report:
  - Accidents and Fatalities
- Recordkeeping:
  - Keep records of work-related accidents, injuries and illnesses (OSHA 300 Log)
  - Certain low hazard industries (i.e. retail, service, finance) and small businesses with less than 10 employees are exempt
- Post:
  - OSHA Poster informing employees of their rights
  - OSHA Citations and abatement verification notices
- DO NOT discriminate against employees exercising their rights under the OSH Act
Rights as an Employer

- Request identification from OSHA compliance officers
- Request and inspection warrant
- Be advised by compliance officers of the reason for an inspection
- Have an opening and closing conference with compliance officers
- Accompany compliance officers on inspections
- Request an informal conference after an inspection
- File a Notice of Contest to citations, proposed penalties, or both
- Request a variance from a standard's requirements under certain circumstances
- Be assured of the confidentiality of trade secrets
- Submit a written request to the National Institute for Occupational Safety and Health for information on potentially toxic substances in your workplace

Responsibilities as an Employee

- To help prevent exposure to workplace safety and health hazards
- Comply with all OSHA requirements that apply to our actions or conduct

Rights as an Employee

- Review employer-provided OSHA standards, regulations and requirements
- Request information from your employer on emergency procedures
- Receive adequate safety and health training when required by OSHA standards
- Ask the OSHA Area Director to investigate hazardous conditions or violations of standards
- Have your name withheld from your employer if you file a complaint with OSHA
- Be advised of OSHA actions regarding your complaint
  - Informal review of any decision not to inspect or to issue a citation
  - Observe any monitoring or measuring of toxic substances or harmful physical agents
- Review at a reasonable time OSHA 300 log
- Request a closing discussion following an inspection

OSHA Rulemaking

- In promulgating rules, OSHA must provide:
  - Reasoned evidence concerning the economic consequences of the standards it issues
  - The regulatory benefits anticipated
  - The technical feasibility (if necessary) of the required actions by the affected industries
- Rulemaking:
  - Assessments of prospective control technologies
  - Estimates of the incremental costs to be incurred to achieve compliance
  - Examinations of the cost burdens imposed
  - Estimates of expected benefits
  - Justification for agency intervention into the workings of the marketplace
Permanent Standards

- Health Hazards
  - Asbestos (1972)
  - Vinyl chloride (1974)
  - Coke oven emissions (1976)
  - Occupational exposures to lead (1978)
  - Noise exposure (1983)

- Safety Arena
  - Construction safety and health regulations (1971)
  - General industry standards (1971)
  - Marine terminals (1983)
  - Hazardous waste operations and emergency response training (1989)
  - Process safety management (1992)
  - Confined spaces (1993)

Zero-Sum Game

- One of the most criticized regulatory agencies
- Consequence of their mission
- Establishing and enforcing OSH regulations “invariably pits individuals and groups with strongly held beliefs and vital interests against one another”
- Long-standing friction between Labor and Management that predates OSHA

Controversy

“Setting workplace health and safety compliance standards continues to be one of the most contentious arenas of government regulatory policy. Debates among labor, industry, outside experts, and various government bodies over the availability of appropriate technological controls and the economic consequences of their adoption are often at the heart of these matters.”
- Roger Herdman, Director, Office of Technology Assessment, US Congress

NIOSH Mission

- The federal agency responsible for conducting research and making recommendations for the prevention of work-related injury and illness.
  - Centers for Disease Control and Prevention (CDC)
  - Department of Health and Human Services
- Established to help assure “safe and healthful working conditions for working men and women by providing research, information, education, and training in the field of occupational safety and health.”
NIOSH Strategic Goals

- Focused program of research to reduce injuries and illnesses among workers in high-priority areas and high-risk sectors (i.e., mining, agriculture, construction, health care)
- System of surveillance for major workplace illnesses, injuries, exposures, and health and safety hazards
- Increasing prevention activities
- Providing information, training, and capacity to prevent occupational injuries and illnesses

NIOSH Locations & Disciplines

- Headquartered in Washington, DC
  - Research Office and Laboratories in Cincinnati, OH; Morgantown, WV; Pittsburgh, PA; Spokane, WA; Atlanta, GA; Anchorage, AK
- 1,400 Workers
  - Epidemiology
  - Medicine
  - Industrial Hygiene
  - Safety
  - Psychology
  - Chemistry
  - Engineering
  - Statistics

NIOSH Research

- Multidisciplinary teams
  - Intramural and extramural research
- National Occupational Research Agenda (NORA)
  - 21 Priority research areas including:
    - Traumatic injury
    - Asthma
    - Chronic Obstructive Pulmonary Disease (COPD)
    - Hearing loss
    - Control technologies

NIOSH Recent Research Accomplishments

- Developed virtual reality technology to simulate elevated workplaces
- Evaluated the effectiveness of ultraviolet germicidal irradiation
- Evaluated state-of-the-art lifting equipment to eliminate low-back injuries
- Identified industries and occupations with increased risk for COPD
- Defined the current state of noise control technology for the mining industry
NIOSH Prevention, Surveillance, and Training & Communication Programs

- Health Hazard Evaluation (HHE) Program
- Fire Fighter Fatality Investigation and Prevention Program
- National Personal Protective Technology Laboratory (NPPTL)
- Sentinel Event Notification System for Occupational Risks (SENSOR)
- Agricultural Centers Programs
- Education and Research Centers (ERCs)

Industrial Hygiene

"Occupational hygiene is the science and art dedicated to the anticipation, recognition, evaluation, and control of environmental factors arising from the workplace that may result in injury, illness, impairment, or affect the well-being of workers and members of the community."

Principles of Evaluating Worker Exposure

- Anticipation: ability to recognize potential hazards
- Recognition: the acknowledgement of health hazards in the workplace
- Evaluation: process of examining an operation to determine the extent of health hazards
- Control: the control of health hazards in the workplace to ensure a healthful work environment

Exposure Assessment

Comprehensive exposure assessment is the systematic review of the processes, practices, materials and division of labor in the workplace.

- Exposure Monitoring
- Hazardous Materials Management
- Hearing Conservation
- Engineering, Administrative & Work Practice Controls
- Personal Protective Equipment (PPE)
- Radiation Safety
- Medical Surveillance & Epidemiology
- Hazard Communication
- Education & Training
Range of Workplace Hazards:

- **Chemical**
  - Arising from liquids, solids, fumes, dusts, vapors & gases

- **Physical**
  - Noise, vibration, poor lighting, radiation, & extreme temperatures

- **Biological**
  - Bacteria, viruses, infectious waste & infestations

- **Psychological**
  - Stress & strain

- **Non-application of Ergonomic Principles**
  - Poorly designed machinery, workstations, mechanical devices, & tools

Healthcare Wide Hazards:

- **Bloodborne Pathogens**
- **Electrical**
- **Ergonomics**
- **Fire Hazards**
- **Glutaraldehyde**
- **Hazardous Chemicals**
- **Infection**
- **Latex Allergy**
- **Legionnaires' Disease**
- **Needlesticks**
- **Noise**
- **Mercury**
- **Inappropriate PPE Employee**
- **Slips/Trips/Falls**
- **Stress**
- **Tuberculosis**
- **Lack of Universal Precautions**
- **Workplace Violence**

Construction Industry Hazards:

- **Falls**
  - Unprotected Sides, Wall Openings, and Floor Holes
  - Improper Scaffold Construction
  - Unguarded Promulgating Steel Rebars
  - House of Portable Ladders
  - Falling/Flying Objects

- **Electrical Incidents**
  - Contact with Power Lines
  - Lack of Ground-Fault Protection
  - Fault to Ground Missing or Discontinuous
  - Equipment Not Used in Manner Prescribed
  - Improper Use of Extension and Flexible Cords

- **Trenching and Excavation**
  - No Protective System
  - Failure to Inspect Trench and Protective Systems
  - Unsafe Spot-Pile Placement
  - Unsafe Access/Exit
Percent of nonfatal workplace illnesses by industry sector, 2005

- Construction: 4%
- Health care and social assistance: 19%
- Leisure and hospitality: 6%
- Mining: 0.3%
- Agriculture, forestry, fishing and hunting: 1%
- Manufacturing: 20%
- Other services: 2%
- Education services: 1%
- Financial activities: 4%
- Professional and business services: 7%
- Utilities: 1%
- Transportation and warehousing: 5%
- Wholesale trade: 3%
- Manufacturing: 39%
- Wholesale trade: 3%
- Financial activities: 4%
- Professional and business services: 7%
- Utilities: 1%
- Transportation and warehousing: 5%
- Retail trade: 6%
- Information: 2%

Number of fatal work injuries, 1992-2005

Rate of fatal work injuries per 100,000 workers, 1992-2005

The manner in which workplace fatalities occurred, 2005

- Transportation incidents: 16%
- Contact with objects and equipment: 18%
- Medical treatment: 10%
- Assaults and violent acts: 14%
- Rollovers and overturned: 14%
Fatal injury for selected occupations with large numbers of worker fatalities, 2005

![Bar chart showing fatalities across various occupations]

Fatal injury counts and most frequent event for selected occupations, 2005

- Drivers/sales workers and truck drivers (n=993)
  - 68% Highway vehicle incidents
- Farmers and ranchers (n=341)
  - 32% Non-highway vehicle incidents
- Construction laborers (n=339)
  - 32% Fall to lower level
- Misc. agricultural workers (n=176)
  - 62% Fall to lower level
- Police and sheriff's patrol officers (n=123)
  - 41% Homicides
- First-line supervisors/managers of construction trades (n=122)
  - 30% Fall to lower level
- First-line supervisors/managers of retail sales workers (n=105)
  - 70% Homicides

Fatal occupational injuries by major occupation groups, 2005

<table>
<thead>
<tr>
<th>Occupation Group</th>
<th>Fatalities</th>
<th>Fatality rate per 100,000 employed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation and material moving</td>
<td>1,543</td>
<td>17.8</td>
</tr>
<tr>
<td>Construction and extraction</td>
<td>1,180</td>
<td>12.9</td>
</tr>
<tr>
<td>Service</td>
<td>657</td>
<td>2.8</td>
</tr>
<tr>
<td>Management, business, &amp; financial</td>
<td>603</td>
<td>2.9</td>
</tr>
<tr>
<td>Installation, maintenance, &amp; repair</td>
<td>396</td>
<td>7.6</td>
</tr>
<tr>
<td>Farming, fishing, and forestry</td>
<td>324</td>
<td>31.4</td>
</tr>
<tr>
<td>Sales and related</td>
<td>320</td>
<td>1.9</td>
</tr>
<tr>
<td>Production</td>
<td>274</td>
<td>2.9</td>
</tr>
<tr>
<td>Professional and related</td>
<td>237</td>
<td>0.8</td>
</tr>
<tr>
<td>Office &amp; Administrative support</td>
<td>106</td>
<td>0.5</td>
</tr>
<tr>
<td>Military</td>
<td>47</td>
<td>4.0</td>
</tr>
</tbody>
</table>

Selected occupations with high fatality rates, 2005

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Fatalities</th>
<th>Fatality rate per 100,000 employed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fishers &amp; related fishing workers</td>
<td>48</td>
<td>118.4</td>
</tr>
<tr>
<td>Logging workers</td>
<td>80</td>
<td>92.9</td>
</tr>
<tr>
<td>Aircraft pilots &amp; flight engineers</td>
<td>81</td>
<td>66.9</td>
</tr>
<tr>
<td>Structural iron &amp; steel workers</td>
<td>35</td>
<td>55.6</td>
</tr>
<tr>
<td>Refuse &amp; recycle material workers</td>
<td>32</td>
<td>43.8</td>
</tr>
<tr>
<td>Farmers and ranchers</td>
<td>341</td>
<td>41.1</td>
</tr>
<tr>
<td>Electrical power-line install &amp; repair</td>
<td>36</td>
<td>32.7</td>
</tr>
<tr>
<td>Drivers/sales workers &amp; truck drivers</td>
<td>993</td>
<td>29.1</td>
</tr>
<tr>
<td>Misc. agricultural workers</td>
<td>176</td>
<td>23.2</td>
</tr>
<tr>
<td>Construction laborers</td>
<td>339</td>
<td>22.7</td>
</tr>
</tbody>
</table>
Key findings of the 2005 Census of Fatal Occupational Injuries

- Fatal work injuries among workers under 20 years of age were up about 18 percent from the 2004 figure to 166 cases.
- Fatal work injuries involving women in 2005 were down 3 percent to 402 cases—the lowest total ever recorded by the fatality census.
- Fatalities among agricultural workers were up 23 percent from 145 in 2004 to 176 in 2005.
- Fatal falls were lower by 7 percent after reaching a series high in 2004.
- While the number of fatal work injuries in private construction continued to be the most of any industry sector, the number of fatalities was 4 percent lower in 2005 than 2004.

Underestimating the Problem

- BLS counts may underestimate the problem by as much as 69%.
- BLS excludes many categories of workers
  - Self-employed
  - Farms with <11 employees
  - Employees covered by other federal safety & health laws
  - Federal, state, & local government workers
  - Private household workers

Causes of Underreporting

- Workers Compensation system as an incentive
- Firms seeking government contracts
- OSHA’s injury rates for targeting inspections
- Maintain an image of a ‘safe workplace’

How About the Worker?

- Economic incentives by the employer
- “Accident Prone” label
- Disciplining workers who report
- Workers Compensation = “Slacker”
- Foreign-born workers
**What About OSHA?**

What about OSHA’s role in enforcing regulations and issuing violations and penalties?

**OSHA Violations & Penalties**

- Willful: hazardous condition existed but no reasonable effort to eliminate
  - $5,000 to $70,000 per willful violation
- Repeated: employer cited previously for similar condition
  - penalty of up to $70,000 for each violation
- Serious: workplace hazard could cause injury or illness that would most likely result in death or serious physical harm
  - penalties up to $7,000 for each violation
- Other: A violation that has a direct relationship to job safety and health, but is not serious in nature, is classified as "other"
- Failure to Abate (FTA): when the employer has not corrected a violation for which OSHA has issued a citation
  - Penalty of up to $7,000 per day for each violation

**Federal OSHA and State Plan OSHA Inspection/Enforcement Activity, FY 2005**

<table>
<thead>
<tr>
<th>Category</th>
<th>Federal</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspections</td>
<td>38,763</td>
<td>57,344</td>
</tr>
<tr>
<td>Safety</td>
<td>31,136</td>
<td>44,905</td>
</tr>
<tr>
<td>Health</td>
<td>7,647</td>
<td>12,440</td>
</tr>
<tr>
<td>Construction</td>
<td>22,181</td>
<td>27,279</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>8,467</td>
<td>10,086</td>
</tr>
<tr>
<td>Violations</td>
<td>85,054</td>
<td>127,735</td>
</tr>
<tr>
<td>Willful</td>
<td>726</td>
<td>196</td>
</tr>
<tr>
<td>Repeat</td>
<td>2,326</td>
<td>2,456</td>
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<tr>
<td>Serious</td>
<td>60,662</td>
<td>58,091</td>
</tr>
<tr>
<td>Unclassified</td>
<td>70</td>
<td>33</td>
</tr>
<tr>
<td>Other</td>
<td>20,968</td>
<td>68,544</td>
</tr>
<tr>
<td>FTA</td>
<td>302</td>
<td>415</td>
</tr>
</tbody>
</table>

**OSHA Enforcement & Coverage**

- FY 2005
  - 2,117 federal and state OSHA inspectors
  - 8 million workplaces
  - Current staffing levels
    - Federal OSHA - 117 years for a single visit
    - GA, LA, DE, FL - 150 years for a single visit
    - 20 States - over 150 years for a single visit
    - States with OSHA-approved plans - 65 years for a single visit
Federal OSHA and State Plan OSHA
Penalties, FY 2005

<table>
<thead>
<tr>
<th></th>
<th>Federal</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penalties – Total ($)</td>
<td>98,751,227</td>
<td>71,662,403</td>
</tr>
<tr>
<td>Willful</td>
<td>31,431,427</td>
<td>6,221,315</td>
</tr>
<tr>
<td>Repeat</td>
<td>8,454,113</td>
<td>4,810,354</td>
</tr>
<tr>
<td>Serious</td>
<td>52,965,118</td>
<td>51,844,929</td>
</tr>
<tr>
<td>Other</td>
<td>3,230,440</td>
<td>7,229,901</td>
</tr>
<tr>
<td>FTA</td>
<td>1,163,394</td>
<td>1,371,989</td>
</tr>
<tr>
<td>Average Penalty/Violation ($)</td>
<td>1,161</td>
<td>561</td>
</tr>
<tr>
<td>Willful</td>
<td>43,924</td>
<td>31,741</td>
</tr>
<tr>
<td>Repeat</td>
<td>3,635</td>
<td>1,959</td>
</tr>
<tr>
<td>Serious</td>
<td>873</td>
<td>892</td>
</tr>
<tr>
<td>Other</td>
<td>154</td>
<td>109</td>
</tr>
<tr>
<td>FTA</td>
<td>3,852</td>
<td>3,306</td>
</tr>
</tbody>
</table>

NY Times Investigation of OSHA

“Companies whose willful acts kill workers face lighter sanctions than those who deliberately break environmental or financial laws.”

- 100 workers die each year as result of acts of intentional wrongdoing or plain indifference
- 1982 to 2002 declined to seek prosecution in 93 percent of “horror story” cases
- Killing a worker is considered a misdemeanor under the OSH Act
- Maximum sentence of six months in jail
- Over 170,000 workplace deaths since 1982 with 1,242 considered “willful”
  - 16 convictions involving jail time

Hazardous Communication Standard
29 CFR 1910.1200

- Uniform requirements for hazard of chemicals
- Chemical manufacturers to convey hazard information to downstream employers
- All employers must have a hazard communication program
- Ensures all employers receive the information they need to inform & train their employees (i.e., labels, MSDS’s, training)
- Ensures employees are effectively informed concerning potential and existing chemical hazards

Hazard Communication Program

- Written Program
  - Must describe how the plan will be implemented
- Material Safety Data Sheets (MSDS’s)
- Material Inventory
- Labels & Other Forms of Warning
- Employee Information, Education & Training
- Retraining
- Non-Routine Tasks
- Contractors
Material Safety Data Sheets

Material Safety Data Sheets (MSDS’s)
- To be maintained for all hazardous materials handled in the company.
  - Identify the chemical
  - Physical and chemical properties
  - Physical and health characteristics
  - Primary routes of entry
  - Exposure limits
  - Precautions for safe handling
  - Controls to limit exposure
  - Emergency first aid procedures
  - Name of manufacturer or distributor

MSDS Availability

- Must be readily available during each work shift to employees when they are in their work areas
- Employees may review the MSDS for materials they work with at the time in their work area
- Employees may request copies of MSDS’s
- OSHA and NIOSH may have access to MSDS’s within an organization

Workplace Violence

- Workplace violence
  - Domestic and global problem
  - 14% of US fatalities in 2004
  - Lack of universal definition
  - Incident underreporting
  - Lack of mandated regulations for workplace violence prevention
    - OSHA Guidelines are voluntary

Incident Underreporting in Health Care Industry

- Lack of institutional reporting policies
- The perception of assaults as part of the job
- Employee beliefs that reporting will not benefit them
- Employees concerns that assaults may be viewed as a result of poor job performance
Violence in HCW14,15

- BLS (2004): 50% of nonfatal injuries and assaults against workers occurred in the health care and social service settings
- Canadian study found 68% of ED employees experienced increased frequency of violence with 57% reporting physical assault in the last 12 months
- Veteran Health Administration study found that during one fiscal year (October 1990 to September 1991)
  - 24,219 incidents of assault occurred in 166 VA facilities
  - 6,552 involved battery and physical assault

Violence in HCW16-18

- Michigan study of 171 emergency room physicians found that 75% of physicians reported verbal threats and 28% reported being physically assaulted in the year before the survey
- Worker's compensation data claims in Oregon (1990 to 1999) found that nursing aides/orderlies had the highest rate for claims (46.4 per 10,000 workers; CI = 32.9 - 53.6)
- The Minnesota Nurses' Study found rates of 13.2 (12.2 to 14.3) per 100 persons per year for physical violence and 38.8 (37.4 to 40.4) per 100 persons per year for non-physical violence

References