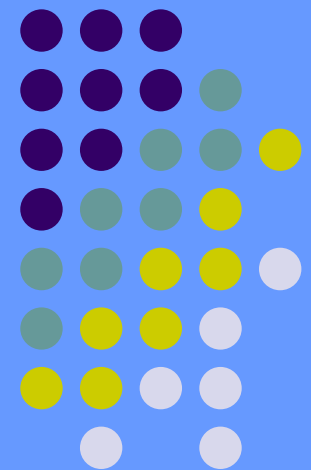


BASIC CONCEPTS OF INFECTION CONTROL

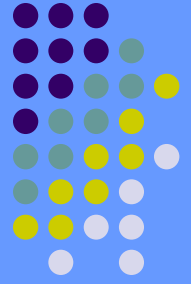
Isolation Precautions

International Federation of
Infection Control



Objectives

- Background
- Types of isolation
- Standard Precautions
- Requirements
- Current recommendations



Introduction

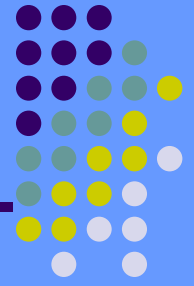


- Three fundamental principles for health care of patients with a transmissible infection:
 - What will IP achieve?
 - What is the route of transmission of the infectious agent?
 - Can you prevent infection between patients or between patients and health care workers (HCW)?



Introduction

Isolation policies are debated in these areas -



- Isolation rooms ventilation
- Nature and significance of airborne transmission
- Placement of patients
- Role of screening cultures
- Importance of clothing
- Hand hygiene - soap and water or alcoholic rub
- Gloves/gowns for close contact or when entering isolation room
- Use of masks
- Environmental disinfection at regular intervals or when needed



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Introduction

- Evidence is sometimes difficult to find
- Publications rarely give detailed information or take into account the importance of preventive measures (hand hygiene, single rooms)
- Investigations on IP are difficult and costly and therefore rare
- Outbreak reports are numerous, but cannot be used to estimate the effects of preventive measures



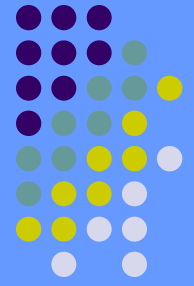
Evolution of Recommendations



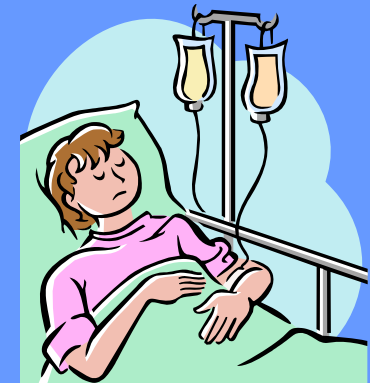
- **Before 1900**
 - Infected patients segregated in separate wards
 - Lazarettos established for smallpox patients
 - Didn't control infection because routes of transmission and aseptic techniques not considered
- **1900:**
 - Use of protective barriers (aprons, masks, caps and shoe covers) for HCW
 - Isolation hospitals and sanatoria for TB patients
- **1950:**
 - Guidelines for management and treatment of TB



Evolution of Recommendations



- **1950-1960:**
 - Isolation wards in general hospitals
- **After 1970**
 - Protective isolation of immunocompromised patients and single rooms





Category Isolation

- Initially published in 1970 by CDC
 - Reviewed in 1975 and 1983
- Categories based on routes of transmission and use of protective barriers
 - Strict Isolation
 - Contact Isolation
 - Respiratory Isolation
 - Protective Isolation (eliminated in 1975)
 - Enteric Precautions
 - Wound and Skin Precautions
 - Discharge Precautions
 - Blood Precautions (replaced by Universal Precautions)





Category Isolation

Advantages	Disadvantages
Easy to initiate	Over isolation
Standardization	Increasing costs
	Unknown impact





Disease Specific Isolation

- Recommendations based on route of transmission of different infections
- Special isolation practices are designed for each of the most frequent diseases



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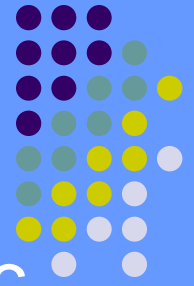


Disease Specific Isolation



Advantages	Disadvantages
Cost containment	HCW must have good knowledge of different infections
	Over isolation
	Most applicable in smaller hospitals with fewer number of beds





Universal Precautions

- Developed 1985 in response to AIDS epidemic
 - To prevent infections being transmitted by blood to HCW's
- The UP approach -- apply Blood and Body Fluid Precautions to all persons regardless of infection status
- Previously IP had only been used for patients under a suspected or confirmed disease
- UP increased hospital costs due to use of protective barriers and disposable items



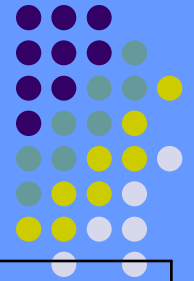
Body Substance Isolation (BSI)



- Instituted in 1987; similar approach to UP
- All fluids coming from patients handled using gloves
- Doesn't consider other barriers or prevention of needlestick injuries
- Main problems with BSI
 - Re-use of gloves without changing them
 - Use for activities unrelated to patient care
- Gloving provides a false sense of security, decreasing hand washing frequency and causing latex dermatitis



Body Substance Isolation (BSI)



Advantages	Disadvantages
Protects persons regardless of their presumed infection status	Increases costs
	Doesn't consider airborne infections
	Confusion for HCW

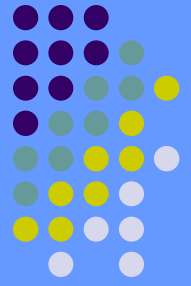




Transmission of Infections

- Contact Transmission
 - Direct contact, e.g., a surgeon with an infected wound on a finger performs a wound dressing change
 - Indirect contact, e.g., secretions transferred via the hands of a HCW
 - Faecal-oral via food



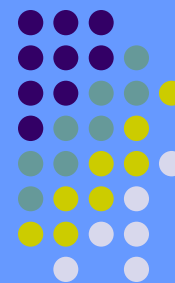


Transmission of Infections

- Droplet Transmission
 - Droplets expelled, e.g., when sneezing, or coughing, (< 2m from the source)
 - Direct droplet transmission
 - Droplets reach mucous membranes or are inhaled
 - Indirect droplet transmission
 - Droplets contaminate surfaces/hands and are transmitted to another site, e.g., mucous membranes is often more efficient than direct transmission
 - Common cold, RSV



Transmission of Infections



- Airborne Transmission
 - Small particles carrying microbes are transferred as aerosols via air currents for > 2m from the source, e.g., droplet nuclei or skin scales
 - Direct airborne transmission - particles are inhaled (e.g., *Varicella zoster*) or contaminate wounds (e.g., *S.aureus*)



Transmission of Infections



- Bloodborne Transmission
 - Blood is transferred via sharps or needle stick injuries, transfusion or injection





Standard Precautions

- Taken with every patient, independent of any known condition (e.g., infected or colonized)
- Designed to prevent cross transmission before a diagnosis is known



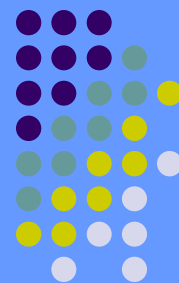


Standard Precautions

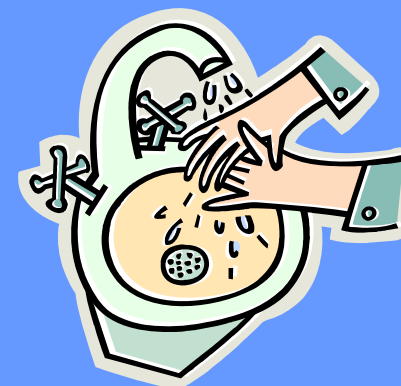
- Hand disinfection with alcohol or hand washing before and after patient care
- Disposable gloves on contact with blood and body fluids
- Protective apron or gown if an expectation of contact with body fluids
- Mask and goggles or other face protection if an expectation of splashing to the face
- The routes of transmission that are prevented are
 - Contact
 - Bloodborne
 - Droplet



Ward Design



- Wards can be designed to facilitate standard precautions
- Washbasins needed for good hand hygiene
- Hand hygiene is not improved by >1 sink per 6 beds
 - Alcohol hand rub dispensers must be placed instead
 - In high-risk wards one per bed is desirable



Ward Design

- Space between beds is important
 - Beds should be at least far enough apart that a nurse cannot touch both beds at the same time
 - Decreasing the distance between beds from 2.5 to 1.9m increases transfer of MRSA 3.15 times
- Spread of MRSA can be directly related to overcrowding



Prevention of Airborne Transmission



- Use of single rooms prevents transmission
- Ventilated rooms with negative pressure difficult to maintain
 - Have not been shown to be more effective for preventing TB than single rooms with doors closed
- Single rooms with anterooms reduce air movement between room and corridor
 - Easier to maintain but costly to build
- If several patients have an infection caused by the same agent, they can share the same room (cohort isolation)



Placement of Patients



- In most cases Standard Precautions sufficient
- Placement of patients into different rooms should be based on clinical signs and not on culture results



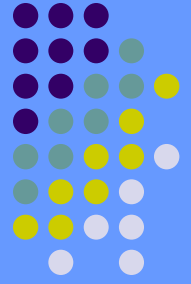


Placement of Patients

- When placing patients consider:
 - Single room (including bathroom) when gross contamination of the environment likely (e.g., large wounds with heavy discharge, massive uncontrolled bleeding, diarrhoea)
 - Single room, door closed when airborne to contact transfer likely (e.g., injured skin with gram positive infection)
 - Single room ventilated to the outside when airborne transfer likely (e.g., TB)
 - Single room with airlock when massive airborne transfer is likely (e.g., varicella)



Transmission of Multiresistant Agents



- Use of a single room not the whole solution to preventing spread
- Surveillance cultures
 - Costly
 - Have a low sensitivity
 - Usually focus on one or two infectious agents
 - Divert attention and resources from more important areas of concern (may be helpful in an outbreak)



Control of Methicillin-resistant *Staphylococcus aureus*



- An intensive care unit with eight single rooms observed for three years - MRSA isolation practiced after surveillance cultures
- Despite this, 56 patients from the community with undiagnosed MRSA caused 80 cases
- Transmission stopped when barrier nursing of ALL patients introduced

Hartstein AI, et al. Control of methicillin-resistant *Staphylococcus aureus* in a hospital and an intensive care unit. *Infect Control Hosp Epidemiol* 1995; 16(7):405-11





Staff, Equipment and Surfaces

- Keep equipment and surfaces clean
- Hand disinfection between patients
- Clean disposable gloves when touching secretions
 - Disinfection of gloves with alcohol is ineffective, dissolves the glove material



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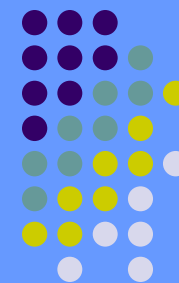


Staff, Equipment and Surfaces

- Wearing a protective gown
 - Clothes contamination can be reduced 20 -100 times
 - Plastic aprons reduce the transmission of *S aureus* in abdominal surgery to the patient's bed by 30 times, compared to wearing a uniform changed daily
- Masks, goggles, and visors are protection against blood splashes
- A respirator may be used as protection against TB (especially multi- or extended-drug resistant)



Misuse of Gloves



- Gloves are often overused
- 120 HCW observed in 784 patient contacts
- Gloves were used in 93.5% of contacts but were needed only in 58%
- 82% of the contacts that should have been aseptic were performed with dirty gloves
- Hand disinfection not performed in 64% of contacts

Girou E, et al. Misuse of gloves: the foundation for poor compliance with hand hygiene and potential for microbial transmission? *J Hosp Infect* 2004; 57:162-169.

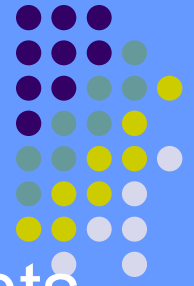




Family Members Providing Care to Patients in Hospitals

- Must be educated by the staff to use good hygiene and appropriate IP
- Should be the same as those used by the staff, excluding the use of gloves



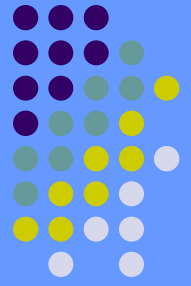


IP Policy

- Institute Standard Precautions for all patients
- Institute Special Precautions when indicated
- Decontaminate hands between patient contacts
- Wash hands after touching infective material
- Use no touch technique when possible
- Dispose of faeces, urine and other patient secretions via designated sinks and clean and disinfect bedpans, urinals and other containers



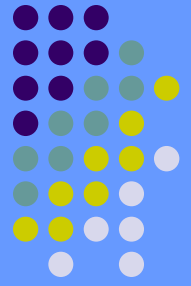
IP Policy



- Wear gloves, when in contact with blood, body fluids, secretions, excretions and contaminated items
 - Wash hands after removing gloves
 - Change gloves between patients
- Clean up spills of infective material promptly
- Ensure that patient-care equipment, supplies, and linen are cleaned between each patient use



Minimal Requirements



- Written policy of IP
- Gloves available for touching secretions, excretions and infective items
- Barriers (masks and goggles) available for staff in critical areas
- Single rooms for airborne transmission





Conclusions

- The objective of IP: decrease the transmission of infectious agents between staff and patients
- Isolation precautions can reduce the risk of transmission if applied properly
- Recommendations have evolved to be simple and effective
- Standard precautions is enough for most patients
- Hospitals need to have a written policy and evaluate its compliance





Key Points

- Microorganisms can be transmitted from patients to other patients and staff
- Isolation precautions (IP) can reduce the risk of transmission if applied properly
- Objective of IP: decrease the transmission of infectious agents between staff and patients



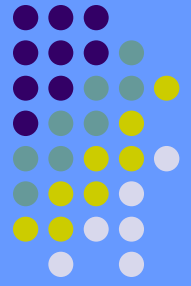


Key Points

- IP policies include: hand hygiene, protective clothing, single rooms with ventilation, and restrictions for movement of patients and staff
- Rituals are costly, cumbersome, sometimes dangerous and should be avoided
- Apply IP according to signs and symptoms; do not wait for laboratory results



References and Further Reading



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