To report vaccine-preventable diseases, call the Kansas Epidemiology Hotline 24 hours-a-day at 1-877-427-7317.

Making a difference one disease at a time
identify...prevent...report!
prevent it...report it!

Bibliography
Control of Communicable Diseases Manual, 19th Edition
American Academy of Pediatrics, Red Book Online
Centers for Disease Control and Prevention
Immunization Action Coalition

"Healthy Kansans living in safe and sustainable environments"
**Diphtheria**

Causative agent—*corynebacterium diphtheriae*—an aerobic gram-positive bacillus

Peak Incidence—occurs primarily in winter and spring

Incubation period is 2-5 days (range, 1-10 days) May involve any mucous membrane

Sites of infection—anterior nasal, pharyngeal and tonsillar, laryngeal, cutaneous, ocular and genital

Transmission—most often person-to-person spread through coughing and sneezing, rarely from skin lesions or articles soiled with discharges from lesions of infected persons (example fomites)

Diphtheria occurs in four clinical forms:

- **Anterior Nasal Diphtheria** ► Mucopurulent nasal discharge, white membrane forms on nasal septum
- **Pharyngeal and Tonsillar Diphtheria** ► Malaise, sore throat, anorexia, low-grade fever, within 2-3 days bluish-white membrane forms on the tonsils and may cover most of the soft palate, the membrane may then become grayish-green in color or black if bleeding has occurred.
- **Laryngeal Diphtheria** ► Fever, hoarseness, barking cough, can be an extension of the pharyngeal form or can only involve this site; membrane can lead to airway obstruction, coma and death
- **Cutaneous (Skin ) Diphtheria** ► In the United States, cutaneous diphtheria has been most often associated with homeless persons. Skin infections may be manifested by a scaling rash or by ulcers with clearly

Laboratory Diagnosis

- Specimens should be taken from the nose and throat (i.e., both a nasopharyngeal and pharyngeal swab) for culture
- Clinical specimens for culture of the area should use medium containing tellurite as it provides a selective advantage for the growth of this organism

Comment:

Cutaneous diphtheria is not reportable. Respiratory disease caused by non-toxigenic C. diphtheriae should be reported as diphtheria. All diphtheria isolates, regardless of association with disease, should be sent to the Diphtheria Laboratory, National Center for Infectious Diseases, CDC through KDHE lab.
Diphtheria

10 y/o boy with severe diphtheria
- conjunctivitis
- pharyngeal membrane
- bull neck
- severe myocarditis
- all vaccines contraindicated
Hepatitis A
(Infectious hepatitis)

Causative agent — hepatitis A virus
Peak incidence — no seasonal variation
Incubation period — 28 days with an average range of 15-50 days.
Transmission — primarily by the fecal-oral route by either person-to-person contact or ingestion of contaminated food or water

Clinical Course
• abrupt onset of fever, malaise, anorexia, nausea, abdominal discomfort, followed by dark urine and jaundice a few days later
• illness usually does not last longer than 2 months
• small percentage of persons have prolonged or relapsing signs and symptoms for up to 1 year, the virus may be excreted during a relapse.

Laboratory criteria for diagnosis:
• Serologic testing of hepatitis A IgM anti-HAV

Please report any suspect case of hepatitis A immediately to your local health department or to the Kansas Epidemiology Hotline 24 hours-a-day at 1-877-427-7317. Do not wait to report until tests results are available.
Hepatitis B
(Serum Hepatitis)

Causative agent — hepatitis B virus
Peak Incidence — no seasonal variation.
Incubation period — 60—150 days, range 90 days
Transmission — by parenteral or mucosal exposure to body fluids from persons who have acute or chronic hepatitis B infection.

Hepatitis B occurs in three common clinical forms:
- Acute Infection ► discrete onset of nausea, vomiting, abdominal pain and diarrhea followed by jaundice a few days later, 30% - 50% of adults and 10% of children develop symptoms
- Chronic Infection ► usually asymptomatic
- Perinatal transmission ► from mother to infant at birth

Laboratory criteria for diagnosis
- Serologic testing for HBsAg
- Serologic for IgM anti—HBc

Please report any suspect case of hepatitis B disease immediately to your local health department or to the Kansas Epidemiology Hotline 24 hours-a-day at 1-877-427-7317. Do not wait to report until tests results are available.
# Interpretation of Hepatitis B Serologic Tests

<table>
<thead>
<tr>
<th>Tests</th>
<th>Results</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>HBsAg</td>
<td>Negative</td>
<td>Susceptible</td>
</tr>
<tr>
<td>anti-HBe</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>anti-HBs</td>
<td>Negative</td>
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<tr>
<td>HBsAg</td>
<td>Negative</td>
<td>Immune due to vaccination</td>
</tr>
<tr>
<td>anti-HBe</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>anti-HBs</td>
<td>Positive with ≥10mIU/mL</td>
<td></td>
</tr>
<tr>
<td>HBsAg</td>
<td>Negative</td>
<td>Immune due to natural infection</td>
</tr>
<tr>
<td>anti-HBe</td>
<td>Positive</td>
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<tr>
<td>anti-HBs</td>
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<tr>
<td>HBsAg</td>
<td>Positive</td>
<td>Acutely infected</td>
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<td>anti-HBe</td>
<td>Positive</td>
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<tr>
<td>IgM anti-HBe</td>
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</tr>
<tr>
<td>anti-HBs</td>
<td>Negative</td>
<td>Chronically infected</td>
</tr>
<tr>
<td>HBsAg</td>
<td>Positive</td>
<td>Four interpretations possible*</td>
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<tr>
<td>anti-HBe</td>
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<tr>
<td>IgM anti-HBe</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>anti-HBs</td>
<td>Negative</td>
<td></td>
</tr>
</tbody>
</table>

*Postvaccination testing, when it is recommended, should be performed 1-2 months following dose #3.

† 1. May be recovering from acute HBV infection.
  2. May be distantly immune and the test is not sensitive enough to detect a very low level of anti-HBs in serum.
  3. May be susceptible with a false positive anti-HBe.
  4. May be chronically infected and have an undetectable level of HBsAg present in the serum.
Haemophilus Influenzae Serotype b Invasive Disease

(Hib)

Causative agent—haemophilus influenzae, a gram-negative coccobacillus

Peak Incidence—bimodal seasonal pattern, with one peak between September and December, and a second peak between March and May

Incubation period—is unknown, but probably less than one week

Transmission—occurs through contact with mucus or droplets from the nose and throat of an infected person

Invasive disease caused by *H* influenzae type b can affect many organ systems. The most common types of invasive disease are:

- Meningitis
- Epiglottitis
- Pneumonia
- Arthritis
- Cellulitis
- Osteomyelitis
- Pericarditis

Laboratory criteria for diagnosis:

- A Gram stain of an infected body fluid should be cultured on appropriate media (e.g., blood, cerebrospinal fluid [CSF], joint fluid, pleural fluid, or pericardial fluid.) All isolates of *Haemophilus influenzae* should be serotyped.
- Hospitalization is generally required for invasive Hib disease.

Please report any case(s) of Invasive *Haemophilus influenzae* disease immediately to your local health department or to the Kansas Epidemiology Hotline 24 hours-a-day at 1-877-427-7317.
Hib
(haemophilus influenzae type B)
Human Papillomavirus

(HPV)

Causative agent - human papillomaviruses that infect the epithelium ► more than 100 HPV types, 40 types infect the mucosal epithelium ●

Peak Incidence - no known seasonal variation

Communicability — presumed to be high as a large number of new infections are estimated to occur each year

Transmission - by direct contact, usually sexual, with an infected person, occurs most frequently with sexual intercourse, but can occur following non penetrative sexual activity. ► may also be transmitted by non sexual routes of genital transmission from a woman to a newborn infant at the time of birth

HPV Clinical Features:
● most HPV infections are asymptomatic and result in no clinical disease
● Clinical manifestations include:
  ► anogenital warts
  ► recurrent respiratory papillomatosis
  ► cervical cancer precursors (cervical intraepithelial neoplasia)
  ► cancer (cervical, anal, vaginal, vulvar, penile and some head and neck cancer)

Laboratory criteria for diagnosis:
● HPV tests approved by the FDA for triage of women with equivocal Papanicolaou (Pap) test results AND for cervical cancer screening in women over age 30
  ► HPV test for men is done only in a research setting.
Measles
(Rubeola, Hard measles, Red Measles, Morbilli)

Causative agent: measles virus, a paramyxovirus, genus Morbillivirus

Peak Incidence: occurs primarily in the late winter and spring

Incubation period: about 10 days, but may be 7—18 days from exposure to onset of fever, usually 14 days until rash appears, rarely as long as 19–21– days

Transmission: occurs primarily from person to person via cough and sneezing. May occur from 4 days before to 4 days after rash onset.

Measles is highly communicable with greater than 90% secondary attack rates among susceptible persons.

Characteristics:
• Stepwise increase in fever often peaking as high as 103° - 105° F with either Cough, or Coryza or Conjunctivitis
• Maculopapular rash usually lasting 5-6 days, beginning at the hairline, then involving the face and upper neck, during the next 3 days, rash gradually proceeds downward and outward, reaching the hands and feet.
• Koplik’s spots may be present in the buccal mucosa (occurs 1-2 days before the rash to 1-2 days after the rash
• Rash fades in order of appearance

Laboratory criteria for diagnosis:
• Positive serologic test for measles IgM antibody, or ► 3 or more days after rash onset
• Significant (generally a four-fold) rise in measles specific IgG antibody level (acute/convalescent)
• Isolation of measles virus from a clinical specimen (nasopharynx or urine) ►Within 7 days of rash onset

Please report any suspected case(s) of measles immediately to your local health department or to the Kansas Epidemiology Hotline 24 hours-a-day at 1-877-427-7317. Do not wait to report until tests results are available.
Meningococcal Disease

Causative agent — the bacteria, *Neisseria meningitidis* (*N. meningitidis*) a gram-negative diplococcus with at least 13 serogroups

Peak Incidence — occurs throughout the year, but the incidence is highest in the late winter and early spring.

Incubation period — is 3—4 days with a range of 2—10 days.

Transmission — primary mode is by respiratory droplet spread or by direct contact with the infected person such as kissing, coughing, chewing on toys and sneezing.

► Onset can be abrupt and course of disease rapid ◄

Invasive meningococcal disease occurs in two common clinical forms:

- Meningitis — sudden onset of fever, chills, myalgias, headache, stiff neck, nausea, vomiting, photophobia, altered mental status
- Blood infection — sudden onset of fever, petechial or purpuric rash, often associated with hypotension, shock, acute adrenal hemorrhage and multiorgan failure

Laboratory criteria for diagnosis:

- Blood and/or Cerebrospinal fluid (CSF) for cultures

All isolates for meningococccemia must be sent to: Division of Health and Environmental Laboratories
Forbes Field, Building, # 740
Topeka, KS 66620-0061 Phone: 785-296-1636

Please report any suspect case of meningococcal disease immediately to your local health department or to the Kansas Epidemiology Hotline 24 hours-a-day at 1-877-427-7317. Do not wait to report until tests results are available.
Mumps

Causative agent – mumps virus, a paramyxovirus
Peak incidence – peaks predominantly in late winter and spring but is reported throughout the year.
Incubation period – is 14-18 days (range 14-25 days)
Transmission – spread from person to person by sneezing, talking or coughing

Characteristics

✓ Prodrome symptoms are nonspecific and include:
  • Myalgia
  • Anorexia
  • Malaise
  • Headache
  • Low-grade fever
✓ Parotitis may be unilateral or bilateral ► Any combination of single or multiple salivary glands may be affected ◄
  • May first be noted as earache and tenderness on palpation of the angle of the jaw
  • Symptoms tend to decrease after 1 week and usually resolve after 10 days

Laboratory criteria for diagnosis;

- Positive serologic test for mumps IgM antibody, Must be collected within 3-7 days post onset
- Significant rise in mumps specific IgG antibody level (acute/convalescent)
- Isolation of mumps virus from a clinical specimen (swab from the parotid duct) Must be collected no later than
  3 days post onset/Use sterile Dacron or polyester-tipped swabs with plastic or aluminum shafts only

Please report any suspected case of mumps immediately to your local health department or to the Kansas Epidemiology Hotline 24 hours-a-day at 1-877-427-7317. Do not wait to report until test results are available.
Mumps
### Pertussis

*(Whooping cough)*

**Causative agent** - *bordetella pertussis*, a gram-negative rod

**Peak incidence** - no distinct seasonal pattern, but it may increase in the summer and fall

**Incubation period** - is commonly 7-10 days, with a range of 4-21 days, and rarely 42 days

**Transmission** - person to person by the respiratory route through contact with respiratory droplets or by contact with airborne droplets of respiratory secretions.

**Pertussis occurs in three stages:**
- begins with mild upper respiratory tract symptoms similar to the common cold
  - catarrhal stage
- progresses to paroxysms of cough characterized by inspiratory whoop and commonly followed by vomiting
  - paroxysmal stage
- symptoms wane gradually over weeks to months
  - convalescence stage

Please report any suspected case of pertussis immediately to your local health department or to the Kansas Epidemiology Hotline 24 hours-a-day at 1-877-427-7317. Do not wait to report until test results are available.
Pertussis
(Whooping cough)

Treatment
- **Erythromycin** (E-mycin®, Eryc®, EryTab®)
  - **Infants**—40-50 mg/kg/day PO, in 4 divided doses (Max 2g/day)
  - **Children**—10-50 mg/kg/day PO in 4 divided doses (Max 2g/day)
  - **Adults**—250-500 mg PO, QID in 4 divided doses (Max 2g/day)
  - **All ages**—14 day duration

- **Azithromycin** (Zithromax®)
  - **Infants**—< 6 months of age, 10 mg/kg/day PO, for 5 doses (Max 250 mg/day)
  - > 6 months, same as dose for children
  - **Children**—10 mg/kg/day PO, in 1 dose then 5 mg/kg for 4 doses (Max 500 on day 1, then Max 250 mg/day)
  - **Adults**—500 mg PO in 1 dose (Max 500 mg/day)
  - **All ages**—5 day duration

- **Trimethoprim-Sulfamethoxazole** (Bactrim™, Septra®)
  - **Infants**—should not be given to infants < 2 months, > 2 months, same as dose for children
  - **Children**—8 mg TMP/40 mg SMX/kg/day PO in 2 divided doses
  - **Adults**—1 double strength BID
  - **All ages**—14 day duration
Pertussis 
(Whooping cough)

Treatment
- **Clarithromycin (Biaxin®)**
  - **Infants**—should not be given to infants < 1 month of age, > 1 month, same as dose for children
  - **Children**—10-12 mg/kg/day PO, in 2 divided doses (Max 1g/day)
  - **Adults**—500 mg PO BID
  - **All ages**—14 day duration
Pertussis

The diagnosis of pertussis is based on a characteristic clinical history (cough for more than 2 weeks with whoop, paroxysms or posttussive vomiting) as well as positive culture or PCR

Laboratory criteria for diagnosis:
- Polymerase chain reaction (PCR) is the preferred method.
  (Use Dacron or polyester-tipped swab with wire or plastic shafts only).
- Culture
  (nasal aspirate or swab of the posterior nasopharynx requires special transport medium)
- Serology IgM and IgG
  (not standardized confirmatory testing)

Obtaining NPG Specimen:
- Encourage patient to cough
- Immobilize head
- Insert NPG swab into a nostril, touching posterior nares
- Hold in place for ten seconds, rotate once
- Remove swab slowly and replace in transport tube
Polio
(Poliomyelitis)

Causative Agent — polio virus, which is an Enterovirus (RNA) with serotypes 1,2,3
Peak Incidence — in the summer months in temperate climates
Incubation period — 6-20 days with a range of 3-35 days
Transmission — person to person via the fecal-oral route although the oral-oral route may account for some cases.

Characteristics
√ Sore throat
√ Fever
√ Nausea
√ Vomiting
√ Headache
√ Loss of superficial reflexes
√ Increased deep tendon reflexes
√ Severe muscle aches
√ Spasms in the limbs or back

Laboratory criteria for diagnosis:
At least two stool specimens and two throat swabs should be obtained 24 hours apart from patients with suspected poliomyelitis as early in the course of the disease as possible (i.e., immediately after poliomyelitis is considered as a possible differential diagnosis), but ideally within the first 14 days after onset of paralytic disease. Specimens should be sent to the state or other reference laboratories for primary isolation. Laboratories should forward isolates to CDC for intratypic differentiation to determine whether the poliovirus isolate is wild or vaccine derived.

Please report any suspected case of polio immediately to your local health department or to the Kansas Epidemiology Hotline 24 hours-a-day at 1-877-427-7317. Do not wait to report until test results are available.
Polio (poliomyelitis)
Rubella
(German Measles)

Causative Agent—rubella virus, classified as a togavirus, genus Rubivirus

Peak incidence—usually in the winter and spring

Incubation period—14 days with a range of 12-23 days ► Communicable period 4-7 days before to 7 days after rash appears.

Transmission—primarily through direct or droplet contact from nasopharyngeal secretions.

Characteristics:
✓ Prodrome does not usually occur in young children ► Prodrome of 1-5 days is experienced by adolescents and adults ► Prodrome consists of the following symptoms:
  • Low-grade fever
  • Malaise
  • Headache
  • Arthralgia or arthritis ► may occur in up to 70% of adult women ► rare in children and adult males
  • Lymphadenopathy, ► (post-auricular, posterior cervical suboccipital)
  • Mild conjunctivitis, cough, coryza
✓ Rash is maculopapular and occurs 14-17 days after exposure
  • Rash begins on the face and then progresses from head to foot.
  • Rash lasts about 3 days
  • Rash is occasionally pruritic

Laboratory criteria for diagnosis:
  • Positive serologic test for rubella IgM antibody, or
  • Significant rise in rubella specific IgG antibody level (acute/convalescent)
  • Isolation of rubella virus from a clinical specimen
  • PCR positive for rubella virus

Please report any suspected case(s) of rubella immediately to your local health department or to the Kansas Epidemiology Hotline 24 hours-a-day at 1-877-427-7317. Do not wait to report until tests results are known.
Tetanus

Causative Agent—*clostridium tetani*, a slender, gram-positive anaerobic rod

Occurrence—occurs worldwide but is most frequently encountered in densely populated regions in hot, damp climates with soil rich in organic matter

Incubation period—ranges from 3 to 21 days, usually about 8 days

Reservoir—found primarily in the soil and intestinal tracts of animals and humans

Transmission—primarily by contaminated wounds

Communicability—is not contagious from person to person

Tetanus disease occurs in three common clinical forms:

- **Local Tetanus** ► uncommon form of the disease, in which patients have persistent contraction of muscles in the same anatomic area as the injury ◄
- **Cephalic Tetanus** ► rare form of the disease, occasionally with otitis media where *C tetani* is present in the flora of the inner ear, following injuries to the head when there is involvement of the cranial nerves, especially in the facial area ◄
- **Generalized tetanus** ► presents with a descending pattern, with first sign of lockjaw, followed by stiffness of the neck, difficulty in swallowing and rigidity of abdominal muscles, elevated temperature, sweating, elevated blood pressure and episodic rapid heart rate, spasms may occur frequently and last for several minutes, spasms continue for 3—4 weeks, complete recovery may take months,
- **Neonatal tetanus** is a form of generalized tetanus
Tetanus

Complications:
- Laryngospasm and/or spasm of the muscles of respiration leading to interference with breathing
- Fractures of the spine or long bones from sustained contractions and convulsions
- Hyperactivity of the autonomic nervous system leading to hypertension and/or an abnormal heart rhythm
- Nosocomial infections are common because of prolonged hospitalization
- Pulmonary embolism
- Aspiration pneumonia

Laboratory criteria for diagnosis:
- There are no laboratory findings characteristic of tetanus. The diagnosis is entirely clinical and does not depend upon bacteriologic confirmation. Sera collected before TIG is administered can demonstrate susceptibility of a patient to the disease.

Please report any suspected case of tetanus immediately to your local health department or to the Kansas Epidemiology Hotline 24 hours-a-day at 1-877-427-7317.
Tetanus
Varicella

*(Chickenpox)*

**Causative agent** – varicella zoster virus (VZV), a DNA virus and member of the herpes virus group

**Peak Incidence** – late winter/early spring

**Incubation period** – is between 14-16 days of exposure, with a range of 10-21 days

**Transmission** – person to person from infected respiratory tract secretions, airborne droplets or by direct contact or inhalation of aerosols from vesicular fluid of skin lesions

**Characteristics:**
- mild prodrome in adults of 1-2 days of fever and malaise
- rash usually appears first on the head, then on the trunk and then the extremities
- rash is pruritic
- rash progresses rapidly from macules to papules to vesicular lesions before crusting—highest concentration of lesions is on the trunk

**Laboratory criteria for diagnosis:**
- isolation of varicella virus from a clinical specimen, or
- direct fluorescent antibody (DFA), or
- polymerase chain reaction (PCR), or
- significant rise in serum varicella immunoglobulin G (IgG) antibody level by any standard serologic assay
Influenza

**Causative agent** - influenza virus ► 2 types: A, B◄

**Peak incidence** - usually from December to March

**Incubation period** - is usually 2 days, may vary from 1-4 days

**Transmission** - person to person via large virus-laden droplets generated when infected persons cough or sneeze

**Clinical Features:**
- abrupt onset of fever, myalgia, sore throat, nonproductive cough, headache
- fever usually 101° - 102°F
- rhinorrhea, substernal chest burning, ocular symptoms ► eye pain and sensitivity to light◄, pneumonia may occur

**Laboratory criteria for diagnosis:**
- rapid diagnostic testing for influenza antigen permits those in office and clinic settings to assess the need for anti-viral use in a more timely manner
- isolation of influenza virus by culture from a clinical specimen of the nasopharynx, throat, sputum
  ► the above specimens must be obtained within 3 days of onset of illness◄

Please report any influenza deaths in children under 18 years of age to your local health department or to the Kansas Epidemiology Hotline 24 hours-a-day at 1-877-427-7317.
Influenza
Pneumococcal Disease

Causative agent — *streptococcus pneumoniae (S pneumoniae or pneumococcus)*, a gram-positive anaerobic bacterium with more than 90 subtypes, of which 10 cause most of the invasive disease.

Peak incidence — more common during the winter and in early spring when respiratory diseases are more prevalent.

Incubation period — may vary but usually 1—3 days.

Transmission — direct person-to-person contact via respiratory droplets or autoinoculation in persons carrying the bacteria in their upper respiratory tract.

Invasive pneumococcal disease occurs in three common clinical forms:

- **Pneumococcal pneumonia** ► abrupt onset of fever, shaking, chills or rigors, chest pain, cough, shortness of breath, rapid breathing and heart rate and weakness.
- **Pneumococcal meningitis** ► stiff neck, fever, mental confusion and disorientation and visual sensitivity to light
- **Pneumococcal bacteremia** ► may include a combination of the symptoms of pneumonia and meningitis, along with joint pain

Laboratory criteria for diagnosis:

- Isolation of *S. pneumoniae* from a normally sterile site (e.g., blood, cerebrospinal fluid, or, less commonly, joint, pleural, or pericardial fluid).

All isolates must be sent to: Division of Health and Environmental Laboratories
Forbes Field, Building # 740
Topeka, KS 66620-0001
Phone: 785-296-1636
Rotavirus

Causative agent — rotavirus, a double-stranded RNA virus of the family Reoviridae
Peak incidence — usually progresses from the southwest portion of the United States beginning in November and December and spreads to the Northeast by April and May.
Incubation period — is 1-3 days
Transmission — fecal-oral spread, through close person-to-person contact and by fomites ► toys and other environmental surfaces contaminated by stool ◄

Variable Clinical Features:
• often preceded by vomiting
or
• self-limited watery diarrhea
or
• severe dehydrating diarrhea with fever and vomiting

► The clinical features and stool characteristics of rotavirus diarrhea are nonspecific, and similar illness may be caused by other pathogens. As a result, confirmation of a diarrheal illness as rotavirus requires laboratory testing ◄

Laboratory criteria for confirmation diagnosis:
• detection of rotavirus antigen in stool by enzyme immunoassay (EIA)