

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



Infectious Waste Its Effects On Environment And Health

A Public Health Problem

By

Dr. Fuad Hameed Rai

**Chief Medical Advisor
Maroof International Hospital Islamabad**

**Formerly
Medical Superintendent Shalamar Teaching Hospital
Managing Director Hospital Waste Management (Guarantee) Ltd
Chief Operating Officer Himont International (Pvt) Ltd**

Session Objectives

By the end of the session the participants should have achieved the following:

- **Understood what does “Infectious Waste” mean and its importance.**
- **Understand the hazardous effects of improper disposal of health care waste on health and environment.**
- **Know how to protect ourselves, our families and friends from Infectious diseases.**

Historical Aspect

- **The 20th century had witnessed enormous progress in eliminating major causes of death in around the world.**
- **Public Health Measures to identify, track, treat & prevent disease played substantial role in adding more than 25 years to the average Lifespan of western nations.**
- **Environmental protection measures including food sanitation, food inspection, clean air and water systems are major contributors to this success.**

Occurrence of Diseases

Interaction of the human HOST (a person) with one - or all - of following determinants or Risk Factors)

Biological = e.g., exposure to Bacteria, viruses etc....

Modifiable Risk Factors

Behavioral = e.g., Tobacco smoking, Drinking & driving

Environmental = exposure to degraded environment

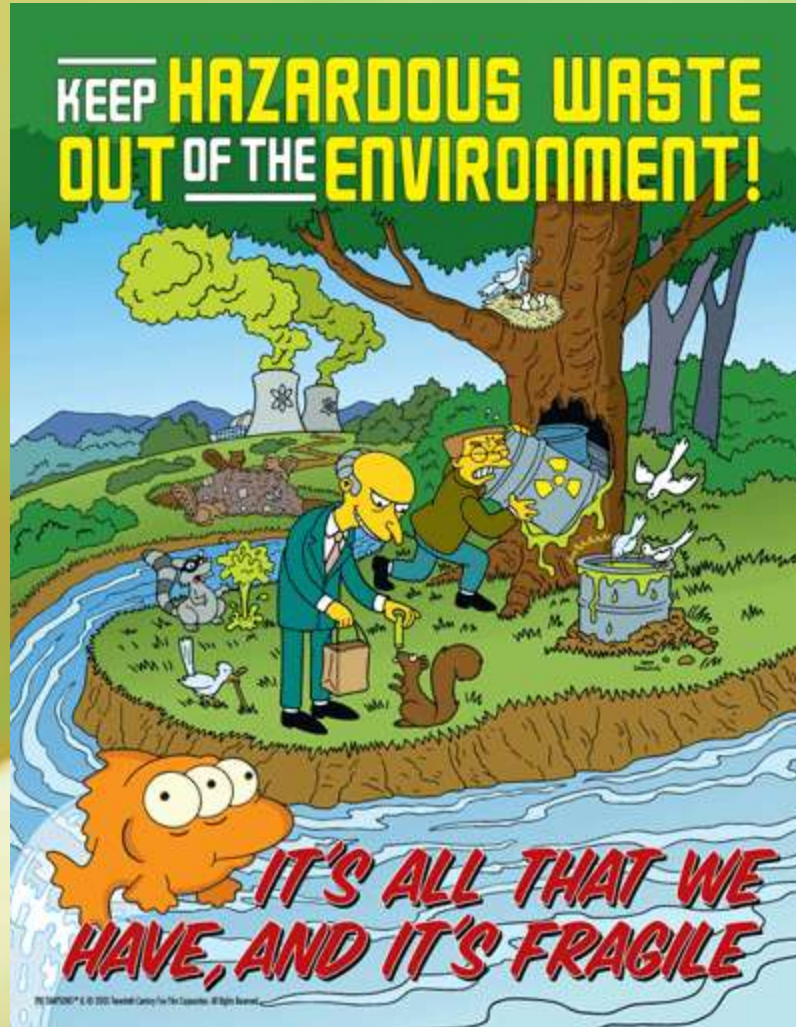
Social = (e.g., Poverty, hunger/malnutrition)

Non-modifiable

Genetic

Physiological = age & gender

**KEEP HAZARDOUS WASTE
OUT OF THE ENVIRONMENT!**



**IT'S ALL THAT WE
HAVE, AND IT'S FRAGILE**

HEALTH CARE WASTE

CAUTION



INFECTIOUS WASTE

Handle with Care

Definition



The Health Care Waste means "all waste arising from establishments, providing health care services to humans and animals".

It is also defined as the total waste stream from a health Care facility that includes both **potentially infectious waste** and non-infectious waste materials.

Health-care activities (for humans) which generate HAZARDOUS HEALTHCARE waste include:

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



SOURCES OF HAZARDOUS HEALTHCARE WASTE

- The major sources of infectious waste include the following:
 - Hospitals
 - Clinical Laboratories
 - Research Facilities
 - Blood Banks
 - Nursing Homes
 - Mortuaries
 - Autopsy Centers
 - Animal Research



The minor sources of healthcare waste include the following:

- Physician's Office
- Dental Clinics
- **Home Healthcare**
- Specialist Clinics
- Acupuncturists
- **Cosmetic Piercing and Tattooing**
- Rehabilitation Centers
- Paramedic Services
- **Beauty Saloons & Barber Shops**

i) Non Risk Waste

- Waste which has not been infected and is hence comparable to normal domestic garbage.
- Usually it constitutes 75% to 90% of the total quantity of waste generated by any such facility.

ii) Risk Waste

- This waste consists of materials that are susceptible to contain pathogens (or their toxins) to cause diseases to a potential host.
- Usually, it comprises of 10-25% of the total Health Care Waste.
- Infectious waste includes infectious sharps and infectious non-sharp materials.

a) Infectious sharps consist of:

- Syringes or other needles
- Blades
- Infusion sets
- Broken glass or
- Other items that can cause direct injury

b) Infectious non-sharps include materials:

- c) That have been in contact with human blood, or its derivatives
- Bandages
 - Swabs or items soaked with blood
 - Isolation wastes from highly infectious patients (including food residues)
 - Used and obsolete vaccine vials
 - Bedding and other contaminated materials infected with human pathogens
 - Human excreta from patients are also included in this category
 - Cultures from laboratory work
 - Waste from surgery and autopsies
 - Waste from Haemo-dialysis units

- All individuals exposed to hazardous healthcare waste are potentially at risk of being injured or infected. Risk of hazardous healthcare waste comprises of:
 - Infectious
 - Pathological
 - Sharps
 - Pharmaceutical
 - Genotoxic
 - Chemical
 - Heavy Metals
 - Pressurized Containers
 - Radioactive

RISK TO THE POPULATION AT LARGE TO ACQUIRE INFECTIOUS DISEASES

- These include all kinds of diseases which are caused by micro-organisms.





The potential health effects of Infectious waste include the following:

- HIV infection
- Hepatitis B and C infection
- Gastrointestinal tract related infections
- Respiratory infections
- Infections caused by blood borne pathogens
- Skin infections
- Effects of radioactive substances
- Intoxication

Infectious Substances Affecting Humans and Animals

- Junin Virus
- Kyasanur Forest disease virus
- Lassa virus
- Machupo virus
- Marburg virus
- Monkeypox virus
- *Mycobacterium tuberculosis*
- Nipah virus
- Omsk Hemorrhagic fever virus
- Poliovirus
- Rabies virus
- *Rickettsia prowazekii*
- Rift Valley fever virus
- Russian spring-summer encephalitis virus
- Sabia virus
- *Shigella dysenteriae type 1*
- Tick-borne encephalitis virus
- Variola virus
- Venezuelan equine encephalitis virus
- West Nile virus
- Yellow Fever virus
- *Yersinia pestis*

Infectious Substances Affecting Human and Animals

- *Bacillus anthracis*
- *Brucella abortus*
- *Brucella melitensis*
- *Burkholderia mallei* – *Pseudomonas mallei*
- *Burkholderia pseudomallei* – *Pseudomallei*
- *Chlamydia psittaci* – avian strains
- *Clostridium botulinum*
- *Coccidioides immitis*
- *Coxiella burnetti*
- Crimean-Congo hemorrhagic fever virus
- **Dengue virus**
- Eastern equine encephalitis virus
- Ebola virus
- Flexal virus
- *Francisella tularensis*
- Guanarito virus
- Hantaan virus
- Hantaviruses causing hantavirus pulmonary syndrome
- **Hepatitis B & C virus**
- **Herpes B virus**
- Human Immunodeficiency virus
- **Highly pathogenic avian influenza virus**
- Japanese Encephalitis virus

WASTE SEGREGATION

SEGREGATION

- The most important component of Healthcare Waste Management is segregation.
- Segregation is the process of separating different waste streams while keeping in view the type of treatment and disposal options.
- A proper system of segregation should identify waste according to the source and type of disposal methodology.
- It would also require waste containers for each category of waste.

The primary objectives of implementing a proper HCW management system in any healthcare facility are:

- Containing infections
- Occupational Safety and
- Reducing public health risks outside the healthcare facility

COLOR CODING SYSTEM

- Yellow Bags / Containers – Infectious Waste
- Black/Blue or white Bags / Containers – Non Infectious Waste or General Waste
- Sharp Containers – Infectious Sharps

SOME FACTS

DIRECT IMPACT OF INFECTIOUS WASTE

SOME FACTS

- In 1992, eight cases of HIV were recognized as occupational infections in France. In two of them transmission took place through wounds in waste handlers.
- In June 1994, out of 39 cases of HIV infection in USA, 34 reportedly occurred from an injury through the sharp biomedical waste. Four resulted from exposure of skin or mucous membrane to infected blood

SOME FACTS

- By June 1996, the number of cumulative recognized cases of occupational HIV infection had risen to 51 in USA and all of them were nurses, doctors or laboratory assistants.

SOME FACTS

- Nearly 66 per cent of the rag pickers in India suffer from an injury (or wound) because of health care waste. Considering this you can ascertain what will be the situation in Pakistan.

SOME FACTS

- Most of the data given above is from developed countries. Unfortunately we do not have an effective system of reporting such episodes in Pakistan.
- One can however imagine that if the situation is so much alarming in developed nations what it will be like in our country.

MEASURES TO BE OBSERVED IF AN ACCIDENT OCCURS

- Extreme care should be taken while dealing with the sharps. In case an injury due to (infected) sharps or broken glass takes place, clean the wound immediately, first with saline and then with spirit or povidone iodine. Consult a doctor as further cleaning and dressing of the wound may be required.

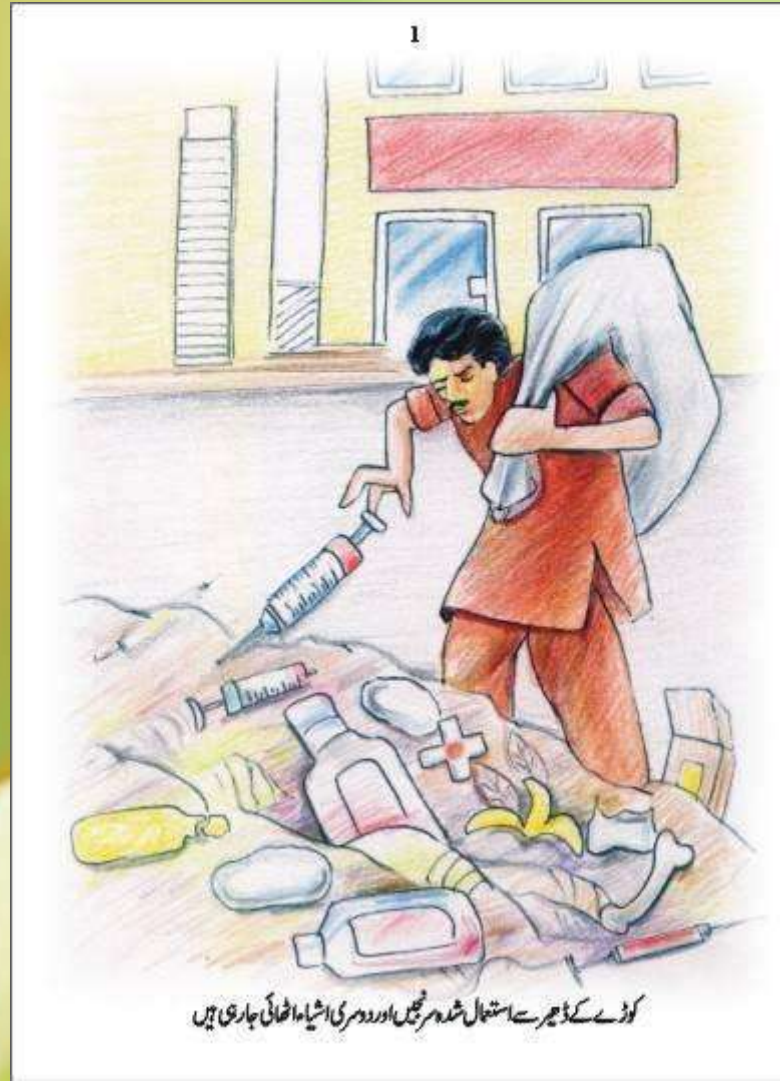




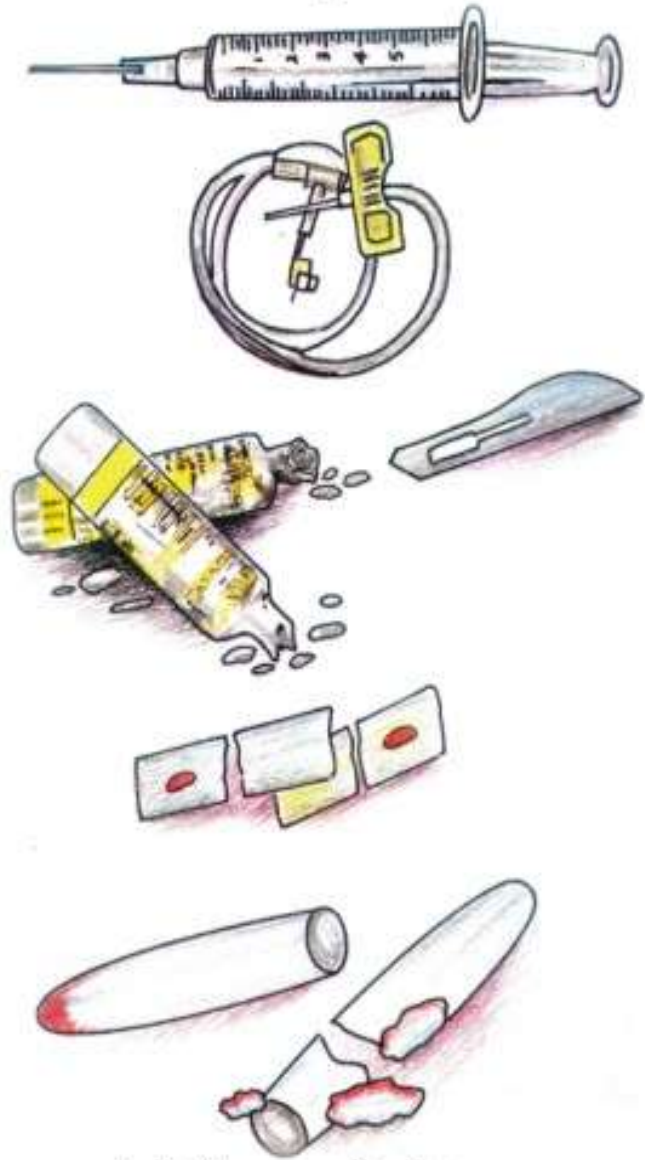
A Pictorial Drive Through Of A Health Facility Disposing Off Waste

Pictures/Cartoons in the following few pages are Property of the

Pakistan Initiative For Mothers and the Newborns (PAIMAN)

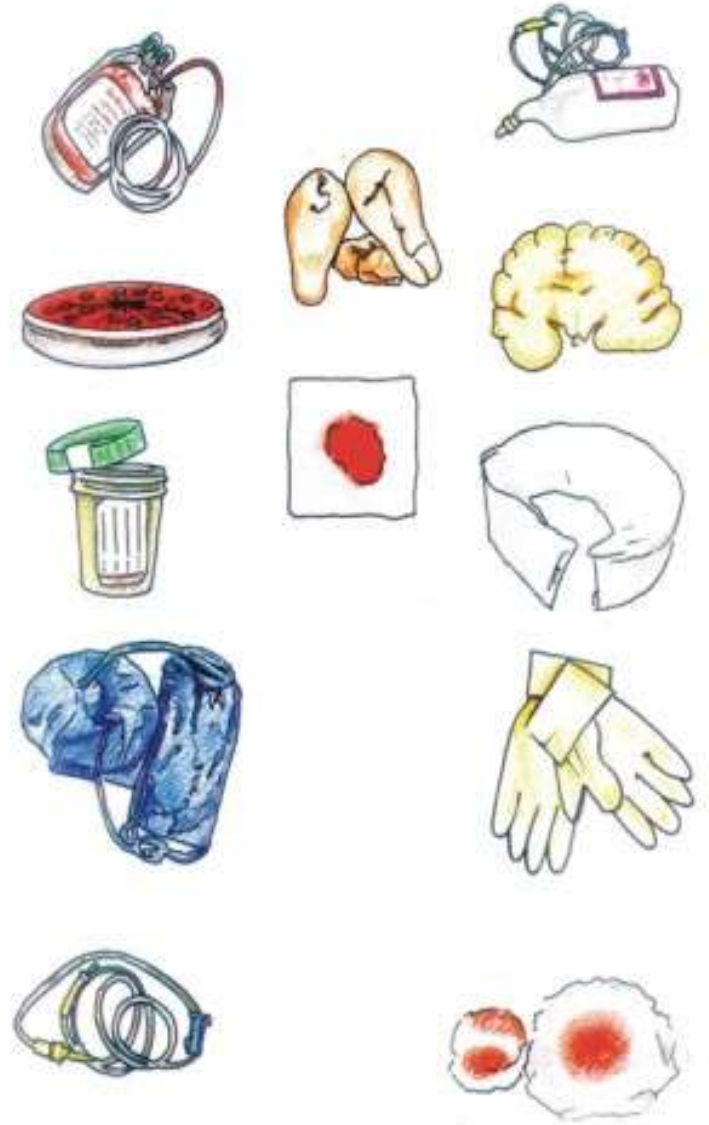


3



بیماریاں پھیلانے والی آلودہ نوکدار اور سوز و جاراحیہ کی مختلف اقسام

2



بیماریاں پھیلانے والے آلودہ کوڑے کی مختلف اقسام



بھاریاں پھیلانے
والی تیز دھارا شیام

بھاریاں پھیلانے
والی آلودہ اشیام

عام کوڑا



سانس کے ذریعے آلودہ ہوا جسم میں داخل ہو کر بھاریاں پھیلاتی ہیں



ایسے آلودہ کوڑے کو جس میں میز و حارہ اشیاء شامل نہ ہوں کو پیلے رنگ کے بیگیوں میں ڈالنا چاہیے جو کہ ہسپتال کے مختلف شعبوں میں موجود ہونے چاہئیں



بیماریاں پھیلانے والی میز و حارہ آلودہ اشیاء کو میز و حارہ اشیاء کے ڈبے میں ڈالنے کا صحیح طریقہ

ہسپتال کے آلودہ کوزے اکٹھا کرنے کا صحیح طریقہ



فلٹر پتے سے ہسپتال کے کوزے کو پھینکا جا رہا ہے



فلٹر پتے سے پھینکا گیا ہسپتالوں کا آلودہ کوزا
کسی کو ذمہ داری کرنے کا باعث بن سکتا ہے

وارڈ کا آلودہ کوزا



فلٹر پتے سے آلودہ اشیاء کو پھینکا جا رہا ہے

آلودہ کوڑے کوڑا لیموں کے ذریعے اکٹھا کرنا



آلودہ کوڑے کوڑا لیموں کے ذریعے اکٹھا کیا جا رہا ہے



کوڑے کو قبیلوں میں بند کیا گیا ہے



آلودہ کوڑے کوڑا لیموں کے ذریعے مشورہ لے جایا جا رہا ہے
جو خاص اس مقصد کے لیے بنائی گئی ہیں



آلودہ کوڑے کے بیگز کوڑا لیموں میں رکھا جا رہا ہے

آلودہ کوڑے کو اکٹھا کرنا



آلودہ کوڑے والا بیگ ٹرالی سے نکالا جا رہا ہے



ٹرالی میں بیگ لٹکایا جا رہا ہے



انہنیائی پیٹریاں پھیلانے والے
کوڑے کو ڈھل بیگ کیا جا رہا ہے



انہنیائی آلودہ کوڑے والا بیگ کو باندھا جا رہا ہے

13



کوڑے کے تھیلوں کو پکڑنے کا صحیح طریقہ



ٹرالی کے ذریعے آلودہ کوڑے کے تھیلوں کو کوڑا تالف کرنے والی مشین تک لے جایا جا رہا ہے

12

کوڑا تالف کرنے والی مشین



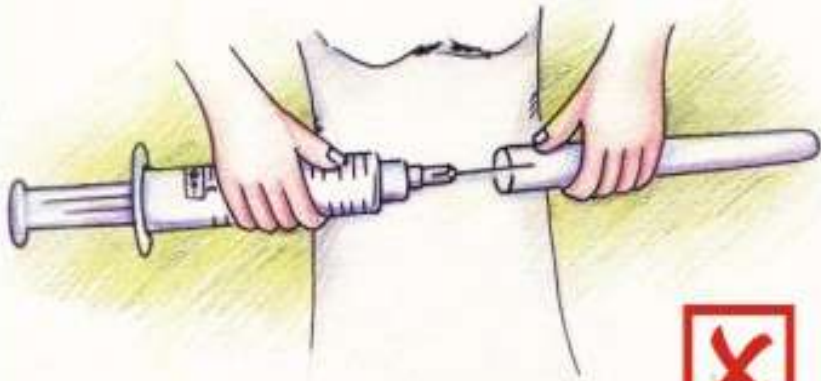
تیار یاں پھیلانے والے کوڑے کا اسٹور



ایچمن اسٹور



کوڑا تالف کرنے والی مشین



سرج کوری کیپ کرنے کی بجائے چھوٹے گےے طریقے سے کاٹیں



سرج کی سوئی نیڈل کنٹر سے کاٹی جا رہی ہے

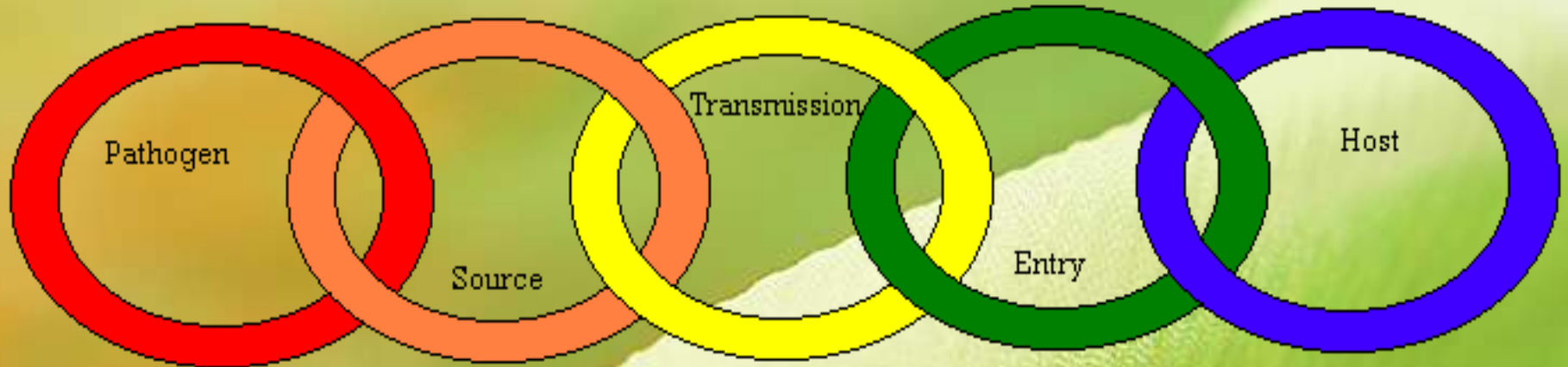


آلودہ کوڑے کو خاص مشین میں سائٹسی بنیادوں پر تلف کیا
جا رہا ہے۔ آلودہ کوڑے کو بلند درجہ حرارت پر جلانے کی وجہ سے
بیماریوں پھیلانے والے جراثیم ختم ہو جاتے ہیں

**RISK OF
INFECTIOUS DISEASES
AND
HOW TO PREVENT THEM?**

Chain of Infection

Links in the Chain of Infection



Infection Control = Break any link in the chain

SOURCE: Tulane University - Office of Environmental Health and Safety
(OEHS)

Infectious Diseases

- **Foodborne and Waterborne Diseases**
 - **High Risk** = Diarrhea (bacterial), Hepatitis A, typhoid fever
 - **Intermediate Risk** = Diarrhea (protozoal), Paratyphoid, cholera, Hep E
- **Prevention**
 - Consume food, water, ice only from approved sources
 - Operate food preparation facilities in accordance with health regulation
 - Wash your hands after using toilets and before eating (hand washing facilities should be near toilets and dining facilities)

Infectious Diseases

- **Animal-contact Diseases**

- **Risk of = Rabies**

- **Prevention**

- **Avoid animal contact, especially if the animal exhibits strange behavior**

- **No mascots**

- **Report all animal bites and scratches**



Infectious Diseases

- **Vector-borne Disease**

- **Risk** = Malaria & Dengue Fever through Mosquito



- **Protective Measures**

- Use DEET on all exposed skin
 - Treat clothings with permethrin when on vacation to farms, villages or hilly areas.

Infectious Diseases

- **Sexually Transmitted Diseases**
 - **Risk of** = Gonorrhea, Chlamydia, HIV, Hepatitis B

- **Prevention**
 - Refrain from any promiscuous sexual activity



Infectious Diseases

Water-borne Disease

Avoid Risk of = Leptospirosis

Prevention

Avoid unnecessary contact with lakes, rivers, streams, and unclean swimming pools

There will not be a sign like this.

WARNING!

**LEPTOSPIROSIS
HEALTH HAZARD**

FRESH WATER STREAMS AND MUD
POSSIBLY POLLUTED WITH BACTERIA

SWIM, BOAT,
OR HIKE AT YOUR OWN RISK

*are you
at risk?*

- Symptoms of leptospirosis include
 - High fever, severe headache, chills, muscle aches, and vomiting, and may include jaundice (yellow skin and eyes), red eyes, abdominal pain, diarrhea, or a rash. If the disease is not treated, the patient could develop kidney damage, meningitis (inflammation of the membrane around the brain and spinal cord), liver failure, and respiratory distress. In rare cases death occurs.
 - Many of these symptoms can be mistaken for other diseases. Leptospirosis is confirmed by laboratory testing of a blood or urine sample.

How do people get leptospirosis?

Outbreaks of leptospirosis are usually caused by exposure to water contaminated with the urine of infected animals. Many different kinds of animals carry the bacterium; they may become sick but sometimes have no symptoms. *Leptospira* organisms have been found in cattle, pigs, horses, dogs, rodents, and wild animals. Humans become infected through contact with water, food, or soil containing urine from these infected animals. This may happen by swallowing contaminated food or water or through skin contact, especially with mucosal surfaces, such as the eyes or nose, or with broken skin. The disease is not known to be spread from person to person.

How is leptospirosis treated?

Leptospirosis is treated with antibiotics, such as doxycycline or penicillin, which should be given early in the course of the disease.

Intravenous antibiotics may be required for persons with more severe symptoms. Persons with symptoms suggestive of leptospirosis should contact a health care provider.

Infectious Diseases

A stylized illustration of a hand being tested with a tuberculin skin test needle. The hand is shown in a light skin tone, and the needle is inserted into the skin. The background is a dark teal color with a large, light-colored circular shape behind the hand.

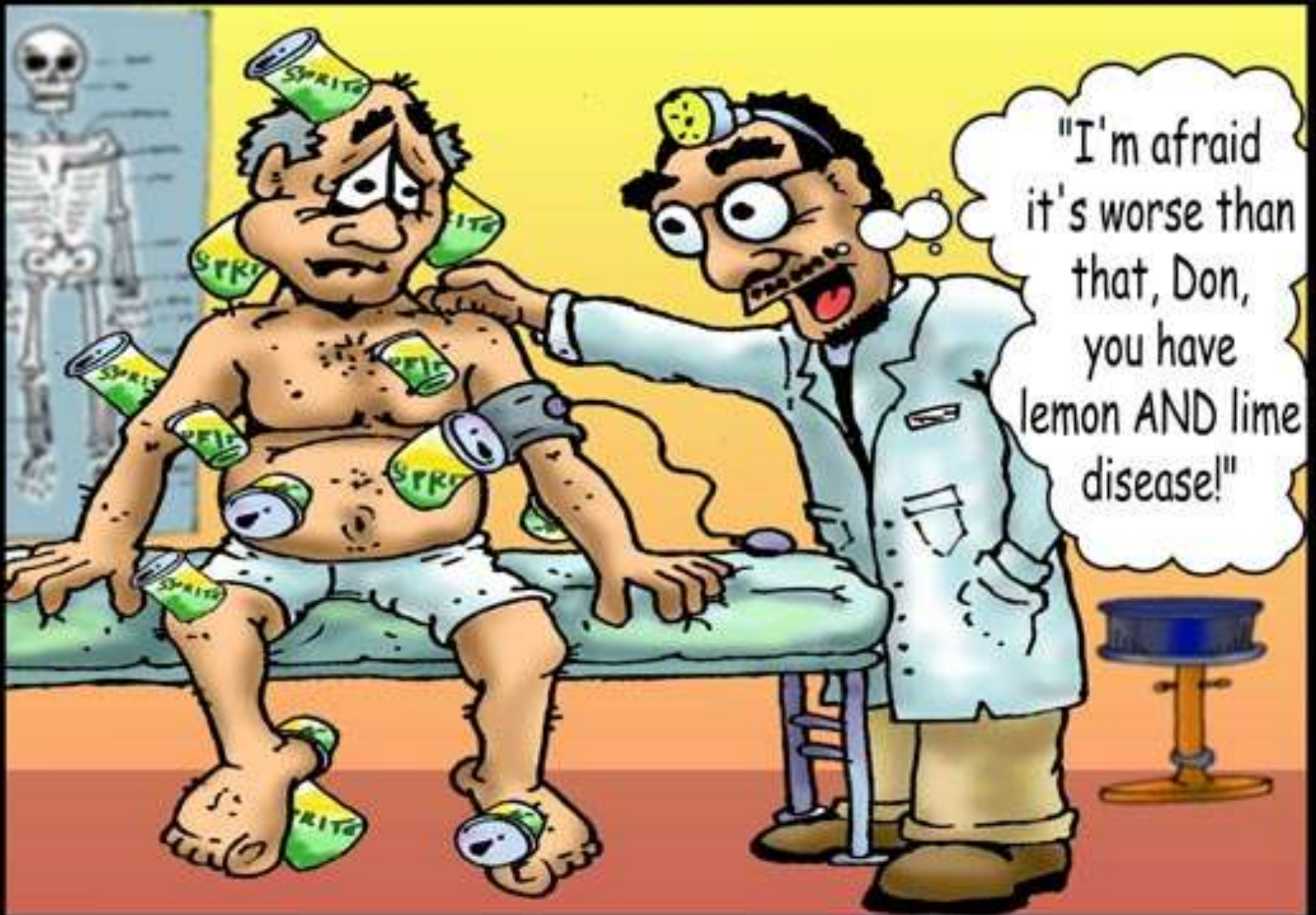
- **Respiratory Diseases**

- **Avoid Risk of** = Tuberculosis

- **Prevention**

- **Tuberculin skin test**
- **72 sq ft/person and head-to-toe sleeping arrangement**
- **Cough or sneeze into your upper sleeve instead of your hands**
- **Wash hands at every opportunity**
- **Avoid unnecessary close contact with the sick**

RELAX !



(c) 2003 London's Times Cartoons Illustrated By: Simeon Liebman e.simeon@verizon.net

ENVIRONMENTAL DEGRADATION

INDIRECT RISK THROUGH POLLUTED ENVIRONMENT



Give a name to this picture!

Environmental Issues

- **Drinking Water Contamination**

- Drinking water in some areas of Pakistan may contain microbial or chemical contaminants. Consumption of water contaminated with raw sewage or runoff containing fecal pathogens may cause a variety of

acute enteric
infections

Name this picture!



THANK YOU

ANY QUESTIONS?

THANK YOU!!

