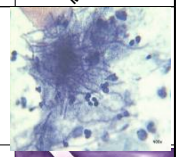
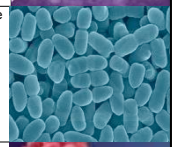
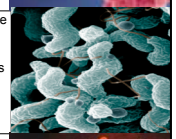
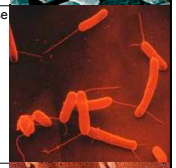
# GENERAL MICROBIOLOGY FACT SHEET

| Pathogen | Genus species | Disease | Risk Group | Host Range | Transmission | Signs & Symptoms | Incubation | Fact | Micrograph |
|---|---|---|---|---|---|---|---|---|---|
| Bacteria | *Actinomyces* spp. *Actinomyces israelii* | Actinomycosis | 2 | Humans, cattle, horses | Person-to-person by contact of mouth, aerosols, fomites. | Opportunistic pathogen. Chronic bacterial disease localized in jaw, thorax, or abdomen. Characterized by persistent swelling, suppuration and formation of abscesses or granulomas. | variable - days to months. | Fatality rate of 5-20% if untreated. Opportuinistic pathogen. |  |
| Bacteria | *Bacillus cereus* | Food Poisoning | 2 | Humans | Ingestion of foods kept at ambient conditions after cooking; emetic form frequently associated with cooked rice. Not communicable from person to person. | Opportunistic pathogen; intoxication characterized by two forms: an emetic form with severe nausea and vomiting and a diarrheal form with abdominal cramps and diarrhea. Usually mild and self-limiting (24 hrs). | 1-6 hours, average 4 hours; diarrheal form 6-24 hours (average 17 hours) | Infectious dose is greater than 10e6 organisms by ingestion (>10e5 organisms/g of food). |  |
| Bacteria | *Bordetella pertussis* | Whooping Cough | 2 | Humans | Direct contact with discharges from respiratory mucous membranes of infected persons by the airborne route. | Stage 1: Catarrhal: Irritating cough, lasts 1 to 2 weeks; Stage 2: Paroxysmal; violent coughs followed by a high pitched inspiratory whoop, lasts 2 to 6 weeks; Stage 3: Convalescent; the cough gradually decreases in frequency and severity, lasts several weeks | 6-20 days | Common in children worldwide; pertussis is among the most lethal infant diseases- Treatment with dTaP(acellular pertussis vaccine, a preventive vaccine) is now available for adults |  |
| Bacteria | *Brucella melitensis* | Brucellosis | 3 | Humans, swine, cattle, goats, sheep, dogs | Skin or mucous membrane contact with infected animals, their blood, tissue, and other body fluids.. | High and protracted (extended) fever. Infection affects bone, heart, gallbladder, kidney, spleen, and causes highly disseminated lesions and abscess | 1-15 weeks | Most commonly reported laboratory-associated bacterial infection in man. |  |
| Bacteria | *Campylobacter jejuni* | Traveller's diarrhea | 2 | Humans, animals and birds | By ingestion of organisms in undercooked food or in unpasteurized milk or water; from contact with infected pets (puppies and kittens), farm animals or infected infants. | Acute enteric disease of variable severity; diarrhea, abdominal pain, malaise, fever, nausea and vomiting; prolonged illness in up to 20% of patients; blood in association with mucus. | 2-5 days with a range of 1-10 days (dose dependant) | Important cause of diarrheal illness worldwide in all age groups (5-14% of diarrhea in world); common source outbreaks most often associated with foods, unpasteurized milk and unchlorinated water. Infectious dose is 500 organisms or less by ingestion. |  |
| Bacteria | *Escherichia coli*- Enterotoxigenic (ETEC) | Travellers Diarrhea / Gastroenteritis | 2 | Humans, most mammals (livestock) | Fecal-oral route; fecal contamination of water, food or fomites; poor sanitation and hygiene. Produces a heat labile enterotoxin (ST). | Low grade fever, profuse watery diarrhea without blood or mucous; abdominal cramping, vomiting, acidosis, prostration, malaise and dehydration. Self-limiting cholera-like disease in man. | 24-72 hours | Leading cause of traveller's diarrhea and a major cause of diarrheal disease in underdeveloped nations. |  |
| Bacteria | *Escherichia coli*- Enteropathogenic (EPEC); Entero dherent (EAEC) | Acute Diarrhea | 2 | Humans, most mammals (livestock) | Fecal-oral route; fecal contamination of water, food or fomites; poor sanitation and hygiene. Produces an enteroxin. | Intestinal disease accompanied by watery diarrhea, fever, cramps and vomiting; bloody stool in some cases; serious disease in infants | 12-72 hours | Highly infectious for infants; Adults by ingestion - 10,000 to 1e10 organisms needed for infection. In developing countries, the EPEC are highly prevalent and are a cause of childhood diarrheal disease and de-hydration associated deaths. |  |
| Bacteria | *Escherichia coli*- Enteroinvasive **(EIEC)** | Bacillary Dysentery | 2 | Humans | Fecal-oral route; fecal contamination of water, food or fomites; poor sanitation and hygiene | Fever; mucoid, occasionally bloody diarrhea, generally self-limiting; most severe form may result in hypotension with severe toxemia; sometimes associated with food poisoning. | 12-72 hours | Communicable for duration of fecal excretion (several weeks). Low infectious dose, approx. 10 organisms by ingestion. |  |

**Through the OSHA and ABSA Alliance, ABSA developed this fact sheet for informational purposes only. It does not necessarily reflect the official vies of OSHA or the U.S. Department of Labor**

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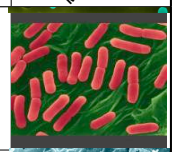
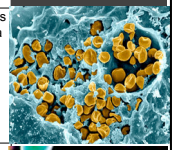
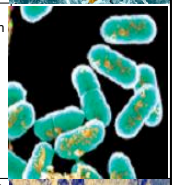
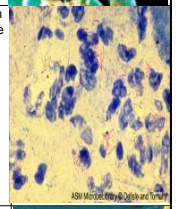
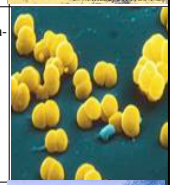
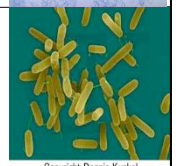
| Bacteria | *Escherichia coli*-Enterohemorrhagic **(EHEC)** | Hemorrhagic Colitis | **2** | Humans, animals (0157-H7 piglets, calves and cattle) | Ingestion of contaminated food (undercooked hamburger meat, unpasteurized milk); fecal-oral transmission; person-to-person transmission (extremely high) | Low grade fever, cramps, abdominal pain, watery diarrhea followed by bloody diarrhea, leading to hemorrhagis colitis and hemolytic uremic syndrome. In most patients, the disease is self-limited. However, 10% of children and a lessser number of adults may develop HUS (hemolytic uremic syndrome). | 2-8 days | Communicable for duration of fecal excretion (7-9 days). |  |
| Bacteria | *Francisella tularensis* | Tularemia (Rabbit Fever) | **3** | Wild animals (rabbits) and birds; some domestic animals; humans | Inoculation of skin, conjunctiva or mucosa with blood or tissue when handling infected animals; fluids from infected flies or other animals; arthropod bites | Presents as an indolent ulcer at site of infection, with swelling of the regional lymph nodes and sudden onset of pain and fever, fever that lasts 3-6 weeks without treatment; inhalation may be followed by a pneumonic disease | 1-14 days (usually 2-5 days) | Type B strains have a 5-15% fatality rate; type A strains approximately 35% mortality from pulmonary tularemia |  |
| Bacteria | *Listeria monocytogenes* | Listeriosis | **2** | Mammals, birds, fish, crustaceans and insects | Transmitted from mother to fetus in utero; direct contact with infectious material or contaminated soil; ingestion of contamin-ated food (vegetables and dairy products | A flu-like illness with gastrointestimnal symptoms. Perinatal infections can result in abortion or stillbirth in utero; In adults infection can cause meningitis, endocarditis, septicemia, and disseminated granulomatous lesions. | 3-70 days; mean incubation period is 3 weeks. | Mothers of infected newborn infants may shed the agent for 7-10 days after delivery; infected patients can shed organism in the stool for months. |  |
| Bacteria | *Mycobacterium tuberculosis*; *Mycobacterium avium* complex | Tuberculosis (TB) | **3** | Primarily humans, primates, other animals (rodents). | Inhalation of aerosols (droplet nuclei); direct invasion of mucous membranes or breaks in skin. | TB can be in a latent or active phase. Individuals with latent TB do not have clinical symptoms but show sensitivity on screening. Active disease is present in those with clinical symptoms. An immunocompromised state increases likelihood of developing active disease. MTB can cause several clinical illnesses one of which is pulmonary TB (fatigue, fever, cough with bloody sputum, chest pain). | 4-12 weeks from infection to primary lesion or significant tuberculin reaction. | Infectious dose is 10 bacilli by inhalation. Tb bacilli can survive for 6-8 months in contaminated sputum outside of the host. Prompt diagnosis and treatment of active disease is important to prevent severe disease of surrounding population. |  |
| Bacteria | *Neisseria meningitidis* | Meningitis | **2** | Humans | By direct contact, including droplets and discharges from nose and throat of infected persons, more often carriers than cases. | Sudden onset with fever, intense headache, nausea and often vomiting, stiff neck, and frequently a petechial rash with pink macules; delirium and coma. | 2-10 days | Personnel working with high concentrations or large quantities of organisms should be immunized with tetra-valent polysaccharide vaccine (A,C Y,and W-135); |  |
| Bacteria | *Nocardia asteroides* | Nocardiosis | **2** | Humans, animals | Nocardiosis - Inhalation of contaminated dust; Mycetoma - subcutaneous contamination by a penetrating wound (thorns, splinters); rarely nosocomial post surgical transmission occurs. | Fever, cough, chest pain, CNS disease, headache, lethargy, confusion, seizures, sudden onset of neurologic deficit. Chronic disease originating in lungs; 80% of cases present as invasive pulmonary infection, disseminateddisease or brain abscess. 20% as cellulitis. | months | 10% of pulmonary disorders are fatal; Not directly transmitted from person-to-person. |  |
| Bacteria | *Pseudomonas* spp. (*Pseudomonas aeruginosa, Pseudomonas capacia*) | Respiratory and Urinary Infections, Pneuminia, Bacteremia | **2** | Humans, animals and plants | Direct contact with contaminated water or aerosols, or contact of mucous membranes with infectious discharges from conjunctivae or upper respiratory tract of infected persons. | Skin and soft tissue infections may be mild as in hot tub folliculitis or severe as in necrotizing fasciitis. Pseudomonas can cause a variety of severe clinical illness to include: UTI's, malignant otitis externa, bone infections, pneumonia, bacteremia, mengingitis, and endocarditis. | 24-72 hours | Opportunistic pathogen in the immunocompromised host; |  Copyright Dennis Kunkel |



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| Pathogen | Genus species | Disease | Risk Group | Host Range | Transmission | Signs & Symptoms | Incubation | Fact | Micrograph |
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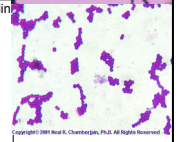
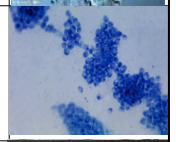
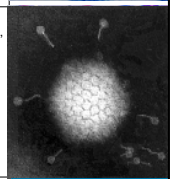
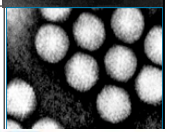
| Bacteria | *Salmonella* spp. | Salmonellosis | 2 | Humans; domestic and wild animals, birds. | Ingestion of contaminated food, from infected animals; fecal-oral transmission from person to person; direct contact with pets (reptiles, birds, turtles, tortoises). | Food borne disease with sudden onset of abdominal pain, diarrhea, nausea and vomiting; dehydration may be severe in infants and elderly. May progress to more serious septicemia, endocarditis, pneumonia; and typhoid like enteric fever. | 6-72 hours | Communicable throughout course of infection; several days to several weeks; temporary carriers can continue for several months. |  |
| Bacteria | *Shigella dysenteriae*, *Shigella sonnei*, *Shigella flexneri*, *Shigella boydii* | Shigellosis, Bacillary Dysentary | 2 | Humans and primates | Direct or indirect fecal-oral transmission; poor hygiene practices by direct contact or indirectly by contaminated food; water, milk, cockroach, and fly-borne transmission. | Diarrhea, fever, nausea, and sometimes toxemia, vomiting, cramps and tenesmus; stools contain blood, mucus and pus. | 1-7 days | Communicable during acute infection and until agent is no longer present in feces, usually within 4 weeks after illness. *S. dysenteriae* infections have up to 20% case fatality rate. Infectious dose is 10-200 organisms by ingestion. . |  |
| Bacteria | *Streptococcus pyogenes* | Strep Throat, Skin Infections, Impetego, Food Poisoning, Scar-let Fever, Necro-tizing Fasciitis/ Pneumonia | 2 | Humans | Via inhalation of respiratory droplets, direct or intimate contact with patient (especially nasal); rarely by indirect contact through objects or hands; | Fever, tonsillitis, pharyngitis), streptococcal skin infections (impetigo or pyoderma), scarlet fever (skin rash, fever, nausea), toxic shock, septicemia and necrotizing fasciitis. | 1-3 days | Same strain causes impetigo and strep throat; Fatality rates: Necrotizing fasciitis 20%, Scarlet fever 3%, Toxic shock syndrome 60%. |  |
| Bacteria | *Staphylococcus aureus* | Skin and Soft Tissue Infections **(SSTIs),** Toxic Shock Syndrome, Impetigo, Food Poisoning | 2 | Humans, occassionally cows | Contact with carriers; from draining lesions or purulent discharges; spread person-to-person; ingestion of food containing staphylococcal enterotoxin via contaminated food. Mother to baby during delivery. | Food poisoning is characterized by abrupt/violent onset, severe nausea, cramps, vomiting, and diarrhea; infections may cause impetigo, folliculitis, abscesses, boils, infected lacerations; deep infections include endocarditis, necrotizing fasciitis, meningitis, septic arthritis, pneumonia and toxic shock. | infections: 4-10 days; food poisoning (ingesting enterotoxin) 2-4 hours. | Many strains are multi-resistant to antibiotics; methicillin resistant (MRSA) strains have caused major out-breaks; vancomycin resistance (VRSA) strains are increasing. |  |
| Fungi | *Aspergillis* spp. ***Aspergillus fumigatus*** | Aspergillosis | 2 | Humans | Inhalation of airborne conidia, direct inoculation of skin. | Acute pneumonia with multifocal infiltrates expanding to consolidation; disseminated aspergillosis extends to other organs (ie., skin, CNS, liver, kidney, heart); most common cause of otomycosis. | a few days to weeks | Widely distributed in nature; in soil, cereal grains, hay and other plant material or food stuff. Spores survive in soil and decaying matter for a long time. |  |
| Fungi | *Candida albicans* | Candidiasis; Thrush | 2 | Humans (normal human flora) | Endogenous spread (part of normal human flora); by contact with excretions of mouth, skin, and feces from patients or carriers; from mother to infant during childbirth. | Mycosis of superficial layers of skin or mucous membranes; ulcers or pseudomembranes in esophagus, GI tract or bladder; hematogenous dissemination may produce systemic invasive disease with lesions in kidney, spleen, lung, liver, prosthetic cardiac valve, eye, meninges, brain. | variable | Survives outside of host, especially in moist, dark areas. Opportunistic pathogen. |  |
| Virus Adenoviridae | Adenovirus types 40 and 41 | Acute Respiratory Disease | 2 | Humans; experimentally infected rabbits, pigs and calves | Direct contact person-to-person by the fecal-oral route; respiratory route | Nausea, vomiting, diarrhea, malaise; tissues of the eye and respiratory tract; asymptomatic infection common (virus in feces of healthy individuals). May cause an acute hemmorrhagic cystitis infection in immunocompromised hosts. | 3-10 days | Ingestion; accidental parenteral inoculation; droplet exposure of the mucous membranes of the eyes, nose, or mouth; inhalation of concentrated aerosolized material. |  |
| Virus Adenoviridae | Adenovirus types 1,2,3,5 and 7 | Acute Respiratory Disease | 2 | Humans | Directly by oral contact and droplet spread; indirectly by tissues, eating utensils and other articles freshly soiled with respiratory discharge of an infected person; outbreaks have been related to swimming pools. | Fever, rhinitis, pharyngitis, tonsillitis, cough and conjunctivitis; common cause of nonstreptococcal exudative pharyngitis among children under 3 years; more severe diseases include laryngitis, croup, bronchiolitis, or severe pneumonia.May cause an acute hemmorrhagic cystitis infection in immunocompromised hosts. | 1-10 days | A syndrome of pharyngitis and conjunctivitis (pharyngoconjunctival fever) can develop. |  |

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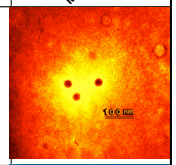
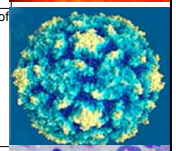
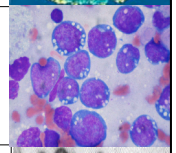
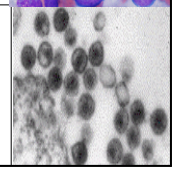
|---|---|---|---|---|---|---|---|---|---|
| Virus Picornaviridae | Coxsackie virus | Devil's Grip, Hand Foot and Mouth Disease, Vesicular Pharyngitis | **2** | Humans | Direct contact with nasal and throat secretions from an infected person, fecal-oral route, inhalation of infected aerosols. | Abrupt onset of fever, sore throat, anorexia, dysphagia, vomiting and small, discrete vesicular lesions in the oral regions; vesicular stomatitis has more diffuse lesions in the oral region.Group A viruses: aseptic meningitis, colds, acute hemorr-hagic conjunctivitis and acute myocardio-pathies and group B: acute myocarditis and a polio-like paralysis | 3-5 days | Although people of any age can get infected, the majority of patients identified with Coxsackie infection are children. Pregnant women can pass Coxsackie virus to their newborns. |  |
| Virus Herpesviridae | Epstein-Barr virus **(EBV) (=Herpesvirus 4)** | Infectious Mononucleosis (IM) | **2** | Humans | Person-to-person by oropharyngeal route via saliva, possible spread via blood transfusion (not important route). | Infectious mononucleosis - acute viral syndrome with fever, sore throat, splenomegaly and lymphadenopathy; Burkitt's lymphoma - monoclonal tumour of B cells. | IM - 4-6 weeks | IM is communicable for up to 1 year or more, 15-20% of EBV antibody-positive adults are oropharyn-geal carriers; tumours are not communicable. |  |
| Virus Herpesviridae | Epstein-Barr virus **(EBV) (=Herpesvirus 4)** | Burkitt's Lymphoma (BL) | **2** | Humans | Primary infection occurs early in life or involves immunosuppression and reactivation of EBV later. | Burkitt's lymphoma - monoclonal tumour of B cells; Burkitt's lymphis a cancer of the lymphatic system (in particular, B lymphocytes). | 2-12 years from primary infection | Burkitt's lymphoma can be divided into three main clinical variants: the endemic, the sporadic and the immunodeficiency-associated variants which are all associated with HIV and AIDS. |  |
| Virus Retroviridae | Human Immunodeficiency virus (HIV-1 and HIV-2) | Acquired Immune Deficiency Syndrome (AIDS) | **3** | Humans | Person to person through direct exposure to infected body fluids (blood, semen) sexual contact, sharing unclean needles etc.; transplacental transfer can occur. | Insidious onset with non-specific symptoms such as lymphadenopathy, anorexia, chronic diarrhea, weight loss, fever, and fatigue | 6 months to 7 years: most people seroconvert within 4-10 weeks. Development of symptoms and progression to AIDS can vary greatly depending on treatment. | HIV-1 is the predominant form in the US and HIV-2 in Africa. |  |

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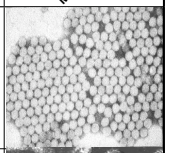
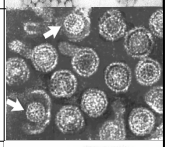
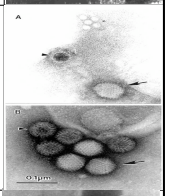
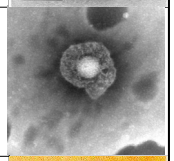
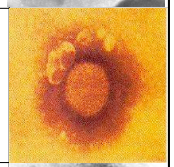
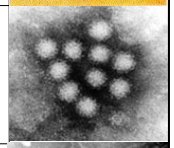
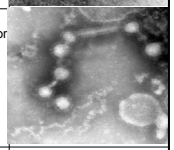
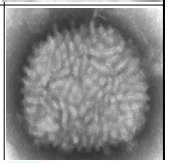
| Virus Herpesviridae | Hepatitis A virus **(HAV)** | Infectious Hepatitis | **2** | Humans | Person-to-person by fecal-oral route; ingestion of contaminated food (i.e., shell fish) and water. Rare instances of transmission by blood transfusion. | Many infections are asymptomatic; abrupt onset with fever, malaise, anorexia, nausea and abdominal discomfort, followed within a few days by jaundice. Mild illness (1-2 weeks) to severely disabling (6-9 months period), no carrier state. | 10-50 days | Infectious dose is 10-100 HAV particles. Survives in water and sewage for long periods (days-weeks). No carrier state associated with HAV. |  |
| Virus Hepadnaviridae | Hepatitis B virus **(HBV)** | Serum Hepatitis | **2** | Humans | Percutaneous or mucosal exposure to infectious body fluids (blood, body fluids, tissues, or cell lines). Direct blood-to-blood contact with an infected person. Mother to child transmission during childbirth. | Disease onset is gradual with anorexia, abdominal discomfort, nausea and vomiting, arthralgia and rash, jaundice and mild to moderate fever. Severity ranges from asymptomatic to fatal hepatic necrosis. | Incubation period ranges from 45-180 days with HBV serum antigen (Ag) appearing in 2 weeks. | 80% of infected individuals will only exhibit acute infection, while 20% will become chronic carriers. HBV vaccine is 95% efficacious pre-exposure. |  |
| Virus Flaviviridae | Hepatitis C virus **(HCV)** | Parenterally transmitted non-A, non-B hepatitis | **2 (US) 3 (UK)** | Humans | Primary route of transmission is via Infected blood. Percutaneous exposure to contaminated blood and plasma derivatives. | Anorexia, vague abdominal discomfort, nausea and vomiting, progressing to jaundice (less frequently than in individuals infected with hepatitis B); severity ranges from unapparent cases in approximately 90% of infections to rare fulminating, fatal cases. | 2 wks to 6 mo; chronic infect-ion may per-sist for up to 20 years be-fore onset of cirrho-sis or heptoma | 75-85% of infected persons become chronically infected and 70% of chronic sufferers go on to develop liver disease. |  |
| Virus Herpesviridae | Herpes simplex viruses Herpesvirus 1 **(HSV-1)** and Herpesvirus 2**(HSV-2)** | Fever Blister, Cold Sore, Genital Herpes | **2** | Humans | HSV-1 - contact with saliva of carriers, infection of hands of health care personnel (i.e., dentist); HSV-2 - usually by sexual contact or direct contact of infected secretions. | HSV-1 - infection of the oral mucosa (face & lips); reactivation of latent infection results in fever blisters or cold sores. HSV-2 is genital herpes and is associated with aseptic meningitis. Either can infect both oral mucosa or genital tract. 90% of HSV-1 infections are oral; 85% of HSV-2 are genital. | HSV-1: 7-10 days; HSV-2: 2 -12 days. | Virus may be secreted in saliva for up to 7 weeks after recovery and from genital lesions for 7-12 days. 50% - 90% of adults possess antibodies to HSV-1. Deleted "type." |  |
| Virus Arenaviridae | Lymphocytic Choriomeningitis virus | Lymphocytic Meningitis | **2** | Humans, guinea pigs, hamsters, mice and monkeys | Aerosols transmission via dust contaminated with rodent excreta; contam-ination of mucous mem-branes, cuts with infected body fluids; no evidence of person to person spread. | Bi-phasic febrile illness; mild influenza-like illness or occasional meningeal symptoms. Symptoms include fever, fatigue, headache, nausea, vomitting and muscular pain | 8-13 days | Infected mice excrete virus in saliva, urine and feces; man is infected through inhalation of infectious aerosolized particles of rodent urine, feces or saliva, |  |
| Virus Caliciviridae | Norovirus (formerly Norwalk virus) | Acute Gastroenteritis **(AGE)** | **2** | Humans | Primarily by fecal-oral route; other sources include water, food (part-icularly shellfish and sal-ads), aerosol and fomites. Communicable during the acute stage of the disease. | Acute onset with vomiting, non-bloody diarrhea, abdominal cramps; 25-50% of affected persons report myalgias, malaise, headache, nausea and low-grade fever. Illness usually resolves within 24-48 hours. | 10-60 hours | Norovirus is respons-ible for 50% of all food illnesses.. |  |
| Virus Paramyxoviridae | Respiratory Syncytial virus (RSV) | Common cold, Bronchiolitis or Pneumonia | **2** | Humans | Respiratory secretions; in-halation of large droplets; fomites; direct oral contact; indirectly by hands and eating utensils or other articles freshly soiled by respiratory discharges. | Most common cause of common cold-like lower respiratory tract illness in infants and young children; causes common colds in adults; pneumonia in infants, and bronchiolitis in very young babies. Most common cause of viral pneumonia in children < 5 years. | 4 to 5 days | Infectious dose is 100-640 infectious organisms when administered intranasally. Viral shedding may persist for several weeks after symptoms subside. |  |
| Virus Poxviridae | Vaccinia virus | Disseminated Vaccinia | **2** | Humans | Ingestion, parenteral inoculation, droplet or aerosol exposure of mucous membranes or broken skin with infectious fluids or tissues; recently vaccinated individuals can transmit the vuirus to others from the site of inoculation. | Vesicular or pustular lesion, area of induration or erythema surrounding a scab or ulcer at inoculation site; major complications encephalitis, progressive vaccinia (immunocompromised susceptible), eczema vaccinatum - a localized or systemic dissemination of vaccinia virus. | 5-10 days Infectious dose is unknown. | Smallpox vaccine is indicated for laboratory workers directly involved with vaccinia and vaccinia virus recombinants. |  |

***Images were obtained from the U.S. Centers for Disease Control & Prevention Public Health Image Library (PHIL).**

**Reference:Current Diagnosis and Treatment of Infectious Disease 2001 by The McGraw-Hill Companies, Inc**