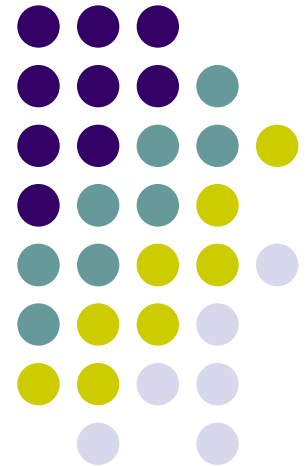
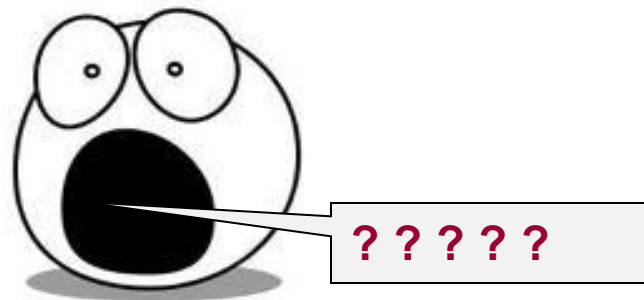


Infection Prevention and Control in the Laboratory

**Everything You Wanted to Know
But were Afraid to Ask**



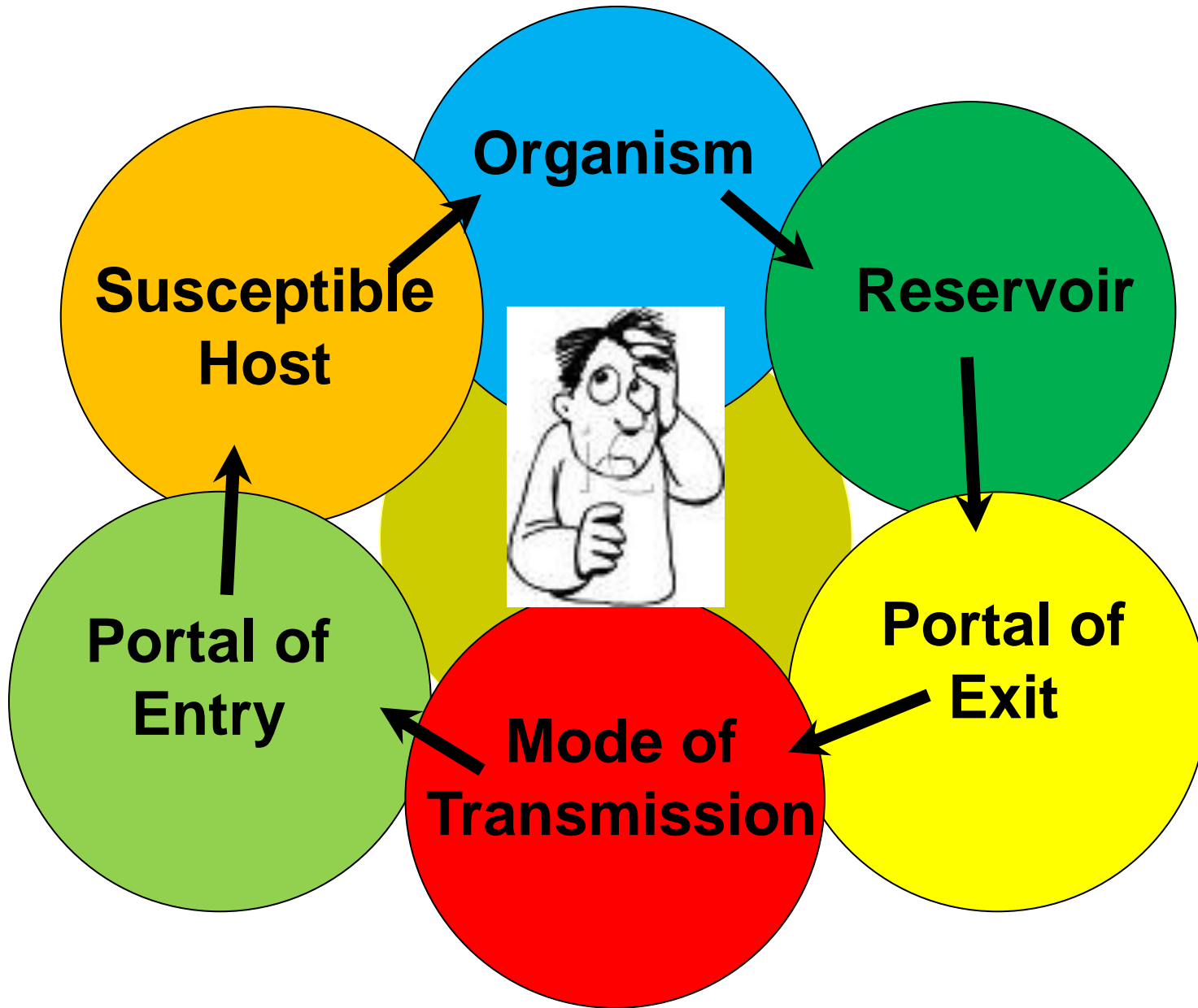
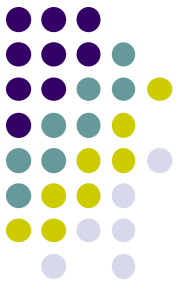
Objectives



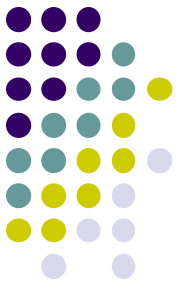
Learning objectives for this session:

- Definitions
- Organisms
- Infection Risks
- Hand Hygiene
- Standard Precautions
- Personal Protective Equipment (PPE)
- Transmission Based Precautions.
- Cleaning and Disinfection
- Questions

Chain of Infection

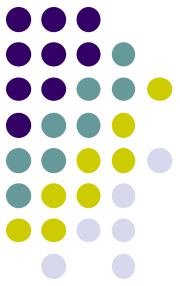


Colonization



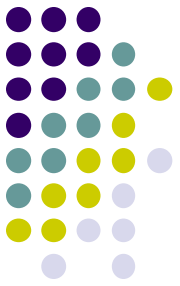
- When an Organism is growing in or on a body site without signs or symptoms of infection. (We are all colonized with bacteria).
- Colonized persons are generally **not** treated with antibiotics or decolonized.
- Colonization generally precedes infection.

Infection



- When an Organism invades tissue, organs, blood, with signs and symptoms of infection. (fever, inflammation, pus).
- Infections are treated with the appropriate antibiotics.
- Once the infection is cured the person is still considered colonized.

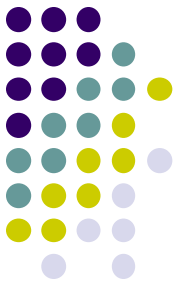
What Lives on Our Hands?



Resident flora:

- Is our “normal skin flora”.
- Consists of relatively fixed types of microorganisms regularly found in a given area and when washed or sanitized promptly reestablish themselves.
- They rarely cause infections except when introduced into the body through invasive procedures.

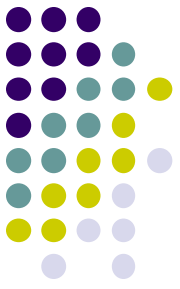
What Lives on Our Hands?



Transient flora:

- Consist of microorganisms derived or contacted from the environment including patients, equipment, and staff.
- Generally survive on the skin of the hands for less than 25 hours and generally do not produce disease or establish themselves permanently on the host.
- Transient flora may colonize, proliferate and produce disease in other body sites and persons.
- Can be removed by hand decontamination with soap and water or an alcohol-based preparation.

MRSA and VRE



Methicillin Resistant *Staphylococcus aureus* (MRSA)

- can colonize the nares, perineum and skin without causing signs and symptoms of infection.

Vancomycin Resistant Enterococcus (VRE)

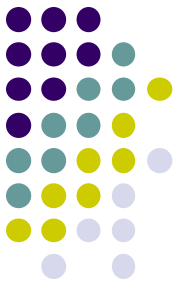
- can colonize the bowel without causing signs and symptoms of infection.

MRSA and VRE



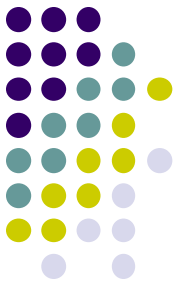
- The infections caused by MRSA and VRE are similar to those caused by antibiotic sensitive *Staphylococcus aureus* and Enterococcus, which include; soft tissue infections, bacteremia, fistula infections, osteomyelitis, pneumonia, septicaemia, and endocarditis.

Gastrointestinal Pathogens



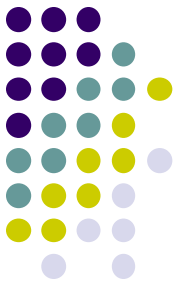
- Common pathogens are *Clostridium difficile* and Norovirus.
- Signs and symptoms are patients or staff with unexplained diarrhea or vomiting.
- During Norovirus outbreaks up to 60% of the infected/symptomatic population is staff.
- Hand washing with soap and water is best!
- Do not share food on outbreak units (pizza, donuts, chocolates, muffins can be contaminated).

Tuberculosis

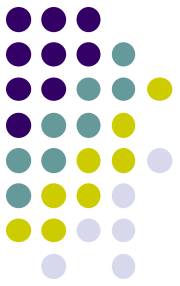


- TB infection may occur when a person is exposed to *Mycobacterium tuberculosis* bacteria (MTB).
- TB disease occurs when the body's immune response is weakened and the bacteria invades the body causing symptoms.
- TB can invade various parts of the body such as liver, spine, lungs.
- **Only pulmonary TB is contagious.**

Cost of Infections



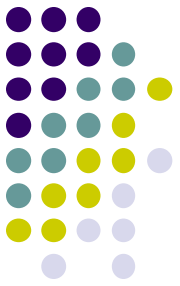
What is a Health Care Associated Infection? (HAI)



HAI is:

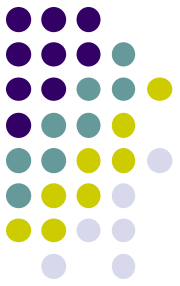
- **An infection occurring in a patient during the process of care in a hospital or other health care facility which was not present or incubating at the time of admission.**
- **This includes**
 - Infections acquired in the hospital but appearing after discharge.
 - Occupational infections among health care providers of the facility”.

The Impact of Health Care Associated Infections



- Health care associated infection remains a patient and staff safety issue and represents a significant adverse outcome of the health care system. (Baker et al, 2004; Stone et al, 2004)
- Estimates of the global burden of health care associated infection are hampered by limited availability of reliable data.

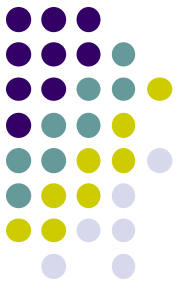
HIAs Impacts Negatively



Patients with one or more HIAs during in-patient stay remain in hospital and incur costs on average three times greater than uninfected patients.

(Plowman et al, 2001)

(McGeer, A. "Hand Hygiene by Habit". Infection prevention: practical tips for physicians to improve hand hygiene. *Ontario Medical Review*, November 2007, 74 (10).)

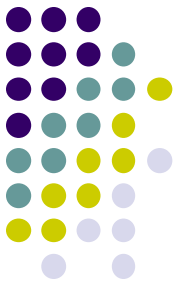


Risk Factors For Infection



Risk Factors for Transmission

Source patient



High Risk

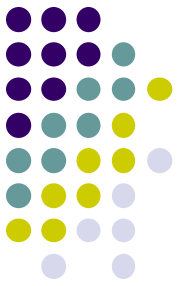
- Incontinent
- Draining Wounds
- Hands on Care
- Invasive Devices
- Poor compliance (confused)

Low Risk

- Good hygiene
- Covered wounds
- Self-care
- No devices
- Cooperative

Risk Factors for Transmission

Microorganism



High Risk

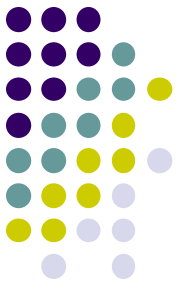
- Survive Environment
- Large inoculum
- Low infective dose
- High pathogenicity
- Long period of infectivity
- Airborne spread
- Carrier state

Low Risk

- Unable to survive
- Low inoculum
- High infective dose
- Low pathogenicity
- Short period of infectivity

Risk Factors for Transmission

Environmental



High Risk

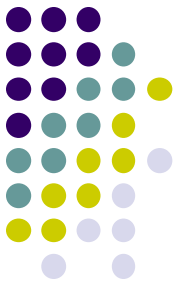
- Inadequate HK
- Shared equipment
- Crowded space
- High staff ratio

Low Risk

- Adequate housekeeping
- Dedicated equipment
- Adequate spacing
- Low staff ratio

Risk Factors for Transmission

Host Patient



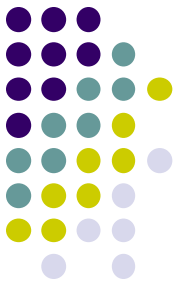
High Risk

- Intensive care pt
- Invasive procedure
- Non-intact skin
- Debilitated
- Extremes of age
- Recent antibiotic therapy

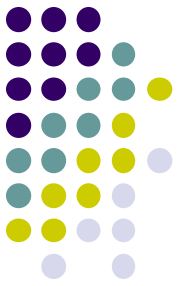
Low Risk

- Able to do self care
- No indwelling devices
- Intact skin and mucous
- Membranes
- Strong immune system

So What Do We Do ?



- Hand Hygiene
- Standard Precautions
- Transmission Based Precautions
- Cleaning and Disinfection

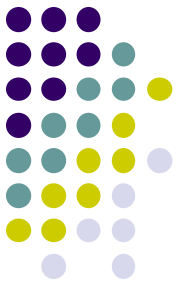


Hand Hygiene

Good hand hygiene is one of the **single most effective measures** for preventing the spread of organisms that cause infection.



Why hand hygiene is so important



Hands move micro-organisms from one person or place to another.

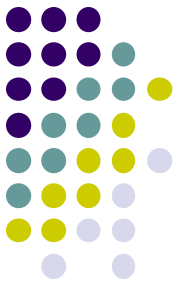
- By decontaminating our hands, we remove transient micro-organisms acquired by recent contact with patients/residents.
or with the environment
- Hand hygiene protects both patients/residents and healthcare workers.

Why People Don't Decontaminate Their Hands



**Many healthcare workers
do not fully understand the risks associated
with not decontaminating their hands.**

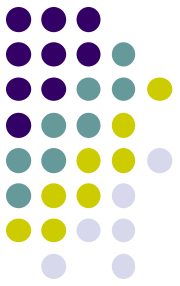
Why People Don't Decontaminate Their Hands



There are many reasons why individuals do not perform hand hygiene.

- Low staffing levels and other practical issues contribute to poor hand hygiene, such as:
 - inadequate sinks
 - no soap or hand towels
 - poor water temperature control
- Different people respond to different motivators
 - identify what works best for individuals

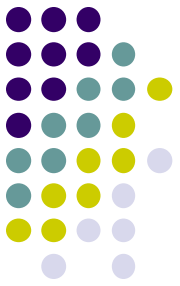
Hand Hygiene



Three ways to clean your hands:

- Plain soap and water
- Antiseptic soap and water
- Alcohol based hand sanitizer

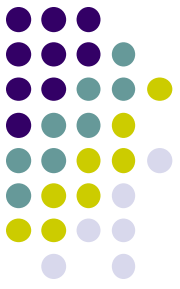
Plain Soap and Water



Hand washing with plain soap and water is sufficient for most routine daily activities.

- **Mechanical removal** of micro-organisms makes hands socially clean.
- Soap suspends easily removable micro-organisms allowing them to be washed off.
- If there are no/inadequate facilities for hand washing with soap and warm running water, then use alcohol hand gels/rubs.
- It takes at least 15 seconds to achieve effective decontamination using the six-step technique.
- If you are looking after a patient/resident with diarrhea (for whatever cause) you should wash your hands with soap and water.

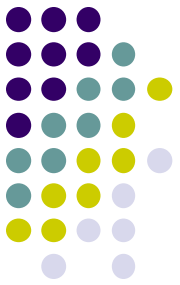
Antiseptic Soap and Water



Antiseptic hand wash removes and destroys micro-organisms.

- **Mechanical and chemical removal** of micro-organisms prepares hands for surgical/invasive procedures.
- Aqueous antiseptic solutions both reduce resident flora and remove/destroy transient flora.
- Antiseptics may also be used before aseptic procedures, and when looking after patients or procedures with AROs.

Hand Washing



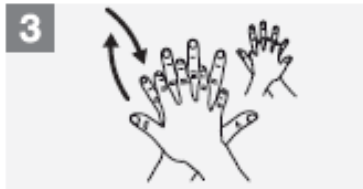
Wet hands with water;



Apply enough soap to cover all hand surfaces;



Rub hands palm to palm;



Right palm over left dorsum with interlaced fingers and vice versa;



Palm to palm with fingers interlaced;



Backs of fingers to opposing palms with fingers interlocked;



Rotational rubbing of left thumb clasped in right palm and vice versa;



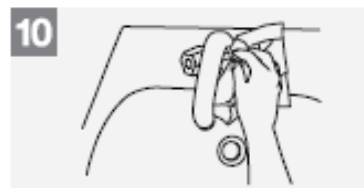
Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;



Rinse hands with water;



Dry hands thoroughly with a single use towel;

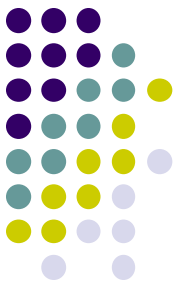


Use towel to turn off faucet;



Your hands are now safe.

In order to be effective hand washing must last 40–60 seconds

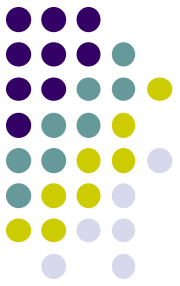


Alcohol-based Preparations

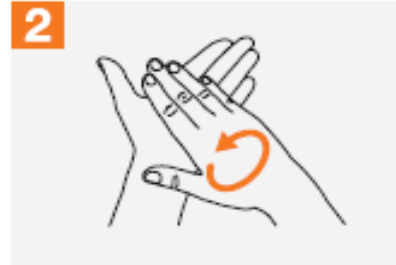
Alcohol-based preparations offer a solution when time and facilities are restricted.

- Ideal for rapid hand decontamination on visibly clean hands
- Require no sink and water facilities.
- The technique for alcohol-based preparations is the same as for hand washing.
- Concentrations of 70% alcohol are used as they have less of a drying effect than alcohol-based preparations of higher concentrations.
- Not a cleansing agent, so visible contaminants still need removing with soap and water.
- Takes 15 to 30 seconds to perform.

How to Hand Rub



1a Apply a palmful of the product in a cupped hand, covering all surfaces;



2 Rub hands palm to palm;



3 Right palm over left dorsum with interlaced fingers and vice versa;



4 Palm to palm with fingers interlaced;



5 Backs of fingers to opposing palms with fingers interlocked;



6 Rotational rubbing of left thumb clasped in right palm and vice versa;



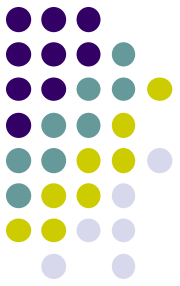
7 Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;



8 Once dry, your hands are safe.

Hand rub takes only 20–30 seconds!

Skin care

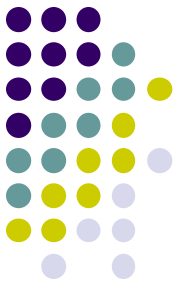


Frequent hand decontamination can cause long-term changes in the skin.

Minimise the risk of skin damage by following guidance

- Report any skin irritation or abnormality immediately to the Occupational Health and Safety.
- Apply hand cream regularly to protect the skin from dryness
- Avoid use of communal jars of hand cream as these can become contaminated.

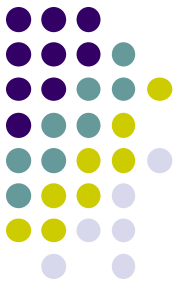
Other Hand Considerations



The wearing of nail polish, nail art and jewellery is a potential source of infection.

- Short nails harbour fewer micro-organisms.
- Nail art increases the number of micro-organisms on the hands.
- Jewellery prevents effective hand decontamination
- There are higher levels of micro-organisms beneath and around jewellery.
- Nail brushes cause increased shedding of skin cells and skin damage.

When to Practice Hand Hygiene



5 Moments from the World Health Organization (WHO).

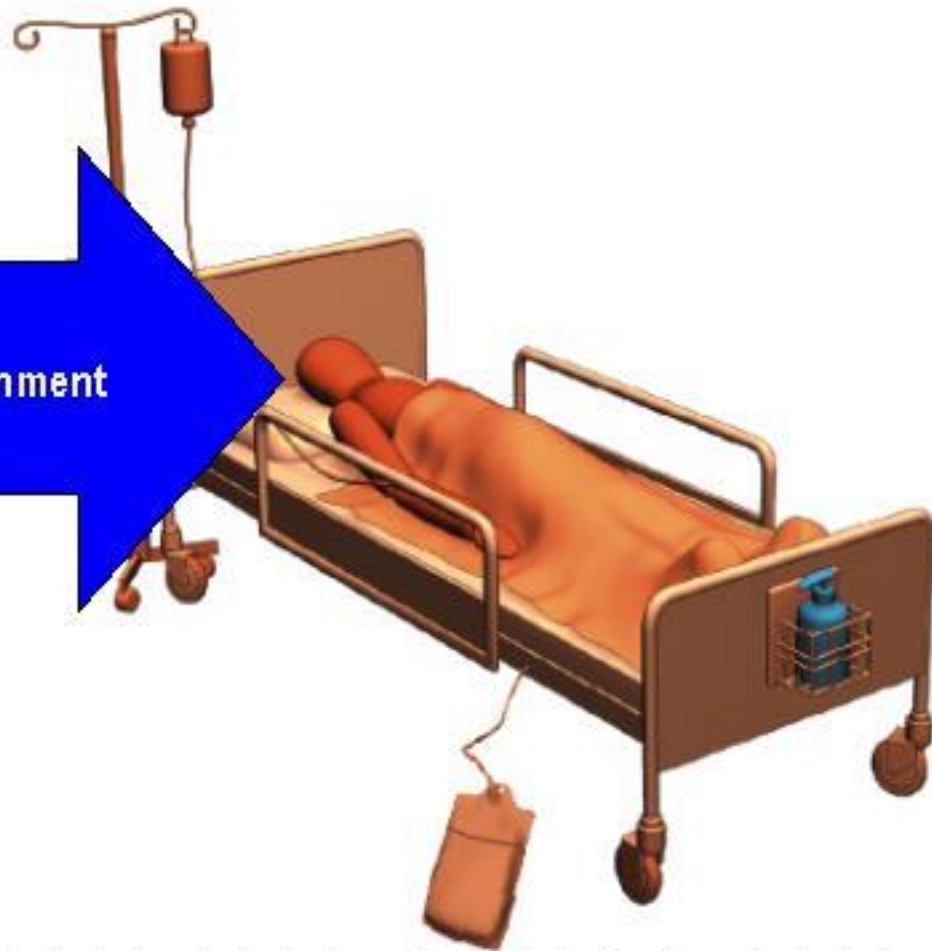
- Describes hand hygiene as event related.
- Glovers are not a substitute for hand hygiene.
- Visible soil must be removed before hands can be sanitized.
- Alcohol hand rub is the preferred agent for hand hygiene, unless there is diarrhea, C diff in the environment.



Your 5 Moments For Hand Hygiene

1

Before initial
patient/patient environment
contact

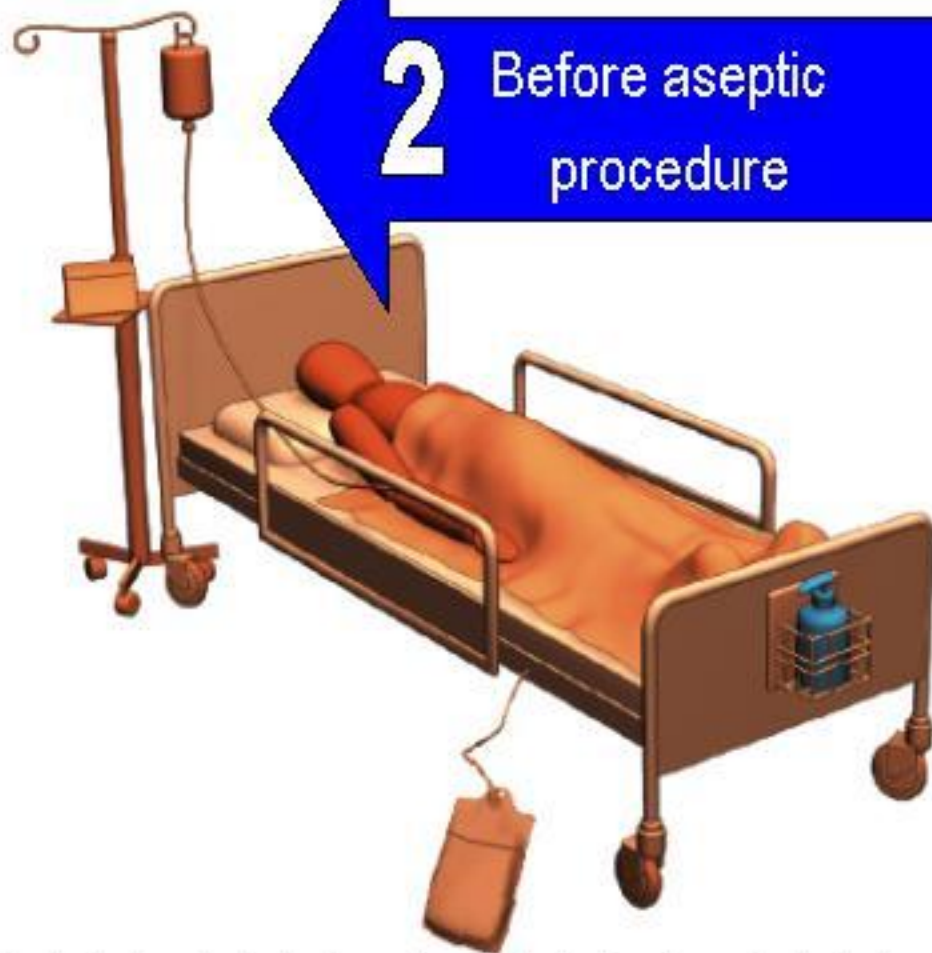


Clean Your Hands

Your 5 Moments For Hand Hygiene

2

Before aseptic procedure



Hand
Sanitizer

Antibiotic
Four Lix Plans

Clean Your Hands

Your 5 Moments For Hand Hygiene



3 After body fluid
exposure risk

Clean Your Hands



Your 5 Moments For Hand Hygiene



4

After patient
contact

Hand
Sanitizer

Antibiotic
Four Lix Plans

Clean Your Hands

Your 5 Moments For Hand Hygiene

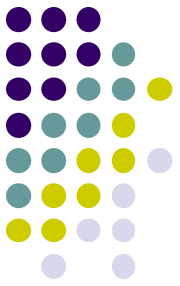


5 After contact with
patient
environment



Clean Your Hands

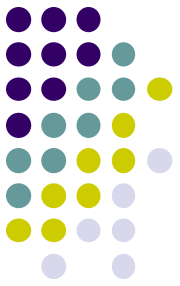
Hand Hygiene Summary



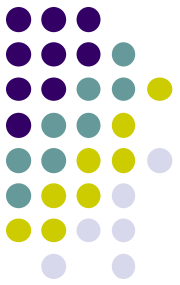
Hand Hygiene Take Away Message.

1. Hand hygiene is one of the single most effective measures for reducing the spread of infection.
2. Hand hygiene protects patients/clients and staff.
3. It's easy and everyone can do it.

Precautions

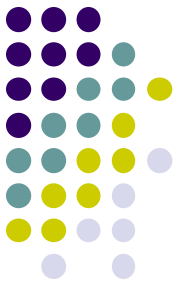


Standard Precautions



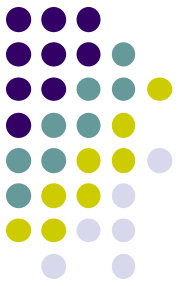
- **Standard Precautions** are used for all body substances and moist body sites for the environment, patients, staff, visitors all the time.
- Hand Hygiene including hand washing with soap and water or rub with alcohol is the foundation of Standard Precautions.
- Appropriate use of Personal Protective Equipment (PPE).

Personal Protective Equipment (PPE)



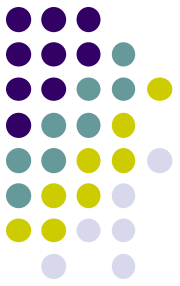
- Gloves
- Gowns
- Masks
- Face Protection:Goggles/Face Shield

3 Types of Gloves



- Latex non powdered.
 - sterile and non-sterile
- Vinyl non latex, non powdered.
 - sterile and non-sterile
 - tasks < 20 minutes
- Nitrile non latex, non powdered.
 - non sterile
 - tasks >20 minutes

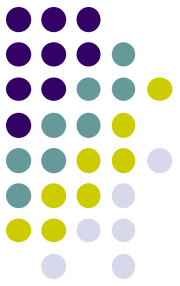
Glove use



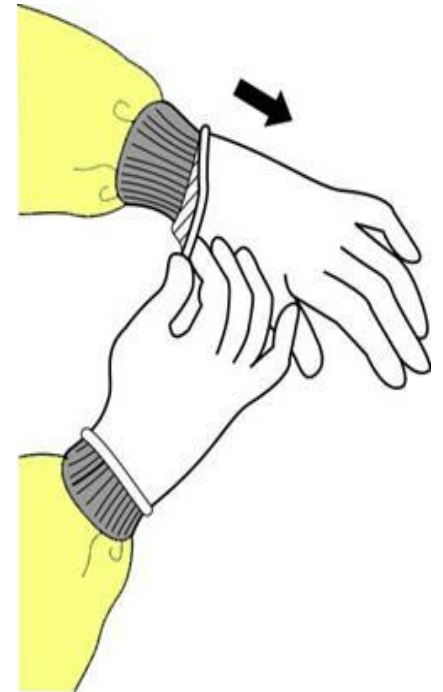
Gloves are NOT a replacement for hand hygiene.

- Gloves are for contact with:
 - blood body fluids
 - mucus membranes
 - environmental surfaces that may be contaminated with blood or body fluids
- Hand Hygiene right after removing gloves.

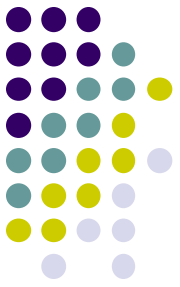
How to Remove Gloves



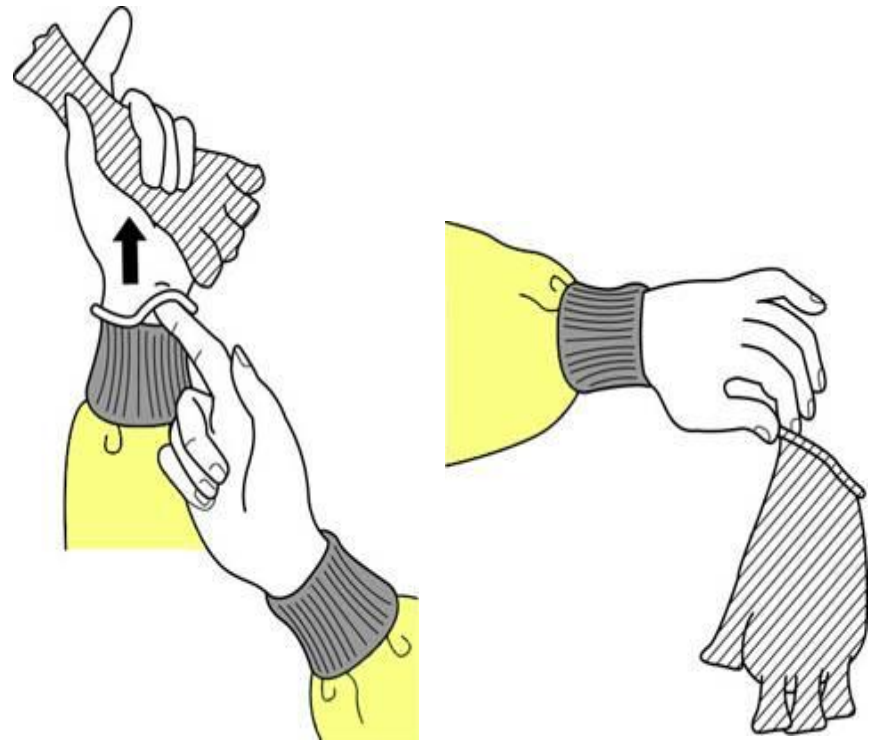
- ❑ Grasp outside edge near wrist
- ❑ Peel away from hand, turning glove inside-out
- ❑ Hold in opposite gloved hand



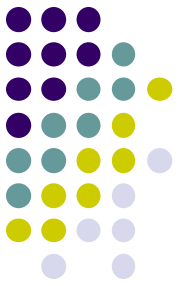
How to Remove Gloves



- ❑ Slide ungloved finger under the wrist of the remaining glove
- ❑ Peel off from inside, creating a bag for both gloves
- ❑ Discard in garbage
- ❑ Perform hand hygiene

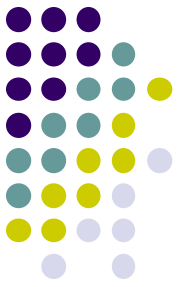


Types of Gowns



- Types of gowns available:
 - Micro fiber (cleaned in laundry)
 - Disposable waterproof (single use)
 - Plastic aprons

Removing Gowns



- ❑ Unfasten ties
- ❑ Peel gown away from neck and shoulder
- ❑ Turn contaminated outside toward the inside
- ❑ *Carefully* fold or roll into a bundle
- ❑ Discard in laundry
- ❑ Perform hand hygiene

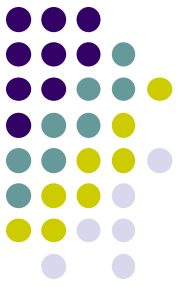


2 Types of Masks



- Regular Fluid Shield masks
 - Procedure masks
 - Surgical masks
 - Both with or without eye protection
- N95
 - Requires fit testing (OH&S)
 - Different styles and sizes
 - Will be marked “N95”

Donning an N95 Mask/Respirator



- ❑ Perform hand hygiene
- ❑ Select a fit tested mask
- ❑ Place over nose, mouth and chin
- ❑ Secure on head with elastic
- ❑ Fit flexible nose piece over nose bridge
- ❑ Adjust to fit
- ❑ Perform a fit check –
Inhale – respirator should collapse
Exhale – check for leakage around face



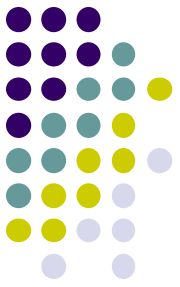
Removing an N95 Mask/Respirator



- ❑ Lift the bottom elastic over your head first
- ❑ Then lift off the top elastic
- ❑ Do not touch mask face
- ❑ Discard in garbage
- ❑ Perform hand hygiene



Eye and Face Protection

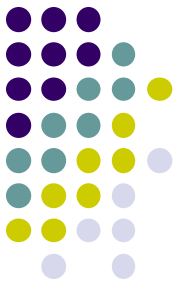


Use eye and face protection if you anticipated a spray or splash.

- Personalize eye protection
- Reusable eye wear must be cleaned between uses
- Eye glasses are not protective



Correct Order for Removing PPE



MOST Contaminated

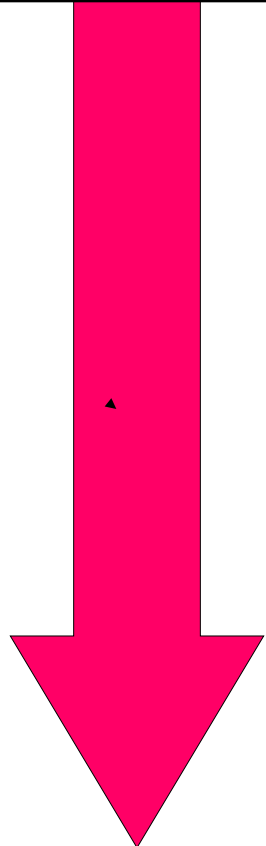
1. Gloves

2. Gown

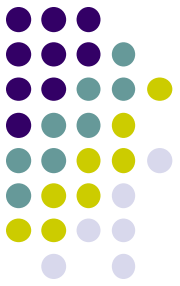
3. Eye protection

4. Mask

LEAST Contaminated



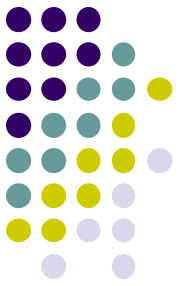
Summery Standard Precautions



Standard Precautions requires the user to decide the type of personal protective equipment to used depending on:

- The task being performed and the risk of coming in contact with body fluids.
- The type of additional Transmission Based Precautions (if any) the patient is on.

Linen and Waste



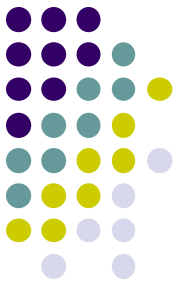
Linen

- All linen is treated the same
- Place in water proof bag if grossly soiled or wet before putting in the laundry bag

Waste

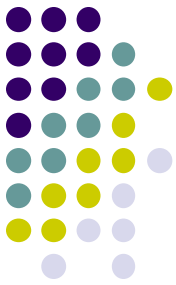
- Use the correct receptacle for garbage
- Place sharps in puncture resistant containers
- Follow laboratory policys for disposal of all specimens

Transmission Based Precautions



- Airborne
- Contact
- Droplet
- Droplet/Contact
- Contact/Airborne

Transmission Based Precautions



AIRBORNE PRECAUTIONS

Private Negative Pressure Room Required. Keep Door Closed.

1 STOP Visitors: Please Report to Nursing Station

2 Clean Hands:

- before and after handling patient
- before entering and after leaving room
- after touching environmental surfaces
- after removing gloves

3 Mask:

- N95 mask must be worn while in room
- Note: All N95 masks have NIOSH printed on them

WEAR PERSONAL PROTECTIVE EQUIPMENT

Gown: For direct contact with patient or environmental surfaces. Remove when leaving room.

Non-Sterile Gloves: For direct contact with patient, items, and/or environmental surfaces. Remove when leaving room.

Mask & Goggles: Wear eye protection if risk of splash or splatter.

Providence HEALTH CARE

CONTACT PRECAUTIONS

1 STOP Visitors: Please Report to Nursing Station

2 Clean Hands:

- before and after touching patient
- before entering and after leaving room
- after touching environmental surfaces
- after removing gloves

3 Wear Personal Protective Equipment

Gown: For direct contact with patient or environmental surfaces. Remove when leaving room.

Non-Sterile Gloves: For direct contact with patient, items, and/or environmental surfaces. Remove when leaving room.

Providence HEALTH CARE

DROPLET PRECAUTIONS

1 STOP Visitors: Please Report to Nursing Station

2 Clean Hands:

- before and after touching patient
- before entering and after leaving room
- after touching environmental surfaces
- after removing gloves

3 Mask:

- Must wear if within 3 meters (10 feet) of patient
- Remove when leaving room

WEAR PERSONAL PROTECTIVE EQUIPMENT

Mask & Goggles: Wear eye protection if risk of splash or splatter.

Providence HEALTH CARE

DROPLET / CONTACT PRECAUTIONS

1 STOP Visitors: Please Report to Nursing Station

2 Clean Hands:

- before and after touching patient
- before entering and after leaving room
- after touching environmental surfaces
- after removing gloves

3 WEAR PERSONAL PROTECTIVE EQUIPMENT

Mask:

- Must wear if within 3 meters (10 feet) of patient
- Note: All N95 masks have NIOSH printed on them

Goggles: For direct contact with patient or environmental surfaces. Remove when leaving room.

Non-Sterile Gloves: For direct contact with patient, items, and/or environmental surfaces. Remove when leaving room.

Mask & Goggles: Wear eye protection if risk of splash or splatter.

Providence HEALTH CARE

AIRBORNE / CONTACT PRECAUTIONS

Private Negative Pressure Room Required. Keep Door Closed.

1 STOP Visitors: Please Report to Nursing Station

2 Clean Hands:

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WEAR PERSONAL PROTECTIVE EQUIPMENT

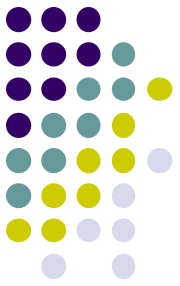
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Non-Sterile Gloves: For direct contact with patient, items, and/or environmental surfaces. Remove when leaving room.

Mask & Goggles: Wear eye protection if risk of splash or splatter.

Providence HEALTH CARE

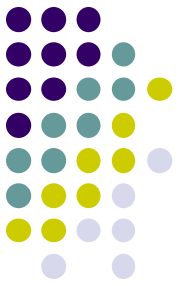
Transmission Based Precautions



The patient care unit is responsible to inform staff:

- When the patient requires additional Transmission Based Precautions.
- The type of precautions required.

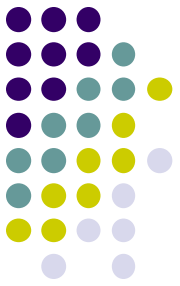
Contact Precautions



Gown and Gloves for all direct patient and/or the patients' environment.

- Contact: MRSA, VRE, C difficile, unexplained diarrhea/vomiting.
- Visible body fluids and spills.

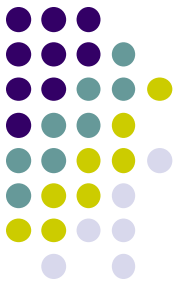
Droplet Precautions



Use of a **surgical mask and eye protection** within 1 meter (3 feet) of patient/procedure where droplets are created:

- Meningitis (bacterial or unknown etiology) or if patient complaining of fever, headache, sore neck.
- Coughing patient.
- MRSA in the sputum, with a cough.
- Suctioning or aerosol generating procedures

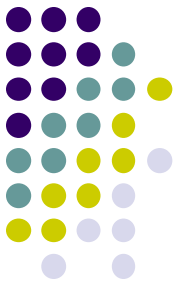
Airborne Precautions



Patients/procedures known or suspected to have pulmonary TB, Measles require Airborne Precautions.

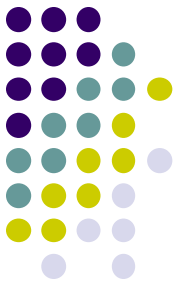
- Staff working with TB must wear an **N95 mask.**
- N95 masks always have “N95” marked on them.
- N95 masks are single use.
- Fit testing available through OH&S.

Droplet and Contact



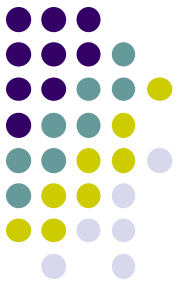
- Droplet and Contact Precautions require gowns, gloves, surgical mask and eye protection are used in combination.
- Example for patients/procedures with **influenza** or patients complaining of influenza like illness (e.g. respiratory symptoms, myalgia, fever).

Airborne and Contact



- A/C Precautions use all available PPE: Gowns, gloves, N95 mask, eye protection and environmental engineering (negative pressure single rooms).
- Chicken Pox, Disseminated Varicella Zoster, Viral Hemorrhagic Fever, SARS.

Environmental Cleaning



- Cleaning is the physical removal of visible soil, body fluids or foreign materials.
- Cleaning must be performed before disinfection or sterilization can occur.
- Accomplished by manual or mechanical means, using water with detergent or enzymatic products.

Disinfectants



All disinfectants are reviewed by infection control.

- Quaternary Ammonium compound in 14% alcohol.
- Accelerated hydrogen peroxide.
- Precept: Sodium hypochlorite.
- Phenols
- Bleach 1:50 for specific organisms. Example for Norovirus, C.diff

How YOU Can Prevent Infections

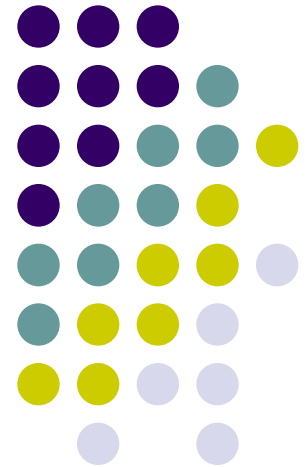


- Single most important thing is to wash your hands
 - Before eating
 - After going to the washroom
 - Before and after patient care
- Get vaccinated for influenza (in the fall)
- Adhere to infection control alerts placed on doors of patient rooms
- If you are sick with an infectious agent, stay home



Thanks for Your Time

Questions

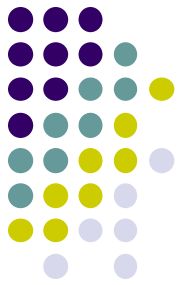


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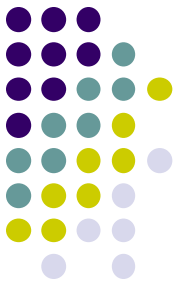
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