Proper Handling of Isolation

Each facility or organization will have its own policies and procedures when dealing with Isolation. This course will review and present updated information dealing with isolation and why it is needed.

Isolation is the physical separation of Individuals (patients) with certain infections from other people as a precaution to prevent the transmission of an infection or disease. Using up-to-date information, and our understanding of how infections are transmitted, Isolation policies and practices can minimize transmission in a clinical, ambulatory (outpatient), or hospital setting.

The CDC (Centers for Disease Control) and HICPAC (Hospital Infection Control Practice) have defined guidelines for hospital-based infection precautions. “Standard precautions” was the recommended guidelines that the CDC implemented to reduce the spread of infections in the hospital setting. Many, if not most of these precautions should also apply to outpatient and clinical settings. These precautions include hand washing and wearing personal protective equipment (PPE), including gloves, mask, eye protection and gowns. In the hospital setting there are usually two levels of precautions. At the first level is **Standard Precautions** and at the second is **Transmission-based Precautions**.

Standard Precaution combines the major features of Universal Precautions and Body Substance Isolation. Standard Precautions is based on the principle that all blood, body fluids, secretions (except sweat), skin that is not intact, and mucous membranes may contain

infectious transmissible agents. All patients are treated equally and should be treated as potentially infected. It should not matter if they have a suspected or confirmed infection and/or disease all patients should be treated as if they have been infected.

Standard Isolation precautions not only should be use on **all** patients, but any room contamination and should include:

- Gloves: to anticipate contacts with all body substances including blood, body fluids, mucous membranes, secretions and excretions.

- Eye protection, masks and gowns **must** be worn if splashing of body substances is possible.

- Hands and other contaminated skin surfaces should be washed thoroughly and immediately if accidentally contaminated by body substances.

- Patient supplies or medications that come in contact with the floor or other potentially contaminated surfaces must be disposed of or disinfected appropriately. It is extremely important that the environmental services ensure consistent environmental cleaning and disinfection with focus on restrooms even when it does not appear to be soiled.

Transmission-based Isolation should not only include Standard Isolation precautions but will be used on patients with suspected or know infections requiring special isolation precautions. The infection control department of each facility should provide guidance on the appropriate Isolation to be used on each patient.

Not only should patients be treated as if they have been infected, but also all equipment that has come in contact with that patient. This included direct and not direct contact. All infection control practices should be applied during the health care delivery.

The practice of Universal Blood and Body fluid Precautions was introduced in 1985. Universal Precautions were designed for doctors, nurses, patients, and health care support workers who were required to come into contact with patients or bodily fluids. This included staff and others who might have indirect contact with patients. In 1987 the practice of Universal Precautions was adjusted based on the rules of body substance isolation. In 1991 the Bloodborne Pathogens Standard Precautions recommended by the CDC were mandated by OSHA for all workers in the U.S. health care settings. In 1996, both practices were replaced by the latest approach know as Standard Precautions (health care). Body substance Isolation (BSI) is to go further than Universal precautions. These recommendations began with the AIDS outbreak. This practice was to help Employees of health care systems, to be isolated further from the pathogens that are known to carry HIV.

The CDC estimated that nearly 600,000 percutaneous injuries annually in the U.S. involved contaminated sharps. Congress passed the Needlestick Safety and Prevention Act directing OSHA to revise the bloodborne pathogen standard. That revision was published January 18, 2001 and became effective April 18, 2001.

It is within the role/scope of physicians, physician assistants, Nurse practitioners, nursing staff and infection control practitioners to place patients appropriately and order Transmission-based Special Isolation Precautions. **It is <u>everyone's</u> responsibility** to comply with isolation

precautions and **everyone's** (all employed staff) to tactfully call on all observed infractions to the attention of the non compliant staff.

The quality of care should not be compromised by Isolation Precautions.

There are two broad categories that these pathogens: bloodborne (body fluids), and airborne. This is the curriculum for pre-hospital providers and firefighters. This is because patients' medical conditions and diseases at this point are usually unknown, so the BSI is initiated at this point.

These precautions should be in place when dealing with the following:

- Blood
- Feces
- Urine
- Preseminal fluid
- Semen
- Vaginal secretions
- Cervical mucus
- Vomitus, sputum
- Mucous
- Nasal secretions
- Phlegm

- Saliva
- Secretions
- Colostrum
- Amniotic fluid
- Blood from the umbilical cord
- Breastmilk
- Synovial fluid
- Cerebrospinal fluid
- Peritoneal fluid
- Pleural fluid
- Marrow
- Note: sweat is not to be included as a secretion.

When, dealing with these bodily fluids, you should use a hospital gown (plastic or sterile), medical gloves (sterile or unsterile), Shoe covers (type depending on exposure), Surgical mask including N95 respirators up to actual surgical hoods, Safety glasses, shields and surgical masks with shields.

Transmission based precautions may be needed in addition to Standard precautions for patients suspected or known to harbor certain infections. The types of Isolation in addition to Standard Universal precaution/Body substance isolation are:

Airborne Transmission which requires negative air room pressure; this is to eliminate disease being pushed outside of the room from positive pressure inside the room. When thinking of Airborne, one should think of Tuberculosis.

- Strict (disease spread by airborne and contact routes)
- Respiratory

Droplet transmission includes diseases such as mumps, rubella, and influenza pertussis.

- Droplet/Pediatric Respiratory

Contact Transmission which can be direct or indirect contact with skin, can be MRSA or contaminated surfaces. This can also include vomitus and feces.

- Contact
- Enteric (pertinent to small intestine)
- Vancomycin / Antibiotic Resistant

The type of Isolation used is based on how the disease or infection can be spread from one person to another. Make sure to read the sign posted at the door or bedside to understand the isolation being used on a particular patient. These signs indicated which personal protective equipment (PPE) must be used before entering the room and before initiating any personal care that is needed with this patient.

When possible, an isolation station should be set up in each room in preparation for isolation precautions.

Currently, many hospitals are using a system called **category-specific isolation** to protect people from bacteria infecting a given patient. This system is supposed to be an easier system for staff in understanding the categories. This system breaks isolation down into five categories;

1. Strict Isolation

2. Respiratory Isolation

3. Wound and Skin Precaution

4. Enteric Precautions

5. Blood/Body fluid precautions

The rationale behind this system is it's easier for all health care providers to remember the procedures for these categories versus the individual infectious diseases.

There are other additional categories of isolation that can be used in any system that a health care system chooses to use. Isolation is used also to protect patients who have immune suppressed systems. Because they are highly susceptible to contracting an infection, one category is called "compromised host precaution", other terms include "protective isolation" and "Transmission-based Isolation Precautions".

We will discuss these isolations precautions individually, however the single most important infection control measure that affects all categories is **hand washing!!** Hand washing provides all individuals with increased safety; this includes all inpatient and outpatient units

caring for patients with isolation precautions. This means anyone who comes in contact with this patient or patient's room.

All Isolations should be used in conjunction with Standard Universal/ Body Substance precautions. These standards include always using gloves, mask and gowns. Depending on the situation the gloves and gowns may be sterile.

Make sure to place appropriate Isolation sign on patient's door!!

Once an Isolation has been assigned to a patient, it is the nursing department's responsibility to educate the patient and the patients family on hand hygiene, respiratory etiquette and isolation procedures.

Visitors shall be instructed and supervised by nursing personnel in proper isolation techniques.

Contact and Contact Plus Isolation and Precautions

The purpose Contact and Contact Plus isolation and precautions are to prevent the spread of disease for patients with highly transmissible or microbiological microorganisms. Contact and Contact Plus Isolation Precautions are designed to reduce the transmission of highly transmissible or epidemiologically important microorganisms. This would include inpatient and outpatient settings, as well as anyone who comes into contact with this patient.

These patients should be placed in private rooms. Everyone should don gloves and impervious gown upon entering the room and at all time while in a contact isolation room. Change gloves and gown when having contact with infective material. Remove gloves and gown before leaving the room. **Always perform hand hygiene immediately!!** Ensure

that hands/clothing/skin do not touch potentially contaminated environmental surfaces or items in the patients room.

Contact happens with mutual touching or apposition (placing together, or bringing into proximity) of two bodies. Direct contact is the transmission of a communicable disease from the host to a healthy person.

Indirect contact is transmission of a communicable disease is any medium between the host and the susceptible person. The medium could potentially be hands of a health care worker, medical supplies, clothing or contaminated food/water.

Contact precautions may be used for the following diseases:

- **Diphtheria** (cutaneous): a skin infection, usually at the site of a wound, caused by C. diphtheria, usually in humid tropical regions or with poor sanitation.

- **Herpes simplex virus** (neonatal or mucocutaneous severe)

- **Impetigo:** a bacterial infection of the skin caused by streptococci or staphylococci, usually yellow to red and weeping with crusted or pustular lesions. Impetigo can develop after trauma.

- **Major** (non-contained) abscesses, cellulitis, decubitis

- **Multi-drug resistant organisms:** this includes both infected and colonized patients. Methicillin Resistant Staphylococcus Aureus (MRSA), Vancomycin Resistant Enterococcus (VRE), Extended Spectrum Beta Lactamase (ESBL). Patient with a history of MRSA, VRE, or ESBL will remain on isolation usually for their entire hospital stay and possibly future admissions.

• **Pediculosis:** Infestation of lice, usually causing a scalp infection. In turn, this may develop a secondary bacterial infection. Therapies modify frequently due to the resistance of lice, to current therapies and to limit toxicities to medications.

• **Respiratory syncytial virus (RSV)**, parainfluenza virus or enteroviral infections in infants and young children. Virtually all children in U.S. have been infected by age 6. This is a group of viruses that cause upper respiratory infections in humans, especially children.

• **SARS** (Severe Acute Respiratory Syndrome): A highly contagious, potentially lethal viral respiratory illness first diagnosed in China November 2002. Radiograph (x-ray) compatible with pneumonia. Instances without pneumonia are considered moderate infections.

• **Scabies**: Contagious infestation of the skin with the itch mite.

• **Smallpox**: An acute, highly contagious, and frequently fatal viral illness cause by the variola virus. Patients usually presenting with influenza-like symptoms, especially high fever.

• **Staphysococcal furunculosis** in infants and young children, usually involving boils.

• **Staphylococcal scaled skin syndrome**: A scald is deeper than a burn from dry heat and this is the infection of.

• **Viral/hemorrhagic conjunctivitis**

• **Viral hemorrhagic fever**: Ebola, Lassa Fever, Marburg Virus: Sporadic outbreaks in Africa, widespread bleeding into many organs and fever similar to Lassa, and Marburg as well as Congo-Crimean viral hemorrhagic fevers.

- **Zoster**: Herpes

Contact Plus Precautions: When using Contact plus precautions, all items in contact with an Isolation patient must be wiped with Bleach wipes and is used for the following diseases: Clostridium Difficile, Norovirus, Acute diarrhea disease illness:

Patients with a history of, or are positive for Clostrudium difficile, are to remain on Contact plus precautions for an extended amount of time. Usually the patients remain on contact plus precautions for three months after the last positive culture.

With Contact Plus Precautions, perform hand hygiene with soap and water after PPE removal. Use bleach wipes on all equipment.

Make sure to clean patient-care items, bedside equipment and frequently touched surfaces daily. Try to use single-use items only.

These single use items can include Blood pressure cuffs (BP Cuffs), stethoscopes, and thermometers. **Do not share** any equipment with any other patients! If sharing, make sure all equipment is thoroughly cleaned and disinfected.

If needing to ambulate the patient in a shared hallway, refer to a Transportation Isolation policy, if one is available. Make sure to don gloves and impervious gown when ambulating a patient in the hallway.

When a contact precautions patient is transferred, notify the receiving area that the patient has a disease transmittable by direct hand or skin to skin contact. Make sure they know of any area with potential drainage. Wrap a clean blanket or sheet around patient, with care not

to contaminate the outside of the blanket or sheet. Personnel should wear gown and gloves if body substance is anticipated.

Make sure to have the wheelchair or gurney, disinfected prior to the using on another patient. Always perform hand hygiene after dealing with a contact precautions patient. Remember: even your uniform can become contaminated.

Airborne Isolation Precautions: (Respiratory Isolation)

The purpose of Airborne Isolation is for patients who have been confirmed or suspected of having airborne diseases to appropriately isolate to prevent the spread of the disease. This precaution is designed to reduce the transmission of microorganisms by airborne droplet nuclei or dust particles containing the infectious agents that can remain suspended in the air, which can be dispersed by air currents. Environmental health and Safety usually are responsible for respiratory protection programs.

Airborne Isolation precautions can be used for the following diseases:

• **Avian Influenza** (Bird flu): Influenza A virus primarily infects birds and poultry, and may occasionally cause a febrile illness in human beings. Symptoms include cough, muscle aches, sore throat and headache. Viral pneumonia or acute respiratory distress syndrome can be seen in severe cases. A pandemic of type H5N1 avian influenza killed millions of people worldwide in the early 20th century.

Influenza A is responsible for about 65% of cases, Influenza B about 35%, Influenza C causes such a small amount it's not even accounted for.

• **Measles** (Rubeola; reddish): A highly communicable disease caused by the rubeola virus. Symptoms include fever, general malaise, sneezing, nasal congestion, brassy cough, conjunctivitis, spots on the buccal mucosa (Koplik's spots) and maculopapular eruption over entire body. An episode of measles almost means permanent immunity.

• **Monkeypox**: A poxviral illness clinically similar to smallpox. The same vaccination is used for monkeypox exposure as is smallpox.

• **Novel or unknown pathogens** to be discovered:

• **Pulmonary**, laryngeal and draining extrapulmonary lesion:

• **SARS** (Severe Acute Respiratory Syndrome): A highly contagious, potentially lethal viral respiratory illness first diagnosed in China November, 2002. Usually presents a fever greater than 100.4°F, cough, difficulty breathing and hypoxia. Can be consistent with pneumonia findings in x-rays.

• **Smallpox/Variola** (pustule): An acute, highly contagious viral infection that can be frequently fatal. Smallpox is caused by the Variola virus.

• **Tuberculosis**/ (M. Tuberculosis):

• **Varicella** (a tiny spot), Chickenpox, and disseminated Herpes Zoster: An acute infectious disease usually seen in children under age 15, caused by Varicella-Zoster virus. It is usually described as a dew drop on a rose petal pattern, scattered in clusters ("crops") over the trunk of the body. It also includes the face, scalp, upper extremities, and

sometimes the thighs. It is transmitted by respiratory droplets that contain infectious particles. Direct contact can also spread the virus.

Other precautions that must be taken into consideration when dealing with Airborne Isolation precautions are: Make sure patients are put into private rooms with special ventilation. The ventilation systems in these rooms should be negative pressure. Make sure no one enters these rooms that may be susceptible to measles or varicella which can be identified by negative antibody titer.

All persons entering a patient's room should use a N95, HEPA, OR PAPR respirator mask. In some cases a hood may also be worn when necessary. Another standard precaution may be to gown and glove before entering patient's room.

Transport patients to essential studies or purposes **ONLY**. Limit excessive movement in patient's room when possible. Make an attempt to perform procedures in patient's room to help limit transportation of the patient. Notify receiving departments when a patient is on Airborne Precautions. If a patient is wearing a surgical mask during transportation and infectious skin lesions are covered, health care staff does not need to wear a mask or respirator.

When a patient has skin lesions related to varicella or smallpox, even draining lesions caused by M. tuberculosis, always cover these areas prior to transportation to prevent aerosolization.

It is a nursing responsibility to notify engineering immediately to verify that the negative pressure ventilation system and the alarm system, if one is in place, is working correctly. It usually is the engineering departments' responsibility to monitor the negative pressure in that room daily.

Patients on Airborne Precautions are usually brought straight to the Operating Room, they bypass Preop. The Positive pressure is turned off by engineering prior to the patient being brought down from their hospital room so that the OR is ready. Depending on what each hospitals policy, once the surgical case is complete, the O.R. might remain empty for a specific amount of time prior to the positive pressure being turned back on. This may also affect when a surgical suit is cleaned. This depends on if the policy required the room to be vacant for that time frame. If the room is grossly bloody, be sure to spray gross blood with a pretreatment so it does not dry; making it harder for Environmental Services (EVS) to clean the room.

Also verify whether this should be a terminally cleaned room or not, prior to the next case. The new standard is, all operating rooms should be terminally cleaned every twenty-four hours.

Once the room is cleaned make sure to call engineering to turn on the positive pressure. Make sure all doors to this Operating Room are closed. If the hospitals policy states to wait a certain amount of time prior to using this room, make sure to document the time the operating rooms positive pressure was turned back on.

When possible, try to schedule any Airborne Precaution cases as the last case of the day. This helps make it easier to follow hospital policy without delaying the following cases.

Droplet Isolation Precautions:

The purpose of Droplet Isolation Precautions is to prevent the confirmed or suspected disease spread from droplet transmissions. Droplet precautions include coughing, sneezing, talking and when procedures are performed. Transmission is usually affiliated with coming into close contact (less than three feet) with the source.

Droplet Isolation is used for the following diseases:

• **Adenovirus**, in infants and young children: This includes any double-stranded DNA viruses that can cause upper respiratory tract infections. A large number of these viruses have been isolated.

• **Diphtheria** (Pharyngeal): is a rare toxin-mediated bacterial infection marked by patchy grayish-green membrane over the tonsils, uvula, soft palate, and posterior pharynx. It can happen in skin, conjunctiva, ears, GI and urinary tracts. The bacteria that causes this is Corynebacterium diphtheria and airborne droplets from person to person where the carrier is asymptomatic or a convalescent patient. The Diphtheria toxoid in the US has made the incidence of the disease rare.

• **Haemophius influenza type B**, including meningitis, pneumonia, epiglottitis, and sepsis: Haemophius is a genus of the gram-negative, nonmotile bacilli; some of these bacteria are normal flora of the upper respiratory tract, while others cause serious illness. Haemophilus influenza type B is a vaccine preventable cause of meningitis. In children it can cause epiglottitis, pneumonia, septic arthritis, and cellulitis.

Meningitis: is the inflammation of the membranes of the spinal cord or brain. Usually but not always caused by an infectious illness. Bacterial

meningitis is a medical emergency and must be treated immediately. Meningitis is fatal in about 10% to 40% of the cases, even with immediate treatment. In about 10% of these cases there is neurological injury in patients who do survive. This disease in adults is usually caused by Streptococcus Pneumoniae or Neisseria menigitidis, although other microbes could also be responsible.

Pneumonia: Is an inflammation of the lungs usually due to infection caused by either bacterium, viruses or pathogenic organisms. This term usually means an infectious disease. Pulmonary inflammation due to other reasons is called pneumonitis. In the U.S. alone about 4,500,000 cases of pneumonia happen each year and is the 6th most common cause of death due to infectious disease. Pneumonia presents with fever, chills, shaking chills, pleuritic chest pain, coughing, and prostration. The most important symptom is difficulty breathing, with shortness of breath which may require supplemental oxygen. Unfortunately these symptoms are not universal and a patient may present with mild symptoms. Treatment is based on gram stain of sputum and x-rays.

• **Influenza**: Is an acute contagious respiratory infection which presents with fever, headache, muscle aches/pains, chills, prostration (lying with body extended possibly face down), runny nose, watery eyes, cough, and sore throat. Influenza usually, but not always strikes during the winter. Influenza can also be fatal, up to an estimated 36,000 deaths annually. Vaccinations are available during the “flu” season.

• **Meningococcal disease**, including meningitis, Pneumonia, and sepsis: Meningococcal is a caused by various serogroups of Neiseria meningitides which is a gram-negative diplococcus.

• **Parvovirus B19**: This is referred to as the “fifth disease” and is not related to the animal parvovirus. This will be addressed in more in depth later in the course content.

• **Pertussis** (whooping cough): is a contagious disease with a 7 to 10 day incubation period. Symptoms are paroxysmal (repeatedly without warning) coughing; vomiting that follows the cough, and a whooping inspiration. It is caused by a nonmobile gram-negative bacillus (Bordetaella pertussis). Immunization against pertussis is available and mandatory for school entrance in some states.

• **Plague** (yersinia Pestis): is any widespread contagious disease associated with a high death rate. The natural host for yersinia pestis is usually ground squirrels, wild rodents and rats; the vector is the rat flea. Symptoms for the plague are high fever, restlessness, confusion, prostration, delirium, shock and coma. In the U.S., about 15 cases of plague are reported per year and are usually in the western and southwestern regions. If treated immediately plague is rarely fatal, however, in U.S., about 1-in-7 dies because of delayed diagnosis and treatment.

• **Rubella**: Is a mild, highly infectious viral disease only in humans, historically in children. The vaccine has made the disease rare among vaccinated children and young adults. Rubella is contracted through nasopharyngeal secretions, blood, urine and stool.

• **Streptococcal Pharyngitis**, pneumonia, or scarlet fever in infants and young children: Streptococcal Pharyngitis is a common bacterial infection of the throat and tonsils especially in children between 5 and 15 years of age. Symptoms are usually fever, sore throat, painful swallowing, exudates (fluid or solid debris concentration) on tonsils,

and swollen anterior cervical lymph nodes. Caused by Group A beta-hemolytic streptococci which could lead to rheumatic fever and post streptococcal glomerulonephritis.

Scarlet Fever: An Acute contagious disease presenting with Pharyngitis and a pimply red rash. Its cause is Group A beta-hemolytic streptococcus from any one of more than 40 strains, and usually affects children 3-15 years of age. Symptoms are the pharynx and tonsils being swollen and red with exudates, Fever, chills, vomiting, abdominal pain, and malaise. The tongue can be white initially with red swollen papilla, and after about 5 days the white disappears creating a “strawberry” red tongue. A red pinpoint rash appears on trunk, and then spreads out within 12 hours of fever that blanches with pressure and feels like sand paper.

With Haemophilus influenza and meningococcal disease, most hospital policies require isolation for 24 hours with the appropriate antibiotic before being removed from isolation.

Patients under droplet isolation precautions should have private rooms unless other patients have the same microorganism. If patients must be in the same room, make sure they are physically separated to limit contact. Make sure to keep patients’ room door closed at all times. When dealing with these patients, make sure to wear a surgical mask when within 3 feet of the patient. Make sure to change the surgical mask with each new encounter.

When cohorting patients make sure patients are provided with a safe environment and in accordance with hospital infection control precaution policies. A daily assessment of each patient’s isolation status

should be completed daily to determine is reassignment of rooms is necessary.

Limit the movement of these patients, when the need for transportation arises, place a mask on the patient. Make sure to notify the receiving department of droplet isolation.

Patients in the Periop setting including Preop, O.R. and PACU as well as Emergency department and X-ray should all follow the same precautions.

Remember when considering patients, in rooms the recommendation would be;

- A private room should be assigned to patients who require Airborne and Droplet precautions. An exception would be during periods of significant influx of infectious disease patients who have consistent symptoms (SARS, Influenza).

- A private room is highly recommended for patients with Contact Isolation, unless during high census there are patients with the same disease. Still try to keep patients physically separated. Make Sure patients who contaminate the environment with body fluids and do not assist in maintaining appropriate hygiene are not cohorted.

- Applicable microorganisms for cohorting include: MRSA, VRE, and Clostridium difficile as long as the patient is no longer incontinent and can maintain appropriate hygene. Cohorting applies to patients colonized or “previously identified” with the previous admission and without current infection.

Contraindications to cohorting, per The Centers For Disease Prevention and Control (CDC) is; whenever possible do not place a patient colonized with MRSA and/or VRE in a room with someone with an indwelling catheter, an invasive line, pressure ulcers or other functional disabilities that may prevent compliance with contact precautions. This also includes patients who are confused, who may wander out of bed and contaminate a roommates part of the room.

Enteric Precautions: recognized by some facilities and is dealing with direct contact with gastrointestinal secretions, vomitus and feces.

This is a possible route for pathogens to be transmitted through contact. Always use a private room for pediatric patients because it is so difficult for them to remain in their own beds.

There are also categories of Isolation that protects the immune suppressed patient from others. This category is sometimes called the **compromised host precaution**. An example of this is:

Neutropenic Precautions: this is an abnormally small amount of neutrophils. In this case, the patient is extremely susceptible to infections. They must have a private room, and strict hand hygiene (including nails) must be enforced. Visitors must be restricted!! Usually the neutophil count (ANC) is <500-1000/mm3. Neutophils are the most common white blood cell (WBC).

These patients cannot have unwashed fresh fruits and vegetables, raw eggs or yogurt. They also cannot have flowers or plants. Avoid all sources of stagnant water, for example, denture cups or irrigation containers.

Below is a chart to address the type and duration of precautions needed for each infections listed. The codes for this chart are:

- A: Airborne Precautions
- C: Contact Precautions
- D: Droplet Precautions
- S: Standard Precaution

Whenever A, C, or D are used make sure to also use S

Under “Duration” of precautions:

CN means until off antimicrobial treatment and culture negative.

DI means duration of illness (with would lesions, DI means until the wound stops draining), until environment completely decontaminated.

U means until time specified in hours (hrs) after initiation of effective therapy.

Unknown: means criteria for establishing eradication of pathogen has not been determined.

Under Precautions:

NRT: No risk of transmission

SP: Standard Precautions

HCW: Health care workers

Precautions chart for recommendations

Infection/condition	Type	Duration	Precautions
Abscess			
Draining Major	C	DI	No dressing or containment of drainage; until drainage stops
Draining minor/limited	s		Dressing covers and contains drainage.
Acquired human immunodeficiency syndrome (HIV)	s		Post –exposure chemoprophlaxis from some blood exposure
Adenovirus infection	D	CN	Once no longer contagious
Amebiasis	S		Person to Person is rare. Transmission with children and mentally challenged reported
Anthrax	S		Infected patients pose **NRT**
Cutaneous	S		Transmission through draining lesions is possible. Hand wash
Pulmonary	S		**NRT** from Person to person
Environmental: Aerosolizable spore containing powder or other substance.	S		Until decontamination complete wear N95/PAPRS mask, protective clothing, decontaminate patient. Wash hand 60 seconds and 60 days antimicrobials with post exposure vaccine under IND.
Antibiotic-Associated Colitis(Clostridium difficile)	S		
Athropod-Borne viral encephalitides (eastern, western, Venezuelan equine, Encephalomyelitis; St. Louis, CA encephalitis, West Nile virus) and Viral fevers(Yellow fever, tick)	S		**NRT** from person to person except rarely by transfusion, Organ transplant, breastmilk, placenta. Mosquito treatments

Infection/condition	Type	Duration	Precautions
Ascariasis	S		NRT from person to person
Aspergillosis	A/C		In massive soft tissue infection coupious drainage repeat irrigations required.
Avian Influenza	A		
Babesiosis	S		NRT except rarely by transfusion
Blastomycosis, North America, cutaneous or pulmonary	S		NRT person to person
Boutulism	S		NRT person to person
Bronchiolitis	C	DI	Use Mask according to **SP**
Bruellosis (undulant, Malta, Mediterranean fever).	S		NRT person to person except via banked spermatozoa and sexual contact. Antimicrobial prophylaxis
Campylobacter gastroenteritis	S	DI	Use Contact precautions for diapered or incontinent persons for duration of illness to control institutional outbreaks.
Canadidiasis all forms including mucocutaneous	S		
Cat-scratch fever (benign inoculation lymphoreticulosis)	S		NRT Person to person
Cellulitis, uncontrolled drainage	C	DI	
Chancroid (soft chancre) (H. Ducreyi)	S		Transmitted sexually from person to person
Chickenpox	C		
Chlamydia Trachomatis			
Conjunctivitis	S		
Genital	S		
Pneumonia(infants<3M)	S		
Chlamydia Pneumoniae	S		Outbreaks rarely reported in institutional populations
Cholera			
Closed-cavity infection			

Infection/condition	Type	Duration	Precautions
Open drain in place; limited or minor drainage	S		Contact precautions with copious drainage.
No drain or closed drainage system in place	S		
Clostridium (C. difficilie)	C		Hand hygiene soap and water
C. Botulinum	S		NRT Person to Person
C. difficile	C	DI	Hand Hygiene soap and water
C. Perfringens			
Food poisoning	S		NRT Person to Person
Gas Gangrene	S		Transmission from person to person rare, one outbreak in surgical setting reported. Contact precautions with extensive wound drainage.
Coccidiodomycosis (valley Fever)			
Draining lesions	S		NRT person to person, except under extraordinary circumstances, Coccidiordes immititis is not produced in humans
Pneumonia	S		NRT person to person
Colorado tick fever	S		NTR person to Person
Congenital rubella	C	Until 1 yr	SP if nasopharygeal and urine cultures repeatedly neg. after 3 months of age
Conjunctivitis			
Acute bacterial	S		
Chlamydia	S		
Gonococcal	S		
Acute Viral (acute hemorrhagic)	C	DI	Adenovirus most common; enterovirus 70, Coxsackie virus A24, also associated with community outbreaks. Highly contagious in eye clinics, Pedi and

Infection/condition	Type	Duration	Precautions
Cont;			Neonatal setting, institutional settings reported.
Corona virus associated with SARS (SARS-CoV)	S		
Coxsackie virus disease	S		
Creutzfeldt-Jakob disease, CJD, νCJD	S		Use disposable instruments when possible or disinfection and/or special sterilization for surfaces, objects contaminated with neural tissue.
Croup	C		
Cryptococcosis	S		NRT person to person, rarely via tissue and corneal transplant.
Cryptosporidiosis	S		
Crysticercosis	S		NRT person to person
Cytomegalovirus infection, including neonates and immunosuppressed patients	S		No additional precautions for pregnant patients
Decubitus ulcer	S		
Dengue fever	S		NRT person to person
Diarrhea, Acute-infective etiology suspected	C		
Diphtheria			
Cutaneous	C	CN	Until 2 cultures taken 24hrs apart are negative
Pharyngeal	D	CN	Until 2 cultures taken 24hrs apart are negative
Ebola virus (hemorrhagic fever)	C	DI	
Echinococcosis (hydatidosis)	S		
Echovirus (enteroviral)	S		
Encephalitis or encephalomyelitis			See what the specific etiology agent is to treat
Enterobiasis (pin worms)	S		

Infection/condition	Type	Duration	Precautions
Enterococcus species multidrug resistant organisms or Vancomycin resistant	C	DI	
Enterocolitis, C. difficile	C	DI	
Enteroviral infections	S		Contact precautions for diapering and/or incontinent children for duration of illness and control institutional outbreaks
Epiglottitis: Haemophilius influenza type b	D	U 24 hrs	Diagnosis specific disease agents for epiglottitis
Epstein-Barr virus infection, including infectious mononucleosis	S		
Erythema infectiosum (parvovirus B19)	S		
Escherichia Coli gastroenteritis	C		
ESBL Extended Spectrum Beta lactamase, resistant	C	DCN	Patient to remain on isolation list until 3 negative cultures are obtained.
Food poisoning			
Botulism	S		NRT person to person
C. perfringens or welchii	S		NRT Person to person
staphylococcal	S		NRT person to person
Furunculosis, Staphylococcal	S		Contact if drainage not controlled. Follow institutional MRSA policy
Infants and young children	C	DI	
Gangrene (gas gangrene)	S		NRT person to person
Gastroenteritis	S	DI	Use Contact precautions for diapered or incontinent persons for duration of illness to control institutional outbreaks.
Adenovirus	S		Contact precautions for diapered or incontinent patients

Infection/condition	Type	Duration	Precautions
Campylobacter species	S		Contact precautions for diapered or incontinent patients
Cholera (Vibrio Cholerae)	S		Contact precautions for diapered or incontinent patients
C. difficile	C	DI	Discontinue antibiotics when appropriate; do not share equipments between patients. Consistent environmental cleaning and disinfection required. Hand Hygiene use soap and water
Cryptosporidium	S		Contact precautions for diapered or incontinent patients
E. coli			
Enteropathogenic and other shiga toxin producing strains	S		Contact precautions for diapered or incontinent patients for duration of illness
Other species	S		Contact precautions for diapered or incontinent patients
Giardia Lamblia	S		Contact precautions for diapered or incontinent patients
Norovirus	S		Contact precautions for diapered or incontinent patients *Persons who clean areas heavily contaminated with feces or vomitus benefit from wearing Masks since virus can be aerosolized from these substances. Ensure consistent environmental cleaning and disinfection focus on restroom even when they do not appear to be soiled. Hypochlorite solutions may be required when there is continued transmission.
Rotavirus	C	DI	Ensure consistent environmental cleaning and disinfection with frequent removal of diapers.

Infection/condition	Type	Duration	Precautions
Salmonella species including S. typhi	S		Contact precautions for diapered or incontinent patients
Shigella species (Bacillary Dysentery)	S		Contact precautions for diapered or incontinent patients
Vibrio parahaemolyticus	S		Contact precautions for diapered or incontinent patients
Viral	S		Contact precautions for diapered or incontinent patients
Yersinia enterocoltica	S		Contact precautions for diapered or incontinent patients
German Measles	D	DI	
Giardiasis	S		
Gonococcal ophthalmia neonatorum (gonorrheal ophthaomia, Acute conjunctivitis of newborn	S		
Gonorrhea	S		
Guillain-Barre syndrome	S		Not an infectious condition
Haemophilus influenzae			Disease specific
Hand, Foot and mouth disease (enteroviral infection)	S		
Adults	S		
Infants/Children	C		
Hansens Disease (Leprosy)	S		
Hantavirus pulmonary syndrome	S		NRT person to person
Hemorrhagic fevers	C	DI	Call state health department and the CDC for advice involving management of a suspected case
Helicobacter pylori	S		
Hepatitis, viral			
Type A	S		Provide hepatitis A vaccine post-exposure as recommended
Diapered or incontinent patients	C		Contact Precautions in infants and children <3 yrs old for duration of

Infection/condition	Type	Duration	Precautions
Cont:			Hospital stay. Children 3-14yrs of are for 2 weeks after onset of symptoms. > 14yrs for 1 week.
Type B-HBsAG positive; Acute or Chronic	S		Use recommendations for care of patients in hemodialysis centers
Type C	S		Use recommendations for care of patients in hemodialysis centers
Type D:Seen only with B	S		
Type E	S		Contact precautions for diapered or incontinent patients
Type G	S		
Herpangina: Enteroviral Infection	S		Contact precautions for diapering and/or incontinent children for duration of illness and control institutional outbreaks
Herpes Simplex (herpesvirus hominis)			
Encephlitis	S		
Mucocutaneous, disseminated or primary, severe	C	Until lesions are dry & crusted	
Mucocutaneous, recurrent (skin, oral, genital)	S		
Neonatal	C	Until lesions are dry and crusted	Use for asymptomatic, exposed infants delivered vaginally or by c-section. If mother has active infection and membranes ruptured > than 4-6 hours, culture infant at 24-36hrs must be neg. after 48hrs
Herpes Zoster (varicella-zoster) (shingles)	S		NO airborne precautions required for infants and children <2yrs
Disseminated disease in any patient and localized	A,C	DI	Susceptible **HCW**s should not enter room, use immune **HCW.**

Infection/condition	Type	Duration	Precautions
Cont: disease in immunocompromised patient until infection ruled out.			
Localized in patient with immune intact system with lesions that can be contained/covered	S	DI	Susceptible **HCW**s should not enter room, use immune **HCW.**
Histoplasmosis	S		NRT person to person
Hookwork disease (aneylostomiasis, uncinariasis)	S		
Human Immunodeficiency virus (HIV)	S		Post-exposure chemoprophylaxis for some blood exposures
Human Metapneumovirus	C	DI	Assumed Contact transmission as for RSV sine the viruses are closely related. Wear masks
Impetigo	C	U 24hrs	
Infectious mononucleosis	S		
Influenza			
Human (seasonal influenza)	D	5 days from onset symp. Except Immuno Patients	Private room, if cohort same illness try to keep physically separate. Use N95, can use surgical mask. Negative room pressure. N95 and PAPR for all high risk procedures: Bronchoscopy, Intubation, cultures autopsy.
Avian (H5N1, H7, H9)	A	Call state health departm ent and CDC for Advice	See: WWW.cdc.gov/flu/avian/professional/infect-control.html for current Avian influenza guidance.
Pandemic Influenza	D	5 days from	See: http://www.pandemicflu.gov for current information

Infection/condition	Type	Duration	Precautions
Cont:		Onset of symptoms	
Swine (H1N1)	A/D	7 days after onset then re-culture, If neg. then Isolation maybe discounti nued	Airborne isolation and a negative pressure room is recommended. Private room with door closed. N95 respirator preferred. N95 and PAPR for all high risk procedures: Bronchoscopy, Intubation, cultures autopsy.
Kawasaki Syndrome	S		Not an infectious condition
Lassa fever (hemorrhagic)	C		
Legionnaires disease	S		NRT person to person
Leprosy	S		
Leptospirosis	S		NRT person to person
Lice	S		www.cdc.gov/ncidod/dpd/parasites/lice/default.html
Head(pediculosis)	C	U 24hrs after treatment	
Body	C	U 24hrs after treatment	Transmitted person to person through infested clothing
Pubic	C	U 24hrs after treatment	Transmitted person to person through sexual contact
Listeriosis (Listeria Monocytogenes)	S		NRT person to person, rarely transfusions, contain and repel mosquitoes

Infection/condition	Type	Duration	Precautions
Lyme disease	S		NRT person to person
Lymphocytic choriomeningitis	S		NRT person to person
Lymphgranuloma Venereum	S		
Malaria	S		NRT person to person, rarely transfusion, failure to follow SP, contain and repel mosquitoes
Marburg virus disease (hemorrhagic fever)	C		
Measles (rubeola)	A	4 days after onset of rash **DI** In immuno com.	Susceptible **HCW**s should not enter room, use immune **HCW.** Can use respirator, post-exposure vaccine within 6 days. Call state health department and CDC advice.
Meloidosis, all forms	S		NRT person to person
Meningitis			
Aseptic (non-bacterial or viral) enteroviral	S		Contact for infants and young children
Bacteria, Gram-negative enteric, in neonates	S		
Fungal	S		
Haemophilus Influenzae, type b know/suspected	D	U 24hrs	
Listeria monocytogenes	S		
Neisseria meningitides (meningococcal) known or suspected	D	U 24hrs	
Pnuemococcal	S		
Streptococcus pnumoniae	S		
M. Tuberculosis	S		Draining use Contact/Airborne precaustion, Children Airborne

Infection/condition	Type	Duration	Precautions
Other diagnosed Bacterial	S		
Meningococcal disease: sepsis, pneumonia, meningitis	D	U 24hrs	Post chemopophylaxis for household contacts, HCWs exposed to respiratory secretions; post exposure vaccine only to control outbreaks
Molluscum contagiosum	S		
Mononucleosis	S		
Mucormycosis	S		
Monkeypox	A,C	A-until monkey pox confirmed and smallpox excluded C-until lesions crusted	See: www.cdc.gov/ncidod/monkeypox for current recommendations. pre/post exposure vaccine recommended for exposed HCWs.
Mucormycosis	S		
Multidrug-resistant organisms (MDRO's) infection or colonization (MRSA, VRE,VISA/VRSA, ESBLs, resistant S. pneumonia)	S/C		MRDO's judged based on local, state, regional or national recommendations to be of clinical and epidemiologic significance. Contact Precautions. • See: CDC management of multidrug-resistant Organisms in the health care setting 2006 for guidance www.cdc.gov/hicpac/mdro/mdro_0.html
Gastrointestinal	C	CN	C. difficile patients to remain on contact isolation for 6 months from last + culture

Infection/condition	Type	Duration	Precautions
Respiratory	C	CN	
Pneumococcal	S		
Skin, wound or burn	C	CN	MRSA patients to remain on Contact Isolation for all subsequent hospitalization.
Mumps (infectious parotitis)	D	U 9 days	After swelling; susceptible HCWs should not provide care if immune care givers available.
Mycobacteria, nontuberculosis (atypical)			NRT person to person
Pulmonary	S		
wound	S		
Mycoplasma pneumonia	D	DI	
Necrotizing enterocolitis	S		Contact precautions when cases clustered temporally
Nocardiosis, draining lesions or other presentations	S		NRT person to person
Norovirus (gastroenteritis)	S		
Norwalk agent gastroenteritis	S		
ORF	S		
Parainfluenza virus infection, repiratory in infants and young children	C	DI	Viral shredding may be prolonged in immunosuppressed patients, Removal uncertain from CP
Paravirus B19 (erythema infectiosum)	D		Maintain precautions in immunosuppressed, Patients with transient aplastic crisis or red-cell crisis maintain precautions for 7 days.
Pediculosis (lice)	C	U 24hrs after treatment	
Pertussis (whooping cough)	D	U 24hrs after	Private room, cohorting same disease, keep physically separate

Infection/condition	Type	Duration	Precautions
Cont:		treatme nt	
Pinworm infection (enterbiasis)	S		
Plague (Yersinia Pertis)	D		
Bubonic	S		
Pneumonic	D	U 48hrs	Antimicrobial prophylaxis for exposed HCW
Pleurodynia			
Adults	S		
Children	C	DI	
Pneumonia			
Adenovirus	D,C	DI	Outbreaks in Pediatric and institutional settings, in immunocompromised hosts extend duration of Droplet and Contact precautions due to prolonged shedding of virus.
Bacterial including gram-bacterial	S		
B. cepacia in patients with CF, including respiratory colonization	C	Unknow n	Private room, Avoid contact with other CF patients.
Chlamydia	S		
Fungal	S		
Haemophilus Influenzae, type b: Adults	S		
Infants and children	D	U 24hrs	
Legionella spp.	S		
Menigococcal	D	U 24hrs	See: meningococcal disease above
Mutidrug-resistant bacterial	S/C		See: Multidrug resistant organisms
Mycoplasma (primary atypical pneumonia)	D	DI	
Pneumoccoccal Pneumonia	S		Use Droplet precautions if evidence of transmission on unit

Infection/condition	Type	Duration	Precautions
Pneumonia continued:			
Pnuemocystis jiroveci (pneumosutis carinii)	S		Do not place with immunocompromised patient
Staphylococcus aureus	S		For MRSA, MDROs
Streptococcus group A:			
Adults	D	U 24hrs	Streptococcal disease Contact precautions if skin lesion present
Infants and young children infectious disease acute or specific vital agent	D	U 24hrs	Contact precautions if skin lesion present
Pseudomonal cepacia in Cystic Fibrosis (CF) patients including respiratory tract colonization	S		Private room
Varicella-zoster			
Viral:			
Adults			
Infants/young children			Depends on specific vital agent
Polimyelitis	C		
Pressure ulcer infected			
Major	C		If not dressing or containment or drainage. Use dressing to contain until drainage stops
Minor or limited	S		If dressing covers and contains drainage.
Prion disease (Cruzfelds-Jocob disease)	S		Use disposable instruments when possible or disinfection and/or special sterilization for surfaces, objects contaminated with neural tissue.
Psittacosis (ornithosis) (Chlamydia psittaci)	S		NRT person to person
Q Fever	S		

Infection/condition	Type	Duration	Precautions
Rabies	S		Person to person is rare, Transmission via corneal, tissue and organ transplants reported. If a patients bite someone or saliva has contaminated a wound or mucous membrane wash wound and treat with post exposure prophylaxis.
Rat-bite fever (streptobacilllus moniliformis disease, spirillum minus disease)	S		NRT person to person
Relapsing Fever	S		NRT person to person
Resistant bacterial infection or colonization			See Multidrug resistant organisms
Respiratory infectious disease, acute			
Adult	S		
Infants/young children	C	DI	
Respiratory syncytial virus infection, infants, young children and immunosuppressed adults	C	DI	Wear mask per SP extend immunosuppressed patients duration of CP
Reye's syndrome	S		Not and infectious condition
Rheumatic Fever	S		Not and infectious condition
Rhinovirus	D	DI	Droplet most important route of transmission. Outbreaks have occurred in NICU's and LTCFs. Add contact precautions if coupious moist secretions and close contact likely to occur.
Rickettsial fever, Tickborne (Rocky Mountain Spotted Fever)	S		NRT person to person, except rarely through transfusion
Rickettsialpox (vesicular rickettsiosis)	S		NRT person to person

Infection/condition	Type	Duration	Precautions
Ringworm (dermatophtosis, dermatomycosis, tinea	S		Rarely outbreaks in healthcare setting, use contact precautions for outbreaks
Ritter's disease (staphylococcal scalding skin syndrome)	S	DI	Consider HCW as potential source of nursery, NICU outbreaks
Rocky Mountain spotted fever	S		NRT person to person, except rarely through transfusion
Roseola Infantum (exanthema subitum; caused by HHV-6)	S		
Rotavirus infection	S	DI	Use Contact precautions for diapered or incontinent persons for duration of illness to control institutional outbreaks.
Rubella (German Measles) (congenital rubella)	D	U 7 days after onset of rash	Susceptible **HCW**s should not enter room, use immune **HCW.** Pregnant women should not care for these patients. Droplet Precautions for exposed HCW susceptible, exclude from duty for 5 days after 1st exposure to 21 days after last exposure.
Rubeola	A	4 days after onset of rash **DI** In immuno com.	Susceptible **HCW**s should not enter room, use immune **HCW.** Can use respirator, post-exposure vaccine within 6 days. Call state health department and CDC advice.
Salmonellosis	S	DI	Use Contact precautions for diapered or incontinent persons for duration of illness to control institutional outbreaks.
Scabies	C	U 24	

Infection/condition	Type	Duration	Precautions
Scalded skin syndrome, Staphylococcal	C	DI	Consider HCW as potential source of nursery, NICU outbreaks
Schistosomiasis (bilhariasis)	S		
Severe Acute Respiratory Syndrome (SARS)	A,D, C	DI plus 10 days after resolution of fever provided symptoms are absent or impr.	Airborne Precautions preferred, N95 or higher respiratory protection, eye protection, aerosol-generating procedures and "super shredders" highest risk for transmission via small droplet nuclei and large droplets. Vigilant environmental disinfection See: www.cdc.gov/ncicod/sars
Shigellosis	S	DI	Use Contact precautions for diapered or incontinent persons for duration of illness to control institutional outbreaks.
Smallpox (variola)	A,C	DI	Until all scabs have crusted and separated (3-4 weeks). Non vaccinated HCWs should not take care of these patients. N95 or higher respiratory protection. Post exposure vaccine within 4 days of exposure is recommended.
Sporotrichosis	S		
Spirillium minor disease (rat-bite fever)	S		NRT person to person
Staphylococcal disease (S. aureus)			
Major	C	DI	No dressing or dressing does not contain drainage adequately
Minor or limited	S		Dressing covers and does contain drainage adequately
Enterocolitis	S		CP for diapered or incontinent

Infection/condition	Type	Duration	Precautions
			Children for duration of illness
Multidrug resistance	S/C		MRDO's judged based on local, state, regional or national recommendations to be of clinical and epidemiologic significance. Contact Precautions. • See: CDC management of multidrug-resistant Organisms in the health care setting 2006 for guidance www.cdc.gov/hicpac/mdro/mdro_0.html
Pneumonia	S		
Scalded skin syndrome	C	DI	Consider HCW as potential source of Nursery, NICU outbreaks
Toxic Shock Syndrome	S		
Streptobacillus moniliformis Disease (rat-bite fever)	S		NRT person to person
Streptoccocal disease (group A streptococcus)			
Skin, wound, or burn			
Major	C,D	U 24hrs	No dressing or dressing does not contain drainage adequately
Minor or limited	S		dressing covers and does contain drainage adequately
Endometritis (puerperal sepsis)	S		
Pharyngitis in infants and young children	D	U 24hrs	
Pneumonia	D	U 24hrs	
Scarlett fever in infants and young children	D	U 24hrs	
Serious invasive disease	D	U 24hrs	Outbreaks occur secondary among patients and HCWs, CP

Infection/condition	Type	Duration	Precautions
Streptococcal Disease (group B streptococcus) neonatal	S		
Streptococcal disease (not group A or B) unless covered elsewhere	S		
Mutidrug-resistant	S/C		MRDO's judged based on local, state, regional or national recommendations to be of clinical and epidemiologic significance. Contact Precautions. • See: CDC management of multidrug-resistant Organisms in the health care setting 2006 for guidance www.cdc.gov/hicpac/mdro/mdro_0.html
Strongloidiasis	S		
Syphillis			
Latent (Tertiary) and seropositivity without lesions	S		
Skin and mucous membranes, including congenital primary and secondary	S		
Tapeworm Disease			
Hymenolepis Nana	S		NRT person to person
Taenia solium (pork)	S		NRT person to person
Other	S		
Tetanus	S		NRT person to person
Tinea (Dermatophytosis, Dermamycosis, ringworm)	S		Rare episodes of person to person transmission
Toxoplasmosis	S		Transmission from person to person rare, vertical transmission

Infection/condition	Type	Duration	Precautions
			From mother to child, transmission through organs and blood transfusions rare.
Toxic shock syndrome (staphylococcus disease, streptococcal disease	S		DP for first 24 hours after implementation of antibiotic therapy if Group A Streptococcus etiology.
Trachoma, acute	S		
Transmissible spongiform encephalopathy (Creutzfeld-Jacob disease, CJD, vCJD)	S		Use disposable instruments when possible or disinfection and/or special sterilization for surfaces, objects contaminated with neural tissue.
Trench Mouth (Vincent's angina)	S		
Trichomoniasis	S		
Trichuriasis (Whipworm disease)	S		
Tuberculosis (M. tuberculosis)	S		AP not required for infants and children < 2 yrs
Extrapulmonary, drainage lesion	A,C		Discontinue precautions only when patient is improving clinically and drainage has stopped or three negative cultures of continued drainage. Check for active pulmonary tuberculosis
Extrapulmonary, no drainage, lesion, meningitis	S		Examine for pulmonary tuberculosis
Pulmonary or laryngeal disease confirmed	A		Discontinue precautions only when patients on effective therapy is improving clinically and has three consecutive sputum smears negative for acid fast bacilli collected on separate days.
Pulmonary or Laryngeal	A		Discontinue precautions only when

Infection/condition	Type	Duration	Precautions
Disease confirmed			The likelihood of infectious TB disease is deemed negligible and either there is another diagnosis that explains the clinical syndrome or the results of three sputum smears for AFB are negative. Each of the sputum specimens should be collected 8-24 hours apart, and at least one should be an early morning specimen.
Skin-test positive with no evidence of current active disease	S		
Tularemia			
Drainage lesion	S		NRT person to person
Pulmonary Tularemia	S		NRT person to person
Thyphoid (salmonella typhi) fever	S	DI	Use Contact precautions for diapered or incontinent persons for duration of illness to control institutional outbreaks.
Typhus			
Rickettsia prowazeki (epidemic or louse-borne typus)	S/C		Transmitted from person to person through close personal or clothing contact
Rickettsia typhi	S		NRT person to person
Urinary tract infection (including pyelonephritis) with or without urinary catheter	S		
Vaccinia (caccination site, adverse events following vaccination			Only vaccinated HCWs should have contact with active caxxination site and care person with adverse vaccinia events.
Eczema vaccinatum	C	Lesions dry and crusted	Scabs separated. Vaccinated HCWs should take care of patient only.
Fetal vaccinia	C		
General vaccinia	C		

Infection/condition	Type	Duration	Precautions
Vaccicia cont:		Same as above	Same as above
Progressive vaccinia	C		
Postvaccinia encephallitis	S		
Blepharitis or conjunctivitis	S/C		Use CP if there is copious drainage
Iritis or keritis	S		
Vaccinia-associated erythema multiform (Stevens Johnson syndrome)	S/C		Not an infectious condition
Secondary bacterial infection (aureus, group A beta hemolytic streptococcus)	S/C		Follow organism specific (strep, staph most frequent) recommendation consider the amount of drainage.
Variola (small Pox)	A/C	DI	Until all scabs have crusted and separated (3-4 weeks). Non vaccinated HCWs should not take care of these patients. N95 or higher respiratory protection. Post exposure vaccine within 4 days of exposure is recommended.
Vibrio Parahaemolyticus	S	DI	Use Contact precautions for diapered or incontinent persons for duration of illness to control institutional outbreaks.
Vincent's Angina (trench mouth)	S		
Viral hemorrhagic fevers due to Lassa, Ebola, Crimian-Congo fever viruses	S,D,C		Private room, Emphisize sharps safety and work practices. Hand hygiene soap and water. Barrier protection against blood and body fluids upon entry into room. Gloves, gown, eye protection including shields. Use N95 respirators or higher respirators.

Infection/condition	Type	Duration	Precautions
Cont:			Largest viral load in final stages of illness when hemorrhage may occur; additional PPE including double gloving, leg and shoe coverings may be used. Notify public health officials immediately if Ebola is suspected.
Viral respiratory diseases			
Adults	S		
Infants and young children	C	DI	
Whooping Cough	D	U 24hrs after	Private room, cohorting same disease, keep physically separate
Wound Infections			
Major	C	DI	No dressing or dressing does not contain drainage adequately
Minor or limited	S		
Yersinia enterocolitica	S	DI	Use Contact precautions for diapered or incontinent persons for duration of illness to control institutional outbreaks.
Zoster (varicella-zoster) (herpes-zoster)	S		NO airborne precautions required for infants and children <2yrs
Zygomycosis (phycomycosis, mucomycosis)	S		NRT person to person

All rooms will be cleaned the same using Universal precautions. Air borne precaution room will require per hospital policy, usually 30 min before discharge, cleaning will be allowed. Room will be cleaned using Hypochlorite solutions (bleach) to clean room. Bleach wipes have also been recommended for an area needing to be cleaned in between regular environmental room cleaning.

It is important to know and to report the conditions and diseases that are reported to the Public Health Department of your state. Since we live in the State of California, I will use this state as the example. The Public Health Department describe in Title 17, California Code of Regulations (CCR) §2500, §2593, §2641-2643 and §2800-2812 reportable Diseases and conditions and other appropriate state, local and federal regulations.

The list of these diseases include

List of Diseases or conditions to be reported **Immediately** by telephone:	
Anthrax	Rabies, Human or Animal
Avian Influenza (human)	SARS (severe Acute Respiratory Syndrome)
Botulism: infant, foodborne, wound	Scombroid Fish Poisoning
Brucellosis	Shiga Toxin (detected in Feces)
Cholera	Smallpox (Variola)
Ciguatera Fish Poisoning	Tularemia
Dengue	Viral hemorrhagic fevers: Crimean-Congo, Ebola, Lassa & Marburg
Diphtheria	
Domoic Acid Poisoning	Yellow Fever
Escherichia Coli 0151:H7 infection	Occurrences of Any Unusual Disease
Hantavirus Infection	Outbreaks of any unusual Disease including diseases not listed in section 2500, specifically if institutional and/or open community
Hemolytic Uremic Syndrome	
Meningococcal Infections	
Paralytic Shellfish Poisoning	
Plague, Human or animal	

Report within one (1) working day by Telephone or Fax:	
Amebiasis	Poliovirus infection
Babesiosis	Psittacosis
Campylobacteriosis	Q Fever
Chickenpox only hospitalized & death	Relapsing Fever
	Salmonellosis other than Typhoid fever
Colorado Tick Fever	
Crytosporidiosis	Shigellosis
Encephalitis: viral, Bacterial, Fungal, Parasitic, specify etiology	Severe Staphylococcus aureus infections that result in death or admission to the ICU
Foodborne Disease	Syphilis
Hemophilus influenza, invasive Disease report < 15yrs of age	Trichinosis
	Tuberculosis
Hepatitis A	Typhoid fever cases and carriers
Listeriosis	Vibrio infections
Malaria	Water Associated Disease: Swimmers itch or hot tub rash
Measles (Rubeola)	
Meningitis: Viral Bacterial, Fungal, Parasitic specify etiology	West Nile Virus (WNV) infections
Pertussis: whooping Cough	Yersiniosis

Report within seven (7) calendar day, by Telephone, Fax or Mail:	
Acquired Immune Deficiency syndrome (AIDS)	Hepatitis, other acute
Anaplasmosis/Enrilchiosis	Influenza deaths < 18yrs of age
Chancroid	Kawasaki Syndrome: Mucodutaneous Lyphnode Syndrome.
Chlamydial infections, include	

Lymphogranulom Verereum	Legionellosis
Coccidiomycosis	Lyme Disease
Creuzfeldt-Jakob Disease (CJD) & other transmissible spongiform Encephalopathies (TSE)	Mumps
	Pelvic Inflammatory Disease (PID)
	Rheumatic Fever, Acute
Cysticercosis or Taeniasis	Rocky Mountain Spotted Fever
Giardiasis	Rubella (German)
Gonococcal Infections	Rubella (Syndrome Congenital)
Hepatitis, Viral	Tetanus
Hepatitis B, Specify acute/Chronic	Toxic Shock Syndrome
Hepatitis C, Specify acute/Chronic	Typhus Fever
Hepatitis D, Delta	

Each facility will have a policy for dealing with contaminated equipment. It should state that all equipment must be handled and transported in a manner to prevent transmission or potentially infectious substance. Equipment can be contaminated and still appear to be clean, this is important to remember.

Equipment should be handled in such a way to prevent potential infectious contact to healthcare or environmental workers. Noncritical equipment should be cleaned and disinfected before use on a different patient.

Biohazardous equipment in its normal use could be contaminated with blood or other potentially infectious materials, therefore it should be treated as such. It should be cleaned according to infection control policies based on a cleaning, disinfection and sterilization policy.

A few machines to think of, that would fall into this category would be a Suction D&C machine, Dialysis machine, Cell saver, and Anesthesia

equipment. If parts of these machines or equipment cannot be cleaned for whatever reason, the machine should be tagged with an international Biohazard symbol. Personnel maintaining or repairing equipment should follow Universal/Standard precautions and wear appropriate personal protective equipment (PPE).

Each facility may have a slightly different color/sign for Biohazard. This symbol has been used since 1966. Biohazardous waste must be handled and disposed of in accordance with the medical waste management act.

Make sure to include in the information which parts have not been decontaminated.

Fluid filled containers that cannot easily and/or safety drained of its contents shall be capped and closed securely and placed into biohazard waste containers or bags. Examples of this may be suction containers or Pleurovacs. Depending on how much fluid can be drained out of Hemovacs or Jackson Pratt drains, they can also fall into this category.

Contaminated instruments and equipment returned to Central Processing can also fall into this category. All instruments and trays should be covered when brought from an Operating Room. If

Instruments or equipment is brought from the outside of the Periop department, Items should be transported in closed transport containers. Disclave transport bags have been used. All sharps, disposable syringes, gauze, cloth towels and other items should be discarded appropriately to prevent possible injury in handling instruments and trays.

Larger equipment such as suction machines (trees, neptunes, etc.), Iv pumps, tourniquet, and bovies should be free of obvious blood and bloody substances and may need to be wiped with Hypochlorite solutions (bleach) or bleach wipes to disinfect.

Equipment that is cleaned by central processing should be placed in a clean designated area for pick up.

Whenever possible, use disposable items while patients are in Isolation, however is sphygmomanometer or stethoscopes are used clean with disinfectant agents. If contaminated with blood or body fluids clean with disinfectant agent and if is not accomplished with wipes then send to Central Processing. The same is true with thermometers; make sure to use fresh covers on all patients.

Urinals and bed pans should be emptied in a manner to prevent splashing of urine or feces. If still grossly contaminated, the disposable item may need to go into a biohazard trash.

Computers and other devices including hand held electronic equipment (cell phones, pagers, glucometers, computers and carts) should be cleaned and disinfected frequently and after each isolated patient.

Biohazardous wastes that can potentially pose an infectious risk are:

- Laboratory waste: Cultures, live and attenuated vaccines, culture dishes, and devices used to transfer, inoculate and mix cultures.

- Waste containing microbiologic specimens or cultures.

- Surgical specimens or tissue removed at time of surgery or autopsy.

- Waste that contains blood or body fluids, containers or equipments contaminated with such. This also includes patients who are isolated by infection control/human wastes.

- Sharp waste: needles, blades, and etc.

- Capped and sealed devices of blood and body fluids: pleurovacs, Hemovacs, suction containers, and blood transfusion bags and tubing.

- Dressings saturated with blood or purulent drainage including potentially infectious substances.

These items can be placed in a biohazard container or bag. A biohazard bag is usually a disposable red bag which is supposed to be impervious to moisture and has the strength to withstand ripping, tearing, or bursting under normal conditions.

Environmental Services must check all sharps containers and replace the container when it is ¾ full. Small sharps containers must be mounted in a lockable device or the larger containers must be in a secured stand to prevent tipping over. EVS must store sharp containers in a Biohazardous waste locked holding area for processing.

Handling and Disposal of Human Tissue and Pathology specimens:

Make sure all universal and standard infection control precautions are used. Human tissue should be handled as biohazard waste, and biohazard containers should be used. Final handling must be done by a licensed medical waste management contractor. Specially labeled **"PATHOLOGY WASTE"** containers are used to prevent human tissue from reaching "regular" biohazardous waste.

Environmental Service personnel must never directly handle human tissue until they are placed into Pathology waste containers by pathology, Operating Room, or Labor and Delivery personnel.

These Biohazardous waste containers for these areas are removed by Environmental service personnel and locked in a holding area until the licensed medical contractor picks this waste up.

Environmental Service personnel will eventually deal with all Biohazardous waste and waste containers. All Biohazardous waste should be empty at least one a day. If it needs to be done sooner, its everyone's responsibility to notify EVS by placing a phone call to the department.

Environmental Service personnel's responsibility is to:

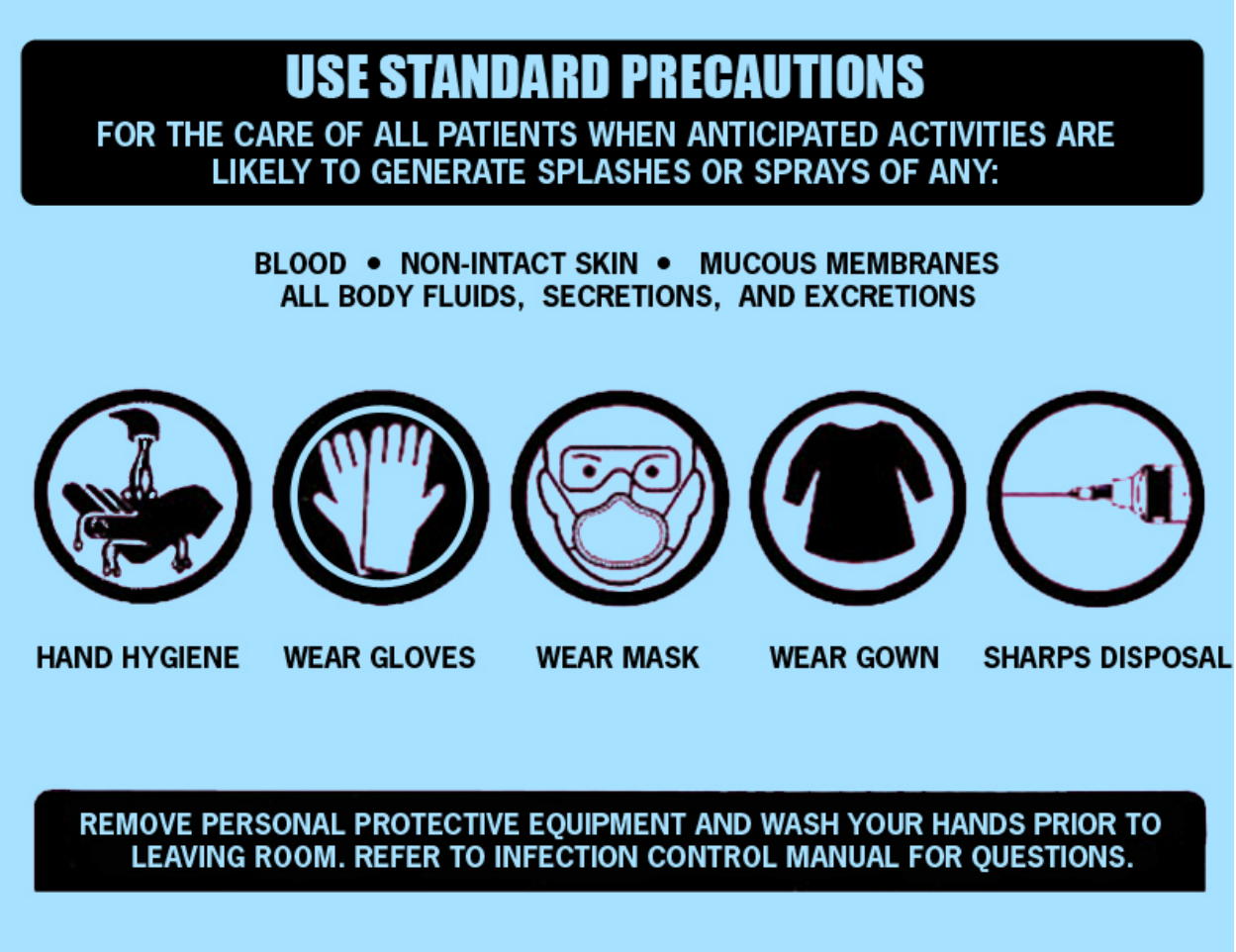
- Make sure bags are no more than ¾ full or sooner if odor is a problem and tie bags closed.

- Appropriate protective apparel is worn when handling and disposing of Biohazardous waste. Heavy utility gloves must be worn when required by policy and procedure.

- Hand hygiene must be performed with soap and water after handling all waste.
- Keep all bags and boxes away from body for protection.
- Trash shuts must never transfer Biohazardous medical waste.
- All Biohazardous waste bags must be transferred by EVS into a rigid or disposable container for internal transport. These containers are to be leak resistant. These containers must be labeled “BIOHAZARD” on the lid and on the sides as to be visible from any lateral direction.

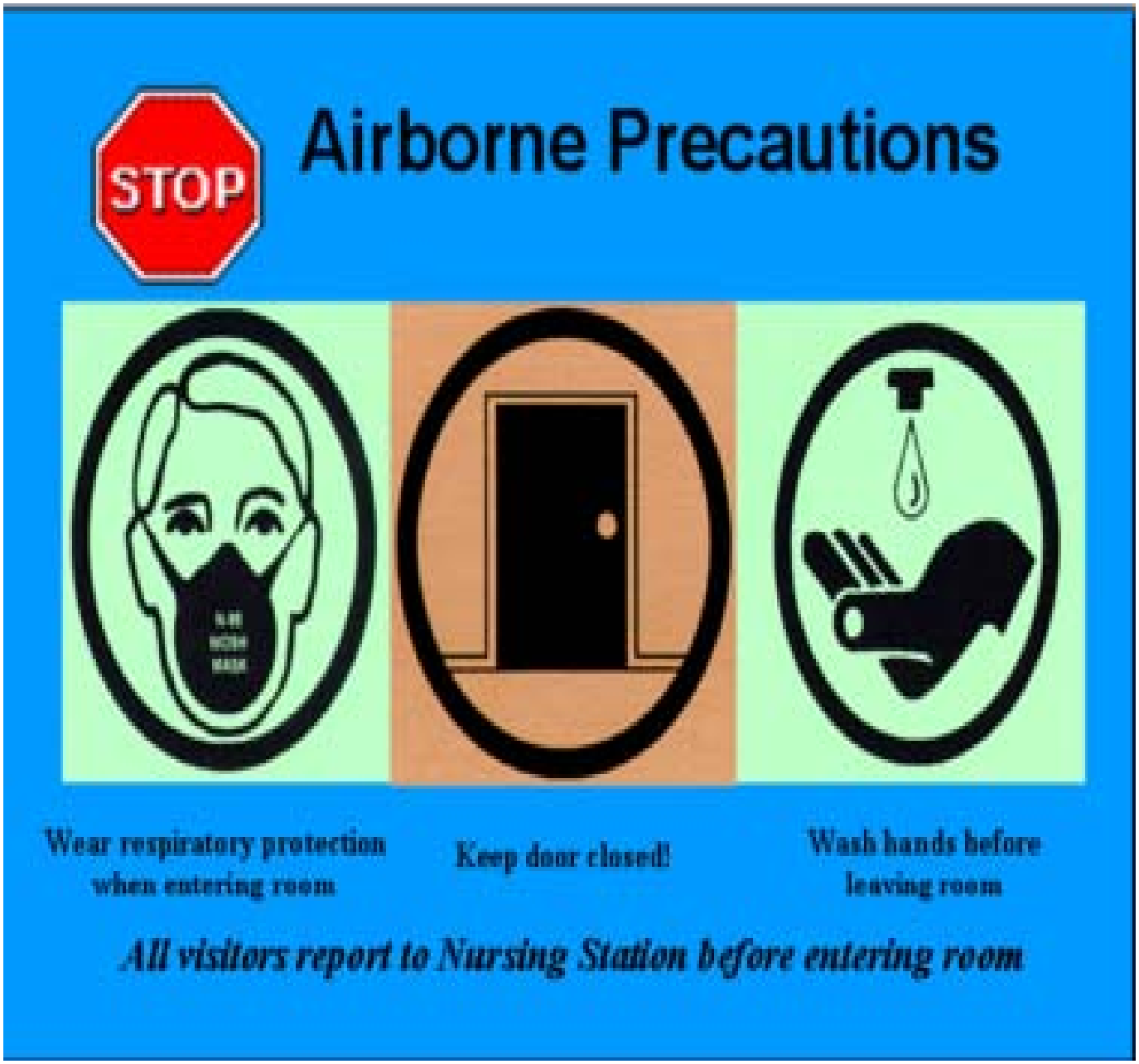
Here are a few examples of Isolation signs:

Standard Precautions:



Contact Precautions Sign:

Airborne Precautions:



Droplet:


STOP
Droplet Precautions
Mask with Goggles or Faceshield
For infant care, grown is required
Please See Nurse Before Entering
Por favor habla con una enfermera antes de entrar

Neutropenic Precautions sign: Could be copied to any color paper,

Please See Nurse Before Entering

Por favor habla con una enfermera antes de entrar

Multidrug resistant Organisms (MDRO's):

Multidrug resistant Organisms are Bacteria are one-celled organisms without a true nucleus or cell organelle that belong to the kingdom of Procaryotae (Monera). In simple terms, multidrug resistant organisms are bacteria strains resistant to antibiotics. It was reported by AOL on 10/11/2010 reported about a disease causing bacteria that can "stand up and walk". They have always been around and over the past few decades, it seemed as though we had controlled them. Now we may be losing control. In the health care setting, the loss of control can be life threatening and very costly.

Some bacteria produce polysaccharides or a polypeptides capsule, this inhibits phagocytosis by the white blood cells. Phagocytosis means destruction or disinigration of phagocytes. Millions of these nonpathogenic bacteria live on human skin and mucous membrane, which are called normal flora. Bacteria that are capable of or cause disease are called pathogens. Pathogenic bacteria are the disease-causing species, and compared to the millions of bacteria it's a very small portion of bacteria as a whole. The cytoplasm of bacteria allows for Gram Stain.

Bacteria have three principle forms spherical (ovoid), rod-shaped or spiral. Bacteria mutates, like all living things. The environment determines the beneficial mutations which have the survival value. We will talk about several different kinds and how they affect the surgical environment and the cost of health care.

Bacteria can also be placed into three groups based on their continued response to gaseous oxygen.

1. **Aerobic bacteria** thrive in the presence of oxygen and require it to grow.
2. **Anerobic bacteria** cannot tolerate gaseous oxygen. These bacteria live in places like under water deep sediment, or those that cause bacterial food poisoning.
3. **Facultative anaerobes** they grow in the presents of oxygen but can continue to grow without it.

Another way to classify Bacteria is how they obtain their energy. Heterotrophs break down complex organic material that they take in from the environment, decaying material including fermentation or respiration. The second group is Autotrophs, they fix carbon dioxide to make their own food. This process can include light energy, or oxidation of nitrogen, sulfur, or other elements. Bacteria's most important role is to release nutrients back into the environment as well as cycling nitrogen.

When you start to look at the history of bacteria, the awareness has been around for a very long time. Around 3500 BC the Sumerian doctors gave their patients beer soup mixed with snake skins and turtle shell for its healing powers. Babylonians used ointments made of frog bile and sour milk. Each of these contained a "like" antibiotic.

The term "Antibiotic" came from the Ancient Greeks which it's self was from the archaic period from the 8^{th}-6^{th} century BC to about 146 BC.

It came from the Greek word άντί which means anti, or against, combined with βίος which means life. Antibiotics are what we use today to fight of infections caused by bacteria. An Antibiotic is a substance or compound that kills or inhibits bacteria. Antibacterial is an alternative name.

As we move through modern day history, we can see how fast and far we have come. We can also look back and understand that the Greeks knew something was there, even though they could not see it.

• 1796- Edward Jenner invented the first small pox vaccination.

• 1862- Louis Pasteur invented the Germ theory of disease. He was born in Dole France and Married Marie with whom he had 5 children. Three of his children died of Typhoid fever, which most felt lead to his drive to save people from disease. In early research Louis worked with the wine growers helping with the fermentation process. This was to pasteurize and kill germs. He was granted a U.S. patent for improvement in Beer and Ale Pasteurization.

•Louis Pasteur's main contributions were changes to minimize the spread of disease by microbes and germs. He discovered that weak forms of disease could be used to immunize against the stronger forms of disease. He also introduced the medical world to the concept of viruses.

•1867- Joseph Lister invented methods for antiseptic surgery. By 1871 he began researching urine contaminated with mold and how it prevented growth of bacteria.

• 1874 -Anton Van Leeuwenhoek built a practical microscope which allowed him to see and describe bacteria, yeast, plants, and the circulation of blood in corpuscles in capillaries.

•1882- Paul Ehrlich invented the acid-fast stain.

•1884- Christian Gram invented the gram stain, a method using stain for the purpose of classifying bacteria.

•1885- Louis Pasteur invented the first rabies vaccination.

1887- R. J. Petri invented the petri dish.

•1890- German doctors Rudolf Emmerich and Oscar Low were the first to use pyocyanase from microbes in hospitals however the first antibiotic did not often work.

•1929- Sir Alexander Fleming a Scottish bacteriologist goes on vacation leaving a petri dish of staphylococci bacteria uncovered. When he returned home mold had invaded the dish and were the mold grew no bacteria was growing. Alexander named the mold Penicillium, and the chemical produced by the mold was named Penicillin. Penicillin is the first recognized antibiotic. Almost immediately after Penicillin was introduced certain strains of strains of staphylococci were recognized as being resistant.

•1935- Gerhard Domagk (1895-1964) a German chemist discovers synthetic antimicrobial chemicals (sulfonamides)

•1942- Antibiotic as a term was used by Selman Waksman.

•1942- Howard Florey and Ernest Chain invent a manufacturing process for Penicillin G Procaine. They shared the 1945 Nobel Prize for medicine on their work for Penicillin.

•1940s-50's- A long came streptomycin, chloramphenicol, and tetracycline. Selman Waksman made the drug Streptomycin from soil bacteria, which was used to treat tuberculosis. The side effects could be really severe.

•1947- four year after companies began to mass produce Penicillin, Microbes begin to appear that could resist it.

•1947- Jonas Salk invented the Polio Vaccine.

•1948- Andrew Moyer was granted a patent for a method of the mass production of Penicillin.

•1950's- It was apparent that Tuberculosis bacteria was rapidly developing resistance to streptomycin, which at that time was used against TB.

•1953- Shigella outbreak in Japan a certain strain of dysentery bacillus is found to be resistant to chloramphenicol, tetracycline, streptomycin and sulfanilamides.

•1954- Becton, Dickinson and company created the first mass-produced syringe and needle produced in glass.

•1957- Nystatin was patented and used to cure many fungle infections.

•1967- Benjamin A. Rubin invented a pronged vaccination needle used for smallpox.

•1977- W. Gilbert and F. Sanger invented a method to sequence DNA.

•1981- Smithkline Beecham patented Amoxicillin and they sold the first tradenames in 1998 for Amoxicillin, Amoxil and Trimox.

•1983- Kary Mullis invented the polymerase chain reaction.

With each description of our antibiotic resistant organisms, we will discuss how each is treated.

Beta-Lactamase/ Extended-Spectrum Bata-Lactamases (ESBLs):

Beta-lactamase are enzymes that are produced by some bacteria and are responsible for their resistance to beta-lactam antibiotics like penicillins, cephamysins and carbapenems (ertapenem). The two most common bacteria are Escherichia coli (E.coli) and Klebsiella pnuemoniae.

Cephalosporins are common in their molecular structure to beta-lactamase; they both have four-atom rings, these are known as beta-lactam. The lactamase enzyme breaks open the ring which deactivates the molecule's antibacterial properties.

Extended-Spectrum Beta-Lactamases (ESBLs) are enzymes that can be produced by bacteria, making them resistant to cephalosporins e.g. cefuroxime, cefotaxime, ceftriaxone and ceftazidime as well as monobactums e.g. aztreonam. Extended-spectrum are third generation antibiotics. These antibiotics are widely used in many hospitals. At this time they do not affect the cephamycins which are cefotetan or cefoxitin. They also do not affect carbapenems including meropenem or imipenem.

ESBLs were first described in the mid 1980's and were mostly found in Klebsiella species. Predominantly, they were seen in hospitals and often in intensive care units usually with patients with illnesses that make them opportunistic for bacterial infections. At that time, it was suggested that ESBLs, because of molecular analysis, may have derived from mutations. This problem was not a big issue at the time, however now we have a new class of ESBL. The new class of ESBLs is called CTX-M enzymes, and is detected among Escherichia coli (E. coli) bacteria.

E. coli is able to resist Penicillins and cephalosporins. These CTX-M enzymes are rapidly expanding. This is not just simple cystits, concern because it is found in most urinary tract infections. Missing the presents of ESBL could result in treatment failure. It is hard sometimes to detect these because they do have different activity levels.

Other types of infections are caused by E. coli which could lead to bacteremia which is a blood infection which could be like threatening. K. pneumonia, which causes bacterial pneumonia, or wound infections in addition to UTIs. Patients with weak immune systems, patients with illnesses, children and elderly are at increased risk.

The National Committee for Clinical Laboratory Standards (NCCLS) developed broth microdilution and disk diffusion screening tests. These tests have indicated that cefpodoxime and ceftazidime show the highest sensitivity of ESBL. Another problem is some ESBLs contain β-lactamases that can mask ESBL production.

Beta-lactam antibiotics are used to treat a broad spectrum of Gram $^{+}$ and Gram^{-} bacteria. Examples of the many different bacteria would be Enterobactoer, K. pneumonia, K. oxytoca, E. coli, Enterobacteriaceae (Salmonella), Proteus, Morganella, Mirabilis, Psuedomonas aeruginosa, Citobacter, andvSerratia, which all produce ESBLs.

Methicillin Resistant Staphyloccus Aureus (MRSA):

What is MRSA? It has been brought to the forefront of many people's minds lately, because it's been a subject of many news features. Why has MRSA been featured? Because of the spread of this "super disease" and new cases; Health care workers are more concerned than ever about its transmission process and getting it themselves.

Staphylococcus aureus is a common cause of healthcare associated infections reported to the National Healthcare Safety Network (NHSN). The percentages reported are Coagulase-negative staphylococci the leading infection is 15%, while Staphylococcus aureus is 14%. Staphylococcus Aureus is the most common cause of surgical site infections at 30% and causing ventilator associated pneumonia at 24%. Of all the healthcare associated S. aureus infections, it is suggested that 49-65% are caused by Methicillin resistant strains.

MRSA: Methicillin Resistant Staphylococcus Aureus is a type of "staph" **bacteria** that does not react to certain beta-lactam antibiotics called antimicrobial-resistant and will normally cause skin infections. Bacteria is a one-celled organism without a true nucleus or cell organelles, belonging to the kingdom of procaryotae (Monera). Millions of non-pathogenic bacteria live on human skin and mucous membranes; these are called normal flora. Bacteria that cause disease are called pathogens. Bacteria, like all living things, undergo mutations. It is the environment that determines which mutations are beneficial to bacteria. Mutations may be Beneficial to bacteria and may not be to humans, because mutation provides resistance to the potentially lethal effects of antibiotics against bacteria.

MRSA can cause other infections that CAN BE FATAL! MRSA occurs most frequently with patients who undergo invasive procedures. Examples are catheters or surgery and with patients who have weakened immune systems. MRSA in the healthcare setting commonly cause bloodstream infections, surgical site infections as well as pneumonia.

History of Methicillin-resistance:

Methicillin-resistance in S. aureus was first identified in the 1960's usually among hospitalized patients.

•Starting in 1974, MRSA infections accounted for about 2% of the total number of staph infections.

• By 1995 it was up to 22%; in 2004 it was 63% so you can see how it is increasing. The CDC estimates that each year approximately 27 million surgical procedures are performed.

•The CDC estimated 94,360 invasive MRSA cases occurred in the U.S. in 2005 and of these cases, 18,650 which means 20% were associated with death.

• In 2006-2007 MRSA is viewed as stabilizing at 56% after evaluation of this trend.

When dealing with the serious MRSA disease that is predominantly delivered by healthcare exposures, about 85% are associated with healthcare. When dealing with the two-thirds outside of the hospital infections, about one-third of those happened during a hospitalization.

About 14% of all infections occurred in persons without obvious exposures to healthcare. The overall rates of disease were consistently highest among persons older than 65, black and also males.

MRSA is resistant to antibiotics including methicillin, oxacillin, penicillin and amoxicillin including cephalosporins (e.g., cephalexin). Since these strong drugs are no longer effective against MRSA, these infections are sometimes called multidrug resistant organisms (MDROs). According to the CDC, high prevalence influences unfavorable antibiotic prescribing, which possibly could contribute to further spread of bacterial resistance.

MRSA is seen most frequently among patients who undergo invasive medical procedures or often occur with people who have weakened immune systems and are in hospitals and/or healthcare facilities. This includes nursing homes, dialysis centers and prisons. MRSA in healthcare settings commonly causes serious and potentially life threatening infections such as bloodstream infections, surgical site infections or pneumonia.

What is a surgical site infection?

An infection that occurs at the site of surgery within thirty days of an operation or within one year of an operation if a foreign body (e.g., artificial heart valve, joint or mesh) is implanted as part of the surgery. Most surgical site infections, approximately 70% are superficial infections which involve the skin only. The remaining, more serious infections may involve tissues under the skin, organs or implanted material.

An example of this would be orthopedic surgery, according to the CDC, who estimates approximately over 4 million orthopedic surgeries are performed each year and over 500,000 of these surgeries involve the knee. Typically depending on the type of surgery, less than 1% of most surgeries result in surgical site infection. Of these infected cases, 50% are caused by MRSA. You can watch these statistics at National Healthcare Safety Network's annual update.

This infection spreads because of skin-to-skin contact, sharing or touching personal items from a person who has infected skin. MRSA can be spread from touching a surface or item that has been in contact with someone with MRSA. In the case of MRSA, patients who already have an MRSA infection or who carry the bacteria on their bodies but do not have any symptoms (Colonized) are the most common sources of transmission.

Colonization of MRSA:

Colonization of MRSA generally proceeds to infection and in this case colonization can be long lasting. This means it could last from months to years in some subpopulations.

MRSA infections that occur in otherwise healthy people who have not recently (usually within the last year) been in the hospital or had surgery are known as Community-associated MRSA infections (CA-MRSA). In the community at large these infections are usually skin and soft tissue (SSTIs) infections such as pimples, furuncles (abscessed hair follicles or "boils"), Carbuncles (coalesced masses of furuncles), abscesses and other pus-filled lesions. The role of MRSA in cellulitis without abscess or purulent drainage is less clear since cultures are

rarely obtained. However these infections may also lead to more serious illness, such as pneumonia.

Major strides have been made in recent years to reduce the numbers of MRSA infections in healthcare settings.

What to look for:

When considering a patient has an MRSA infection, you will find skin with a red, swollen and painful area. This area of skin will be warm to the touch possibly full of puss or other drainage. Another symptom is the Patient will also present with a fever.

The CDC encourages an MRSA in the differential diagnosis of SSTIs compatible with S. Aureus infections, especially those that are purulent (fluctuant or palpable fluid-filled cavity, yellow or white center, central point or "head" draining pus. It may be possible to aspirate pus with a syringe). A patient may present with a complaint of a "spider bite," this should raise suspicion of a Staphylococcus aureus infection.

How is MRSA spread in the healthcare setting?

Although MRSA can come from the environment and be transmitted to people, the most common method of transmission is from person-to-person. The main mode of transmission in the healthcare setting from patients is through human hands, especially healthcare workers' hands. Health care workers hands may become contaminated with MRSA bacteria by contact with infected or colonized patients. If appropriate hand washing with soap and water or use of a alcohol-based hand rub is not performed, the bacteria can be spread from a healthcare worker who has come in contact with MRSA to a patient. It is also appropriate to ask all visitors to wash their hands before visiting patients.

When possible it is best for patients if friends and relatives do not visit while a patient is ill.

Colonization means the growth of microorganisms, especially bacteria, in a particular body site. A patient who has acquired MRSA colonization during a hospital stay has increased risk for MRSA infections after discharge from the hospital or a transfer to a long term acute admission. These MRSA carriers can transmit the disease as the move through and across the healthcare facilities.

If appropriate hand washing with soap and water or using an alcohol-based hand sanitizer is not performed, the bacteria can be spread when the healthcare worker touches other patients.

MRSA:

Common microbes include MRSA are becoming resistant to most commonly prescribed antimicrobial antibiotics and treatments. In some cases, this means no antibiotics are effective against these mutated "Super" bacteria. However at this time, MRSA for healthcare-associated treatment still exits.

People with antibiotic-resistant organisms like MRSA are more likely to have extended and more expensive hospital stays. These patients are at higher likelihood of serious complications and possible health serious issues resulting from this infection. Extended treatments create a greater burden and expense to the healthcare system. Because of this issue, the CDC, State and Local health departments, and other health partners nationwide are collaborating to prevent MRSA infections in the healthcare settings.

Of the pathogens which are causing the antibiotic resistant infections, most strains are associated with MRSA infections and are usually caused by traditional strains associated within the healthcare community. However, the strains traditionally associated with the community transmission are now being identified in the healthcare system as well.

One test to know if you are dealing with MRSA is to culture patients who are suspected to have colonized or have MRSA. Cultures can be expensive to the facility, however, culturing can be less costly that other tests and it is a common practice than labs are accustomed to using. It does however take 72 hours to identify if MRSA is present. Start treating patients as if they are positive while waiting for results. This way there is less chance of spreading if a patient is positive.

The Polymerase chain reaction test is a very fast way of testing patients. This test it is very expensive and it is a more difficult test for lab personnel to perform. Another issue with this test is which body site to use; most common choices are wounds, axilla and groin.

The CDC recommends testing patients who are in high risk areas like ICU, however anywhere in the facility would be appropriate.

It is very important that Healthcare providers review frequently updated policies and procedures when dealing with MRSA.

Preventing MRSA:

There are ways to prevent infection in MRSA colonized patients. The CDC calls these Core Prevention Strategies.

- Assessment of the staff for hand washing/hygiene practices.

- Implement contact precautions for patients with MRSA during hospital stay.

- Recognize previously colonized patients.

- Rapidly reporting MRSA lab results and making sure to give this information during handoff reports. Provide MRSA education for all healthcare providers, this includes all staff members who interact with patient's care.

Hand hygiene is one of the most important parts of the prevention efforts. This prevents transmission of MRSA by the hands of healthcare care professionals. Make sure soap and water, as well as alcohol-based hand creams or gels are easily available to the entire staff including family and visitors. Educate not only health care professionals, but include the patients and family. Watch how the health care providers put these practices into action. Make sure all employees are following policies and procedures correctly. Always do what the CDC calls "Just in time feedback" when staff members are not washing their hands according to policy.

Contact Precautions is another core prevention to put in place with someone with or suspected of MRSA. Use a gown and gloves prior to entering patient's room. Remove this Personal protective equipment (PPE) prior to leaving a patients' room to prevent spread. Put these patients in their own room, or if confirmed MRSA put with another confirmed colonized/infected patient. Always use dedicated if possible disposable items, blood pressure cuffs and stethoscopes are examples. Leave the IV poles and pumps in the rooms for entire stay. These patients could be in the hospital for months.

Education is a huge part of the core prevention measure. Education helps improve adherence to hand hygiene by health care workers and patients, including family and friends. It also helps to improve interventions, including Contact Precautions. Understanding this problem helps to encourage behavioral change.

What can patients do to protect themselves?

There are several things a patient can to protect themselves from MRSA. It is important for patients to maintain a healthy weight. If a patient smokes, educate the importance of quitting at least 30 days prior to surgery. If a patient has diabetes, they should work with their doctor to keep blood sugar levels under control, especially prior to surgery. Make sure patients take a shower or bath prior to surgery, at least the day before. Make sure patients do not shave an area prior to surgery. Explain to the patient hair may be clipped if necessary in surgery.

Patients need to be proactively involved with their care. They can ask that doctors use antibiotics correctly prior to and after their surgery. They can make sure staff is washing hands prior to touching them.

Decolonization therapy for MRSA carriers is one way to try and suppress or possibly eliminate colonization. This is the use of topical and/or systemic agents. This therapy may reduce risk of subsequent infections in MRSA carriers as well as decrease transmission. One of the problems with decolonization is determining which body parts to target, whether it is just the nares, or the whole body. Then, should intra-nasal Mupirocin be used only, or just a chlorhexidine baths. The other option is to do both. There are also oral agents available now. There would be a concern of emergence of Mupirocin resistance.

Prevention is our main goal when talking about MRSA, and prevention in surgery is an Operating Room nurses goal. Health care facilities should put prevention measures in place, which can affect surgical site infections. Active surveillance testing is one of the strategies used. Another more controversial method is Chlorhexidine bathing. There are also impregnated prepackaged wash cloths that some surgeons are having patients use prior to surgery.

It is the Operating Room Nurse's responsibility to post contact precautions signs on doors when necessary. It is also extremely important to pass this information on to each other in our hand off reports and briefings. This information should be written on the O.R. room count boards for all staff entering the room. When possible, have the patients' bed completely cleaned while a surgical case is in progress. Make sure to communicate information about MRSA to environmental services personnel to wear protective equipment. Make sure to completely clean the patient of all body fluids before they leave the Operating Room suite.

Again, communicate all information to recovery room staff so that they are prepared to receive the patient appropriately attired and if possible, separated from other recovery room patients. This will ensure we help prevent surgical site infection throughout the perioperative phase.

Post Surgical Infection Prevention:

Once a patient is discharged, it is very important that the patient takes home this MRSA prevention information. Make sure they know that everyone is to wash their hands for at least 15 seconds when they wash

their hands. Keep hand sanitizer available at all times after surgery. Do not use sanitizer when hands are visibly soiled (dirty).

When educating a patient and patient's family remind them it is important for everyone to wash their hands 15 seconds prior to preparing meals, or eating meals. Always wash hand after using the toilet, keeping this in mind do not share hand towels. Use fresh linins. Wash hands after handling dirty clothes, towels, and linins. Wash all items in contact with patient in hot water to kill any contaminates that could possibly present. Once home from surgery, Patients should not share items, such as razors, clothing or exercise equipment. Everything should be wiped down prior to use. Always keep wounds covered with clean, dry bandages. It is important to keep all shared items and surfaces clean for the surgical patient. These important precautions will help to keep the surgical patient from contacting MRSA after surgery.

Group A Streptococcal (GAS) Disease:

Group A Streptococcus (GAS) is a beta-hemolytic streptococci bacterium often found in the throat and on the skin. Some people may be carriers of streptococci in their throats and or skin and may never have any symptoms of illness. Most GAS infections are relatively mild illnesses. Examples include strep throat, pharyngitis, tonsillitis, sinusitis, otitis media and pneumonia. When thinking of skin issues they could include cellulitis, scarlet fever, erysipelas, necrotizing fasciitis and impetigo. Impetigo is a bacterial infection of the skin caused by

streptococci or staphylococci and marked by a yellow-to-red, weeping and crusted or pustular lesion. These lesions are usually around the nose, mouth, and cheeks or on the extremities. There are several million cases of strep throat and Impetigo reported each year. Group A Streptococcus infection may have immunologic sequelae such as rheumatic fever and acute glomerulonephritis.

Rheumatic fever can develop approximately 18 days after a bout of strep throat, and it can cause heart disease with or without joint pain. Syndenham shorea, a disorder where the muscles of the torso, arms and legs move involuntarily in a dancing or jerky manner and can occur months later.

Occasionally these bacteria can cause severe and even life-threatening diseases including sepsis. When GAS disease is spread to parts of the body where this bacteria is normally not found it can become severe and life-threatening. Examples include when it's found in places such as muscle, blood (bacteremia) or lungs. When found in these places the infections are termed invasive GAS disease. There are about 9,000-11,500 reported cases of invasive GAS disease each year in the US.

There are two forms of this infection that are the most severe kinds of this disease. The first would be Toxic Shock Syndrome (TSS). TSS is related to tampon usage. The bacteria strains that caused exotoxin to be produced were Staphylococcus aureus and Group A Streptococci, which in turn caused TSS. TSS has also been linked with not only vaginal tampons, but has included contraceptive sponges, diaphragms and surgical wound packing. Approximately 10-15 percent of patients with Invasive group A Streptococcal disease die from the infection. This elates to approximately 1,000 to 1,800 deaths annually in the U.S.

This infection usually presents with a fever of 102° (38.9°C) or greater, Diffuse, macular (flat), Erythematous rash, followed by 1 to 2 weeks of peeling of the skin. The peeling usually occurs in the palms of the hands and soles of the feet. The patients may have hypotension or orthostatic syncope.

Patients could have involvement in one of the three or more organ systems.

•When the gastrointestinal system is involved the patient may have vomiting or have diarrhea at the onset of the illness. If the Muscular system is involved, they may have severe myalgia (pain or tenderness).

•The mucous membrane may include any or all of these areas, the vagina, opharyngeal, or conjunctival. A patient may have Issues with hyperemia, unusual amount of blood in a part, including hepatic and hematological (platelet) problems.

•When the central nervous system is involved the patient may experience disorientation or alteration in consciousness without focal neurological signs when fever and hypotension are absent. Culture results are usually negative when taken from blood, throat and cerebrospinal fluid.

The second very serious form is Necrotizing Fasciitis most commonly known as “flesh eating disease” which is a rapidly aggressive spreading bacteria. Even though it is the least common of this disease, it destroys muscle, fat and skin tissue.

Streptococcal toxic shock syndrome (STSS) results in rapid drop in blood pressure and Organs (e.g. kidney, liver and lungs) begin to fail. STSS is not the same as TSS, as it is a different bacteria. 25% of patients with

Necrotizing Fasciitis and more than 35% with STSS die, according to the CDC. Aggressive and early surgical intervention is often needed for a person with Necrotizing Fasciitis to remove the damaged tissue and to try and stop the disease from spreading. Amputation of limbs may occur.

GAS is spread through direct contact of persons who are infected. The Bacteria comes from the mucus of the nose or throat and from infected wounds or sore from an infected person's skin. Patients who have strep throat or skin infections are most likely to spread the infection. However, a person may have the bacteria without any symptoms, but could still pass on the bacteria. When a patient is treated with antibiotics for 24 hours or longer, it usually eliminates the possibility of spreading bacteria. Always reinforce with patients to finish the entire course of antibiotics as directed.

Invasive Group A Streptococcal disease can get past a person's defenses when they have sores or breaks in skin, and this allows the bacteria into the tissue. A person with chronic illness or an immune deficiency may be more susceptible to virulent strains that cause severe disease.

Persons with cancer, diabetes, chronic heart or lung disease or those who use steroids or chemotherapy or have suppressed immune systems are at higher risk. Persons who have open wounds, surgical wounds , chicken pox, who are elderly, and those who have a history of alcohol or drug abuse are also at higher risk for this disease. Patients who are burn victims are also at very high risk. This disease may occur in patients who are otherwise healthy and have no known risk factors.

Once you have GAS infections, it can be treated with many different antibiotics. For STSS and Necrotizing Fasciitis, high doses of penicillin

and Clindamycin are recommended. Supported care in ICU also may be necessary.

How do we stop the spread of Group A Streptococcal infections. It can be as easy as washing ones hands. Good hand washing practices helps to stop the spread of many diseases. Remind anyone who is coughing and sneezing to wash their hands often. Always wash your hands before preparing and eating foods. Persons with sore throats should be seen by a doctor to be tested for strep throat. If results are positive, stay home with treatment for at least 24 hours to prevent spreading.

All wounds should be watched for signs of infection and kept clean and dressed properly. Patients with strep throat but more often with GAS skin infections can also develop inflammation of the kidneys. This rarely happens in the United States because of prompt intervention. If signs of infection arise, seek medical attention immediately to prevent a GAS infection. At the time of surgery, most patients receive a dose of antibiotics prior to incision. Make sure to document this information correctly.

Mycobacterium Tuberculosis:

Tuberculosis (TB) is a bacteria that could have a class of its own, however, this lesion will just hit on some important points related to drug resistance. TB is a bacteria that attacks not only the lungs, but also kidneys, spine and brain. TB is spread through the air from one person to another. It is usually passed when an infected person coughs, sneezes, speaks or sings. According to the CDC, It cannot be spread by kissing or sharing a toothbrush.

Not every patient infected with TB becomes ill; in fact most people are able to fight off the TB bacteria from growing. This is called Latent TB Infection (LTBI). About 5 to 10% with (LTBI), who do not receive treatment, will develop TB. TB sometimes is discovered through the tuberculin skin test or special TB blood test. You could have the disease for years before it becomes active. If the TB bacteria are able to become active, due to weakened immune system for instance, it could likely begin to multiply; eventually the patient may become sick.

Extensively drug-resistant tuberculosis (XDR-TB) is caused by Mycobacterium Tuberculosis. XDR TB is a rare type of multidrug resistant tuberculosis (MDR TB). The first line of medication used to treat TB is Isoniazid and Rifampin, now are no longer effective against MDR TB. XDR TB is also resistant to the best second line medications including Fluroquinolones and at least three of the unjectable drugs being Amikacin, Kanamycin, and Capreomycin. At this time, patients have bad outcomes due to less effective treatments.

Today, Patients with weak immune systems are at higher risk of death once infected with TB. Symptoms of a patient will include not feeling well and a bad cough that they may have had for more than three weeks. A patient may experience chest pain, weakness, fatigue, weight loss (due to suppressed appetite), possible chills and fever. Some patients may complain of night sweating. A patient may complain of coughing up phlegm, which may contain blood. Symptoms will vary when a patient is affected in a different part of the body.

Persons that have these conditions including babies and young children who are also at greater risk are:

1. HIV infected
2. Substance abuse
3. Silicosis: a form of pneumonoconiosis which are inhaled.
4. Diabetes mellitus
5. Severe kidney disease
6. Low body weight
7. Organ transplants
8. Head and neck cancer
9. Patients on corticosteroids or taking rheumatoid arthritis.

C. Difficile (C. Diff):

Clostridium Difficile ("C. Diff") is a bacterium found in feces that causes diarrhea as well as other serious intestinal conditions such as pseudomembranous colitis. About 30% of people have c. Diff as one of the normal germs in their intestine that help digest food. Other complications that result from C. Difficile are serious intestinal conditions such as toxic megacolon and perforations of the colon, sepsis and death in rare cases. C. Difficile is a spore-forming, gram-positive anaerobic bacillus that produces two exotoxins. It is a common cause of antibiotic-associated diarrhea.

Symptoms for C. diff are watery diarrhea, at least three bowel movements per day for two or more days. Other symptoms are loss of appetite, fever, nausea, and abdominal pain or tenderness. Treatment

for C. diff is usually 10 days of antibiotics and has few side-effects. In some cases it may be necessary to have multiple treatments.

To test for C. Diff, a stool culture can be done, although it is very difficult. Antigen detection can also be done, but it must be done in combination with toxin testing to verify diagnosis.

Patients in good health usually do not get Clostridium Difficile disease. Patients with other illnesses or conditions requiring prolonged antibiotics are at greater risk. The elderly or immunocompromised patients are also at greater risk of C. diff. Patients who have had gastrointestinal surgery or intestinal manipulation is at greater risk. Patients usually become infected after coming in contact with items or surfaces contaminated with feces then touch their mouth or mucous membranes. Health care workers can spread the bacteria to other patients or contaminate surfaces if they do not wash their hands after contact with a patient's contaminated feces.

A patient with C. Diff should be placed on Contact Precautions and their room should be cleaned regularly with disinfectants because surfaces harbor the bacterium and is a source of contamination. If possible, place these patients in private rooms because of surface contamination of the C. Diff spores. It is recommended to clean with Hypochlorite-bases disinfectant for environmental surface disinfection.

Always wash hands with soap and water especially after using the restroom. Always wash hands prior to preparing or eating food. Alcohol-based disinfectants are not effective against C. Diff and should not be used to disinfect environmental surfaces.

Treatment options for C. Diff includes Metronidazole or oral Vacomycin, Even with treatment, the patient may still remain colonized.

Klebsiella Pneumoniae (K. Pneumonia):

T. A. Edwin Klebs was a German Bacteriologist and American Pathologist (1834-1913). Klebs identified Klebsiella which is a genus of gram-negative, encapsulated bacilli of the family Enterobacteriaceae.

Edwin Klebs also demonstrated the presents of bacteria in wounds. K. pneumoniae is a species that may cause sinusitis, bronchitis or pneumonia.

Klebsiella pneumoniae in today's healthcare setting has caused infections that include pneumonia, bloodstream infections, wound or surgical site infections and meningitis. Klebsiella is joining the list of bacteria that have developed antibiotic resistance.

Carbapenems is the most recent class of antibiotics that Klebsiella has formed resistance to. When Klebsiella pneumoniae bacteria produce an enzyme know as carbapenemase, they are also known as KPC producing organisms or carvapenem-resistant Klebsiella pneumoniae (CRKP). Carbapenem antibiotics are often the last line of defense against gram-negative infections that are resistant to other antibiotibiotics.

Vancomycin-Resistant Enterococci VRE:

Enterococci are often found in the environment. In Humans it is found in our intestines and in women it is found in the genital tract. These

bacteria may cause infections and the treatment for this is the antibiotic Vancomycin. Some Enterococci bacteria have become resistant to this Antibiotic. Most Enterococci infections are caused by Entercoccus Faecalis. Most Vancomycin-resistant Enterococci (VRE) infections occur in hospitals. VRE is also commonly encountered in Nursing Homes, and other long term care facilities.

The Types of infection that VRE can cause when colonized is Urinary tract infection, wound infections and it can get into the blood stream for blood infections. VRE can live in humans quite often without ever causing disease. Enterococci account for approximately 110,000 UTI'S, 25,000 bacteremia, and 40,000 wound infections and 1,100 endocarditis cases in the U.S. annually.

As always there are certain persons who are at greater risk of being infected from VRE and they are patients who have had antibiotic treatment with Vancomycin or a different antibiotic for a long period of time. Hospitalized patients who have been receiving antibiotic treatment for a long period of time are also susceptible.

Patients with weakened immune systems for whatever the reason maybe at greater risk as well as cancer patients, transplants or ICU stays. Patients who have undergone abdominal or chest surgeries are at a higher risk. Patients who have some type of a medical device an example might be catheters or central lines. Patients who have colonized Enterococci are definitely at higher risk. Patients who have multiple hospitalizations are also included.

The CDC collected information that spanned from 2006-2007 and it indicated that 1 out of every 8 hospital infections were caused by

Enterococci. Of these infections 30% of those were VRE. VRE was most common in those with weakened immune systems.

Patients who have the bacteria present may never have any sign of the bacteria. If a patient does not have any symptoms then they do not need treatment for the bacteria. There are other types of treatments besides Vancomycin which do work however it may be harder to treat. A different antibiotic can be determined through lab testing. If a patient gets an infection because of a catheter, if the catheter is no longer needed, remove it. Patients with bladder infections may report frequent urination, burning when urinating or bladder spasms. Even so removing the catheter may aid in getting rid of the infection as well.

VRE is a contact bacteria, this mean it can be passed person to person. VRE can also come from contaminated surfaces. The main way to stop the spread is washing ones hands and using contact precautions. Make sure to communicate this during hand off reports. It is very important that everyone dealing with this patient is aware that the patient has VRE. Encourage the patient to also tell all health care professional they may come in contact with. VRE is usually not spread through the air.

Remember to wash your hands thoroughly after using the bathroom, Bathrooms can be contaminated with VRE. If possible patients VRE may require their own bathroom. Always wash your hands before preparing food. After dealing with a patient with VRE wash your hands with soap and water, or use an alcohol-based hand rub. Wear Personal protective equipment (PPE) when coming in contact with body fluids, stool or bandages. Always wash your hands after removing gloves. Follow precautions until an infected person has signs of infection, they may be

discontinued once signs are eliminated and patient can care for themselves without contaminating the immediate environment.

Other Resistant Bacteria:

Burkholderia Cepacia (B. Cepacia) : A group or "complex" bacteria which is found in water or soil and is often resistant to common antibiotics. It does not pose great risk to the healthy population. It is usually a problem for patients with weakened immune systems. Patients who have cystic fibrosis (CF) or chronic lung diseases are at higher risk. B. Cepacia pneumonia has been reported in patients who were exposed either by person-to-person contact, contaminated surfaces or devices, and just ordinary exposure to the environment

(VANCOMYCIN-INTERNEDIATE) VISA/Vancomycin Resistant (VRSA): Are specific types of antimicrobial staph bacteria. Most staph is taken care of by Vancomycin; today VISA and VRSA are no longer susceptible.

Stretococcus Pneumoniae disease: Resistant to more than one commonly used antibiotic. Invasive disease is usually caused by Pneumococci. S. Pneumoniae which causes 60,000 cases per year of the invasive disease. Risk groups include people who work at child care centers, and people who recently used antimicrobial agents. Children are also at increased risk.

Resistant Psudomonas Aeruginosa: Commonly found in soil or water. It enters into the body through a cut or other breaks in skin and potentially can become deadly. Mortality rate is 50% of infected patients which can happen with burn patients, and patients with cystic fibrosis. It causes other illness as well UTIs, bone and joint infections.

Resistant E. Coli: Associated with GI infections and dehydration. Resistant E. Coli can come from animal feces. This strain has caused 3,000 deaths a year.

Acinetobacter Baumannii: Also found in soil and water, but can be found on the skin on otherwise healthy people. This rarely occurs outside the health care setting. This bacteria most commonly occurs in patients who are patients in the ICU.

These are only a few more resistant strains. More can be found at the www.CDC.com website.

Remember, your best line of defense against these diseases is strict hand washing and hygiene. For patients, education is very important to prevent the spreading of bacteria.

There are many diseases in which we overcoming. One of the reasons is immunizations which is the vaccination or injection of immune globulins for protection against specific diseases.

An immune globulin is a drug that is created from serum containing antibodies (immunoglobulins). It is given to a patient who is immunoglobulin deficient. It can also provide passive immunization against common viral infections such as Hepatitis A and measles. It seems to inhibit phagocytosis of platelets coated with autoantibodies. The immune globulin can be injected intramuscular (IM) or intravenously.

Examples that we are familiar with are RHo(D) this contains anti-RH antibodies given to pregnant RH-negative women who are having an RH-Positive baby.

Vaccines were started by a British physician Edward Jenner (1749-1823) who derived infectious liquid from cowpox lesions and used to prevent and attenuate (render less virulent) smallpox in humans.

Vaccines are also antigenic molecules in any suspension derived from a microorganism to stimulate an immune response to an infectious disease. They may be make from dead or weakened microorganisms, immunologically active surface markers extracted or copied from microorganisms, inactivated toxins or possibly toxiods derived from microorganisms.

Vaccines are given intramuscular, intradermally , orally, or intranasally. Vaccines can be given as a single agent or they can be combined.

Vaccines are a great, usually inexpensive, easy and well tolerated way to fight microorganisms before getting the disease or lessening the effects. However reactions do happen and should be reported. Side effects usually include fevers, injection site pain, muscle aches and are usually mild. Seizures, active infection, anaphylaxis, shock, and death must be reported. A list of vaccines is below:

- Absorbed Anthrax v: Bacillus anthracis causes anthrax and has been used in biological warfare.

- Antitumor v: Antitumor vaccination

- Bacterial v: a suspension of attenuated or dead bacteria used for active immunity to those same bacteria.

- BCG v: Bacille Calmette-guerin vaccine, a bacteria that is dried but living attenuated culture of mycobacterium bovis.

- DNA v: A vaccine made by genetic engineering in which the gene that codes for an antigen is inserted into a bacterial plamid and then injected into a host. One inside a host it uses the nuclear machinery of the host cell to manufacture and express the antigen. This method may induce immune responses at the cellular level as well as the human immune response.

- DPT v: It is a combination of tetanus toxoids and diptheria and killed pertussis bacilli that is no longer given in pediatric immunizations.

- DTap v: A preparation of diphtheria and tetanus toxoids and acellular pertussis proteins.

- Haemophilus influenza type b v: reduces risks of childhood epiglottitis, meningitis, and other diseases.

- Heterogeneous V: made from other than the patient's own tissue or cells.

- Heterologous v: a vaccine that is made from an organism different from the organisms against which the vaccine is used.

- Homologous v: Autogenous v.

- HPV v: A virus against Human Papillomavirus infection associated with genital warts and cervical cancer.

- Human diploid cell rabies v: an inactivated virus vaccine prepared from fixed rabies virus grown in human diploid cell tissue culture.

- Influenza virus v: It prevents epidemic disease and the morbibity and mortality caused by the influenza virus.
- Killed v: a vaccine prepared from dead microorganisms.
- Live virus: multiple vaccines are made from live virus, including influenza, measles, mumps, polio, and rubella.
- Lyme disease v: in us for veterinary use only.
- Meningococcal v: preventing disease caused by those sero-groups A, C, Y and W135.
- Plague v: Used where plague is an epidemic.
- Polyvalent v: vaccine produced from cultures of a number of strains of the same species.
- Polyvalent pneumococcal v: More valuable with the continually rising, as streptococcus pneumonia, becomes more and more resistant.
- Rabies: For following a bite of a rabid animal.
- Sabin v: Live oral poliovirus
- Smallpox v: a vaccine used to provide immunity against smallpox, one of the deadliest infections in history.
- Tetanus v: A vaccine against clostridium tetani
- Tumor v: Antitumor vaccine
- Typhoid v: One of two forms against typhoid fever.
- Typhus v: virus against epidemic typhus rickettsiae.

• Yellow fever v: protects against this tropical mosquito-borne, viral hemorrhagic fever.

There are several more vaccines these are most of the more known.

I also wanted to touch on the “fifth disease”, which is a mild rash that most commonly is in children. The ill child has what they called “slapped-cheek” rash, on the face. They have a red lacy rash on the trunk and limbs. This rash may also include a child being itchy.

This disease is caused by human parvovirus B19, and only affects humans. Adults have been known to have this virus, but may never have any symptom.

Remember the most important thing is to **Wash your hands** with soap and water to stop the spread of disease.

Please do not forget to take a survey which is located on the test page at the top!!! Give us feed back!!!

Glossary for Isolation precautions based on CDC information:

Airborne infection isolation room (AIIR). Formerly, negative pressure isolation room, an AIIR is a single-occupancy patient-care room used to isolate persons with a suspected or confirmed airborne infectious disease. Environmental factors are controlled in AIIRs to minimize the transmission of infectious agents that are usually transmitted from person to person by droplet nuclei associated with coughing or aerosolization of contaminated fluids. AIIRs should provide negative pressure in the room (so that air flows under the door gap into the room); and an air flow rate of 6-12 ACH (6 ACH for existing structures, 12 ACH for new construction or renovation); and direct exhaust of air from the room to the outside of the building or recirculation of air through a HEPA filter before retruning to circulation (MMWR 2005; 54 [RR-17]).

American Institute of Architects (AIA). A professional organization that develops standards for building ventilation, The "2001Guidelines for Design and Construction of Hospital and Health Care Facilities", the development of which was supported by the AIA, Academy of Architecture for Health, Facilities Guideline Institute, with assistance from the U.S. Department of Health and Human Services and the National Institutes of Health, is the primary source of guidance for creating airborne infection isolation rooms (AIIRs) and protective environments (www.aia.org/aah).

Ambulatory care settings, Ambulatory Surgery Centers (ASC), Home after surgery (has). Facilities that provide health care to patients who do not remain overnight (e.g., hospital-based outpatient clinics, nonhospital-based clinics and physician offices, urgent care centers, surgery centers, free-standing dialysis centers, public health clinics, imaging centers, ambulatory behavioral health and substance abuse clinics, physical therapy and rehabilitation centers, and dental practices.

Bioaerosols. An airborne dispersion of particles containing whole or parts of biological entities, such as bacteria, viruses, dust mites, fungal hyphae, or fungal spores. Such aerosols usually consist of a mixture of mono-dispersed and aggregate cells, spores or viruses, carried by other materials, such as respiratory secretions and/or inert particles. Infectious bioaerosols (i.e., those that contain biological agents capable of causing an infectious disease) can be generated from human sources (e.g., expulsion from the respiratory tract during coughing, sneezing, talking or singing; during suctioning or wound irrigation), wet environmental sources (e.g. HVAC and cooling tower water with Legionella) or dry sources (e.g.,constuction dust with spores produced by Aspergillus spp.). Bioaerosols include large respiratory droplets and small droplet nuclei (Cole EC. AJIC 1998;26: 453-64).

Caregivers. All persons who are not employees of an organization, are not paid, and provide or assist in providing healthcare to a patient (e.g., family member, friend) and acquire technical training as needed based on the tasks that must be performed.

Cohorting. In the context of this guideline, this term applies to the practice of grouping patients infected or colonized with the same infectious agent together to confine their care to one area and prevent contact with susceptible patients (cohorting patients). During outbreaks, healthcare personnel may be assigned to a cohort of patients to further limit opportunities for transmission (cohorting staff).

Colonization. Proliferation of microorganisms on or within body sites without detectable host immune response, cellular damage, or clinical expression. The presence of a microorganism within a host may occur with varying duration, but may become a source of potential transmission. In many instances, colonization and carriage are synonymous.

Droplet nuclei. Microscopic particles < 5 μm in size that are the residue of evaporated droplets and are produced when a person coughs, sneezes, shouts, or sings. These particles can remain suspended in the air for prolonged periods of time and can be carried on normal air currents in a room or beyond, to adjacent spaces or areas receiving exhaust air.

Engineering controls. Removal or isolation of a workplace hazard through technology. AIIRs, a Protective Environment, engineered sharps injury prevention devices and sharps containers are examples of engineering controls.

Epidemiologically important pathogens. Infectious agents that have one or more of the following characteristics: 1) are readily transmissible; 2) have a proclivity toward causing outbreaks; 3) may be associated with a severe outcome; or 4) are difficult to treat. Examples include Acinetobacter sp., Aspergillus sp., Burkholderia cepacia, Clostridium difficile, Klebsiella or Enterobacter sp., extended-spectrum-beta-lactamase producing gram negative bacilli [ESBLs], methicillin-resistant Staphylococcus aureus [MRSA], Pseudomonas aeruginosa, vancomycin-resistant enterococci [VRE], methicillin resistant Staphylococcus aureus [MRSA], vancomycin resistant Staphylococcus aureus [VRSA] influenza virus, respiratory syncytial virus [RSV], rotavirus, SARS-CoV, noroviruses and the hemorrhagic fever viruses).

Hand hygiene. A general term that applies to any one of the following: 1) handwashing with plain (nonantimicrobial) soap and water); 2) antiseptic handwash (soap containing antiseptic agents and water); 3) antiseptic handrub (waterless antiseptic product, most often alcohol-based, rubbed on all surfaces of hands); or 4) surgical hand antisepsis (antiseptic handwash or antiseptic handrub performed preoperatively by surgical personnel to eliminate transient hand flora and reduce resident hand flora) 559.

Healthcare-associated infection (HAI). An infection that develops in a patient who is cared for in any setting where healthcare is delivered (e.g., acute care hospital, chronic care facility, ambulatory clinic, dialysis center, surgicenter, home) and is related to receiving health care (i.e., was not incubating or present at the time healthcare was

provided). In ambulatory and home settings, HAI would apply to any infection that is associated with a medical or surgical intervention. Since the geographic location of infection acquisition is often uncertain, the preferred term is considered to be healthcare-associated rather than healthcare-acquired.

Healthcare epidemiologist. A person whose primary training is medical (M.D., D.O.) and/or masters or doctorate-level epidemiology who has received advanced training in healthcare epidemiology. Typically these professionals direct or provide consultation to an infection control program in a hospital, long term care facility (LTCF), or healthcare delivery system (also see infection control professional).

Healthcare personnel, healthcare worker (HCW). All paid and unpaid persons who work in a healthcare setting (e.g. any person who has professional or technical training in a healthcare-related field and provides patient care in a healthcare setting or any person who provides services that support the delivery of healthcare such as dietary, housekeeping, engineering, maintenance personnel).

Hematopoietic stem cell transplantation (HSCT). Any transplantation of blood- or bone marrow-derived hematopoietic stem cells, regardless of donor type (e.g., allogeneic or autologous) or cell source (e.g., bone marrow, peripheral blood, or placental/umbilical cord blood); associated with periods of severe immunosuppression that vary with the source of the cells, the intensity of chemotherapy required, and the presence of graft versus host disease (MMWR 2000; 49: RR-10).

High-efficiency particulate air (HEPA) filter. An air filter that removes >99.97% of particles > 0.3µm (the most penetrating particle size) at a specified flow rate of air. HEPA filters may be integrated into the central air handling systems, installed at the point of use above the ceiling of a room, or used as portable units (MMWR 2003; 52: RR-10).

Home care. A wide-range of medical, nursing, rehabilitation, hospice and social services delivered to patients in their place of residence (e.g., private residence, senior living center, assisted living facility). Home health-care services include care provided by home health aides and skilled nurses, respiratory therapists, dieticians, physicians, chaplains, and volunteers; provision of durable medical equipment; home infusion therapy; and physical, speech, and occupational therapy.

Immunocompromised patients. Those patients whose immune mechanisms are deficient because of congenital or acquired immunologic disorders (e.g., human immunodeficiency virus [HIV] infection, congenital immune deficiency syndromes), chronic diseases such as diabetes mellitus, cancer, emphysema, or cardiac failure, ICU care, malnutrition, and immunosuppressive therapy of another disease process [e.g., radiation, cytotoxic chemotherapy, anti-graftrejection medication, corticosteroids, monoclonal antibodies directed against a specific component of the immune system]). The type of infections for which an immunocompromised patient has increased susceptibility is determined by the severity of immunosuppression and the specific component(s) of the immune system that is affected. Patients undergoing allogeneic HSCT and those with chronic graft versus host disease are considered the most vulnerable to HAIs. Immunocompromised states also make it more difficult to diagnose

certain infections (e.g., tuberculosis) and are associated with more severe clinical disease states than persons with the same infection and a normal immune system.

Infection. The transmission of microorganisms into a host after evading or overcoming defense mechanisms, resulting in the organism's proliferation and invasion within host tissue(s). Host responses to infection may include clinical symptoms or may be subclinical, with manifestations of disease mediated by direct organisms pathogenesis and/or a function of cell-mediated or antibody responses that result in the destruction of host tissues.

Infection control and prevention professional (ICP). A person whose primary training is in either nursing, medical technology, microbiology, or epidemiology and who has acquired special training in infection control. Responsibilities may include collection, analysis, and feedback of infection data and trends to healthcare providers; consultation on infection risk assessment, prevention and control strategies; performance of education and training activities; implementation of evidence-based infection control practices or those mandated by regulatory and licensing agencies; application of epidemiologic principles to improve patient outcomes; participation in planning renovation and construction projects (e.g., to ensure appropriate containment of construction dust); evaluation of new products or procedures on patient outcomes; oversight of employee health services related to infection prevention; implementation of preparedness plans; communication within the healthcare setting, with local and state health departments, and with the community at large concerning infection control issues; and participation in research. Certification in infection control (CIC) is available through the Certification Board of Infection Control and Epidemiology.

Infection control and prevention program. A multidisciplinary program that includes a group of activities to ensure that recommended practices for the prevention of healthcare-associated infections are implemented and followed by HCWs, making the healthcare setting safe from infection for patients and healthcare personnel. The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) requires the following five components of an infection control program for accreditation: 1) surveillance: monitoring patients and healthcare personnel for acquisition of infection and/or colonization; 2) investigation: identification and analysis of infection problems or undesirable trends; 3) prevention: implementation of measures to prevent transmission of infectious agents and to reduce risks for device- and procedure-related infections; 4) control: evaluation and management of outbreaks; and 5) reporting: provision of information to external agencies as required by state and federal law and regulation (www.jcaho.org). The infection control program staff has the ultimate authority to determine infection control policies for a healthcare organization with the approval of the organization's governing body.

Long-term care facilities (LTCFs). An array of residential and outpatient facilities designed to meet the bio-psychosocial needs of persons with sustained self-care deficits. These include skilled nursing facilities, chronic disease hospitals, nursing homes, foster and group homes, institutions for the developmentally disabled, residential care facilities, assisted living facilities, retirement homes, adult day health care facilities, rehabilitation centers, and long-term psychiatric hospitals.

Mask. A term that applies collectively to items used to cover the nose and mouth and includes both procedure masks and surgical masks (www.fda.gov/cdrh/ode/guidance/094.html#4).

Multidrug-resistant organisms (MDROs). In general, bacteria that are resistant to one or more classes of antimicrobial agents and usually are resistant to all but one or two commercially available antimicrobial agents (e.g., MRSA, VRE, extended spectrum beta-lactamase [ESBL]-producing or intrinsically resistant gram-negative bacilli) 176.

Nosocomial infection. A term that is derived from two Greek words "nosos" (disease) and "komeion" (to take care of) and refers to any infection that develops during or as a result of an admission to an acute care facility (hospital) and was not incubating at the time of admission.

Personal protective equipment (PPE). A variety of barriers used alone or in combination to protect mucous membranes, skin, and clothing from contact with infectious agents. PPE includes gloves, masks, respirators, goggles, face shields, and gowns.

Procedure Mask. A covering for the nose and mouth that is intended for use in general patient care situations. These masks generally attach to the face with ear loops rather than ties or elastic. Unlike surgical masks, procedure masks are not regulated by the Food and Drug Administration.

Protective Environment. A specialized patient-care area, usually in a hospital, that has a positive air flow relative to the corridor (i.e., air flows from the room to the outside adjacent space). The combination of high-efficiency particulate air (HEPA) filtration, high numbers (>12) of air changes per hour (ACH), and minimal leakage of air into the room creates an environment that can safely accommodate patients with a severely compromised immune system (e.g., those who have received allogeneic hemopoietic stem-cell transplant [HSCT]) and decrease the risk of exposure to spores produced by environmental fungi. Other components include use of scrubbable surfaces instead of materials such as upholstery or carpeting, cleaning to prevent dust accumulation, and prohibition of fresh flowers or potted plants.

Quasi-experimental studies. Studies to evaluate interventions but do not use randomization as part of the study design. These studies are also referred to as nonrandomized, pre-post-intervention study designs. These studies aim to demonstrate causality between an intervention and an outcome but cannot achieve the level of confidence concerning attributable benefit obtained through a randomized, controlled trial. In hospitals and public health settings, randomized control trials often cannot be implemented due to ethical, practical and urgency reasons; therefore, quasi-experimental design studies are used commonly. However, even if an intervention appears to be effective statistically, the question can be raised as to the possibility of alternative explanations for the result.. Such study design is used when it is not logistically feasible or ethically possible to conduct a randomized, controlled trial, (e.g., during outbreaks). Within the classification of quasi-experimental study designs, there is a hierarchy of design features that may contribute to validity of results (Harris et al. CID 2004:38: 1586).

Residential care setting. A facility in which people live, minimal medical care is delivered, and the psychosocial needs of the residents are provided for.

Respirator. A personal protective device worn by healthcare personnel to protect them from inhalation exposure to airborne infectious agents that are < 5 μm in size. These include infectious droplet nuclei from patients with M. tuberculosis, variola virus [smallpox], SARS-CoV), and dust particles that contain infectious particles, such as spores of environmental fungi (e.g., Aspergillus sp.). The CDC's National Institute for Occupational Safety and Health (NIOSH) certifies respirators used in healthcare settings (www.cdc.gov/niosh/topics/respirators/). The N95 disposable particulate, air purifying, respirator is the type used most commonly by healthcare personnel. Other respirators used include N-99 and N-100 particulate respirators, powered air-purifying respirators (PAPRS) with high efficiency filters; and non-powered full-facepiece elastomeric negative pressure respirators. A listing of NIOSH- approved respirators can be found at www.cdc.gov/niosh/npptl/respirators/disp_part/particlist.html. Respirators must be used in conjunction with a complete Respiratory Protection Program, as required by the Occupational Safety and Health Administration (OSHA), that includes fit testing, training, proper selection of respirators, medical clearance and respirator maintenance.

Respiratory Hygiene/ Cough Etiquette. A combination of measures designed to minimize the transmission of respiratory pathogens via droplet or airborne routes in healthcare settings. The components of Respiratory Hygiene/Cough Etiquette are 1) covering the mouth and nose during coughing and sneezing, 2) using tissues to contain respiratory secretions with prompt disposal into a no-touch receptacle, 3) offering a surgical mask to persons who are coughing to decrease contamination of the surrounding environment, and 4) turning the head away from others and maintaining spatial separation, ideally >3 feet, when coughing. These measures are targeted to all patients with symptoms of respiratory infection and their accompanying family members or friends beginning at the point of initial encounter with a healthcare setting (e.g., reception/triage in emergency departments, ambulatory clinics, healthcare provider offices) 126 (Srinivasin A ICHE 2004; 25: 1020; www.cdc.gov/flu/professionals/infectioncontrol/resphygiene.htm).

Safety culture/climate. The shared perceptions of workers and management regarding the expectations of safety in the work environment. A hospital safety climate includes the following six organizational components: 1) senior management support for safety programs; 2) absence of workplace barriers to safe work practices; 3) cleanliness and orderliness of the worksite; 4) minimal conflict and good communication among staff members; 5) frequent safety-related feedback/training by supervisors; and 6) availability of PPE and engineering controls 620.

Source Control. The process of containing an infectious agent either at the portal of exit from the body or within a confined space. The term is applied most frequently to containment of infectious agents transmitted by the respiratory route but could apply to other routes of transmission, (e.g., a draining wound, vesicular or bullous skin lesions). Respiratory Hygiene/Cough Etiquette that encourages individuals to "cover your cough" and/or wear a mask is a source control measure. The use of enclosing devices for local

exhaust ventilation (e.g., booths for sputum induction or administration of aerosolized medication) is another example of source control.

Standard Precautions. A group of infection prevention practices that apply to all patients, regardless of suspected or confirmed diagnosis or presumed infection status. Standard Precautions is a combination and expansion of Universal Precautions 780 and Body Substance Isolation 1102. Standard Precautions is based on the principle that all blood, body fluids, secretions, excretions except sweat, nonintact skin, and mucous membranes may contain transmissible infectious agents. Standard Precautions includes hand hygiene, and depending on the anticipated exposure, use of gloves, gown, mask, eye protection, or face shield. Also, equipment or items in the patient environment likely to have been contaminated with infectious fluids must be handled in a manner to prevent transmission of infectious agents, (e.g. wear gloves for handling, contain heavily soiled equipment, properly clean and disinfect or sterilize reusable equipment before use on another patient).

Surgical mask. A device worn over the mouth and nose by operating room personnel during surgical procedures to protect both surgical patients and operating room personnel from transfer of microorganisms and body fluids. Surgical masks also are used to protect healthcare personnel from contact with large infectious droplets (>5 μm in size). According to draft guidance issued by the Food and Drug Administration on May 15, 2003, surgical masks are evaluated using standardized testing procedures for fluid resistance, bacterial filtration efficiency, differential pressure (air exchange), and flammability in order to mitigate the risks to health associated with the use of surgical masks. These specifications apply to any masks that are labeled surgical, laser, isolation, or dental or medical procedure (www.fda.gov/cdrh/ode/guidance/094.html#4). Surgical masks do not protect against inhalation of small particles or droplet nuclei and should not be confused with particulate respirators that are recommended for protection against selected airborne infectious agents, (e.g., Mycobacterium tuberculosis).

References for Proper handling of Isolation

Ask.com internet encyclopedia

WWW.AOLhealth.COM

AORN Journals

Dorland's Medical Dictionary for Health Consumers by Saunders 2007

Factoidz.com Internet for hospital care different types

Http://Library.thinkquest.org

Http://inventors.about.com

Http://www.ucmp.berkeley.edu/bacteria/bacterialh.html

www.jama.com

Mosby's medical dictionary

http://.hpa.org.uk/infections/topics_az/esbl/default.htm

http://.niaid.nih.gov/topics/strep/pages/diagnosis.aspx

Taber's cycloddedic medical dictionary 21st edition 2005

http://Wikipedia.org