

Diagnosis—You Are the Doctor, Part II

Patient Profile

Patient Name _____ Medical History Number _____

1. Review the *Initial Patient Screening* slip for your patient. This slip includes the information gathered by the admitting nurse.
2. Cross-reference the patient's symptoms with the conditions listed on the provided *Medical Condition Overview Table*, the *Medical Condition Overview* and the *Diagnostic Test Order Form*. If desired, consult other reference sources.
3. Your instructor or an assistant will act out the role of the patient and as lab technician during this activity.
4. Generally doctors begin to diagnose patients after reviewing the patient's vital signs, examining the symptomatic area(s) of concern and asking the patient a few questions about his or her lifestyle, health history, work and leisure activities, recent travel or other recent life events. Not all patients will exhibit all the symptoms listed for a condition, and not all symptoms listed are related to the medical condition that is bringing the patient to the urgent care facility.
5. Record in the space below the initial set of questions you want to ask. Be sure to record each question asked and its corresponding response. Although five question spaces are given, fewer or more questions are possible.

Initial Consultation

Question 1: _____

Patient response: _____

Question 2: _____

Patient response: _____

Question 3: _____

Patient response: _____

Question 4: _____

Patient response: _____

Question 5: _____

Patient response: _____

6. Based on the current information gathered, list possible medical conditions the patient may have.

7. Checkmark the desired diagnostic tests on the *Diagnostic Test Order Form* to either confirm or rule out possible medical conditions. Submit the form to the lab technician. The lab technician will return the form with the results filled in. Remember your team only has 15 points worth of tests that can be ordered before a penalty is incurred.
8. Review the information gathered so far, and determine a set of follow-up questions for the patient.

Patient Profile *continued*

Diagnostic Test Order Form

Groups are only allowed to order diagnostic tests worth up to 15 points. This restriction is due to the limitations of insurance coverage or money to pay for testing. Each additional point will result in a penalty.

For tests where the source of body fluid or tissue must be indicated, that test must also be ordered prior to or with the test. For example, a PCR test may use blood as the source, so a blood test must also be ordered; therefore, the total points for this test is 6 points.

1-Point Tests		Test Result
	Breathalyzer test for alcohol	
	Meningococcal rash pressure test	
	Oral cavity exam	
	Otoscopy (ear exam)	
	Palpation Indicate area or organ:	
	Physical exam of the skin	
	Pupil reflex, cornea, retina eye exam	
	Reflex tests, knee, arm, Achilles, foot	
	Rhinoscropy, anterior (internal nose exam)	

2-Point Tests		Test Result
	Antibody-antigen blood test for general antibodies	
	Basal rate blood test for insulin, reproductive hormones, growth hormones	
	Blood cell and serum culture for bacteria, fungi, parasites or viruses in the blood	
	Blood test for metals, such as iron and lead	
	Complete blood count: red and white blood cell count, total hemoglobin, hematocrit fraction, platelet count	
	D-dimer blood test for the presence of blood clots	
	Dynamic test for blood pressure and growth hormones	
	Immunoglobulin blood test for IgA, IgG and IgM	
	Lipid panel for cholesterol levels in blood	
	Liver function blood test	

3-Point Tests		Test Result
	Comprehensive metabolic panel	
	Albumin, alcohol, alkaline phosphatase, alanine aminotransferase, aspartate aminotransferase, bilirubin, blood urea nitrogen, calcium, chloride, CO ₂ , creatinine, glucose, potassium, sodium, total protein	
	Echocardiogram for heart abnormalities	
	EEG (Electroencephalogram) test for brain activity	
	ELISA (Enzyme Linked Immunosorbent Assay) for proteins, hormones, antibodies or pregnancy	
	Ultrasound Indicate area or organ:	

Patient Profile *continued*

3-Point Tests, continued		Test Result
X-ray Indicate area or organ:		
Nasal swab culture for bacteria, fungi, parasites or viruses		
RDT (Rapid Diagnostic Test) (accuracy 50–70%), Choose one: dengue, influenza, malaria, pneumonia, streptococci or tuberculosis		
Skin tissue culture for bacteria, fungi or parasites		
Sputum culture for bacteria, fungi or parasites in respiratory tract		
Stool analysis for digestive tract, liver and pancreas disease; colon cancer; bacteria, fungi or parasites		
Throat swab culture for bacteria, fungi or parasites in the throat and mouth		
Thyroid blood test: TSH, T4, T3, thyroid-stimulating immunoglobulin (TSI) test, Antithyroid antibody test		
Tuberculosis skin test		
Urinalysis: Specific gravity, pH, protein, glucose, ketones, blood, nitrite, bilirubin, urobilinogen		
Urine test for pregnancy		

4-Point Tests		Test Result
Biopsy, fine-needle to test nodules, cysts or tumors Indicate area or organ:		
CSF (Cerebrospinal Fluid) test and culture: pressure, appearance, total protein, gamma globulin, glucose, cell count, chloride		
CT (Computed Tomography) Indicate area or organ:		
CT (Computed Tomography) with radio-contrast Indicate area or organ:		
Diabetic blood testing, either fasting or glucose tolerance test		
Immunoblot test for bacteria, fungi or viral antibodies		
MRI (Magnetic Resonance Imaging) scan Indicate area or organ:		
MRI (Magnetic Resonance Imaging) scan with radio-contrast Indicate area or organ:		
Nuclear medicine scan with radioactive iodine uptake Indicate area or organ:		
PCR (Polymerase Chain Reaction) test for bacterial, parasite or viral DNA. Indicate source of sample:		
Resistance test of cultured bacteria or fungi		
RT-PCR (Reverse Transcriptase-PCR) for RNA viruses Indicate source of sample:		

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Medical Condition Overview

Acute Kidney Failure

Acute kidney failure is also known as acute renal failure. In this disorder, the kidney loses its ability to filter out toxic waste from the blood, which quickly becomes life-threatening. The onset of this condition is quick and can result from trauma to the kidney, liver or bladder, obstruction within the urinary tract, a kidney or urinary tract infection, severe dehydration, over use of over-the-counter pain medications or as a side effect of some heart medications. Diabetic individuals with occasional higher blood sugar levels and those with lupus are at higher risk of experiencing acute kidney failure.

Typical symptoms and diagnostic tests:

- Patient and family history: a personal or family history of diabetes, an injury to the lower back or ureter or recent long hospitalization
- Physical symptoms: back pain and swelling, decreased urinary output, fatigue, fluid retention, nausea, shortness of breath
- Comprehensive metabolic panel: high levels of urea and creatinine
- CT, abdomen: blockage within the urinary tract or the kidneys
- Palpation, back: swelling and pain over kidneys
- Ultrasound, abdomen: blockage within the urinary tract or the kidneys
- Urinalysis: reveals elevated levels of albumin protein and glucose

Adverse Reaction to Vaccination

A small percentage of people have adverse reactions to vaccinations. The reactions can be very minor to life threatening. Health care facilities are required to give patients copies of paperwork that lists the symptoms of a mild or severe reaction to each vaccine administered.

Typical symptoms and diagnostic tests:

- Patient and family history: vaccine received in the last six months
- Physical symptoms: bloody urine or stool, diarrhea, digestive tract inflammation, fatigue, fever, headache, joint pain, muscle aches, pneumonia, skin rash, vomiting
- No clinical tests

Alcohol Poisoning

Alcohol depresses the functions of the central nervous system. Alcohol poisoning occurs when large amounts of alcohol are consumed in a short period of time. Alcohol poisoning can be fatal. Adults and teens are at risk for knowingly ingesting large amounts of household alcohol or liquor. Small children may accidentally ingest alcohol as well.

Typical symptoms and diagnostic tests:

- Patient and family history: recent party, depression or a history of alcohol abuse; for small children, an unlocked liquor, medicine or cleaning product cabinet or the ingestion of vanilla extract
- Physical symptoms: confusion, pale or blue skin, seizures, slow or irregular breathing, unconsciousness, vomiting
- Breathalyzer test: elevated alcohol level
- Comprehensive metabolic panel: elevated alcohol level, low glucose level

Bird Flu

The bird, or avian, flu strain of influenza is caused by H5N1 bird flu virus. This virus is adapted to primarily living in a bird host and in a human as an alternative host. The virus is particularly harmful to birds, but can be serious for humans as well.

Typical symptoms and diagnostic tests:

- Patient and family history: Handling of or exposure to sick or dead birds that carry the virus
- Physical symptoms: dry cough, extreme fatigue, headache, high fever, muscle aches, runny or stuffy nose, sore throat, and sometimes conjunctivitis, diarrhea, nausea, vomiting
- Complete blood count: high number of white blood cells present
- ELISA (Enzyme Linked Immunosorbant Assay): positive reaction to H5N1 virus particles

Brain Abscess

An abscess is a collection of pus surrounded by tissue or a membrane that separates the pus from the rest of the body. Abscesses are caused by the body's response to inflammation and infection. The pus contains live and dead tissue cells, bacteria or fungal cells, white blood cells and plasma. In the case of brain abscesses, bacteria or fungi infect part of the brain. Bacteria from the *Streptococcus* or *Staphylococcus* genus are often the cause of abscesses. Most cases result from a bacterial infection that originates somewhere else in the body and somehow penetrates the brain from the circulatory system. Patient history typically includes brain trauma from an accident, sinusitis, otitis media (inner ear infection), lung or heart infection, or an occurrence of an open wound or sore—even if it is from surgery. Any diseases that compromise the immune system can contribute to the likelihood of a brain abscess.

Typical symptoms and diagnostic tests:

- Patient and family history: recent trauma, infection, medical procedure or a disease that reduces the body's ability to fight infection
- Physical symptoms: chills, confusion, difficulty speaking, drowsiness, fever, headache, loss of coordination, loss of muscle function on one side of the body, seizures, stiff neck, vision changes
- Blood cell and serum culture: presence of bacteria in blood
- Complete blood count: high number of white blood cells present
- CSF test and culture: elevated WBC (white blood cell) count, presence of bacteria in cerebrospinal fluid
- CT or MRI, head: ring enhancing lesion appearance
- EEG test: abnormal brain activity

Celiac Disease

Celiac disease symptoms occur when the villi lining the small intestine become inflamed and damaged. The inflammation and damage inhibits nutrient absorption. Although the exact cause is unknown, symptoms seem to worsen when gluten is consumed.

Typical symptoms and diagnostic tests:

- Patient and family history: relatives with the disease, occurs in both genders at any age, occurs more often in patients with Addison's disease, intestinal cancer, lactose intolerance, thyroid disease or diabetes
- Physical symptoms: abdominal pain, anemia, anxiety, constipation, diarrhea, fatigue, fluid retention, gas, growth delay in children, hair loss, itchy rash with bumps and blisters, joint pain, nausea, numbness in extremities, greasy stool, seizures, vomiting, weight loss
- Immunoglobulin blood test for IgA, IgG and IgM: IgG and IgA elevated
- ELISA for antibodies: IgA and IgG
- Biopsy, fine needle, small intestine: damaged villi visible
- Biopsy, fine needle, skin rash with immunofluorescence: granular IgA deposits

Cerebral Venous Sinus Thrombosis

A blood clot forms in the dural venous sinuses, which drain blood from the brain to the lungs. The clot leads to a buildup of blood in the arteries, which leads to blood leaking into the brain tissue or the arteries rupturing. The blood leaking results in a hemorrhagic stroke. Pregnancy, blood clotting disorders, head trauma and obesity are all factors that can lead to thrombosis.

Typical symptoms and diagnostic tests:

- Patient and family history: a recent head injury, obesity, the last trimester of pregnancy, a family or personal history of blood-clotting disorders
- Physical symptoms: abnormal vision, impaired speech, lightheadedness, loss of muscle control on one side of the body, nausea, seizures, severe headache, vomiting
- CT or MRI, head: may or may not show a dense area in the dural veins
- CT or MRI with radio-contrast, head: shows empty veins behind a blood clot
- D-dimer blood test: abnormal

Chikungunya

Chikungunya is a mosquito-borne illness found in the Caribbean, Africa, Asia, Europe and islands in the Indian and Pacific Oceans. The main vector of this pathogen is the exotic striped Asian tiger mosquito. This condition is often misdiagnosed as Dengue fever because the symptoms are strikingly similar. What distinguishes this tropical illness from others is the excruciating muscle pain it causes in its victims. It is less lethal than the West Nile virus.

Typical symptoms and diagnostic tests:

- Patient and family history: recent travel to infection-prone areas
- Physical symptoms: fever, headache, joint pain and swelling, muscle pain, rash
- Antibody-antigen blood test: neutralizing antibodies present
- Complete blood count: normal
- Immunoglobulin blood test for IgA, IgG and IgM: elevated IgM
- RT-PCR from blood: chikungunya viral RNA present

Dengue Fever

This illness affects travelers who visit tropical and subtropical countries. Four related viruses are responsible for this infection, which is spread through the bite of an *Aedes aegypti* mosquito. The pathogenic virus is related to the one that causes West Nile virus. Its trademark symptom is high fever that drops and rises a second time.

Typical symptoms and diagnostic tests:

- Patient and family history: recent travel to infection-prone areas
- Physical symptoms: bone, joint and muscle pain, bruise easily, high fever, nose and gum bleeds, severe headache, severe pain behind the eyes, rash
- Antibody-antigen blood test: neutralizing antibodies present
- Complete blood count: low number of white blood cells and platelets
- Immunoglobulin blood test for IgA, IgG and IgM: elevated IgG and IgM
- RDT, dengue: positive
- RT-PCR from blood: dengue viral RNA present

Diabetes

Diabetes mellitus is the name of the disorder when blood sugar levels are too high due to problems with the hormone insulin. Type 1 diabetes occurs when the body does not produce functional insulin. Type 2 diabetes occurs when the body does not use the insulin that is produced. Blood glucose levels are elevated with both types of diabetes, and this leads to severe health problems. Gestational diabetes occurs when a woman develops the condition while pregnant, typically in the second trimester. Gestational diabetes often resolves itself after the baby is born, but the condition must be closely monitored during pregnancy to reduce harm to the baby and mother.

Typical symptoms and diagnostic tests:

- Patient and family history: family history of diabetes, autoimmune disease, obesity, inactivity, pregnancy, high blood pressure, abnormal cholesterol levels
- Physical symptoms: extreme hunger, fatigue, frequent infections, frequent urination, increased thirst, slow healing, vision problems, weight loss
- Basal rate blood test: abnormal insulin levels
- Comprehensive metabolic panel: elevated glucose
- Diabetic blood testing: elevated blood glucose
- Lipid panel: low HDL and high triglyceride levels
- Urinalysis: elevated ketones and glucose

Ehrlichiosis

Ehrlichiosis, also known as anaplasmosis, is a tick-borne illness caused by several bacteria in the *Ehrlichia* genus. The Lone Star tick (*Amblyomma americanum*) is the primary vector for the bacteria. Individuals highest at risk of acquiring the condition are ones who spend time outdoors in grassy and wooded areas native to the tick vector endemic to the aforementioned bacteria. Symptoms start 7–10 days after infection.

Typical symptoms and diagnostic tests:

- Patient and family history: outdoor activities in grassy and wooded lots in areas endemic to the disease
- Physical symptoms: conjunctivitis, fatigue, fever, headache, lethargy, muscle aches, and sometimes diarrhea, nausea, rash, vomiting
- Antibody-antigen blood test: positive
- Complete blood count: Low WBC (white blood cell) count, low platelet count, may see infected WBC
- Immunoglobulin blood test for IgA, IgG and IgM: elevated IgM
- Liver function blood test: elevated liver enzymes
- PCR, blood: positive for *Ehrlichia* DNA

Encephalitis

Encephalitis is the inflammation of the brain resulting from a viral infection. Although many viruses can cause encephalitis, it is often seen after infection by the West Nile virus (*Flaviviridae* virus family), the herpes virus family, the arbovirus family or the rabies virus.

Typical symptoms and diagnostic tests:

- Patient and family history: mosquito bite, travel, animal contact, recent measles, mumps, polio, rubella or chickenpox infection
- Physical symptoms: confusion, drowsiness, fatigue, light sensitivity, loss of appetite, loss of coordination, mild fever, mild headache
- Antibody-antigen blood test: neutralizing antibodies present
- Complete blood count: low number of WBC (white blood cell) and platelets present
- CSF test and culture: elevated WBC count, increased intracranial pressure, IgM antibodies for virus present in cerebrospinal fluid
- CT or MRI, head: swelling in the brain
- EEG: abnormal brain activity
- Immunoglobulin blood test for IgA, IgG and IgM: elevated IgG and IgM
- RT-PCR from cerebrospinal fluid: *Flaviviridae*, herpes, arbovirus or rabies RNA present

Giardiasis

Giardiasis is a condition in which the small intestine becomes infected by the *Giardia intestinalis* protozoan. Symptoms typically begin one to two weeks after infection. The protist is found in water, soil or food contaminated by feces of infected humans or animals. Infection can also occur when a caregiver touches contaminated feces and then doesn't wash properly.

Typical symptoms and diagnostic tests:

- Patient and family history: consumption of untreated water or raw, undercooked or contaminated food; direct contact with an infected person or animal
- Physical symptoms: dehydration, gas, greasy stools, loss of appetite, nausea, stomach cramps
- PCR, stool sample: *Giardia* DNA present
- Stool analysis: motile or cysts of *Giardia* present

Hyperthyroidism

Hyperthyroidism is a condition also known as overactive thyroid, where the thyroid gland secretes excess amounts of T3 and T4 hormones. Grave's disease (an autoimmune disorder) is one of the most common causes of this condition. Grave's disease occurs mostly in women over 20 years old, but both genders of any age can develop the disorder. Another cause of hyperthyroidism is an excess of iodine in the diet since iodine is needed to produce the aforementioned hormones.

Typical symptoms and diagnostic tests:

- Patient and family history: family history of goiter, thyroid problems or Grave's disease; consumption of too much iodine
- Physical symptoms: anxiety, bulging eyeballs, diarrhea, enlarged thyroid (goiter), fatigue, hand tremor, increased appetite, memory loss and difficulty concentrating, moodiness, rapid or irregular heart rate, sweating, sudden weight loss
- Biopsy, fine needle, thyroid and thyroid nodules: benign, malignant or filled with fluid
- Blood pressure: elevated systolic (first number) pressure
- Lipid panel: extremely low cholesterol levels
- Nuclear medicine scan with radioactive iodine uptake, thyroid: high levels of radioactive iodine in the thyroid
- Palpation, neck: thyroid enlarged
- Thyroid blood test: elevated T3 and T4 hormones, low TSH levels
- Ultrasound, neck: enlarged thyroid or nodules on thyroid

Hypoglycemia

Hypoglycemia occurs when there is a chronically low level of blood glucose. Hypoglycemia can occur when a diabetic individual is over-treated, but also occurs on its own due to alcoholism, kidney disease, anorexia nervosa, pancreatic tumor and adrenal and pituitary problems.

Typical symptoms and diagnostic tests:

- Patient and family history: member of an at-risk group
- Physical symptoms: confusion, extreme hunger, heart palpitation, seizures, shaky feeling, sweating, vision abnormalities
- Comprehensive metabolic panel: low blood glucose
- Diabetic blood testing: low blood glucose
- Liver function blood test: abnormal

Hypopituitarism

Hypopituitarism is a condition where the pituitary gland under the brain secretes a deficient amount of one or more of the eight growth-stimulating hormones. Hypopituitarism is caused by damage to the pituitary gland from trauma, radiation treatment, stroke, infection, tuberculosis, autoimmune disease or a tumor to the gland itself or the nearby brain tissue. Hypopituitarism affects both genders at any age.

Typical symptoms and diagnostic tests:

- Patient and family history: delayed growth in children, family history of pituitary problems
- Physical symptoms: anemia, cessation of menses in women, chills, cold sensitivity, fatigue, loss of appetite, puffy face, short stature in children, weight loss
- Basal rate blood test: decreased levels of reproductive hormones and growth hormones
- Biopsy, fine needle, pituitary tumor: benign or malignant
- Dynamic test: hormone levels increased after ingestion of stimulating medications
- MRI, brain: tumor or structural abnormality, if present

Hypothyroidism

Hypothyroidism is a condition where the thyroid produces insufficient amount of hormones to regulate the body's metabolism. A malfunctioning pituitary gland that secretes low levels of TSH (Thyroid Stimulating Hormone) is one primary cause. The other primary cause of hypothyroidism is an autoimmune disease known as Hashimoto's disease, where the body's immune system attacks the thyroid gland. Hypothyroidism affects women more than men, especially those over the age of 60.

Typical symptoms and diagnostic tests:

- Patient and family history: women over 60, family history of thyroid problems, radiation to neck or upper chest, lack of iodine in diet
- Physical symptoms: cold sensitivity, constipation, decreased heart rate, depression, dry skin, enlarged thyroid (goiter), fatigue, hair loss, hoarseness, joint pain, low blood cholesterol level, low blood pressure, memory loss and difficulty concentrating, muscle weakness, weight gain
- Biopsy, fine needle, thyroid: shows macrophages and lymphocytes
- Blood pressure: low
- Lipid panel: extremely low cholesterol levels
- Nuclear medicine scan with radioactive iodine uptake, thyroid: reveals low levels of radioactive iodine in the thyroid
- Palpation, neck: thyroid enlarged
- Thyroid blood test: low levels of T3 and T4, high levels of TSH, high levels of antithyroid peroxidase antibodies
- Ultrasound, neck: enlarged thyroid or nodules on thyroid

Infective Endocarditis

Infective endocarditis, also known as bacterial endocarditis, is an infection of the inner lining of the heart surface. Normal bacterial flora from the skin or mouth enters the bloodstream and infects a damaged area of the heart lining, heart valve and major blood vessel. The infection damages the valves and lining, eventually leading to heart failure, stroke, organ damage and brain abscess. The bacteria most often associated with endocarditis are the *Streptococcus* and *Staphylococcus* groups.

Typical symptoms and diagnostic tests:

- Patient and family history: artificial heart valves, congenital heart defect, previous bout of rheumatic or scarlet fever, catheter, IV drug use, tattoo or body piercing, dental procedure that cut the gums
- Physical symptoms: aching joints and muscles, chills, fatigue, fever, gasping for breath, heart murmur, pale skin and gums, persistent cough, swollen feet or legs, weight loss
- Blood cell and serum culture: presence of *Staphylococcus* or *Streptococcus* bacteria
- Echocardiogram: abscess on the heart valves, irregular valve and heart movement
- Palpation, feet and legs: swollen feet or legs
- PCR, blood and serum: DNA from *Staphylococcus* or *Streptococcus* present

Influenza

Influenza, more commonly called the flu, is a respiratory viral infection. The influenza virus spreads through respiratory droplets on surfaces or by breathing in the air from an infected cough or sneeze although the distance must be short since the droplets fall quickly. Symptoms appear 1–4 days after infection and last for less than two weeks. Complications, such as pneumonia, dehydration, sinus and ear infections or a worsening of asthma and congestive heart, failure may occur.

Typical symptoms and diagnostic tests:

- Patient and family history: known outbreak of flu in the home, workplace or community; lack of an annual flu vaccine or vaccine did not contain this strain of influenza virus
- Physical symptoms: body aches, chills, dry cough, fatigue, fever, headache, sore throat and sometimes diarrhea and vomiting
- Antibody-antigen blood test: positive for viral RNA
- RDT, influenza: positive
- RT-PCR, nasal swab: influenza RNA present

Iron Poisoning

Iron poisoning is a state of toxicity that primarily arrives from an acute overdose of iron from supplement pills or from iron-rich foods. Small children who ingest an adult multivitamin are at risk of death.

Typical symptoms and diagnostic tests:

- Patient and family history: ingestion of too many vitamins or foods fortified with iron
- Physical symptoms: abdominal pain, black or bloody stool, chills, dehydration, diarrhea, dizziness, fast but weak heart rate, fatigue, fever, headache, low blood pressure, metallic taste, pale skin with bluish lips and fingernail beds, seizures, vomiting
- Blood test for metals: elevated iron levels—between 350–500 µg/dL toxic; over 1000 µg/dL severe

Lead Poisoning

Lead poisoning is caused by exposure to old lead-based paint or to dust from contaminated soil, drinking water from houses with lead pipes or lead solder, eating or drinking from improperly lead-glazed ceramics, sucking on lead-containing jewelry or toys, using unregulated “traditional” remedies and workplace exposure in some industries. Lead moves into bones, blood and tissues in place of the necessary iron, zinc and calcium.

Typical symptoms and diagnostic tests:

- Patient and family history: live in a house built prior to 1978, home remodeling, imported dishes, inexpensive imported jewelry and toys
- Physical symptoms: abdominal cramps, anemia, constipation, coordination problems, diarrhea, fatigue, irritability, hyperactivity, low appetite, metallic taste, weight loss, intellectual deficits if exposure is chronic or extremely high over a few days
- Blood test for metals: 1–20 µg/dL mild; 30–50+ µg/dL severe
- X-ray, abdomen or long bone: bone changes visible

Listeriosis

Listeriosis, or Listeria, is a type food poisoning caused when vegetables, meat, dairy or processed foods contaminated with the bacterium *Listeria monocytogenes* are ingested. *L. monocytogenes* is common in soil, water and feces. The problem arises when it enters food processing facilities. Older adults, pregnant women, newborns and those with weakened immune systems are highly susceptible. Symptoms may begin a few days after eating the contaminated food, or infection may be asymptomatic for up to two months. Complications of listeriosis are miscarriage, blood infection and meningitis.

Typical symptoms and diagnostic tests:

- Patient and family history: ingestion of unwashed vegetables, undercooked meat, raw milk or soft cheeses, hot dogs, cold cuts or peanut butter
- Physical symptoms: fever, muscle aches, diarrhea, fatigue, headache, stiff neck, confusion, loss of coordination, sometimes convulsions
- Blood culture: shows presence of *L. monocytogenes*
- CSF test and culture: shows the presence of *L. monocytogenes*

Lyme Disease

Lyme disease is a tick-borne illness caused by the spirochete bacterium, *Borrelia burgdorferi*. The vector is a small black tick, either *Ixodes scapularis* or *Ixodes pacificus*, depending upon the location. Tiny tick nymphs are hard to see, and they feed during the spring and summer. Adult ticks can also transmit *B. burgdorferi*. Adults are active during cooler parts of the year. Symptoms may appear 3–30 days after the tick bite.

Typical symptoms and diagnostic tests:

- Patient and family history: a hobby or interest in grassy places of endemic areas
- Physical symptoms: characteristic “bull’s-eye” skin rash, fatigue, fever, headache, muscle and joint aches, swollen lymph nodes
- ELISA: positive for *B. burgdorferi* antibodies
- Immunoblot test: positive for *B. burgdorferi* antibodies
- Lyme disease is only diagnosed if both above tests are positive for *B. burgdorferi* antibodies
- Palpation, neck: lymph nodes enlarged

Malaria

Malaria is a mosquito-borne illness rampant in tropical countries of the world. Hundreds of millions of people are afflicted with malaria each year. It is caused by several members of the sporozoan family *Plasmodium*. The vector is the *Anopheles* mosquito. Symptoms appear 7–30 days or longer after infection.

Typical symptoms and diagnostic tests:

- Patient and family history: recent travel to an endemic area
- Physical symptoms: anemia, bloody stools, chills, enlarged liver or spleen, extreme thirst, fatigue, fever, headache, jaundice, sweating, vomiting; in severe cases brain damage, kidney failure and coma
- Blood cell and serum culture: motile *Plasmodium* in RBC
- Complete blood count: low RBC count, low platelet count
- Comprehensive metabolic panel: elevated bilirubin, elevated aminotransferases
- PCR: positive for *Plasmodium*
- RDT, malaria: positive

Meningitis

Meningitis is an inflammation of the thin tissue that surrounds the brain and spinal cord. If left untreated, the inflammation can lead to brain damage and death. Meningitis can be caused by viruses, bacteria or fungi. The bacterial pathogens mainly responsible for causing meningitis are *Haemophilus influenzae* type b, *Streptococcus pneumoniae*, *Neisseria meningitidis* and *Listeria monocytogenes*. Bacterial meningitis is life-threatening. High school and college students represent the age range featured in headlines of deaths and near-death experiences from this condition.

Typical symptoms and diagnostic tests:

- Patient and family history: close contact with a person infected with the bacteria or exposure to large groups of people
- Physical symptoms: difficulty concentrating and confusion, drowsiness and difficulty waking, high fever, lethargy, light sensitivity, nausea, seizures, severe headache, stiff neck, vomiting, sometimes a skin rash
- Blood cell and serum culture: if bacterial or fungal, positive for bacteria or fungi; if viral, test is negative
- Complete blood count: Elevated WBC (white blood cell)
- CSF: elevated WBC, low glucose levels, elevated protein levels; if bacterial or fungal, positive for bacteria or fungi; if viral, test is negative
- Meningococcal rash pressure test: rash stays red when pressed
- PCR, cerebrospinal fluid: antibodies against known meningitis causing pathogens
- Throat culture: if bacterial or fungal, positive for bacteria or fungi; if viral, test is negative
- X-rays or CT, head or chest: inflammation of tissues in the head, chest or sinuses

Migraine

A migraine is an intense pulsing or throbbing headache often located on one side of the head. The intense headache lasts for several hours or days and may occur several times a year or daily. Migraines are more common in women with symptoms appearing at any stage of life, but often start in adolescence. Migraines seem to have a genetic link.

Typical symptoms and diagnostic tests:

- Patient and family history: a family member who has migraines, patient is a member of an at-risk group
- Physical symptoms: extreme sensitivity to light and sound, intense headache, nausea, vomiting and visual disturbances, including auras, flashing lights, tunnel vision, seeing stars and blind spots
- No clinical tests

Mononucleosis (Mono)

Mononucleosis is also known as the kissing disease, or mono for short. The illness is caused by the Epstein-Barr virus (EBV), a subtype of human herpes virus, which is transmitted by direct body fluid contact, typically saliva. The symptoms may take four to six months to fully manifest themselves, and the infected person is infectious before symptoms appear. Spleen enlargement is one of the more serious symptoms since the spleen may rupture. Immunocompromised patients are at greatest risk of developing serious liver, heart, blood and nervous system complications. Many people contract Epstein-Barr virus as children and do not display serious symptoms. Epstein-Barr becomes latent within the host and can reemerge to enter the infectious stage later. Like other latent-type viruses, once someone has had an Epstein-Barr viral infection, they will always test positive for the virus when tested using the antibody-antigen blood test.

Typical symptoms and diagnostic tests:

- Patient and family history: sharing a drinking container, toothbrush, silverware or kissing with an infected individual
- Physical symptoms: fatigue, fever, headache, malaise, skin rash, sore throat, swollen lymph nodes in neck and armpits, swollen spleen, swollen tonsils
- Antibody-antigen blood test: positive for EBV for latent and active
- Blood cell and serum culture: positive for EBV for latent and active
- Complete blood count: elevated or abnormal WBC
- Oral cavity exam: red, irritated buccal lining, swollen tonsils
- Palpation, neck, armpits, abdomen: enlarged neck and armpit lymph nodes, soft, enlarged spleen
- PCR, blood: positive for EBV viral DNA (human herpes virus-4)

MRSA Infection

MRSA stands for methicillin-resistant *Staphylococcus aureus*. This virus is resistant to many antibiotics and is life-threatening if not treated. The most common location for contact with MRSA is in a health care facility, but it can also be present at child care facilities, schools, dorms, military camps and correctional facilities.

Typical symptoms and diagnostic tests:

- Patient and family history: a member of one of the at-risk groups, recent surgery or injury, participation in contact sports
- Physical symptoms: chest pain, chills, cough, difficulty breathing, fatigue, fever, headache, infected surgical site, malaise, red bumps, pimples, boils or “spider bites” on the skin
- Antibody-antigen blood test: positive for *Staphylococcus aureus* antibodies
- Skin tissue culture: positive for *Staphylococcus aureus*
- Resistance test of cultured bacteria or fungi: positive for antibiotic resistant *Staphylococcus aureus*

Osteomyelitis

Osteomyelitis is a bone infection. Osteomyelitis is often caused by bacteria or fungi that spread from another area of the body. Osteomyelitis also occurs after bone surgery. The bones most commonly infected in adults are the vertebrae, feet and hips. In children, the arm and leg long bones are more frequently the site of osteomyelitis. At-risk groups are those who have diabetes, poor circulation or blood disorders, compromised immune systems, are on dialysis and inject drugs.

Typical symptoms and diagnostic tests:

- Patient and family history: a member of one of the at-risk groups, recent surgery or injury
- Physical symptoms: chills, fever, irritability, lethargy, swelling, redness, warmth, pain over the infected area
- Biopsy, fine needle, bone: bacteria or fungi present
- Blood cell and serum culture: bacteria or fungi present
- Complete blood count: elevated WBC (white blood cell)
- CT with radio-contrast, spine, leg, arm, feet or hips: high contrast in area of inflammation
- Immunoglobulin blood test: elevated IgG and IgM
- MRI (magnetic resonance imaging): shows swelling of the vertebrae
- MRI, spine, leg, arm, feet or hips: indication of inflammation
- X-Ray, spine, leg, arm, feet or hips: bone abscess or inflammation present

Pharyngitis

Pharyngitis, or sore throat, is more common in children than in adults. Most sore throats are viral, but bacteria like *streptococcus* can also produce pharyngitis. People at highest risk are those who have allergies, who work or live in crowded places, who smoke, are susceptible to chronic sinus infections and have compromised immune systems from fighting other illnesses or from recent chemotherapy treatment.

Typical symptoms and diagnostic tests:

- Patient and family history: allergies or smoking, complaint of sore or scratchy throat, difficulty swallowing
- Physical symptoms: pain while swallowing, redness in throat, scratchy throat, swollen lymph nodes in the neck, swollen tissues near back of throat, sometimes fever, headache, joint pain, muscle aches and skin rash
- Immunoglobulin blood test: elevated IgG
- Oral cavity exam: red, swollen throat and tonsils
- Palpation, neck: lymph nodes enlarged
- PCR, throat swab: positive if bacterial or DNA-type viruses; negative for RNA-type viruses
- RDT, streptococci: positive if bacterial; negative if viral
- RT-PCR, throat swab: positive if RNA-type viruses; negative for bacteria and DNA-type viruses
- Throat swab culture: positive if bacterial; negative if viral

Primary Amebic Meningoencephalitis

Primary Amebic Meningoencephalitis (PAM) is a severe infection of the central nervous system caused by the free-living single-celled amoeba, *Naegleria fowleri*. Victims contract the protist through nasal intake of contaminated, warm freshwater ponds, lakes, hot springs and soil. Less often, *N. fowleri* infection is from improperly maintained pools, hot tubs or bathing in or nasal rinsing using contaminated tap water. PAM is almost always fatal.

Typical symptoms and diagnostic tests:

- Patient and family history: frequent exposure to warm or hot (up to 115 °F), stagnant, contaminated freshwater ponds, pools or old pipes where patient may have taken in water through the nose
- Physical symptoms: similar to bacterial meningitis, fever, hallucinations, light sensitivity, nausea, seizures, severe frontal headache, stiff neck, vomiting
- CSF: *N. fowleri* detected
- CT or MRI, head: swelling and bleeding in the brain
- PCR: *N. fowleri* DNA detected

Rocky Mountain Spotted Fever

Rocky Mountain Spotted Fever (RMSF) is a tick-borne disease caused by the bacterium *Rickettsia rickettsii*. The bacteria are transmitted by several different species of ticks. Symptoms typically begin 2–14 days after infection. RMSF may be fatal within 8 days of infection if not treated.

Typical symptoms and diagnostic tests:

- Patient and family history: reveals outdoor activities in grassy and wooded lots in an area endemic to the disease
- Physical symptoms: abdominal pain, conjunctivitis, fever, headache, loss of appetite, muscle aches, nausea, vomiting, sometimes a rash
- Antibody-antigen blood test: positive 7–10 days after infection
- Complete Blood Count: low RBC (red blood cell) count and low platelet count
- Comprehensive metabolic panel: low blood saline, elevated liver enzymes
- Immunoglobulin blood test: must be run twice for IgG, once early and once 2–4 weeks after infection
- PCR, skin biopsy of rash site or liver: positive for *R. rickettsii* DNA, but results may not be available until after patient has died

Sinusitis

Sinusitis, or sinus infection, is when one or more of the sinuses or the nasal passages become infected or inflamed. Acute sinusitis lasts less than 4 weeks while chronic sinusitis lasts longer than 4 weeks and reoccurs more than 4 times a year. Acute sinusitis can be caused by either a virus or a bacterium. Chronic sinusitis can be caused by a virus, bacterium, fungi, allergies or polyps and tumors. Viruses are the most common cause of sinusitis, but a secondary bacterial infection can prolong the inflammation.

Typical symptoms and diagnostic tests:

- Patient and family history: a history of allergies, exposure to infected individuals
- Physical symptoms: congestion, cough, fatigue, fever, headache, postnasal drip, runny nose, sore throat, sometimes bad breath, puffiness around the eyes and face, difficulty breathing through the nose, upper teeth may ache
- Nasal swab culture: negative if viral or allergy related; positive if bacterial or fungal
- Oral cavity exam: inflammation in the buccal cavity, drainage
- Rhinoscopy: inflammation in nasal passages, drainage, polyps or tumor may be present

Toxoplasmosis

Toxoplasmosis is a condition caused by the protozoan parasite, *Toxoplasma gondii*. Millions of Americans have been infected by *T. gondii*, but most are asymptomatic because of their immune systems. Symptoms can appear if the immune system becomes compromised or during pregnancy. The gravest threat from this parasite is to embryos and fetuses of mothers who are newly infected just before or during pregnancy. Infants with this type of exposure can be born with serious eye and brain damage.

Typical symptoms and diagnostic tests:

- Patient and family history: ingestion of undercooked or raw meat or foods and using utensils contaminated by raw meat, drinking contaminated water, ingestion of something that has come in contact with contaminated cat feces or soil
- Physical symptoms: body aches, chills, conjunctivitis, dry cough, enlarged lymph nodes, fatigue, fever, headache, sore throat, vision problems, sometimes diarrhea and vomiting
- CSF: positive for *T. gondii*
- ELISA, cerebrospinal fluid or amniotic fluid: positive for *T. gondii* antibodies
- Immunoblot, cerebrospinal fluid or amniotic fluid: positive for *T. gondii* antibodies
- Immunoglobulin blood test: elevated IgG and IgM
- Palpation, neck: lymph nodes enlarged
- PCR, cerebrospinal fluid or amniotic fluid: *T. gondii* DNA present

Tuberculosis

Tuberculosis (TB) is a contagious illness caused by the bacterium, *Mycobacterium tuberculosis*. Although the *M. tuberculosis* typically attacks lung tissue, it can also attack the brain, spine or kidneys. TB is spread through the air when an infected person coughs, sneezes or speaks. The bacteria then enter the new host as he or she inhales. *M. tuberculosis* can become latent in the body. The latent phase is asymptomatic, and hosts are not infectious. If the bacteria become active, the host will become infectious and symptomatic. Immunocompromised individuals are at greatest risk for TB disease. Other at-risk groups are diabetics, alcoholics, drug addicts and the homeless. Multiple sources indicate that this is the No. 1 killing pathogen of all time, claiming in excess of half a billion lives throughout the course of human history.

Typical symptoms and diagnostic tests:

- Patient and family history: contact with an infected individual in the past
- Physical symptoms: chills, fatigue, fever, persistent cough often with blood or sputum, loss of appetite, night sweats, weight loss
- Antibody-antigen blood test: positive for both active and latent infection
- Immunoblot: positive for both active and latent infection
- PCR, blood, sputum or lung tissue: used to test for specific antibiotic resistant plasmids
- Sputum culture: contains cultures of *M. tuberculosis* bacterium
- Tuberculosis skin test: positive for both active and latent infection
- X-ray, chest: active infection shows dense areas within the lungs from fluid build-up