Workplace Hazards of HCW

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Organizer

Occupational Health Department, Ministry of Health, Kuwait

Crown Plaza Hotel
Pediatric Surgeons
Outlines

• Definitions and introduction
• Hospital risk assessment
• Hospital risk control: T-O-P
• Specific Occupational hazards affecting HCW
A UNIVERSAL TRUTH: NO HEALTH WITHOUT A WORKFORCE
“Be sure to secure your own oxygen mask first before helping another.”
HCW
2017 Year of the Healthy Nurse
Investment in HCW

- Health care is a labor-intensive industry
- Labor is highly skilled and highly paid.
- 60 to 75% of hospital expenses are labor costs
- Streaming of highly advanced technologies

Occupational health and safety risks in the health care sector, Europe, 2010
Work Accidents

Accidents at work by type of activity, EU-15, 2002

- Fishing (estimated): 8592
- Construction: 6913
- Agriculture, hunting and forestry: 5208
- Health and social work (estimated): 4738
- Transport, storage and communication: 4056
- Manufacturing: 3911
- Hotels and restaurants: 3280
- Wholesale and retail trade; repairs: 2469

Source: Eurostat – European Statistics on Accidents at Work (ESAW).
### Death Rate (2005)

<table>
<thead>
<tr>
<th>Occupation</th>
<th>No. employed ($\times 10^3$)</th>
<th>Total deaths</th>
<th>Death rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fisherman</td>
<td>39</td>
<td>46</td>
<td>1,179</td>
</tr>
<tr>
<td>Construction worker</td>
<td>825–1,108</td>
<td>1,198</td>
<td>1,081–1,452</td>
</tr>
<tr>
<td>Pilot</td>
<td>107–129</td>
<td>102</td>
<td>791–953</td>
</tr>
<tr>
<td>Military (active and reserve)</td>
<td>2,600</td>
<td>94</td>
<td>361</td>
</tr>
<tr>
<td>Truck driver</td>
<td>2,544–3,365</td>
<td>530</td>
<td>157–208</td>
</tr>
<tr>
<td>Protective service</td>
<td>2,000</td>
<td>219</td>
<td>108</td>
</tr>
<tr>
<td>Firefighter</td>
<td>1,100</td>
<td>102</td>
<td>93</td>
</tr>
<tr>
<td>US workforce</td>
<td>136,000</td>
<td>5,780</td>
<td>42.5</td>
</tr>
<tr>
<td>Healthcare worker</td>
<td>6,200–9,100</td>
<td>157–353</td>
<td>17–57</td>
</tr>
<tr>
<td>Sheetmetal worker</td>
<td>172–207</td>
<td>8</td>
<td>39–46</td>
</tr>
<tr>
<td>Bartender</td>
<td>339–427</td>
<td>10</td>
<td>23–29</td>
</tr>
<tr>
<td>Lawyer</td>
<td>490–920</td>
<td>6</td>
<td>7–14</td>
</tr>
<tr>
<td>Waiter</td>
<td>1,893–1,981</td>
<td>9</td>
<td>5</td>
</tr>
</tbody>
</table>

*Numbers represent average of annual deaths during 3-year period, 2000–2002. Range of number employed reflects 2 different federal databases (see text). Rates expressed per 1 million workers. [Kent A. Sepkowitz]*
Goals of Health Care Systems

Achieving good health for the population, ensuring that health services are responsive to the public and ensuring fair payment systems.
Definition

A **health facility** is, in general, any location where healthcare is provided. Health facilities range from small clinics and doctor's offices to urgent care centers and large hospitals with elaborate emergency rooms and trauma centers.
Risk Assessment

1 Identifying hazards and those at risk
2 Evaluating and prioritising risks
3 Deciding on preventive action: T-O-P
4 Taking action
5 Documentation, monitoring and review
Summarized Risk Assessment Process

**Planning and Scoping**

**Exposure Assessment**
- SOURCE IDENTIFICATION
- Chemical Release
- Measures of Exposure
- CHEMICAL CONCENTRATIONS: Air, Soil, Water, Food (monitor/model)
- POPULATION CHARACTERISTICS

**Toxicity Assessment**
- Hazard Identification
- Dose/Response Assessment

**Risk Characterization**
- EXPOSURE information
- DOSE/RESPONSE information

Quantitative and Qualitative Expressions of Risk/Uncertainty
## Risk Assessment Matrix

<table>
<thead>
<tr>
<th>Likelihood of the hazard happening</th>
<th>Severity of the potential injury/damage</th>
<th>0 - 5 = Low Risk</th>
<th>6 - 10 = Moderate Risk</th>
<th>11 - 15 = High Risk</th>
<th>16 - 25 = extremely high unacceptable risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Almost Certain 5</td>
<td>Insignificant damage to Property, Equipment or Minor Injury</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Will probably occur 4</td>
<td>Non-Reportable Injury, minor loss of Process or slight damage to Property</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>Possible occur 3</td>
<td>Reportable Injury moderate loss of Process or limited damage to Property</td>
<td>4</td>
<td>8</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>Remote possibility 2</td>
<td>Major Injury, Single Fatality critical loss of Process/damage to Property</td>
<td>3</td>
<td>6</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>Extremely Unlikely 1</td>
<td>Multiple Fatalities Catastrophic Loss of Business</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
Prevention and Control Measures

Hierarchy of Controls

1. Elimination
   - Physically remove the hazard
   - Inherent

2. Substitution
   - Replace the hazard
   - Passive & Active

3. Engineering Controls
   - Isolate people from the hazard
   - Procedural

4. Administrative Controls
   - Change the way people work

5. PP
   - Protect the worker with Personal Protective Equipment

Source: NIOSH website: http://www.cdc.gov/niosh/topics/hierarchy/
Hazards

HCW
Occupational Hazards

- Biological
- Chemical
- Kinetic
- Physical
- Psychosocial
Biological Hazards
Biological agents

- Virus, rickettsia, bacteria, parasites, fungi
- Plant products: pollens, grains, dust
- Animal products: hair, feathers, urine, feces, other protein products
- Insects/reptiles bites and toxins
Biological Risk Assessment

1. the natural **virulence** of the pathogen;
2. its capacity to **survive** in the environment;
3. the **severity** of the disease;
4. the **dose** or exposure level necessary to cause illness or infection;
5. the mode of **transmission**;
6. epidemiological **factors**.
Classification of Biological Agents

- **Group 1**: unlikely to cause human disease.
- **Group 2**: can cause human disease; it is unlikely to spread to the community and there is usually effective prophylaxis or treatment available.
- **Group 3**: can cause severe human disease; it may present a risk of spreading to the community, but there is usually effective prophylaxis or treatment available.
- **Group 4**: causes severe human disease; it may present a high risk of spreading to the community; there is usually no effective prophylaxis or treatment available.
Methods of Transmission

• Blood-borne infections
• Airborne infections
• Contact infections
• Faecal-oral infections
Blood-borne Infections

- Hepatitis virus B, C and D
- Human immune deficiency virus (HIV)
Less Common Blood-borne Diseases

1. Syphilis
2. Malaria
3. Babesiosis
4. Brucellosis
5. Leptospirosis
6. Arboviral infections (especially Colorado tick fever)
7. Relapsing fever
8. Creutzfeldt-Jakob disease
9. Human T-lymphotropic virus type I
10. Viral hemorrhagic fever
Risk of Airborne Infections

- Mumps
- Measles
- Rubella
- Influenza
- TB
- SARS
Risk of Direct and Indirect Infection

• Hepatitis A
• Shigella
• Staphylococci
• Amoeba
• Salmonella
Special Infections

• Tubercular infections;
• Scabies;
• Multi-resistant nosocomial bacteria, such as MRSA and multi-resistant pseudomonas;
• Seasonal influenza.
Immunization of Health-Care Personnel
Recommendations of the Advisory Committee on Immunization Practices (ACIP)
Chemical Risks
## Classification of Toxicity

<table>
<thead>
<tr>
<th>Toxic</th>
<th>Physicochemical</th>
<th>Ecotoxic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very toxic</td>
<td>Explosive</td>
<td>Environment</td>
</tr>
<tr>
<td>Toxic</td>
<td>Fire-enhancing</td>
<td></td>
</tr>
<tr>
<td>Harmful</td>
<td>Extremely flammable</td>
<td></td>
</tr>
<tr>
<td>Corrosive</td>
<td>Highly flammable</td>
<td></td>
</tr>
<tr>
<td>Irritant</td>
<td>Flammable</td>
<td></td>
</tr>
<tr>
<td>Sensitizing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carcinogenic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toxic to reproduction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mutagenic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Otherwise chronically harmful</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Selected groups of chemicals

- cleaning and disinfectant agents;
- anaesthetic drugs;
- Hazardous drugs;
- substances which can endanger reproduction, especially certain pharmaceutical substances.
- Solvents and other laboratory chemicals
- Surgical spirit
- Preservatives
Cleaning and Disinfection

- Surface: scrubbing, wiping
- Instrument
- Hand and skin
- Spraying
- Room
- Laundry
Disinfectants/sterilants

- **Alcohols**: Ethyl-, methyl-, isopropyl alcohol
- **Aldehydes**: Formaldehyde, glutaraldehyde
- **Phenols**: 5% phenol, 1-5% Cresol, 5% Lysol, hexachlorophene, chlorhexidine, chloroxylenol
- **Halogens**: Chlorine, hypochlorite, tincture iodine, iodophores
- **Heavy metals**: Mercuric chloride, silver nitrate, Copper sulphate, organic mercury
- **Surface active agents**: Soaps, detergents, quaternary ammonium compounds
- **Dyes**: Aniline dyes, acridine dyes, ethidium dibromide
- **Hydrogen peroxide**
- **Ethylene oxide**
- **Beta-propiolactone**
Anaesthetic gases

- Dinitrogen monoxide
- Volatile anaesthetics: halothane, enflurane, isoflurane, sevoflurane and desflurane.
Health Effects

- fatigue and headaches
- reduced **fertility** and problems during pregnancy.
- **Mood** swings and negative effects on neuropsychological efficiency.
- **hepatitis** due to the action of halothane,
- Bronchial **asthma** due to enflurane,
- allergic contact **eczema** due to halothane or isoflurane
- genotoxic effects?
- A carcinogenic risk is not probable
- An increased risk of spontaneous **abortions** (High Conc)
Hazardous Drugs

- Hazardous drugs include those used for cancer chemotherapy, antiviral drugs, hormones, some bioengineered drugs, and other miscellaneous drugs (NIOSH, 2016).
Characteristics of Hazardous Drugs

- Carcinogenicity
- Teratogenicity or other developmental toxicity
- Reproductive toxicity
- Organ toxicity at low doses
- Genotoxicity
- Structure and toxicity profiles of new drugs that mimic existing hazardous drugs
### Table 1. Group 1: Antineoplastic drugs, including those with the manufacturer’s safe-handling guidance (MSHG)

<table>
<thead>
<tr>
<th>Drug</th>
<th>AHFS classification</th>
<th>MSHG</th>
<th>Supplemental information</th>
<th>Links</th>
</tr>
</thead>
<tbody>
<tr>
<td>abiraterone</td>
<td>10:00 antineoplastic agents</td>
<td></td>
<td>Women who are pregnant or may be pregnant should not handle without protection (e.g., gloves); FDA Pregnancy Category X</td>
<td>DailyMed; DrugBank</td>
</tr>
</tbody>
</table>

### Table 2 (Continued). Group 2: Non-antineoplastic drugs that meet one or more of the NIOSH criteria for a hazardous drug, including those with the manufacturer’s safe-handling guidance (MSHG)

<table>
<thead>
<tr>
<th>Drug</th>
<th>AHFS classification</th>
<th>MSHG</th>
<th>Supplemental information</th>
<th>Links</th>
</tr>
</thead>
<tbody>
<tr>
<td>carbamazepine</td>
<td>28:12:92 anticonvulsants, miscellaneous</td>
<td></td>
<td>Black Box warning for aplastic anemia; congenital malformations in offspring of mothers who took drug; rapid transplacental passage; FDA Pregnancy Category D*</td>
<td>DailyMed; DrugBank</td>
</tr>
</tbody>
</table>

### Table 3. Group 3: Non-antineoplastic drugs that primarily have adverse reproductive effects

<table>
<thead>
<tr>
<th>Drug</th>
<th>AHFS classification</th>
<th>Supplemental information</th>
<th>Links</th>
</tr>
</thead>
<tbody>
<tr>
<td>acitretin</td>
<td>88:04 vitamin A</td>
<td>Black Box warning on adverse reproductive effects; FDA Pregnancy Category X</td>
<td>DailyMed; DrugBank</td>
</tr>
</tbody>
</table>
Reproductive Toxins

- disinfectants,
- cytostatic drugs,
- anaesthetics (halothane or dinitrogen monoxide),
- other pharmaceuticals,
- laboratory chemicals
- ethylene oxide
Latex Allergy
Chemical Spills
Kinetic Hazards

• Ergonomic
• Accidents/injuries
Ergonomics Hazards

- Repetition
- Force
- Contact
- Awkward postures
- Environment: noise, vibration, cold
Ergonomics in clinical practice
Low back pain
Microscopy
Accidents/Injuries
Slips/Trips and Falls
Slips/Trips and Falls (STF)
Sharp injuries
Safe Hospitals in Emergencies and Disasters
Structural, Non-structural and Functional Indicators

Save Lives!
Make Hospitals Safe in Emergencies
# Hospitals in Emergencies

## Number of reported attacks on health care in emergencies in 2014 and 2015

<table>
<thead>
<tr>
<th>Countries and territories (n=19)</th>
<th>Attacks (n=594)</th>
<th>Percentage of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syrian Arab Republic</td>
<td>228</td>
<td>38%</td>
</tr>
<tr>
<td>West Bank and Gaza Strip</td>
<td>53</td>
<td>9%</td>
</tr>
<tr>
<td>Iraq</td>
<td>43</td>
<td>7%</td>
</tr>
<tr>
<td>Pakistan</td>
<td>43</td>
<td>7%</td>
</tr>
<tr>
<td>Libya</td>
<td>33</td>
<td>6%</td>
</tr>
<tr>
<td>Ukraine</td>
<td>32</td>
<td>5%</td>
</tr>
<tr>
<td>Central African Republic</td>
<td>30</td>
<td>5%</td>
</tr>
<tr>
<td>Yemen</td>
<td>22</td>
<td>4%</td>
</tr>
<tr>
<td>Sudan</td>
<td>20</td>
<td>3%</td>
</tr>
<tr>
<td>Afghanistan</td>
<td>19</td>
<td>3%</td>
</tr>
<tr>
<td>South Sudan</td>
<td>18</td>
<td>3%</td>
</tr>
<tr>
<td>Guinea</td>
<td>11</td>
<td>2%</td>
</tr>
<tr>
<td>Democratic Republic of the Congo</td>
<td>10</td>
<td>2%</td>
</tr>
<tr>
<td>Nigeria</td>
<td>10</td>
<td>2%</td>
</tr>
<tr>
<td>Colombia</td>
<td>7</td>
<td>1%</td>
</tr>
<tr>
<td>Somalia</td>
<td>6</td>
<td>1%</td>
</tr>
<tr>
<td>Liberia</td>
<td>5</td>
<td>1%</td>
</tr>
<tr>
<td>Sierra Leone</td>
<td>3</td>
<td>1%</td>
</tr>
<tr>
<td>Myanmar</td>
<td>1</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>594</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Source: World Health Organization (3).
Physical Hazards

- Noise
- Vibration
- Electrical
- Extremes of temperature
- Non Ionizing radiation
- Ionizing radiation
- Electrical
- Fire
Noise/Vibration
Fires
Extremes of temperature
Laser in medicine
Infrared in medicine

- Dermatology
- Vascular Monitoring
- Breast Imaging
- Pain/Inflammation
Microwave
Electromagnetic
Ionizing radiation
Psychosocial Risks
Stressful Work
Stressful Work
Stressful Work
Stressful Work
Specific HCW job stressors

- Ill and dying clients
- Workload and time pressures
- Increasing emphasis on healthcare cost savings
- Patient aggression
- Patients who are disoriented, irritable, or uncooperative
- Drug abusers
Psychosocial Risks

- Stress
- Burnout
- Drug Abuse
- Violence
- Bullying
- Working Hours
## Risk Assessment of Psychosocial Hazards

<table>
<thead>
<tr>
<th>Psychosocial risks</th>
<th>Total determined</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stress</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burnout</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mobbing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working hours*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Violence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drug abuse</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note: If a knock-out criterion applies, remedial measures are essential!*
# Risk Groups

<table>
<thead>
<tr>
<th>Occupational groups</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
</tr>
<tr>
<td>1. Nursing staff</td>
<td>☐</td>
</tr>
<tr>
<td>2. Household management</td>
<td>☐</td>
</tr>
<tr>
<td>3. Cleaning</td>
<td>☐</td>
</tr>
<tr>
<td>4. Kitchen staff</td>
<td>☐</td>
</tr>
<tr>
<td>5. Doctors</td>
<td>☐</td>
</tr>
<tr>
<td>6. Rescue staff</td>
<td>☐</td>
</tr>
</tbody>
</table>
## Risk Activities

<table>
<thead>
<tr>
<th>Organisation unit/Activity areas</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
</tr>
<tr>
<td>Intensive care unit</td>
<td>☐</td>
</tr>
<tr>
<td>Internal medicine</td>
<td>☐</td>
</tr>
<tr>
<td>Surgery</td>
<td>☐</td>
</tr>
<tr>
<td>Urology</td>
<td>☐</td>
</tr>
<tr>
<td>Gynaecology</td>
<td>☐</td>
</tr>
</tbody>
</table>
Thank You
# Risk of Virus Transmission Following Percutaneous Injury

<table>
<thead>
<tr>
<th>Virus</th>
<th>Chance of HCW Infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>HBV</td>
<td>6 – 30 out of 100 people</td>
</tr>
<tr>
<td>HCV</td>
<td>3 – 10 out of 100 people</td>
</tr>
<tr>
<td>HIV</td>
<td>1 out of 300 people</td>
</tr>
</tbody>
</table>
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Occupational Health ... Care & Production

Organizer
Occupational Health Department, Ministry of Health, Kuwait

Crown Plaza Hotel