3.2 Lecture 1
Definition of HCW, hazards and public health impact

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Overhead 1.2	Health-care activities
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Teacher's notes

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Overhead 1.1

Definitions

Health-care waste

Total waste stream from HCW generators

(major and scattered sources)

Hazardous health-care waste

75 - 90% of general waste (similar to domestic waste)

10 - 25% is hazardous (infectious, toxic etc.)

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Health-care activities

Health-care activities (for humans) generating waste include:

- Diagnosis
- Treatment
- Prevention of diseases
- Alleviation of disablement
- Associated research

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Hazardous health-care waste

- Infectious
- Pathological
- Sharps
- Pharmaceutical
- Genotoxic
- Chemical
- Heavy metals
- Pressurized containers
- Radioactive

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Major sources of health-care waste

- Hospitals
- Clinics
- Laboratories
- Research centres
- Animal Research
- Bloodbanks
- Nursing Homes
- Mortuaries
- Autopsy centres

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Minor sources of health-care waste

- Physician's office
- Dental clinics
- Home health-care
- Nursing homes
- Acupuncturists
- Psychiatric clinics
- Cosmetic piercing and tattooing
- Funeral services
- Paramedic services
- Institutions for disabled persons

Overhead 1.6

HCW Generation by Region

Region	kg/bed/day
• North America	7 - 10
• Latin America	3
• Western Europe	3 - 6
• Eastern Europe	1.4 - 2
• Middle East	1.3 - 3
• East Asia High Income	2.5 - 4
• East Asia Middle Income	1.8 - 2.2

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What is Risk ?

the probability that the hazard
of a substance will cause harm
and the severity of that harm

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Hazardous properties of HCW

Hazardous HCW may have the following properties:

- contains infectious agents
- genotoxic
- contains hazardous chemicals or pharmaceuticals
- radioactive
- contains sharps

Hazardous properties of chemicals

- Toxic
- Corrosive
- Flammable
- Reactive
- Explosive
- Shock sensitive
- Genotoxic

Overhead 1.10

Who is at Risk ?

- Doctors and nurses
- Patients
- Hospital support staff
- Waste collection and disposal staff
- General public

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Public health risks of hazardous HCW

Potential health effects:

- AIDS
- Hepatitis B and C
- Gastroenteric infections
- Respiratory infections
- Blood stream infections
- Skin infections
- Effects of radioactive substances
- Intoxication

Overhead 1.12

Public sensitivity

Public sensitivity

- about incidents involving HCW
- about visual impact of HCW

Cultural practices should be taken into account in HCW management.

Teacher's notes - Lecture 1

Overhead 1.1

Health-care waste is defined as the total waste stream (solid and liquid) from health-care establishments, research facilities and laboratories. In addition, health-care activities in minor or scattered sources, including health-care provided at home, may also generate health-care waste.
75% to 90% of the waste of health-care providers is general waste, comparable to domestic waste, and mostly comes from the administrative and housekeeping function of the establishments. This general health-care waste may also include waste from the maintenance of the premises of a health-care facility. The remaining 10% to 25% are hazardous health-care wastes which may create a variety of health risks. In this course, only hazardous health-care waste will be considered.
General wastes should join the municipal waste stream.

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This will also include some veterinary waste and dead animals arising in research and public health laboratories.

Overhead 1.3

Distribute Handout 1.1: Categories of hazardous health-care waste
The Table sets out the categories of health-care waste. These categories will be considered all throughout the course.

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Hospitals
University hospital, General hospital, District hospital

Other health-care establishments
Emergency medical care services, health-care centres and dispensaries
Obstetrical and maternity clinics, out-patients clinics, dialysis centres
First aid posts and sick bays, long-term health care establishments and hospices, transfusion centres, military medical services

Related laboratories and research centres
Medical and biomedical laboratories, biotechnology laboratories and institutions, medical research centres

Mortuary and autopsy centres, Animal research and testing, Blood banks and blood collection services, Old-age nursing homes

Overhead 1.5

They will rarely produce:
a) Radioactive or cytotoxic waste although in high income countries this is on the increase;
b) Human body parts;
Sharps will be mainly syringe needles.

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Health-care waste generation differs not only from country to country, but also within a country. Waste generation depends on numerous factors such as waste management methods, type of health-care establishment, specializations of the hospital, ratio of reusable items in use, ratio of day care etc. It is therefore suggested that these data only be used as examples, and not as a basis for waste management within an individual health-care establishment. Even a limited survey will probably provide more reliable data on local waste generation than any estimation based on data from other countries or types of establishments.

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Pathogens may infect the human body through the following pathways:
- absorption through an opening or cut in the skin
- absorption through the mucous membranes
- inhalation
- ingestion

Sharps may not only cause cuts and punctures, but also infect the wounds by agents which previously contaminated sharps.
Genotoxic is the property of a substance or its metabolite that is capable of interacting directly with DNA (genetic material), leading to DNA damage that can be assayed. It may include carcinogenic, mutagenic or teratogenic substances.

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These are the properties that hazardous chemicals may have. Fractions of these will be found in HCW after their use or when they are no longer required. They may cause intoxications, injuries or burns. Intoxications can arise from absorption through the skin or mucous membranes and from inhalation or ingestion.

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All persons exposed to hazardous health-care waste are potentially at risk. That is why a tightly controlled management system is required.
The main groups at risk are the following:
- Nurses, auxiliaries, and hospital maintenance personnel;
- Patients in health-care establishments or under home care;
- Visitors in health-care establishments;

- Workers in support services to health-care establishments, such as laundries, waste handling and transportation;
- Workers in waste disposal facilities (such as landfills or incinerators), including scavengers.

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Potential health effects from exposure to health-care waste are numerous. Infections may be transmitted by contact to patient's excretions or body fluids contained in the waste. Pathogens may also be distributed by rodents and insects that come in contact with unsafely stored waste. Little data exist on the number of infections caused by exposure to infectious waste.
Poor management of HCW is also suspected to contribute to nosocomial (or hospital-acquired) infections. There is potential risk of nosocomial infections when the waste contaminates patients or surfaces. This may happen if the waste is not well packaged, stored or handled. Therefore there are strong links between health-care waste management and hospital hygiene. A selection of possible infections that could be caused by exposure to health-care waste is provided in Handout 1.2. Handout 1.4 illustrates the spreading of nosocomial diseases in a very summarized way. In the upper part of the handout are listed the possible sources of pathogens, which includes waste. The middle part contains possible routes of transmission and examples of diseases which may be acquired in a health-care establishment.

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The general public is usually very sensitive about incidents involving health-care waste.
Also, in no culture it is acceptable to dump anatomic waste (recognizable anatomic parts from the human body) on a landfill.
In some cultures, especially in Asia, religious beliefs require that human body parts be turned back to the patient's family in little coffins, to be buried in cemeteries.

Handout 1.1

Categories of hazardous health-care waste

Waste category	Description and examples
Infectious waste	Waste suspected to contain pathogens *e.g. laboratory cultures, waste from isolation wards, tissues, materials or equipment having been in contact with infected patients, excreta*
Pathological waste	Human tissues or fluids *e.g. body parts, blood and other body fluids, human foetuses*
Sharps	Sharp waste *e.g. needles, infusion sets, scalpels, knives, blades, broken glass*
Pharmaceutical waste	Waste containing pharmaceuticals *e.g. pharmaceuticals which are expired or no longer needed, items contaminated or containing pharmaceuticals (bottles, boxes)*
Genotoxic waste	Waste containing substances with genotoxic properties *e.g. waste containing cytotoxic drugs (often used in cancer therapy), genotoxic chemicals*
Chemical waste	Waste containing discarded chemical substances *e.g. laboratory reagents, film developer, disinfectants which are expired or no longer needed, solvents*
Wastes with high content of heavy metals	e.g batteries, broken thermometers, blood pressure gauges
Pressurized containers	Gas cylinders, cartridges and aerosol cans
Radioactive waste	Waste containing radioactive substances *e.g. unused liquids from radiotherapy or laboratory research, contaminated glassware, packages or absorbent paper, urine and excreta from patients treated or tested with unsealed radionuclides, sealed sources*

Handout 1.2

A selection of infections from exposure to health-care wastes, agents and transmission pathways

Pathology	Examples of associated pathogens	Infected body fluids
Gastroenteric infections	Enterobacteria, e.g. *Salmonella, Shigella spp. Vibrio cholerae*, Helminths	Faeces and/or vomiting
Respiratory infections	*Mycobacter tubercul.*, Measles virus, *Strept. pneumoniae*	Breathing secretions, saliva
Ocular infection	Herpesvirus	Eye secretions
Genital infections	*Neisseria gonorrhoeae*	Genital secretions
Skin infections	*Streptococcus* spp.	Pus
Anthrax	*Bacillus anthracis*	Skin secretions
Meningitis	*Neisseria meningitidis*	Cerebrospinal fluid
AIDS	Human immunodeficiency virus (HIV)	Blood, sexual secretion
Haemorrhagic fevers	Junin, Lhassa, Ebola and Marburg viruses	All bloody products and secretions
Septicaemia	*Staphylococcus* spp.	Blood
Bacteraemia	Coagulase-negative staphylococci, *Staphylococcus aureus, Enterobacter, Enterococcus*	Blood
Candidaemia	*Candida albicans*	Blood
Hepatitis A	Hepatitis A virus	Faeces
Hepatitis B & C	Hepatitis B and C viruses	Blood and body fluids

Questions

1) How are the hospital acquired infections dealt with and controlled in your country/ establishment?

2) How do you think that they are transmitted ?

3) What measures would you take to control them?

4) To what extent do you think that health-care waste contributes to the spread of nosocomial infections ?

5) How would you prepare and carry out a programme to raise awareness amongst the staff of the dangers and the measures to combat these problems?

Handout 1.3

Occupational transmission of HIV in the USA and in France

USA:
In June 1994, 39 cases of HIV infections were recognized by the Centre for Disease Control as occupational infections, with the following pathways of transmission:

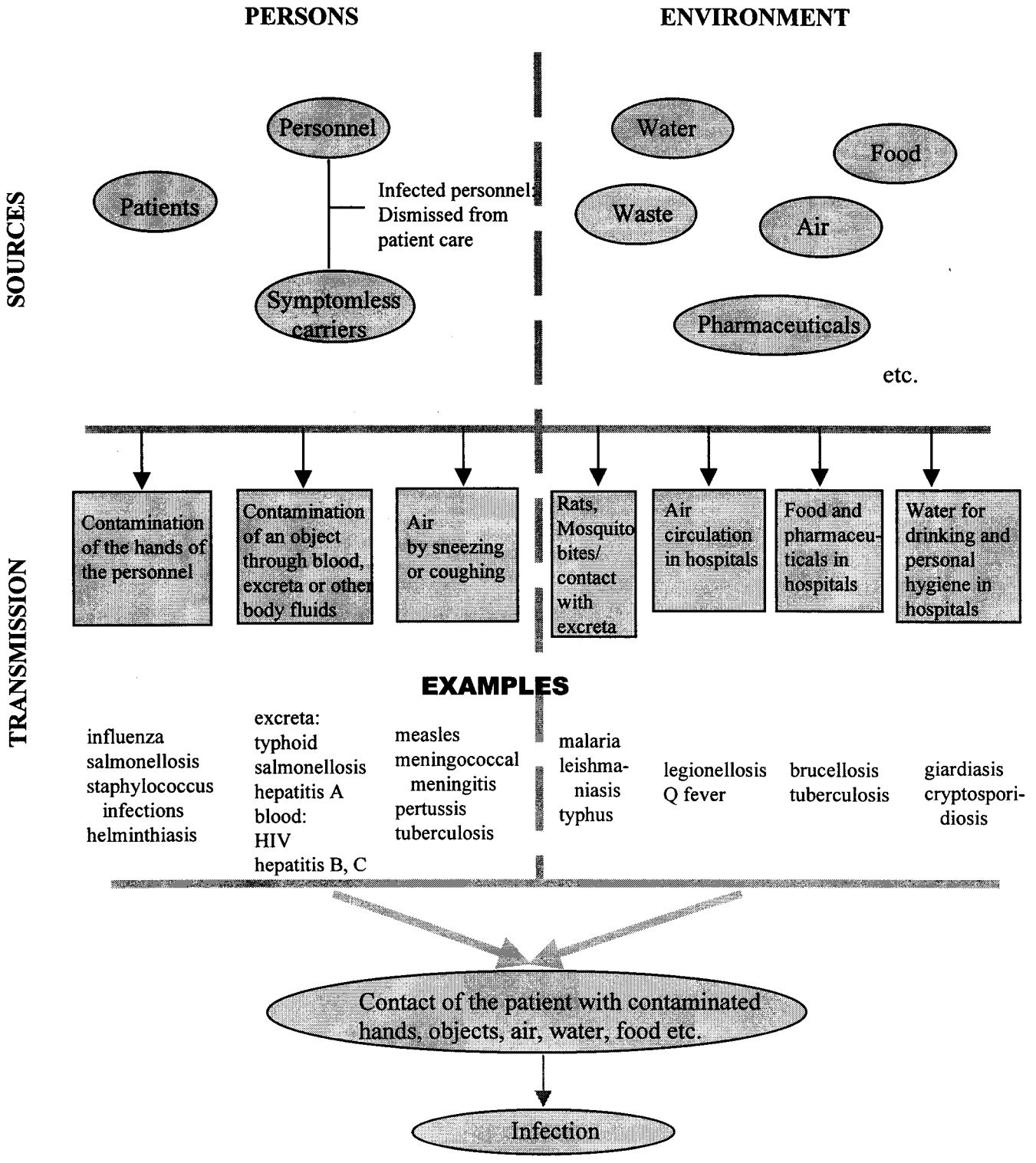
- 32 from syringe needle injuries
- 1 from blade injury
- 1 from glass-tube injury
- 1 from contact with non-sharp infectious item
- 4 from skin or mycosis exposure

In June 1996, the cumulative recognized cases of occupational HIV infections had risen to 51. All cases were nurses, medical doctors or laboratory assistants.

France:
In 1992, 8 cases of HIV infections were recognized as occupational infections. Two cases of HIV transmission through infected wounds were reported among waste handlers.

Handout 1.4

Spreading of nosocomial infections



Note: Many of the listed diseases can spread via more than one route.
This list contains only a few examples compared to the many diseases that may br transmitted within a hospital setting.

Overhead 1.1

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Overhead 1.3

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Overhead 1.4

Major sources of health-care waste

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Overhead 1.6

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Overhead 1.9

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Overhead 1.10

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Overhead 1.11

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