

**2<sup>nd</sup> year Medical Students**

**Infection Control**

**Dr. Hamed Al Zoubi**

**Associate Professor of Medical Microbiology.**

**MBBS / J.U.S.T**

**MSc, PhD/ UK**

**JBCM - Jordan**

# Outline and ILOs

- Introduction
- Understand some basic definitions
- Understand how disease is transmitted , chain of infection
- Learn about the basic principles of infection and disease.
- Review some infection control measures.
- Hospital waste management

كان رسول الله- صلى الله عليه وسلم- إذا عطس غطى وجهه بكفيه  
أو طرف ثوبه

قال رسول الله صلى الله عليه وسلم:

( لا يُورَدُ مُمْرِضٌ عَلَى مُصِحِّ )

(اجعل بينك وبين المجذوم قدر رمح أو رمحين)

(إذا سمعتم به بأرض فلا تقدموا إليه، فإذا وقع بأرض وأنتم فيها فلا تخرجوا  
فراراً منه)

هناك الكثير ايضاً عن النظافة وغسل اليدين والجسم...

# Infection Control:

- Includes all of the practices used to prevent the spread of microorganisms that could cause disease in a person.
- Infection control practices help to protect patients and healthcare providers from disease by reducing and/or eliminating sources of infection.

**Disease**: impairment of normal functioning, manifested by signs and symptoms

**Infection**: the state produced by the establishment of an infective agent in or on a suitable host , host may or may not have signs or symptoms

**Carrier**: individual harbors the agent but does not have symptoms. Person can infect others.

**Reservoir**: habitat (man, animal, etc.) in which the agent normally lives, grows, and multiplies

**Agent**: something (microorganism) that produces or is capable of producing an effect, i.e. infection

# Nosocomial Infections:

- Result from delivery of health services in a healthcare setting, patients??? are at increased risk.
- Unfortunately, nosocomial infections lead to increased healthcare costs, extended hospital stays and prolonged recovery time.
  - Hospital acquired infection

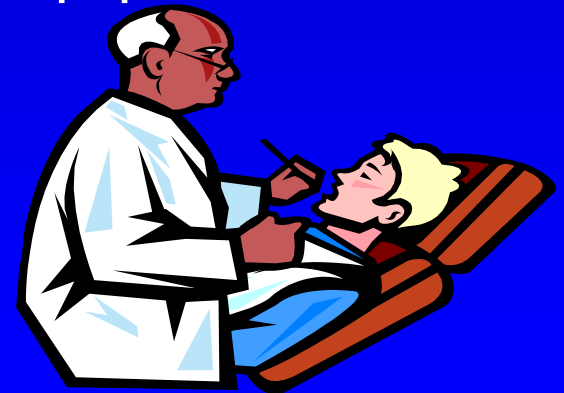


# Patients in healthcare settings are at risk for acquiring or developing infections because:

1. Lower resistance to infectious microorganisms (due to illness or disease).
2. Exposure to an increased number of and more types of disease-causing organisms. (Hospital harbors a high population of virulent strains of microorganisms that are resistant to antibiotics) MRSA, VRE – ***super bugs***.
3. The performance of invasive procedures. (IV catheters etc.. Anything that crosses protective barriers)

# Nosocomial Infections:

- Most nosocomial infections are transmitted by health care workers and patients as a result of direct contact.
- HCWs must pay particular attention to washing hands after contact with patients or equipment.

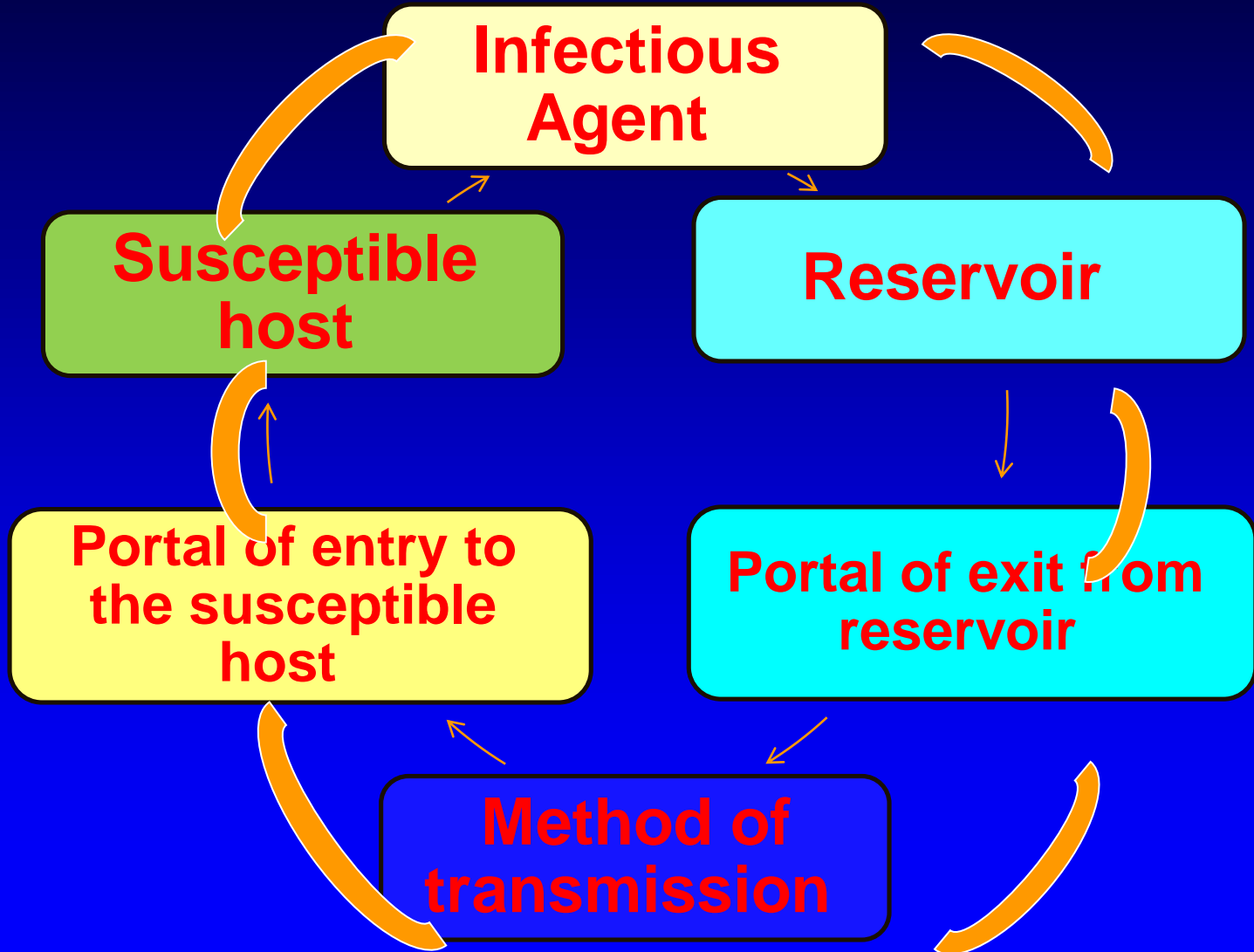


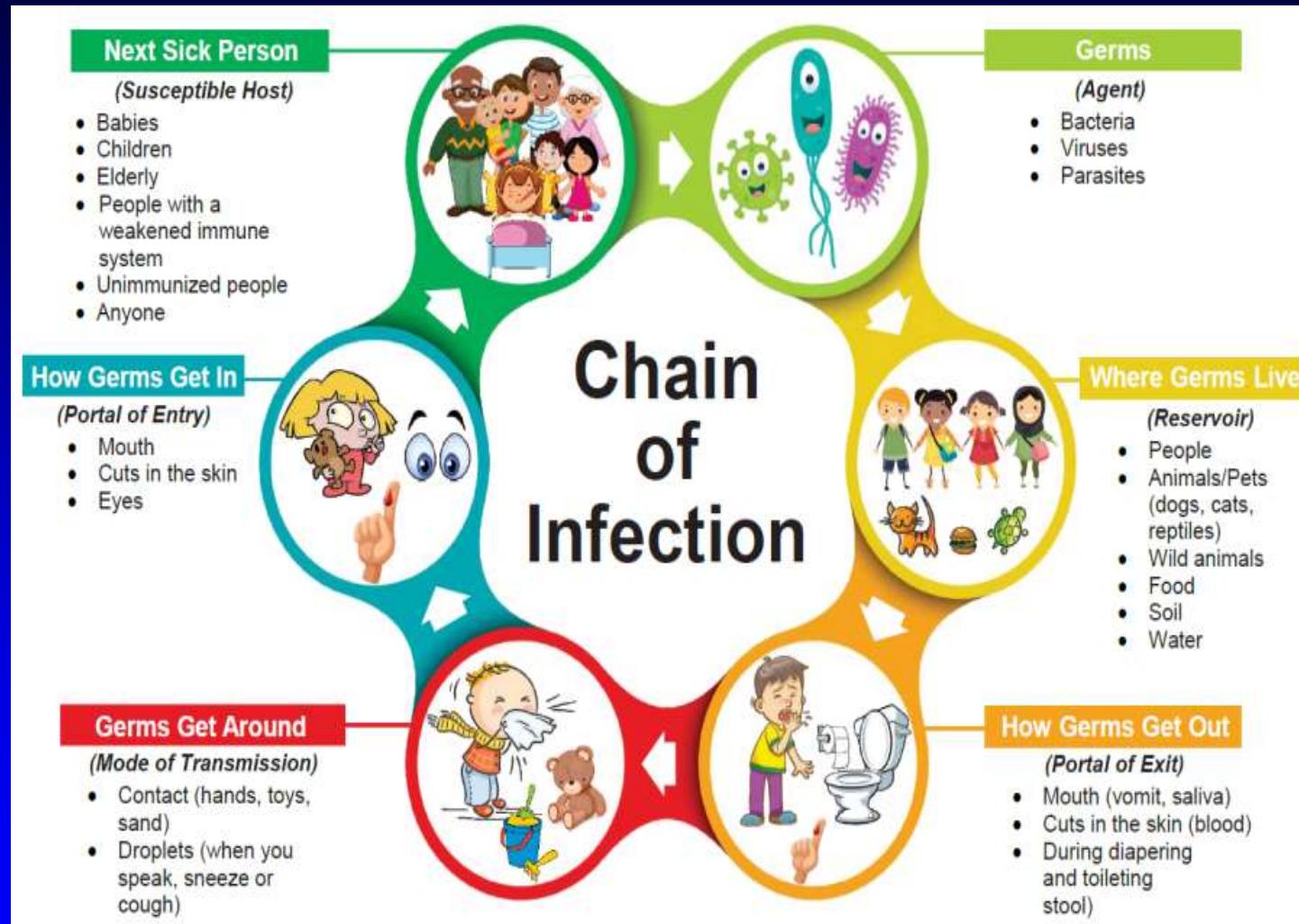


# What are the Types of nosocomial infection?

- **Endogenous:** Autoinfection (infection occurs from the patients' own).
- **Exogenous:** occurs from one patient to another or health care workers and visitors ( hospital environment and personnel).

# Chain of Infection





# Infection Prevention

## Education and Training

- Hygiene
- Follow standard precautions e.g respiratory precautions
  1. Cover coughs and sneezes (everyone, always)
  2. Distancing / separation (everyone, always)
  3. Hand hygiene (everyone, always)
  4. Personal protective equipment (PPE) for essential staff (according to risk assessment ie what procedures or duties you are doing)

Note: PPE = masks/gloves/goggles/Gowns and Overshoes and head and face shield when necessary

## Vaccination

- Keep up to date

## Medicine

- Prophylactic antibiotics – meningitis, pertussis

# Routes of transmission

- Respiratory:
  - Droplet
  - Airborne
- Fecal-oral
- Blood borne
- Vector-borne
- Zoonotic (animals)
- Direct Contact:
  - Host comes into contact with reservoir  
e.g Kissing, skin-to-skin contact, sexual contact
- Indirect Contact:
  - Disease is carried from reservoir to host  
e.g by Contaminated surfaces (fomites)

# Universal precautions (UP)

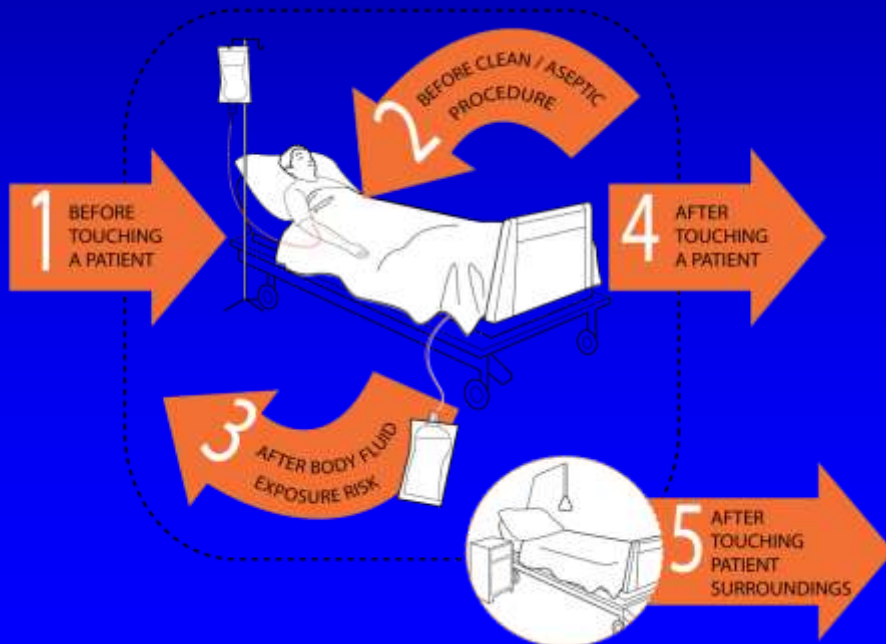
- Are techniques to be used with all patients to decrease the risk of transmitting unidentified pathogens.
- UP obstruct the spread of pathogens that are capable of infecting other persons.

# Universal precautions (UP)

- Include:
  - Hand hygiene
  - Use of personal protection equipments e.g gloves, gown, mask, eye protection, or face shield, depending on the anticipated exposure
  - Safe injection practices e.g never recap a needle that has been used (NSI)

# Hand hygiene (Wash, alcohol rub)

- Is the single most important means of preventing cross – infection
- When:



## How to Handrub?

RUB HANDS FOR HAND HYGIENE! WASH HANDS WHEN VISIBLY SOILED

⌚ Duration of the entire procedure: 20-30 seconds

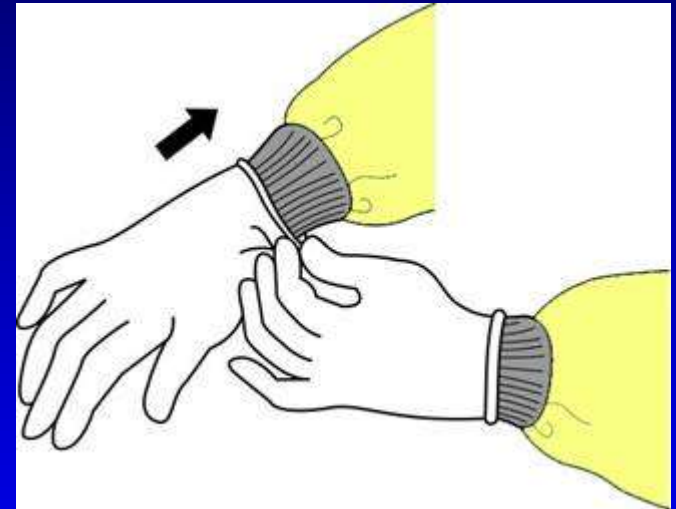
<b>1a</b>  Apply a palmful of the product in a cupped hand, covering all surfaces:	<b>1b</b>  Rub hands palm to palm;	<b>2</b>  Rub hands palm to palm;
<b>3</b>  Right palm over left dorsum with interlaced fingers and vice versa;	<b>4</b>  Palm to palm with fingers interlaced;	<b>5</b>  Backs of fingers to opposing palms with fingers interlocked;
<b>6</b>  Rotational rubbing of left thumb clasped in right palm and vice versa;	<b>7</b>  Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;	<b>8</b>  Once dry, your hands are safe.

World Health Organization | Patient Safety | SAVE LIVES Clean Your Hands



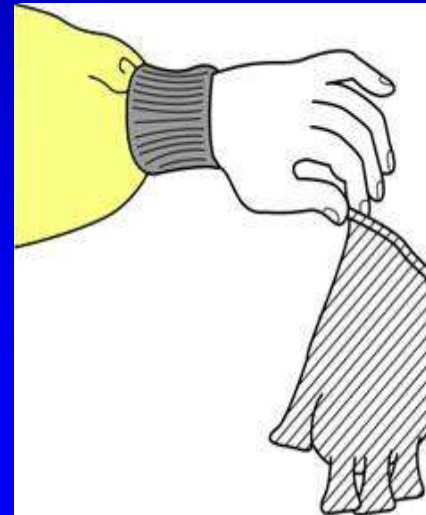
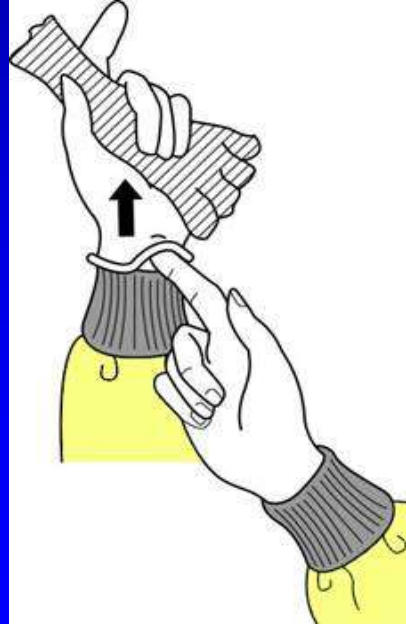
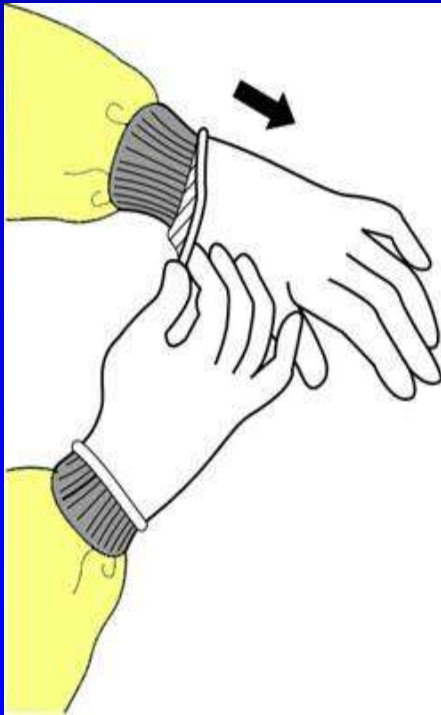
# personal protection equipments PPE

- Wearing: gown , mask, then gloves
- Removing: gloves gown mask



# personal protection equipments PPE

- Removing: gloves gown mask
  - WHERE:
    - At doorway, before leaving patient room or in anteroom
    - Remove respirator outside room, after door has been closed
  - HOW (Gloves)



# personal protection equipments PPE

- Removing: gloves **gown** mask

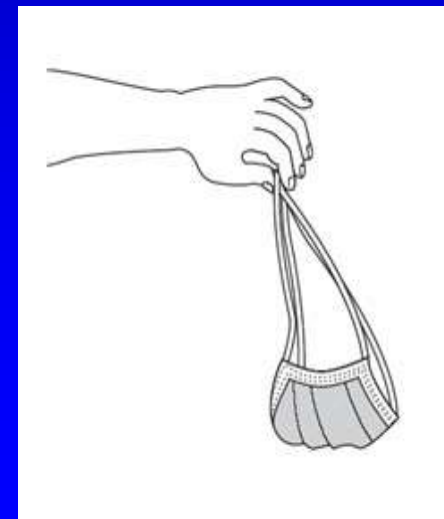
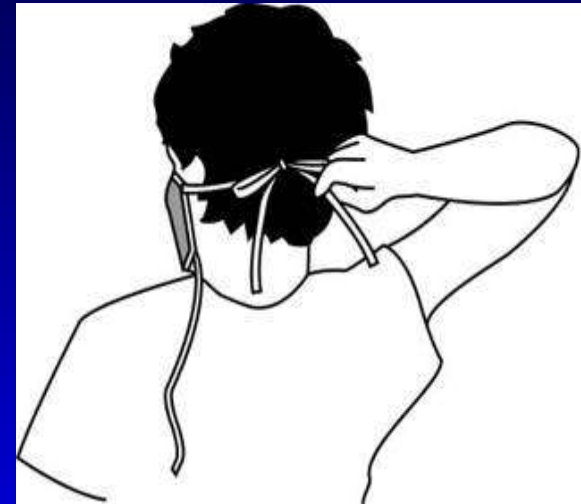
## HOW:

- Unfasten ties
- Peel gown away from neck and shoulder
- Turn contaminated outside toward the inside
- Fold or roll into a bundle
- Discard



# personal protection equipments PPE

- Removing: gloves gown **mask**
  - HOW
- Untie the bottom, then top, tie
- Remove from face
- Discard



- Perform hand hygiene immediately after removing PPE.
- Wash hands with soap and water or use an alcohol-based hand rub

# **Routes of Transmission**

## **1. Respiratory: A. Droplet**

- Large droplets within ~1-1.5 meter :
  - Coughing, sneezing, talking
  - Medical procedures
- Disease Examples:
  - Diphtheria
  - Pertussis (Whooping Cough)
  - Meningococcal meningitis

# Routes of Transmission

## Respiratory: B. Airborne (droplet nuclei)

- Very small particles of evaporated droplets with infectious agent that can:
  - Remain in air for a long time
  - Travel farther than droplets
  - Become aerosolized during procedures
- Examples:
  - Tuberculosis
  - Measles (Rubeola)

# Fate of Droplets



## Organisms Liberated TB

Talking 0-200

Coughing 0-3500

Sneezing 4500-1,000,000

**Droplets can remain suspended in the air for hours.**





- Use a tissue and dispose properly...or use sleeves...
- Hand washing, alcohol gel, keep a distance
- Gown, goggles, mask
- Limit the patient transport

# Masks and Respirators

Respirators rely on an airtight seal and have tiny pores which block droplet nuclei

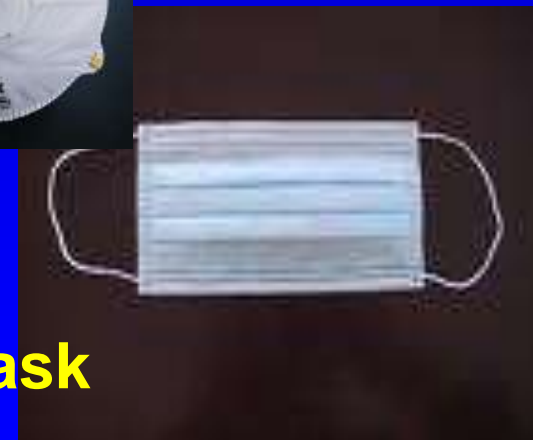
Respirators  
n95



Masks have large pores and do not have an airtight seal to around the edge, permitting inflow of droplet nuclei but not large droplets



Face/surgical mask



**Do**

**Be sure your  
respirator is properly  
fitted!**

**[Should fit snugly at  
nose and chin]**



*\*Image courtesy of: CDC Image Library*

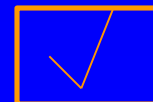
**Why Don't We DO IT  
in Our Sleeves?**

**I cover my coughs.**



- 2. Fecal-oral:
- Feces contaminate food, water, environment, or hands
- Transmission usually occurs when these pathogens gain access through the mouth (by eating contaminated food, vegetables, drinking contaminated water... etc)
- Examples:
  - Hepatitis A, E. coli, cholera
  - General hygienic precautions, wash vegetables properly.....

- **3. blood or body fluids.**
- Blood transfusions, organ transplants, sex
  - Needle stick injury: never recap after use on blood or body fluids
- Examples:
  - HIV, Hepatitis B, C



ضع المحقنة المستعملة في صندوق السلامة  
مباشرة بعد الإستعمال



# What to do if exposed to blood / body fluids

- Puncture wounds should be washed immediately and the wound should be caused to bleed
- If skin contamination should occur, wash the area immediately
- Splashes to the nose or mouth should be flushed with water
- Eye splashes require irrigation with clean water, saline, or a sterile irritant
- **Most importantly: Complete Employee Incident Report. Report exposure to charge nurse (e.g infection control nurse)**



- Don't share non-critical equipment (such as thermometers) between patients
- If a piece of equipment is used with a patient in contact isolation, then the equipment must be properly cleaned and disinfected prior to use on another patient

# Key Points for infection control and Personal Hygiene

- Restrain hair – hair falling forward may drop organisms.
- Keep nails short – no acrylic nails or chipped nail polish.
- Minimum jewelry (see agency policy)
- Cover open wounds with an occlusive dressing
- Bare above elbow, no ties or coats...?

# Waste management in hospital

أمثلة على أنواع النفايات الطبية	نوع النفايات	لون كيس النفايات
الأوراق، مخلفات الأطعمة، عبوات العصير الفارغة البلاستيكية ، أوراق المكاتب، المخلفات الورقية للمستلزمات الطبية، كيس التغذية الوريدية بعد إفراغه.	النفايات غير الخطرة	اسود
الإبر، المشارط، الشفرات، وقطع الزجاج المكسور وعبوات الأدوية الزجاجية المكسورة	النفايات الطبية الخطرة الحادة	وعاء بلاستيكي أصفر مقوى
<ul style="list-style-type: none"> <li>- نفايات وحدات الجراحة والتشريح.</li> <li>- نفايات وحدات غسيل الكلى من أجهزة وأدوات ومستهلكات</li> <li>- المستهلكات الطبية المستعملة للعناية بالمريض والملوثة بدم و سوائل جسم المريض.</li> <li>- أعضاء مريضة تم استئصالها أو مبتورة.</li> <li>- أجنة ميتة او حيوانات مصابة بأمراض معدية.</li> </ul>	النفايات الطبية الخطرة/المعدية و التشريحية	أصفر
<ul style="list-style-type: none"> <li>- مخلفات مرضى الأمراض المعدية .</li> <li>- الأوساط الزراعية والمواد المستعملة لغاية تحاليل الأمراض المعدية في المختبرات.</li> </ul>	النفايات الطبية الخطرة/شديدة العدوى	احمر
<ul style="list-style-type: none"> <li>- النفايات الناتجة عن عمليات تصنيع، نقل، تحضير أو إعطاء العلاج الكيماوي</li> <li>- المستهلكات الطبية (مثل الحفاصات،الشاش)الملامسة لافرازات المريض الذي يتلقى العلاج الكيماوي كالبول والبراز و القيء .</li> </ul>	النفايات السامة للجينات ( نفايات العلاج الكيماوي)	ازرق

# VACCINES

الجرعة	عمر الطفل عند التطعيم
يعطى الطفل مطعوم BCG	في الشهر الأول
يعطى الطفل مطعوم الشلل المقتول IPV و مطعوم الخماسي الذي يتكون من DPT HBV+Hib	في بداية الشهر الثالث
يعطى الطفل مطعوم الشلل المقتول IPV و مطعوم الشلل العموي OPV و مطعوم الخماسي الذي يتكون من DPT HBV+Hib	في بداية الشهر الرابع
يعطى الطفل مطعوم الشلل العموي OPV و المطعوم الرباعي الذي يتكون من Hib+DPT و مطعوم التهاب الكبد نوع ب HBV	في بداية الشهر الخامس
يعطى الطفل مطعوم الحصبة Measles و مطعوم الشلل العموي OPV	في بداية الشهر العاشر
يعطى الطفل الجرعة الاولى من مطعوم MMR	عند بلوغ الطفل عامه الاول (عمر 12 شهر)
يعطى الطفل الجرعة الثانية من مطعوم MMR و الجرعة المدعمة من DPT و الشلل العموي	على عمر 18 شهر

The End