Introduction in Infection Control

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No Side Discussions

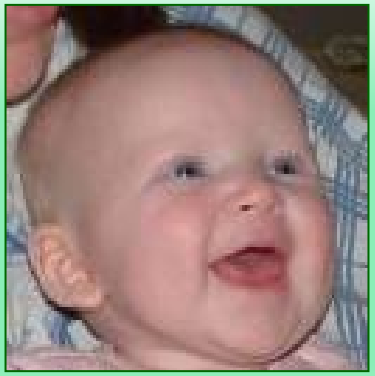
3

No Wrangle

2

Cooperation – Teamwork Spirit

1



Smile

8

Be a model

7

Be Punctual

6

Turn off mobiles

5

Respect Others' Opinions

What is the infection Prevention & control

- Infection Prevention & control refers to policies and procedures used to minimize the risk of spreading infections, especially in hospitals.

tory of IPC

قال عليه السلام: (فر من المجذوم فرارك من الأسد)

وقال صلى الله عليه وسلم:(إذا ولغ الكلب فى إناء أحدكم فليغسله سبعا إحداهن بالتراب) رواه مسلم

وقال عليه السلام : (لا يورد ممْرَض على مصح)

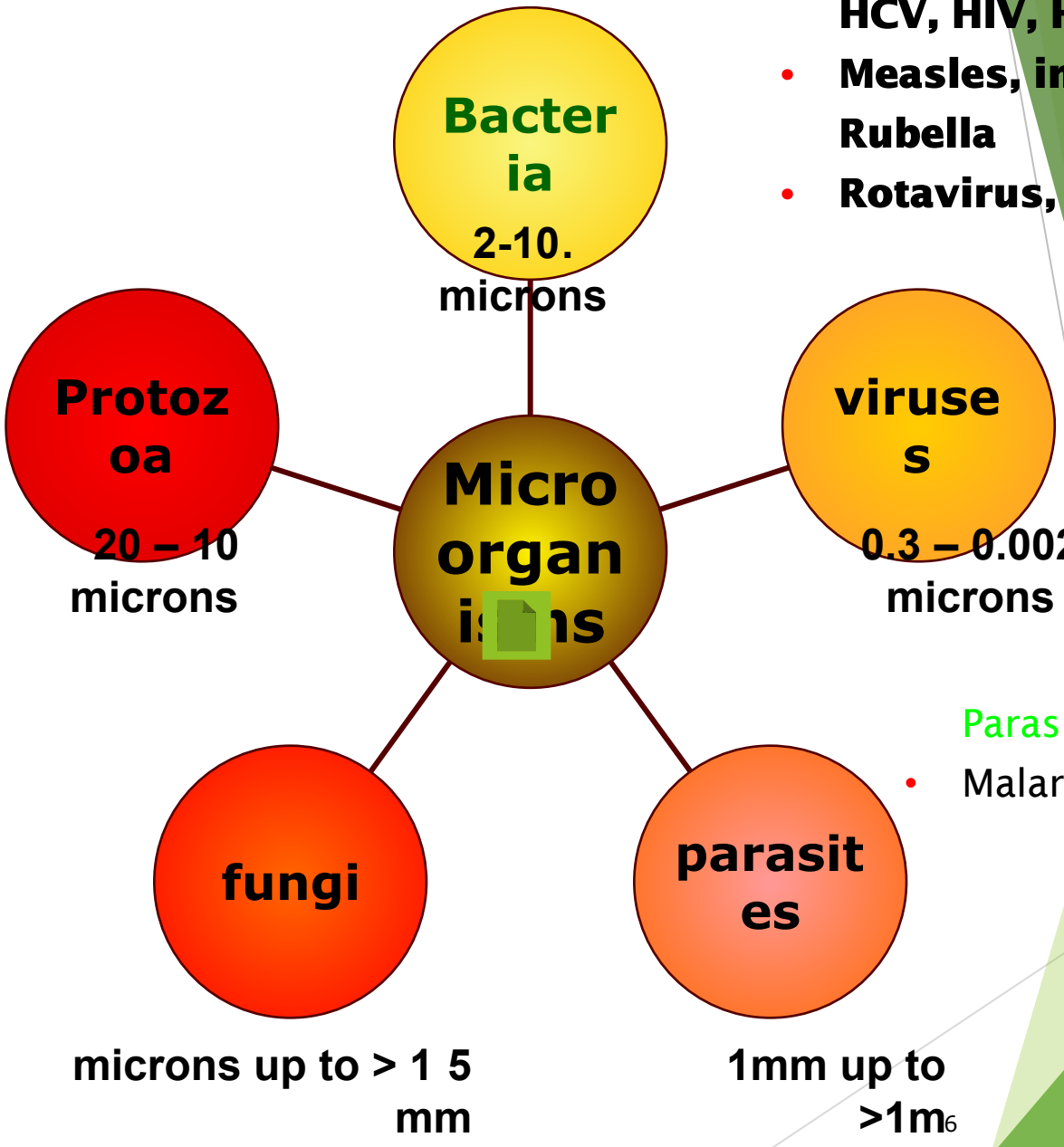
قال عبد الرحمن بن عوف: سمعت رسول الله صلى الله عليه وسلم يقول: (إذا نزل الطاعون بأرض فلا تخرجوا منها فراراً منه، وإذا كان بأرض فلا تدخلوها)

What lives around us?

place	powe	count	Per
Stool	10^{13}	,10,000,000,000,000	Gram
On skin	10^{6}	.1.000.000	Cm^{2}
Saliva	10^{6}	1.000.000	ml
Wet soil	10^{10}	10.000.000.000	Gram
Water stream	10^{7}	10.000.000	mm
Tap water	10^{2}	100	mm
air	10^{3}	more than 1000	L

Bacteria

Klebsiella,
S. aureus,
Acinitobacter,
Enterobacter,
Mycobacterium Tuberculosis



Viruses

- **HCV, HIV, HBV**
- **Measles, influenza, Rubella**
- **Rotavirus, norwalk ….**

Parasite

- Malaria

Magnitude of the Problem

- Major global issue for patient safety
- 5–9 % of patients acquire one or more infections in developed countries
- In ICUs, healthcare acquired infection (HCAI) affects about 30% of patients and mortality may reach 44%.

Impact of HCAI

HCAI can cause:

- more serious illness
- prolongation of stay in a health-care facility
- long-term disability
- excess deaths
- high additional financial burden
- high personal costs on patients and their families

Remember:

The patient may be colonized but not infected , so ***NO SIGNS OF INFECTION*** ,

but still can be a source !!!

Infection PREVENTION is Everyone's Business

Family Visitors

Infection Chain &Standard Precautions

Infection Control & Central Sterilization
Training Specialist

Principles of Infection Prevention & Control

Transmission based precautions

Used for patients known or suspected to be infected or colonized with infectious agents that cannot be contained with standard precautions .alone

Standard Precautions

all blood, body fluids and tissues must be handled as if they are infectious

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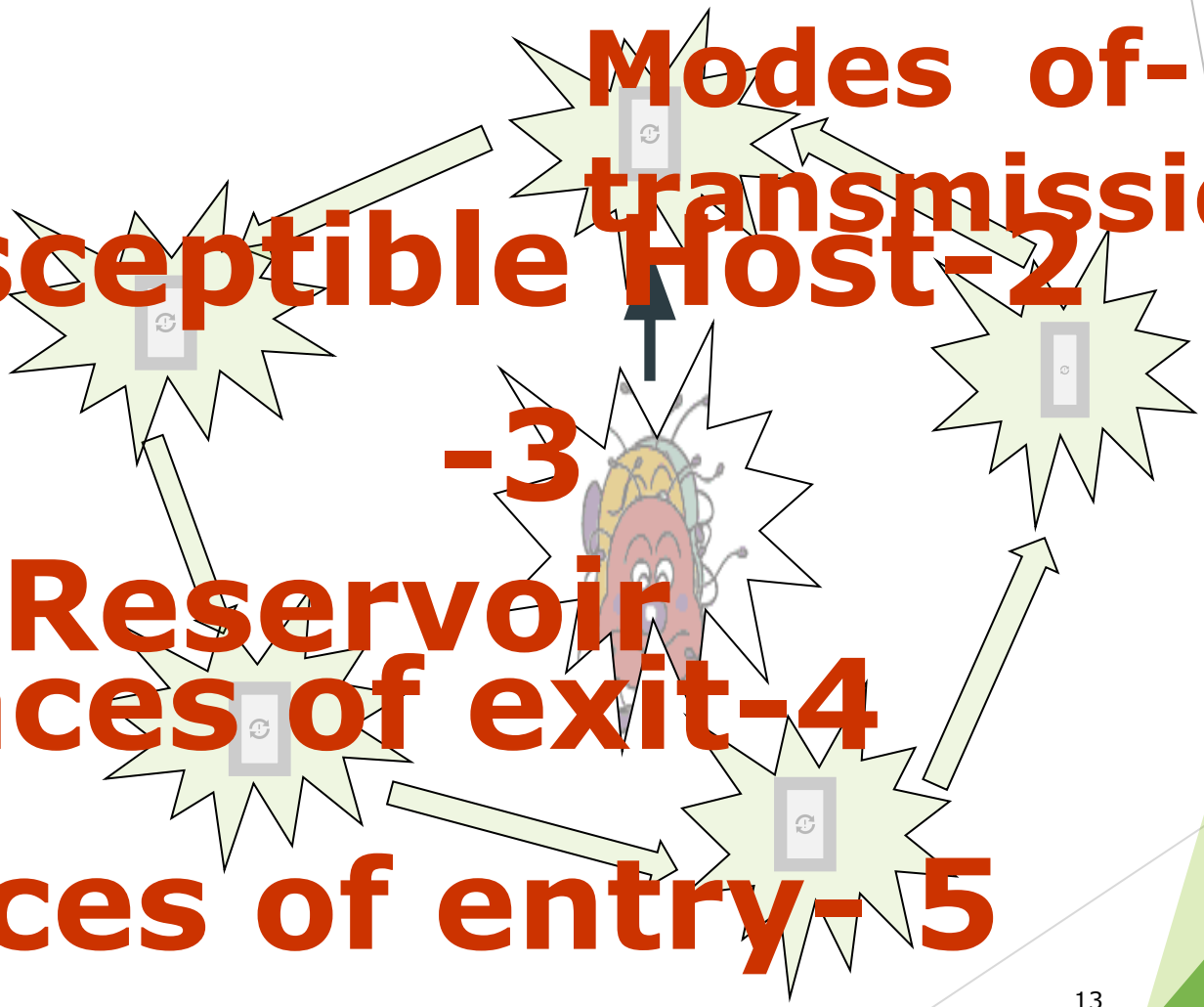
Infection chain



Modes of-1 transmission

Susceptible Host-2

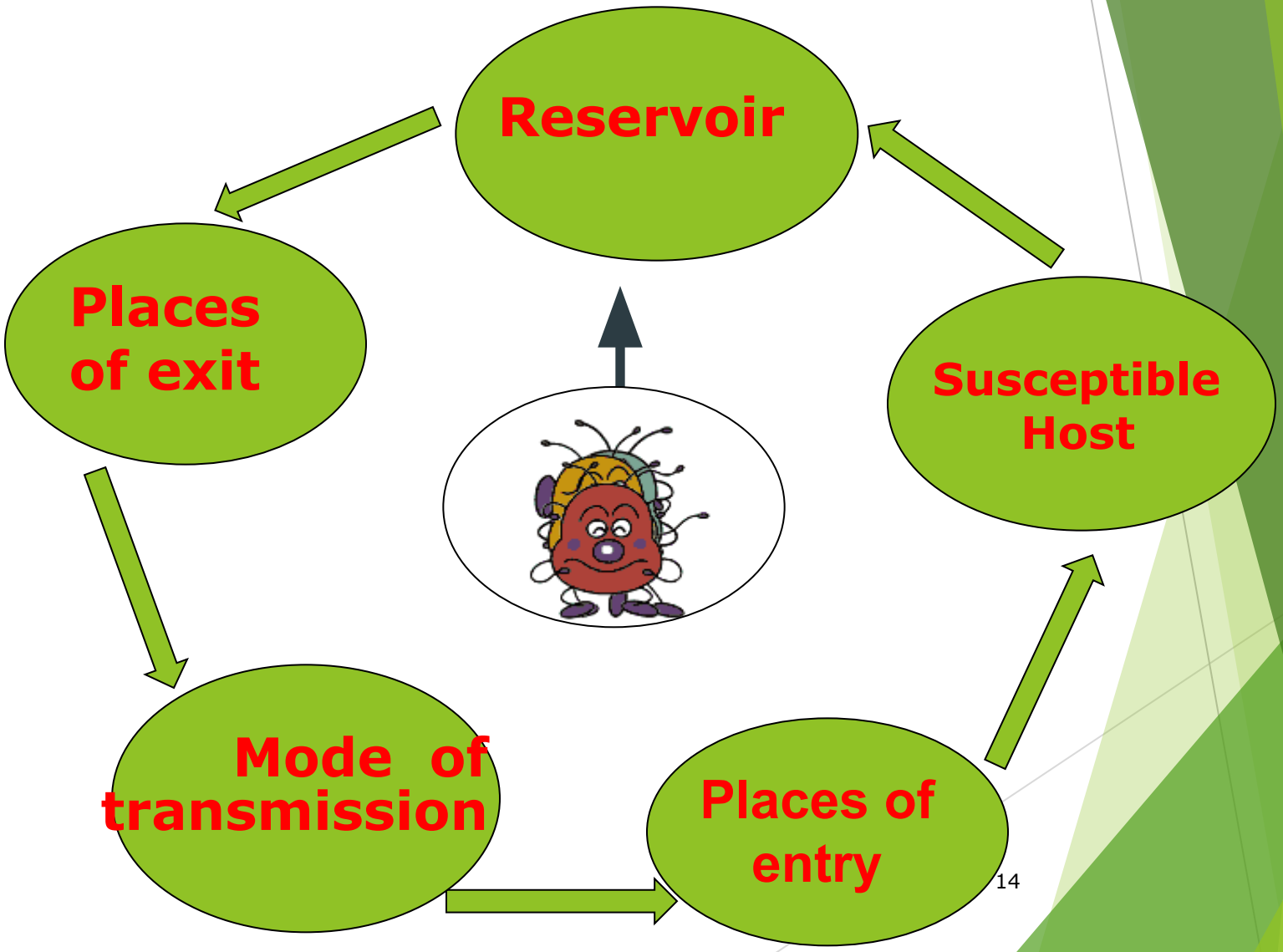
-3

Reservoir

Places of exit-4

Places of entry- 5

Infection chain



Remember !!!

Mode Of Transmission

The most weak point to prevent infection

Patient factors:

- Age
- Disease Processes” (DM, burns, immuno-suppression)
- Invasive procedures
  (urinary catheter, intravenous lines, ventilation)
- Lifestyle
- Occupation
- Diagnostic Procedures
- Medications
- Travel History
- Nutritional Status

Modes of Transmission

- Contact (Direct & Indirect)
- Droplet
- Airborne
- Vehicles
- Vectors

Infection sources in HCF

Endogenous source

- Agent is present at the time of admission as part of patient's normal flora
- Infection develops as a result of
  - altered resistance or
  - introduction of microbes into normally sterile areas

Infection sources in HCF

Exogenous source

Infection occurs from introduction of microbes into or on the patient from an outside source.

Health Care-Associated Infections (HCAI)

In the **past** referred to as “nosocomial” or “hospital” infection

“An infection occurring in a patient during the process of care in a hospital or other health-care facility which was not present or incubating at the time of admission. This includes infections acquired in the health-care facility but appearing after discharge, and also occupational infections among health-care workers of the facility”

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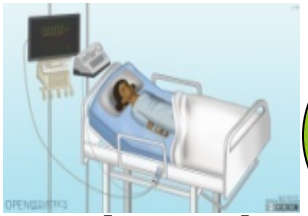
Defining Nosocomial Infections: (Nci):

- Infections are considered to be hospital acquired if they develop at least 48 Hrs after hospital admission without proven prior incubation.
- 2 days after hospital discharge or within 30 days of an operative procedure.

Standard Precautions



Patient placement

Hand hygiene

Cough etiquette and respiratory hygiene

Use of PPE

Environmental cleaning

Standard Precautions

Aseptic techniques

Waste Management

Instrument reprocessing

Lumbar Puncture Procedure

Saving Patients

Safe use of injections

ANTIMICROBIAL STEWARDSHIP AMS

Definitions:

- Antibiogram is:

The overall profile of antimicrobial susceptibility results of a microbial species to a battery of antimicrobial agents during a specified period of time.

Rationale

- The Antibiogram will lead to better antibiotic prescription, and will provide an objective analysis on the resistance pattern in our hospital .

Transmission-based precautions in HCF

Outline

- Routes of transmission
- Precautions levels
  - Standard precautions
  - Transmission-based precautions
    - Contact
    - Droplet
    - Air-borne

Transmission-based Precautions

- All levels require hand hygiene
- Higher level of precautions
- Applied in addition to standard precautions
- Types of transmission-based precautions:
  - Contact precautions
  - Droplet precautions
  - Airborne precautions

UCSF Infection Control

CONTACT PRECAUTIONS

Clean Hands Save Lives

STOP

Visitors—See nurse before entering

STANDARD PRECAUTIONS

Clean hands **plus**

Gown and Gloves

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UCSF Infection Control

Routes of Transmission Contact

Direct Contact

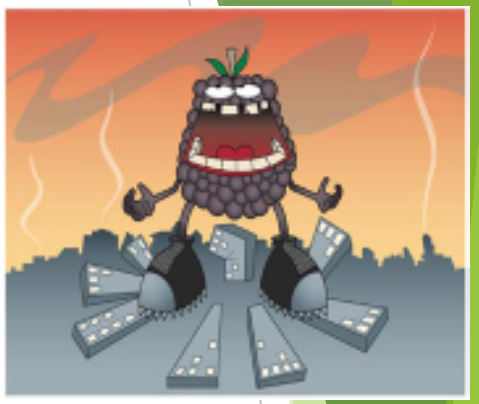
- Host comes into contact with reservoir
- Kissing, skin-to-skin contact, sexual intercourse
- Contact with soil or vegetation

Indirect Contact

- Disease is carried from reservoir to host
- Contaminated surfaces

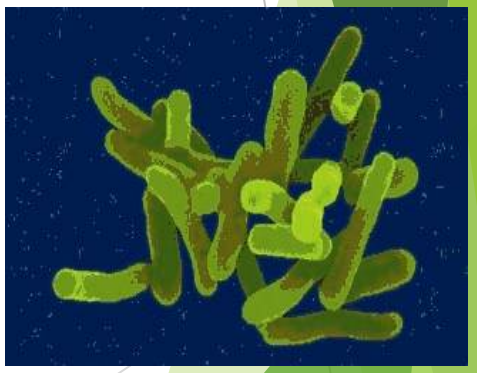
Contact Precautions

- Prevent infection through direct or indirect contact with patients or patient care environment



Examples

- VRE
- Methicillin Resistant S. Aureus " skin"
- Shigellosis
- Hepatitis " A & E"
- Scabies
- Congenital Rubella
- Diphtheria, cutaneous
- Rotavirus
- Impetigo
- Major draining wounds (Staph/Strep) not contained in dressing
- Clostridium *difficile*



Contact Precautions

Taken *in addition to* Standard Precautions

- Isolate or cohort patients
- Limit patient movement
- Gown + gloves for patient / room contact
  - Remove immediately after contact
- Do not touch eyes, nose, mouth with hands
- Avoid contaminating environmental surfaces

Contact Precautions

- Wash hands immediately after patient contact
- Use dedicated equipment if possible
  - If not, clean and disinfect between uses
- Clean, then disinfect patient room daily
  - Bed rails
  - Bedside tables
  - Lavatory surfaces
  - Blood pressure cuff, equipment surfaces

Cleaning and Disinfection for Contact Precautions

- **Detergents**
  - Remove dirt, soiling
  - Mechanical force essential
  - Flush with clean water
- **Disinfectants**
  - Kill viruses, bacteria
  - Decontaminate surfaces
  - Type depends on infectious agent
  - Use *after* detergent


UCSF Infection Control
Clean Hands Save Lives
DROPLET PRECAUTIONS
STOP
Visitors—See nurse before entering
STANDARD PRECAUTIONS
Clean hands plus Mask and Eye Protection
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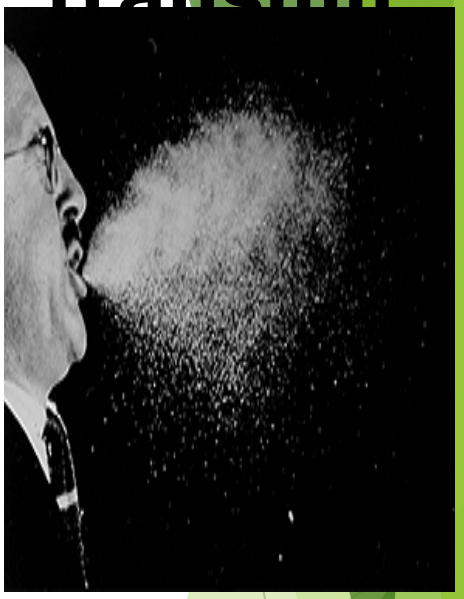
UCSF Infection Control

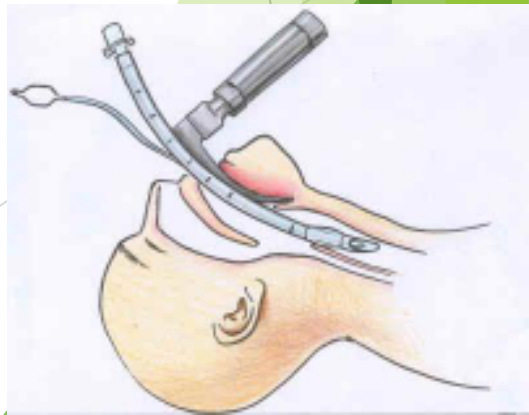
Droplet Transmission

Large droplets within 1 meter transmit

infection via:

- Coughing
- Sneezing
- Talking
- Medical procedures





Droplet Precautions

Taken *in addition to* Standard Precautions

- Wear surgical mask within 1 meter of patient
- Wear face shield or goggles within 1 meter of patient
- Place patients in single rooms or cohort 1 meter apart
- Limit patient movement within facility
  - Patient wears mask when outside of room

Droplet

Examples:

- *Diphtheria*
- *Neisseria meningitides*
- Pertussis
- Influenza
- Rubella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AIRBORNE PRECAUTIONS
Clean Hands Save Lives
STOP
Visitors—See nurse before entering
STANDARD PRECAUTIONS
Clean hands plus
• Immunity Required
• Negative Pressure Required—Keep Door Closed
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Airborne Transmission (droplet nuclei)

Very small particles of evaporated droplets or dust with infectious agent may:

- Remain in air for a long time
- Travel farther than droplets
- Become aerosolized during procedures usually performed in
  - Emergency room
  - Intensive care unit

Airborne Precautions

Taken in addition to Standard Precautions

- Examples
  - Tuberculosis
  - Measles
  - *varicella* - Chickenpox
  - *Variola* - Smallpox
  - Severe acute respiratory syndrome (SARS)
  - Corona virus

Airborne Precautions

- **N95** mask for personnel
  - Check seal with each use
- **Airborne Infection Isolation Room (AIIR)**
  - Air exhaust to outside versus re-circulated
- Patient to wear a surgical mask if outside of the isolation room

Aerosol-generating Procedures

- N95 particulate respirator
  - If not available, wear tight fitting surgical mask and face shield
- Eye protection
- Gloves and hand washing
- Gown and waterproof apron
- Isolation room with negative pressure
- Hair cover optional

Aerosol-generating procedures

- Endotracheal intubation
- Nebulized medication
- Bronchoscopy
- Airway suctioning
- Tracheostomy care
- Chest PT
- Nasopharyngeal aspiration
- Positive pressure ventilation
- Resuscitation maneuvers
- Postmortem excision of lung tissue

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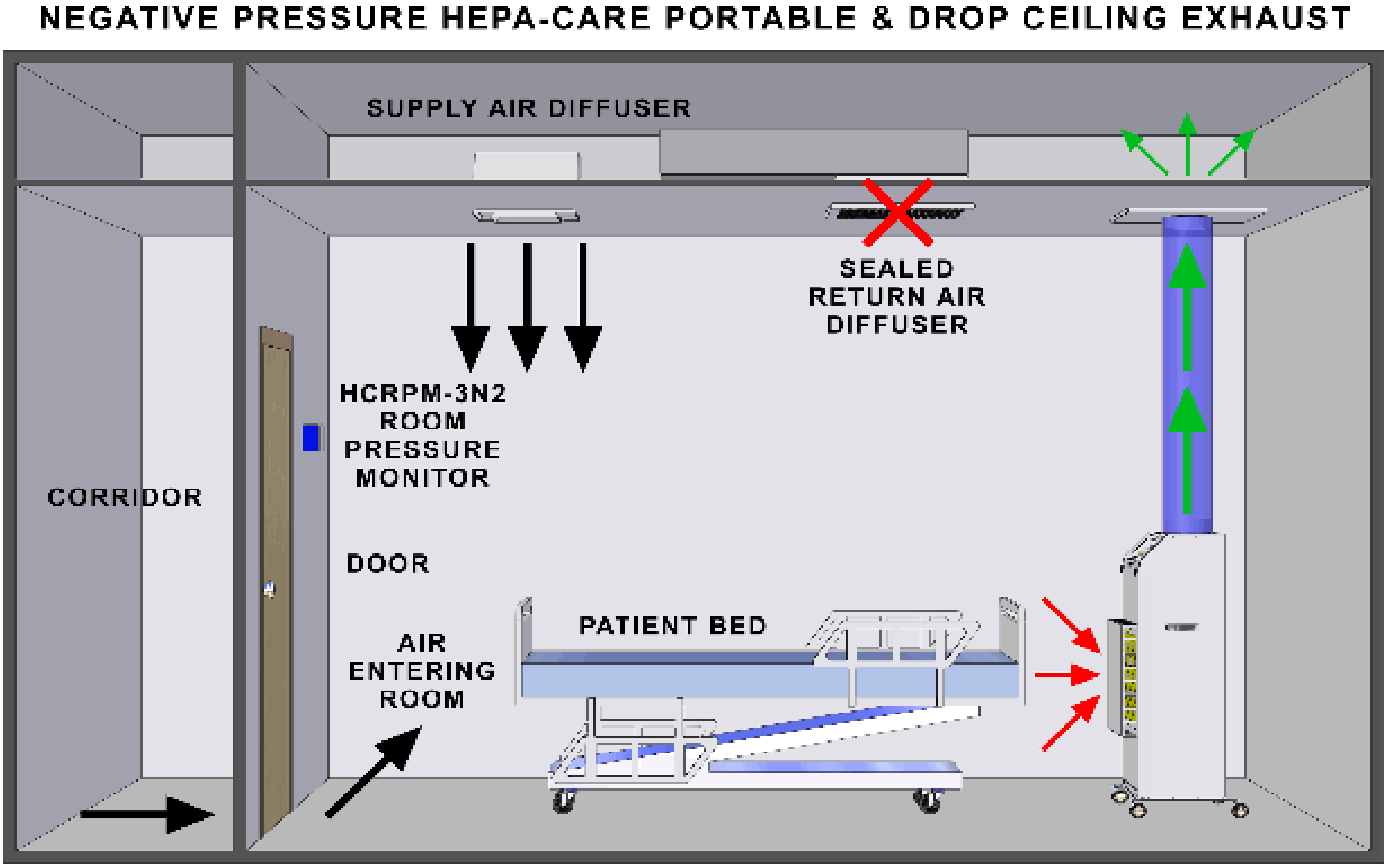
Negative Pressure Isolation Room



Hand Hygiene
Fight antibiotic resistance - it's in your hands

Goal of hand hygiene

منع او الاقلال من

العدوى المصاحبة للرعاية الصحية

Decrease the portion of

Health care associated infections

spread by hand contact

Why hand hygiene?

Most common modes of transmission of pathogens in the hospitals are via hands of health care workers!

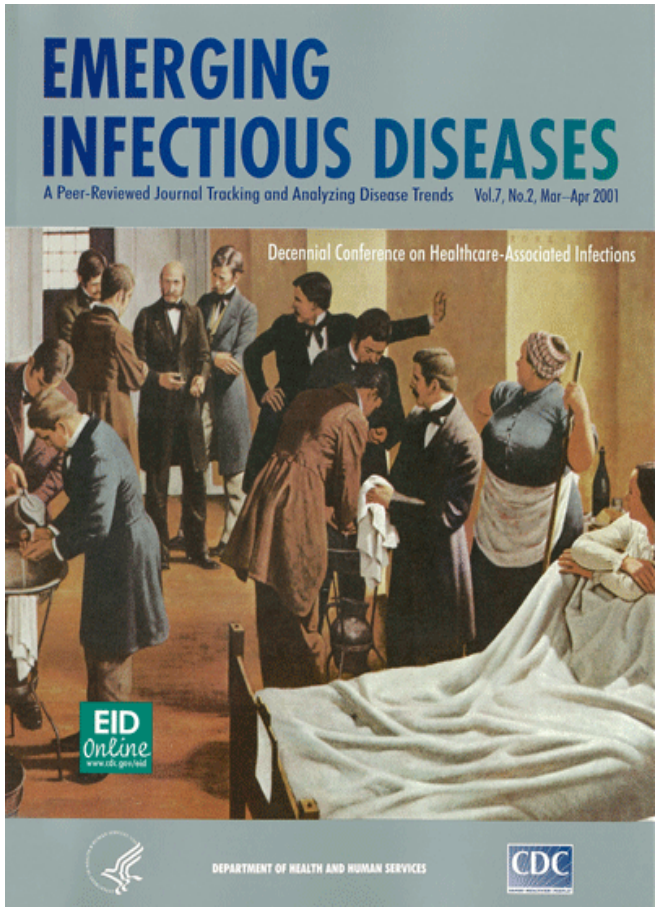
Patient → HCW ~~Hands~~ Patient → Object

1846- Semmelweis observed patients of doctors who delivered babies of women after doing autopsies had higher mortality rates.

- Concept of "Health care associated infection" is born

- 12-18% Mortality due to Puerperal Fever caused by Streptococcus organism

Is there evidence that H.H matters?

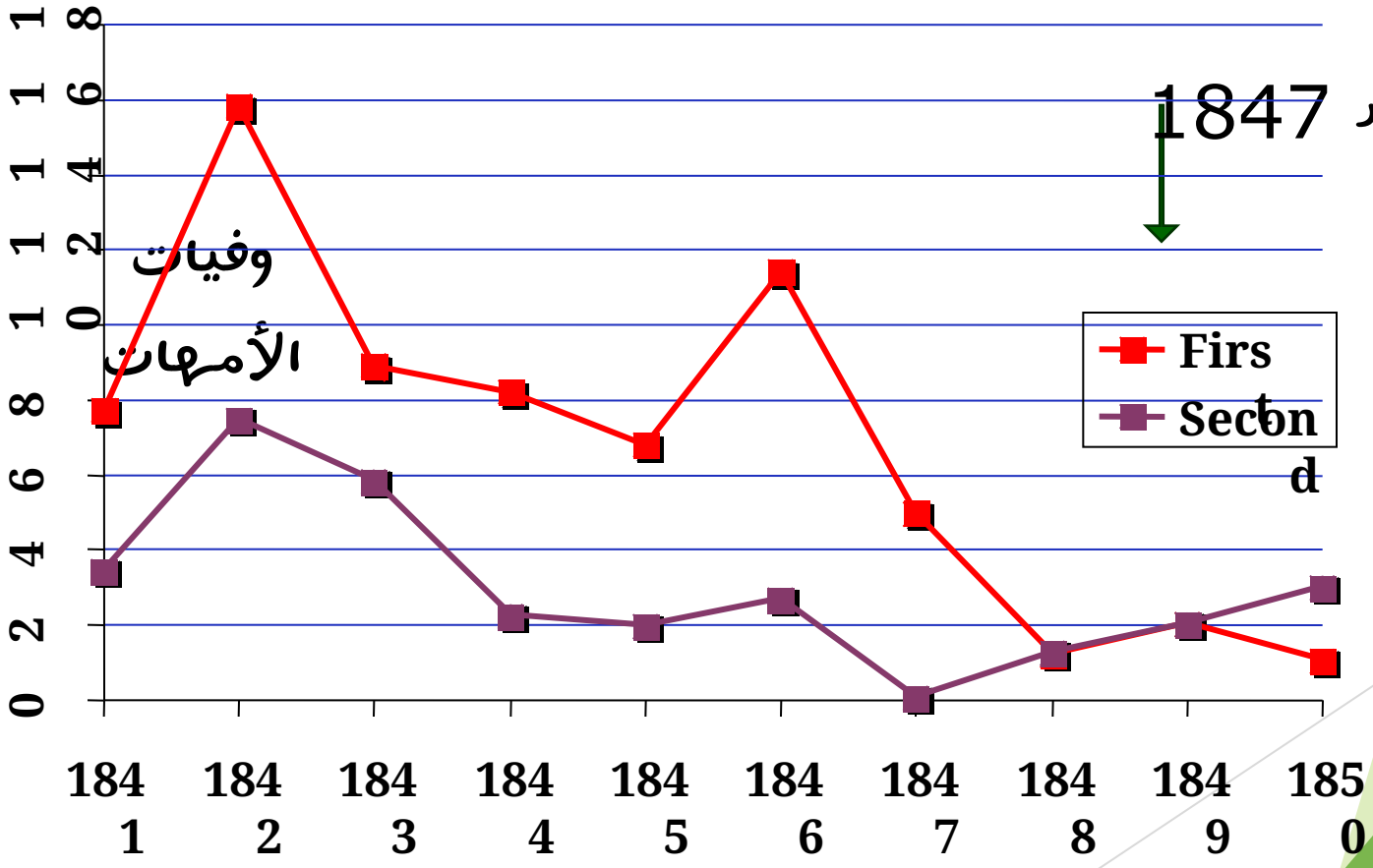


- 1847- He insisted that physicians clean hands with chlorine between each patient. Maternal mortality dropped and stayed low.

معدلات وفيات الأمهات
عيادات التوليد الأولية والثانوية
مستشفى النمسا العام

التدخلات

15 مايو/ أيار 1847



الأولية

الثانوية

Adherence to Hand Hygiene compliance 1999

المكان	العام	القطاع	معدل الالتزام
بيترسون	1981	العنابر العامة	16%
		وحدة العناية المركزة	30%
ألبرت	1981	وحدة العناية المركزة	41%
		وحدة العناية المركزة	28%
لارسون	1983	[illegible] برمته	45%
دونويتز	[illegible]	وحدات [illegible] لسكان	30%
جراهام	1990	وحدة [illegible]	32%
دوبرت	[illegible]	وحدة [illegible]	81%
بيتينجر	1991	وحدات العناية المركزة الجراحية	51%
لارسون	1992	وحدات الولدان	29%
	1992	وحدة العناية المركزة	40%
	1993	وحدة العناية المركزة	40%
	1994	غرفة الطوارئ	32%
	1999	المستشفى برمته	48%

2001 مراض المعدية، مجلة لانست،

1999

1) heavy workloads (too busy)
2) Soap and water take long time
3) sinks are poorly located
4) Hand doesn’t look Dirty!!!
5) skin irritation caused by frequent exposure to soap and water
6. Wearing gloves
7. Lack of appropriate staff

Impact of time

Hand Washing

seconds 60-90

Hand Rubbing

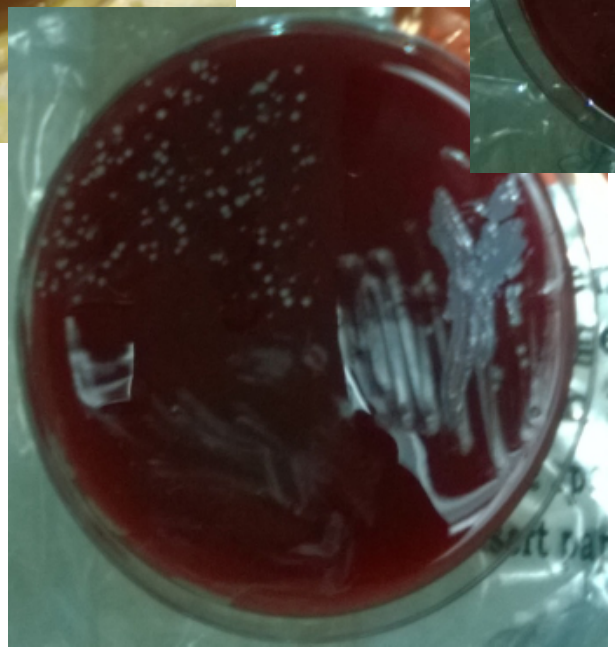
15-20 seconds

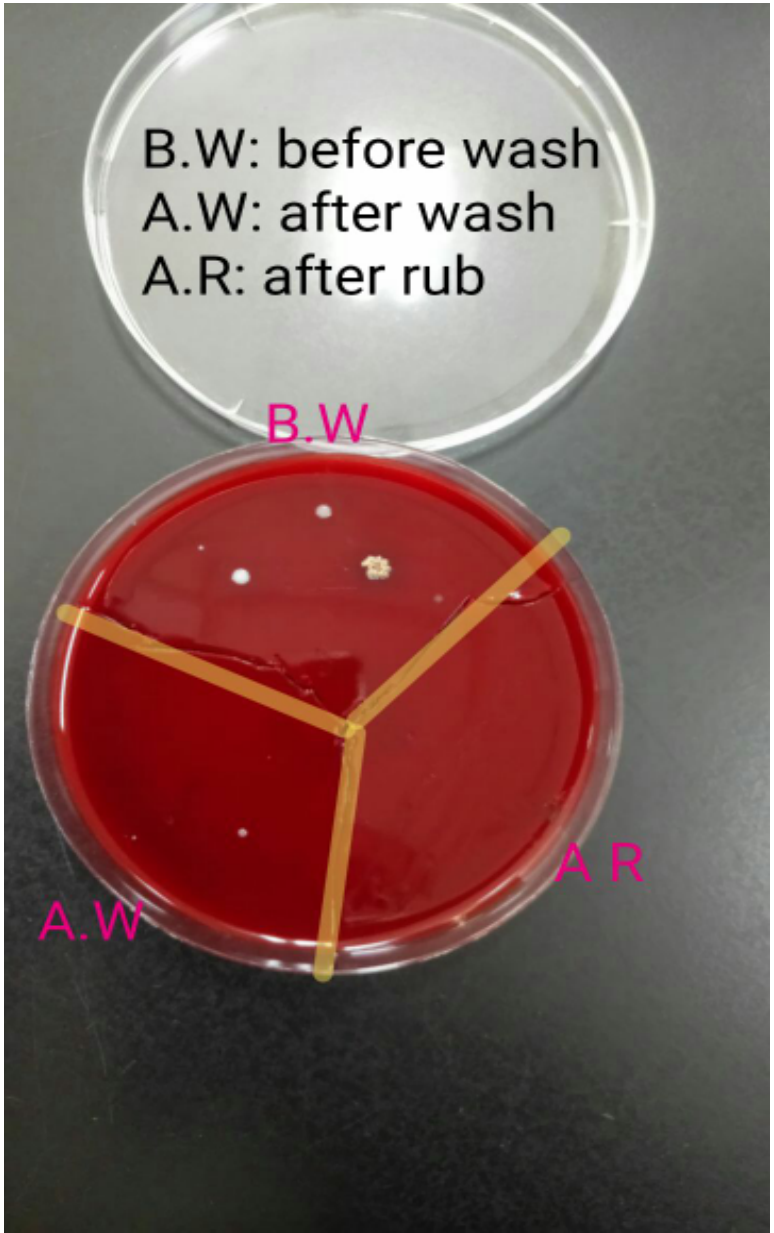
Microbial growth on a cultivation plate

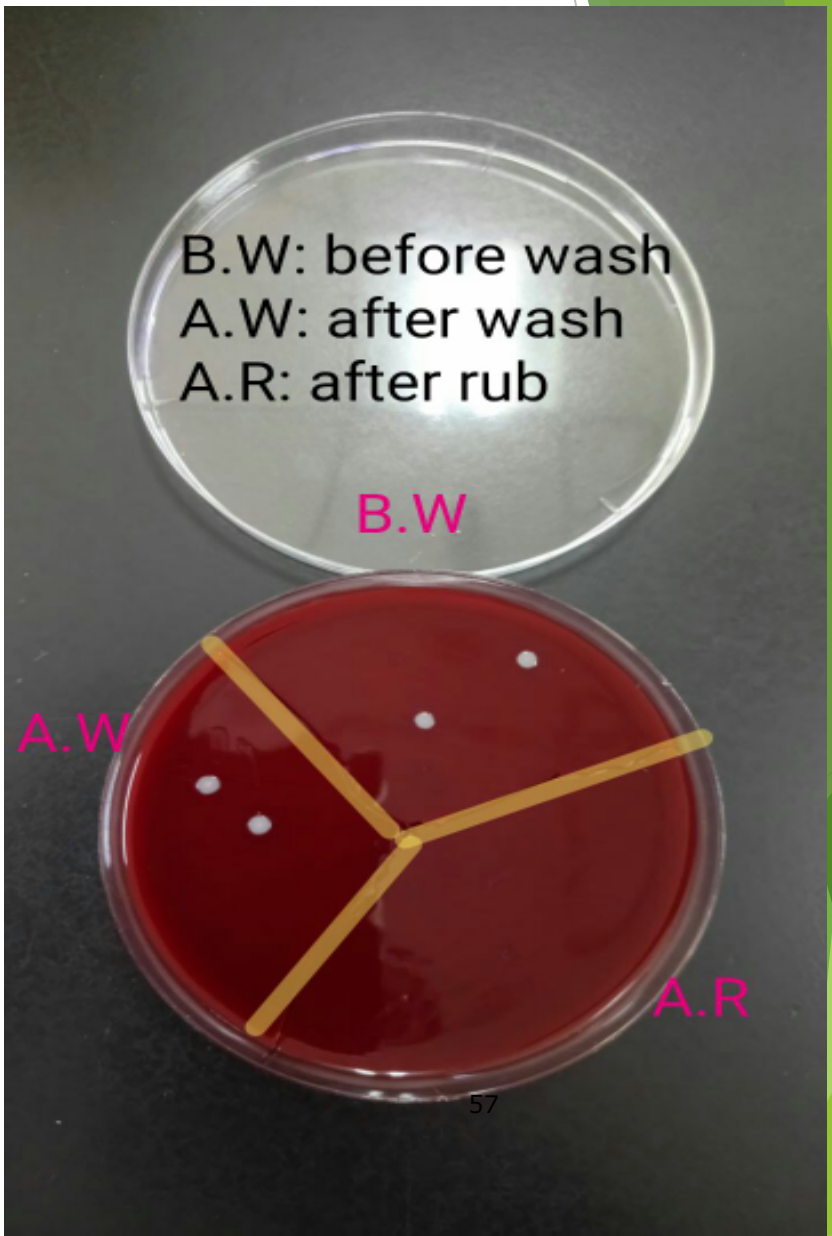
A - without procedures

B - after washing hands with soap

C - after use with alcohol




B.W: before wash
A.W: after wash
A.R: after rub
B.W
A.W
A R


B.W: before wash
A.W: after wash
A.R: after rub
B.W
A.W
A.R

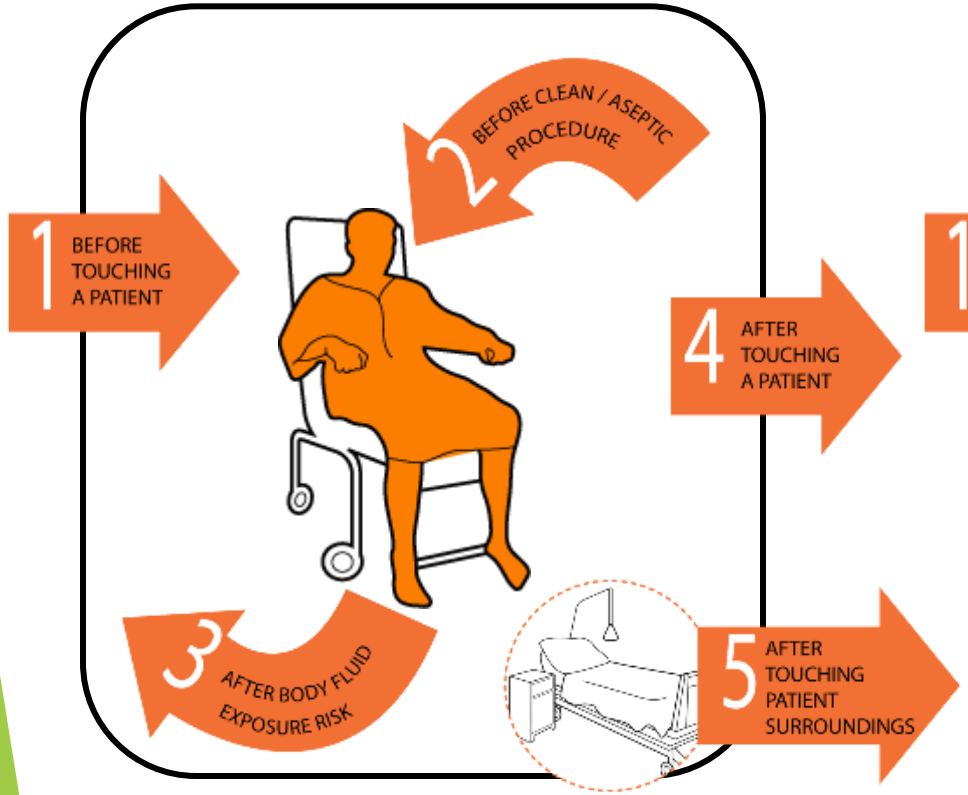
????WHERE TO CLEAN YOUR HANDS

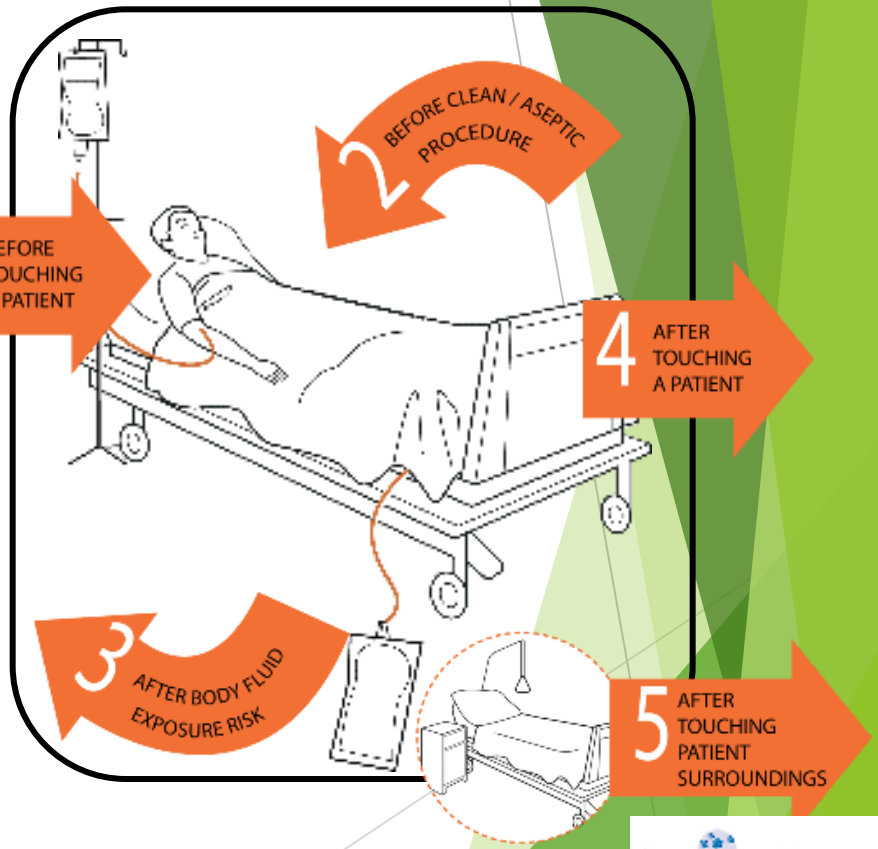

At the point of care

????WHEN TO CLEAN YOUR HAND

1. **before touching a patient,**
2. **before clean/aseptic procedures,**
3. **after body fluid exposure/risk,**
4. **after touching a patient, and**
5. **after touching patient surroundings.**

Setting


1 BEFORE TOUCHING A PATIENT
2 BEFORE CLEAN / ASEPTIC PROCEDURE
3 AFTER BODY FLUID EXPOSURE RISK
4 AFTER TOUCHING A PATIENT
5 AFTER TOUCHING PATIENT SURROUNDINGS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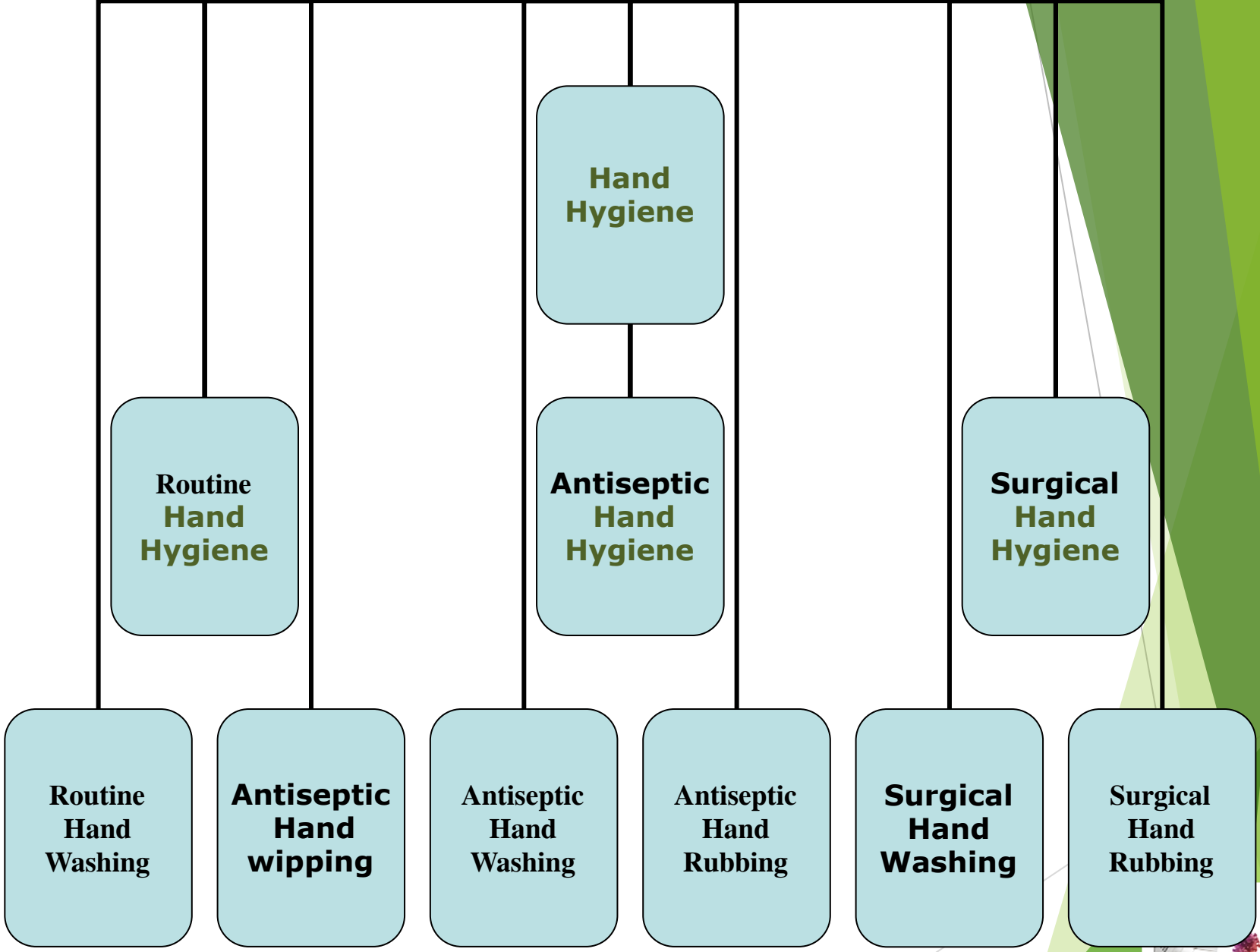
What are the

Types of hand hygiene ???


Hand Hygiene
Routine Hand Hygiene
Antiseptic Hand Hygiene
Surgical Hand Hygiene
Routine Hand Washing
Antiseptic Hand wipping
Antiseptic Hand Washing
Antiseptic Hand Rubbing
Surgical Hand Washing
Surgical Hand Rubbing


Top of Fingernails 89 CFU/cm²
5
Between the Fingers 223 CFU/cm²
4
3
2
Back of Hand 250 CFU/ cm²
Palm of Hand 847 CFU/cm²
1
under nails 61.368 CFU/ cm²

GLOVES PLUS HAND HYGIENE
= CLEAN HANDS

GLOVES WITHOUT HAND
= GERM TRANSMISSION

- The observer must conduct observations openly, without interfering with the ongoing work, and keep the identity of the health-care workers confidential
- Measure compliance to "My 5 Moments for Hand Hygiene" approach recommended by WHO

Injection Safety

Injection Safety

- Definition of unsafe injections
  - Injections that harm the recipient, the provider, or that result in waste that is dangerous for other people.
- The Problem
  - WHO estimates that 12 billion injections administered each year; 50 % (6 Billion) of which are considered unsafe

Injection Safety

- 2002 WHO conducted a review of injection procedures in the Region.
  - **Only 74% of injections were administered safely.**

Source: WHO annual report 2003

A Safe Injection

- No harm to the recipient
- No harm to the health-care worker
- No harm to the community

Reuse of equipment

Unsafe collection

Unsafe disposal

1. Using sterile injection equipment

- **Use a sterile syringe and needle for each injection and to reconstitute each unit of medication**

- Ideally, use a new, quality-controlled single use syringe and needle

2. Using sterile injection equipment

Discard a needle or syringe if the package has been punctured, torn or damaged by exposure to moisture

Preventing contamination of equipment and. 3 medication

Prepare each injection in a clean designated area where blood or body fluid contamination is unlikely

Rationale:

- HBV persists at least seven days in the environment
- HBV can be detected on surfaces in healthcare settings

Injection preparation area contaminated by blood samples, Eastern Europe

Preventing contamination of equipment and medication. 4

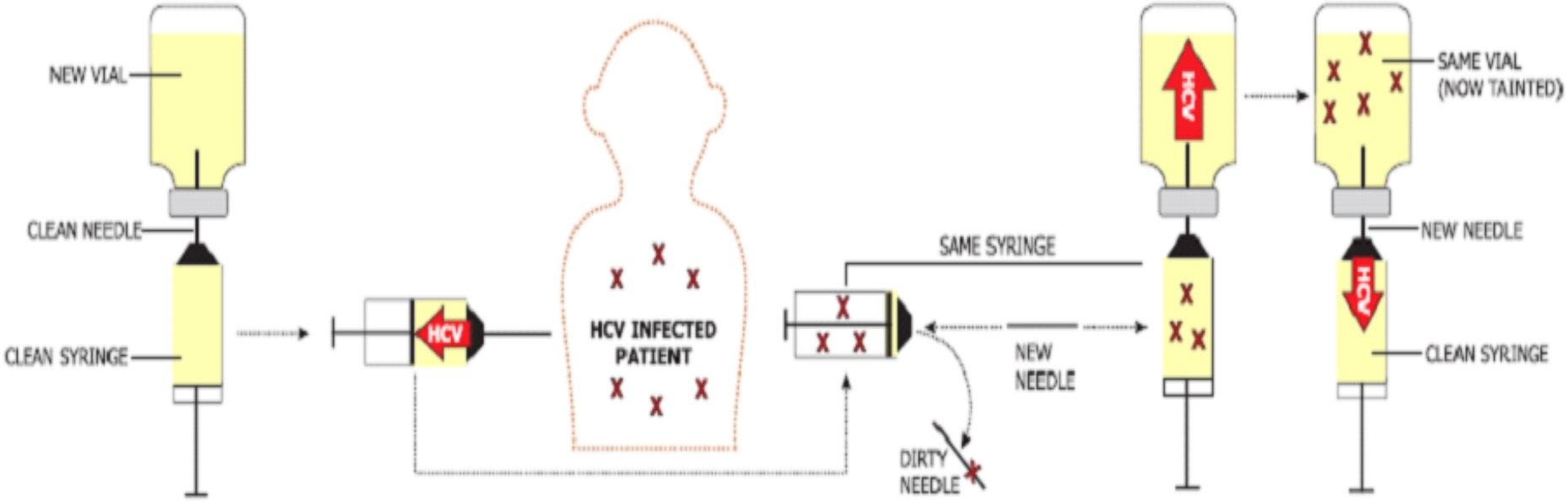
Always pierce the septum of multi-dose vials with a sterile needle
Avoid leaving a needle in place in the stopper

Rationale:

- A needle left in the septum of a multi-dose vial is a door open to contamination
- This practice, associated with the reuse of injection equipment on the same patient, leads to cross-infection

Unsafe Injection Practices and Disease Transmission

Reuse of syringes combined with the use of single-dose vials for multiple patients undergoing anesthesia can transmit infectious diseases. The syringe does not have to be used on multiple patients for this to occur.



1. A clean syringe and needle are used to draw the sedative from a new vial.

2. It is then administered to a patient who has been previously infected with hepatitis C virus (HCV). Backflow into the syringe contaminates the syringe with HCV.

3. The needle is replaced, but the syringe is reused to draw additional sedative from the same vial for the same patient, contaminating the vial with HCV.

4. A clean needle and syringe are used for a second patient, but the contaminated vial is reused. Subsequent patients are now at risk for infection.

5. Preventing contamination of equipment and medication

Protect fingers with a clean barrier
(e.g., small gauze pad) when opening ampoules

Rationale:

- A clean barrier may protect fingers from ampoule breaks


Do NOT touch
Do NOT touch
Permanently attached needle
Minimal dead space
Tamper-resistant colour-coded plunger rod
New V-Clip Auto-Disable
Clear barrel
ow injection/pull forces
e package

Preventing contamination of equipment and medication. *6*

Discard a needle that has touched any non-sterile surface

Rationale:

- Hands and environmental surfaces are non sterile, particularly in healthcare settings
- Medical devices may become contaminated with bacteria if touched

Preventing needle-sticks. 7

1- Anticipate and take measures to prevent sudden patient movement during and after injection

2- No recapping. If recapping is necessary, use a single-handed scoop technique

3- Collect used syringes and needles at the point of use in a sharps container that is sealed before completely full

Avoid the jumping !syringe

one-handed "scoop" technique

Preventing access to used needles. 8

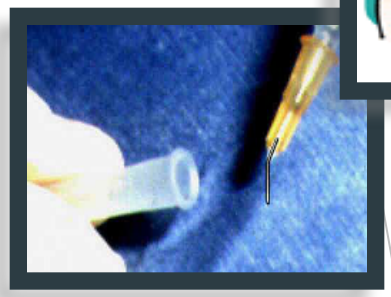
Seal sharps containers for transport to a secure area. After closing and sealing, do not open, empty, reuse or sell them

Rationale:

- Presence of sharps outside of sharps containers leads to needle-stick injuries
- Opening, emptying or reusing sharps containers leads to needle-stick injuries
- In some countries, used syringes have a value and they can be reprocessed and repackaged, leading to infection among patients

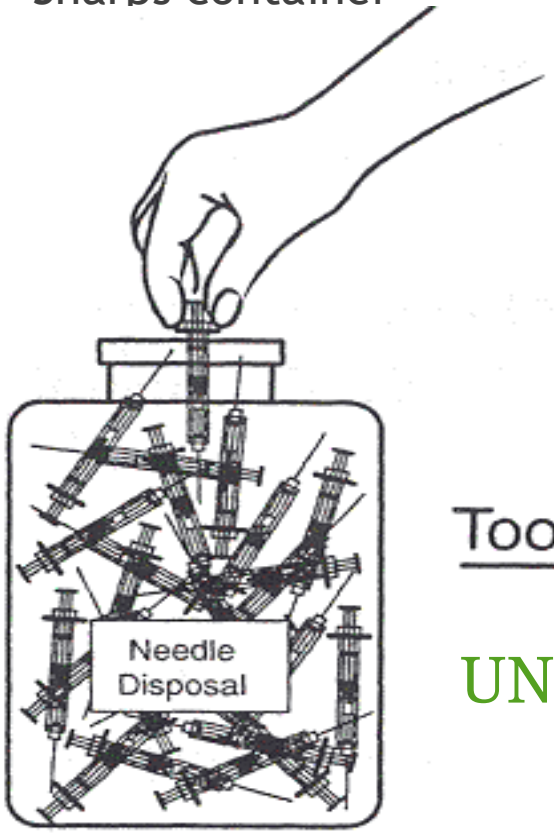
A safety box must be closed before it is completely full

- **Preventing needle stick injury**



  - Do NOT recap needles
  - Do NOT bend needles
  - Do NOT manually remove needles from syringes
  - Do NOT transport without sharp container or safety boxes

- Sharps container



Too Full

UNSAF
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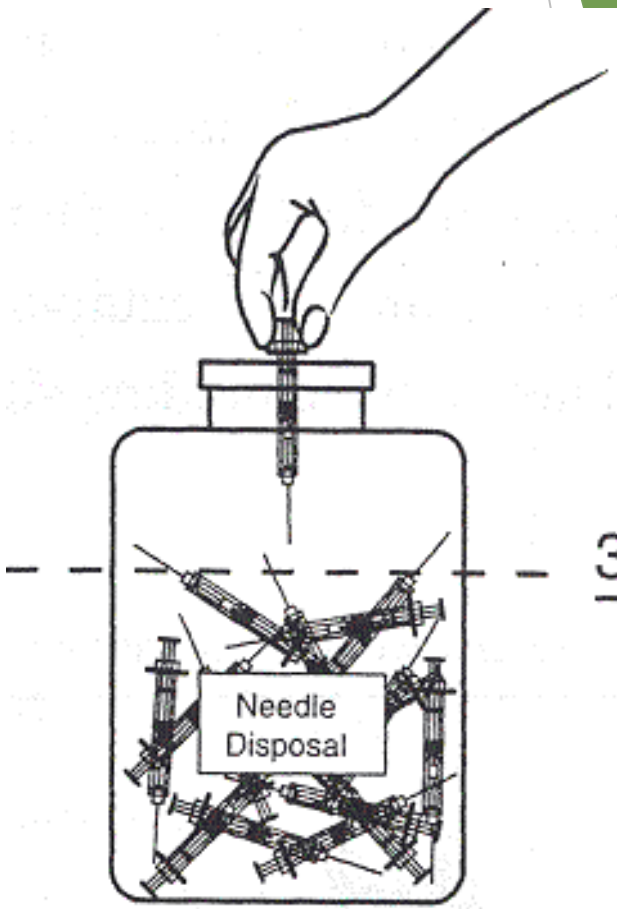


3/4 full

SAFE

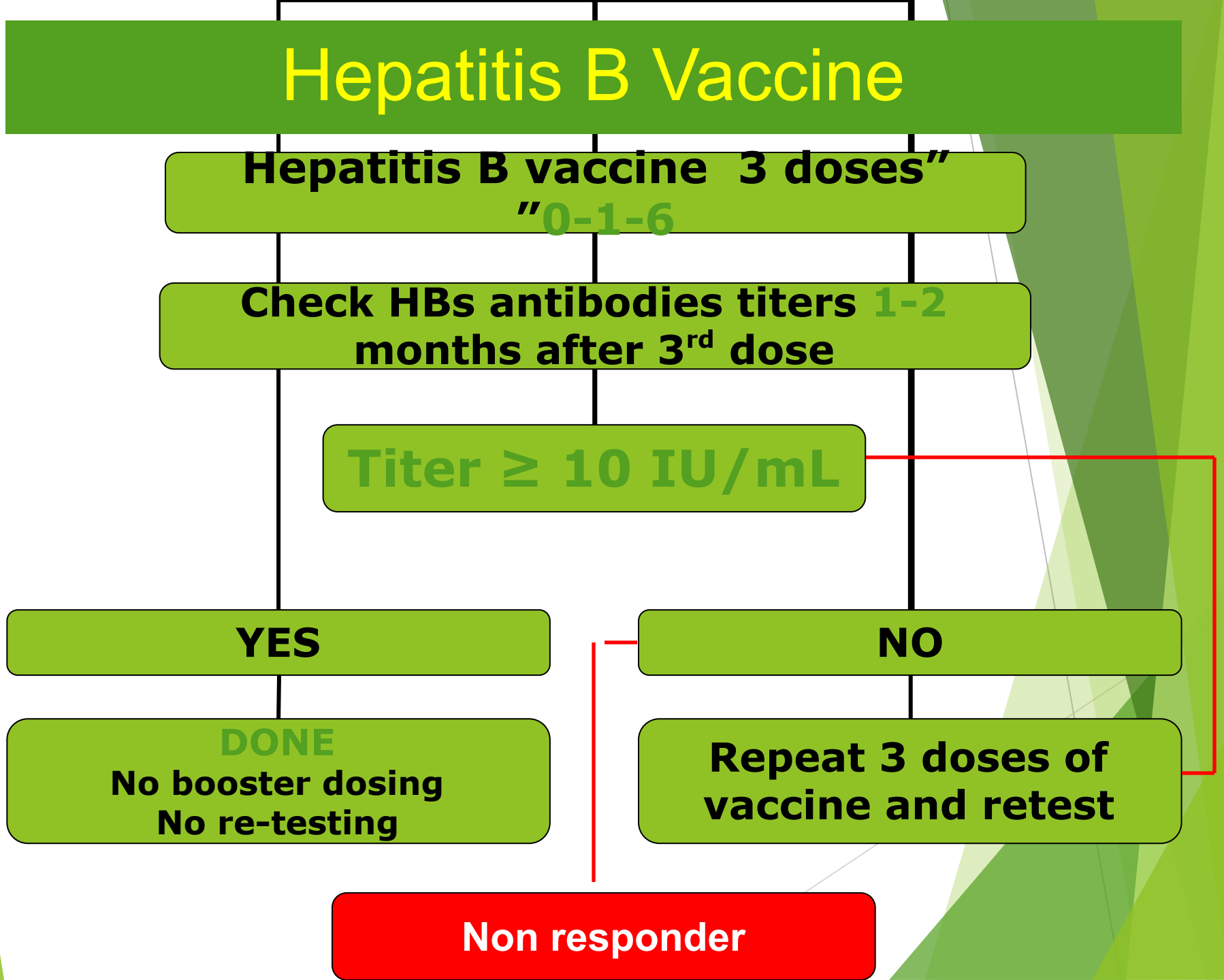
Occupational Health

Elements of Occupational Health Program

1. Pre employment evaluation
2. Health and safety education
3. Immunization program
4. Management of post exposures injuries.
5. Monitoring of injuries and of infectious diseases among HCW.

التطعيم	الفئة المستهدفة	التطعيم / طريقة أخذه / البرنامج	الجرعة المنشطة
التطعيم ضد التهاب الكبد الفيروسي (ب)	جميع مقدمي الرعاية الصحية	1. ثلاث جرعات في العضل بنظام 0 – 1– 2)(بفارق شهر واحد بين الجرعة والاخرى او)0– 1– 6(1. يتم التأكد من الاستجابة للمطعوم خلال شهر الى شهرين بعد الجرعة الثالثة وذلك بفحص الاجسام المضادة	لا يوصى بها
التيتانوس (الكزاز)	من لم يطعّم سابقا	جرعة واحدة في عضلة الكتف	كل 10 سنوات ولكن اذا جرح الشخص وتلوث جرحه وكانت قد تم أخذ آخر جرعة منشطة من فترة تزيد عن 5 سنوات ، ويوصي بأخذ جرعة منشطة .
الحصبة الالمانية	السيدات في سن الحمل، غيرالحوامل، اللاتي لم يتم تطعيمهن من قبل	جرعة واحدة في العضل او تحت الجلد	
الانفلونزا الموسمية	جميع العاملين باستثناء الحوامل في الاشهر الاولى والذين لديهم حساسية من البيض	جرعة واحدة في العضل سنوياً	

Hepatitis B Vaccine



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Exposures occurs through:

- Needle stick
- Cuts from sharp instruments
- Contact an infected blood with mucous membranes or broken skin

Wound Care

- Clean wounds with soap & water.
- Flush mucous membranes with water.
- No evidence of benefit for:
  - application of antiseptics or disinfectants.
  - squeezing (“milking”) puncture sites.
- Avoid use of bleach and other agents caustic to skin.

المريض مصدر الاصابة	الوضع التطعيمي للموظف	الاجراء
التهاب الكبد (B) موجب HBsAg ((positive	لم يتم تطعيمه	اعطاء التطعيم فورا + اعطاء جليوبيولين مناعي *
	غيرمكتمل الجرعات	إكمال كل الجرعات + اعطاء جليوبيولين مناعي *
	ثلاث جرعات من التطعيم	فحص الاجسام المناعية (اذا كانت اكثر او يساوي 10 وحدة دولية فقط متابعة المريض **
التهاب الكبد (B) سالب HBsAg negative))	لم يتم تطعيمه	يتم تطعيمه
	تم تطعيمه	فحص الاجسام المناعية (اذا كانت اكثر او يساوي 10 وحدة دولية يجب متابعة المريض
غير معروف اصابته باتهاب الكبد B	لم يتم تطعيمه	يعامل كما لو كان مصدر الاصابة ايجابيا
	غيرمكتمل الجرعات	إكمال كل الجرعات + اعطاء جليوبيولين مناعي
	ثلاث جرعات من التطعيم	فحص الاجسام المناعية (اذا كانت اكثر او يساوي 10 وحدة دولية فقط متابعة المريض
حامل لمضاد فيروس التهاب الكبد (C)	لا يوجد لقاح للالتهاب الكبد C	فحص الموظف بعد الاصابة مباشرة ثم بعد اسبوعين ثم بعد شهر ثم بعد 3 اشهر بطريقة HCV-Ab , و PCR اذا ظهرت بوادر اصابته يحول الى اخصائي الجهاز الهظمي
حامل لفيروس العوز المناعي البشري HIV	لا يوجد لقاح لفيروس العوز المناعي البشري HIV	- مدة اربعة اسابيع يتم فيه تناول ثلاثة ادوية مضادة للفيروسات (مثل زيدوفودين ولاميفودين) ويجب الرجوع الى البرنامج الوطني لمكافحة الايدز***

* يتم ذلك خلال 72 ساعة من التعرض للعدوى

** تقاس الاستجابة المناعية لمطعوم الكبد (B) بفحص الاجسام المضادة (Hbs Ab) وتعتبر ايجابية اذا كانت أكبر أو يساوي 10 وحدة