Acquired Immunodeficiency Syndrome (AIDS)

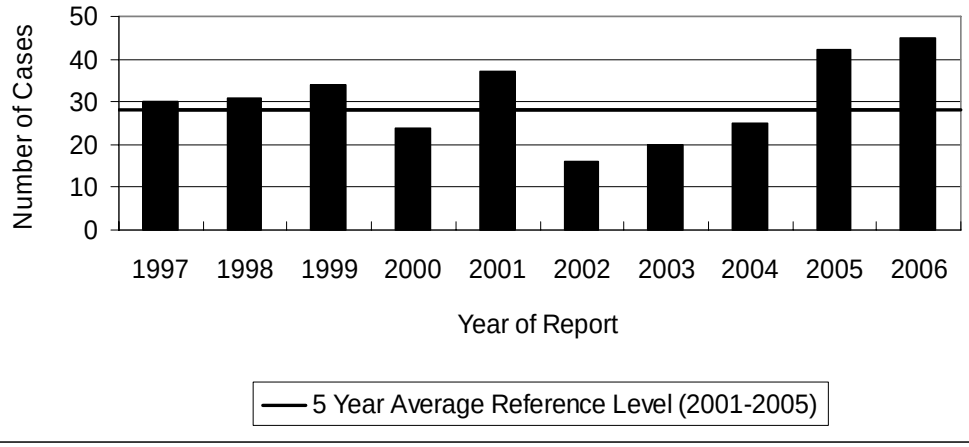
See Human Immunodeficiency Virus (HIV)

Amebiasis

Agent: *Entameoba histolytica* (parasite)
Mode of Transmission: Ingestion of food contaminated with amebic cysts or by direct contact with fecal material from infected animals or people.
Signs/Symptoms: Most infections are asymptomatic. Symptomatic infections include diarrhea, which may become severe, bloody or with mucus; lower abdominal pain; straining to pass stool or urine; weight loss; fever; chills; and constipation. Symptoms may become chronic.
Prevention: Careful hand hygiene after each toilet visit and before preparing and eating food.
Other Important Information: Invasive amebiasis is mostly a disease of young adults and children under two years of age.

There were 45 cases of amebiasis reported in Virginia during 2006. This is a 7% increase over the 42 cases reported in 2005 and a 61% increase from the five year average of 28 cases per year. This is the fourth consecutive annual increase in cases reported since 2002 (Figure 1).

Figure 1. Amebiasis: Ten Year Trend, Virginia, 1997-2006



The 20-29 and 30-39 year age groups had the highest incidence rates (0.9 per 100,000), followed by the 50-59 year age group (0.8 per 100,000 population). No cases occurred in infants. No race was reported for 27% of cases, but among cases with a reported race, the black population had a much higher incidence rate than the white population (1.3 and 0.2 per 100,000, respectively). A higher incidence rate was reported in the male population (0.7 per 100,000) than in the female population (0.5 per 100,000). The highest number of cases occurred in the northern region (18 cases, 0.9 per 100,000), while the southwest region had the highest incidence rate (14 cases, 1.1 per 100,000). The other regions had incidence rates of 0.2 to 0.6 per 100,000.

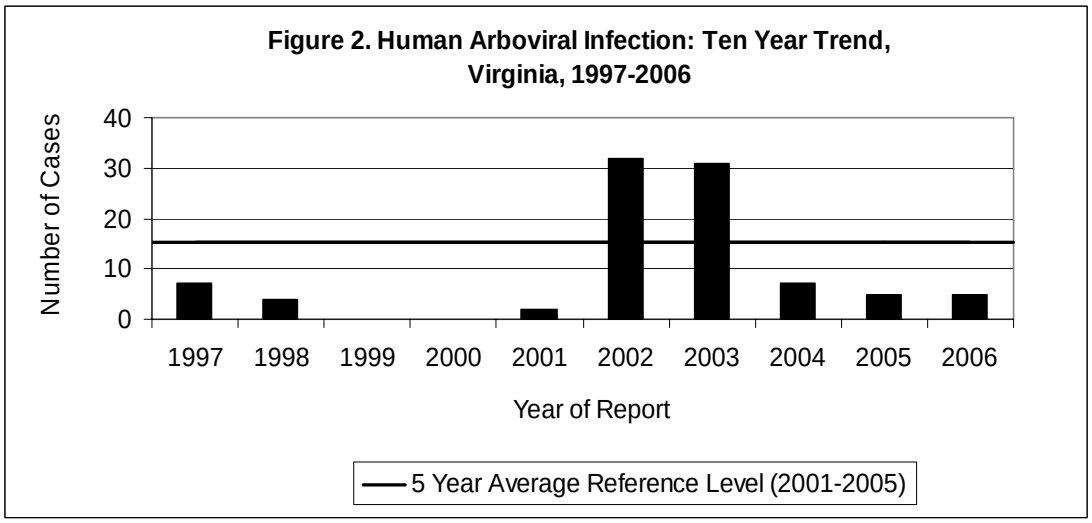
Anthrax

Agent: *Bacillus anthracis* (spore forming bacteria)
Mode of Transmission: Through direct contact with contaminated animal products; ingestion of contaminated, undercooked meat; and inhalation of spores during risky industrial practices (e.g., processing wool or hides) or through an intentional bioterrorism release.
Signs/Symptoms: Exposure through direct contact presents as a lesion that often develops a black scab. Symptoms of abdominal distress (nausea, vomiting, diarrhea, fever) are present in intestinal anthrax. Symptoms of inhalation anthrax are initially nonspecific (fever, cough, chest pain) but will lead to respiratory distress and death if untreated.
Prevention: Minimize contact with infected animals and animal products. A vaccine is available to immunize high-risk individuals.
Other Important Information: Person-to-person transmission is very rare. The period of time from exposure to onset of symptoms ranges from 1 to 60 days. Anthrax is classified as a potential bio-weapon because it can cause serious public health problems, it can be spread across a large area, and it requires a great deal of planning to protect the public's health.

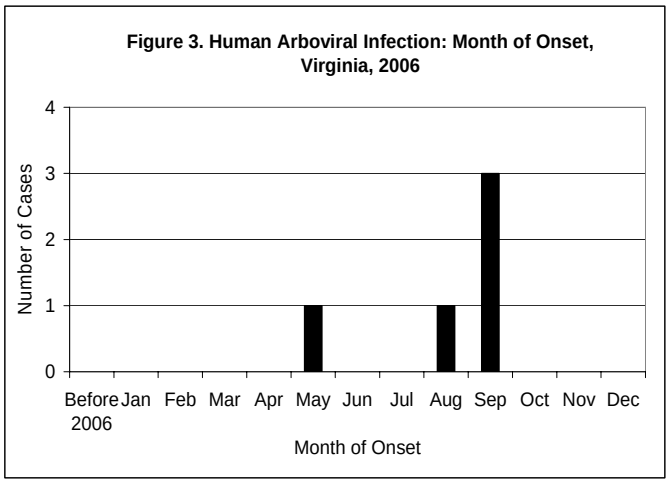
No cases of anthrax were reported in Virginia during 2006. In 2001, two Virginia residents were reported with inhalation anthrax due to an intentional release of *Bacillus anthracis* spores through the U.S. Postal Service. Both individuals were exposed at their workplace and both survived. These were the first reported cases of anthrax in Virginia since 1970.

Arboviral Infection

Agent(s): In Virginia: West Nile virus (WNV), LaCrosse encephalitis (LAC) virus, Eastern equine encephalitis (EEE) virus, and St. Louis encephalitis (SLE) virus.
Mode of Transmission**:** Most common is by the bite of an infected mosquito. West Nile virus may also be transmitted by blood transfusion or transplanted organs from infected donors, by cuts or punctures with contaminated scalpels or needles and, more rarely, by inhalation or ingestion of dust or particles from infected bird feces.
Signs/Symptoms: Range from no symptoms to death, depending on the particular virus and characteristics of the infected person. More severe disease can cause encephalitis (inflammation of the brain) or meningitis (inflammation of the lining of the brain and spinal cord) and may lead to death.
Prevention: Avoid being bitten by mosquitoes. Avoid areas infested by mosquitoes and when in those areas, avoid being bitten by using mosquito repellents and wearing longsleeved, loose fitting, light-colored clothing (mosquitoes are not attracted to light colors). Maintain screens on all open windows and doors. Around your home, eliminate or dump all containers that could hold water and breed mosquitoes.
Other Important Information: WNV infections are more likely to cause severe disease in older persons, but the majority of infections result in no symptoms. LAC is seen primarily in individuals under 19 years of age. EEE is more likely to affect children and older people and has a high death rate; all age groups are equally at risk for developing SLE.



Human



Five cases of human arboviral infection were reported in 2006. This is similar to the five cases reported in 2005 and the seven cases reported in 2004, but 84% less than the 31 cases reported in 2003 (see Figure 2). The elevated levels in 2002 and 2003 were largely attributable to the emergence of WNV in Virginia. All five of the recorded arboviral infections in 2006 were due to WNV infection. The increase in WNV activity from one human case in 2005 might be explained by the dry, hot weather seen during the summer of 2006. Hot weather can enable rapid amplification of the virus in the primary mosquito vector population. Although it was hot in most parts of the state, Virginia's human WNV cases in 2006 occurred only in northern Virginia. Levels of WNV activity were relatively low in the tested mosquitoes from all other areas monitored by mosquito surveillance programs. Additionally, in northern Virginia, bridge-vector species may have contributed to the human WNV cases seen. An unusually large number of the bridge-vector mosquito species (Asian tiger mosquitoes, *Aedes vexans* and *Culex erraticus*) tested positive for WNV. For unknown reasons, these bridge-vector species may have had larger populations in northern Virginia than in other parts of the state, and their infection with WNV coincided with, and may have been enabled by, periods of hot weather.

Four of the five WNV infections in 2006 occurred in persons age 60 and older and all the WNV cases were seen in the white population. Three of the patients were female and two were male. Arboviral infections, especially WNV, increase during the summer months and early fall when people are more commonly exposed to infected mosquitoes. This is a national trend which is reflected in Virginia.

Human LAC cases were not detected in 2006 even though there were four human LAC infections in 2005. There is no known reason for the apparent decline of LAC activity in 2006.

Animal

Zoonotic surveillance for WNV is conducted each year using mosquitoes, sentinel chickens, wild birds, and horses. Surveillance for EEE is conducted using mosquitoes, sentinel chickens, and horses, but not wild birds. During 2006, over 498,873 mosquitoes were tested for WNV. They were tested as "pools" (batches of up to 50 mosquitoes). Of the 13,891 pools tested for WNV, 564 pools (4%) were positive. Of the 300,674 mosquitoes (7,042 pools) tested for EEE, only 53 pools (0.7%) were positive. In 2006, one horse was found to have WNV infection and none was found to have EEE. A total of 37 sentinel chicken flocks were tested by serology every other week from May to October. Of the approximately 120 sentinel chickens tested through the season, six were positive for WNV and 18 were positive for EEE. Testing of 57 wild birds yielded three WNV-positive birds.

Botulism

Agent: Neurotoxin produced by the spore forming organism *Clostridium botulinum* (bacteria)
Mode of Transmission: Foodborne botulism occurs when *Clostridium botulinum* is allowed to grow and produce toxin in food which is then eaten without sufficient heating to inactivate the toxin. In intestinal (infant) botulism, ingested spores germinate, multiply and produce toxin in the intestine.
Signs/Symptoms: Foodborne symptoms include fatigue, weakness, vertigo, and sometimes diarrhea and vomiting. Descending, flaccid paralysis can also occur, which may lead to cessation of breathing and death unless respiration is aided. Intestinal botulism cases show weakness, loss of appetite, an altered cry and loss of head control.
Prevention: All canned and preserved food should be properly processed and prepared. Boiling food for 10 minutes will destroy the toxin, but much higher temperatures are required to kill the spores. Honey and corn syrup should not be given to children younger than 12 months of age.
Other Important Information: The case-fatality rate is 5%-10%. Botulism is listed by the CDC as a potential bio-weapon because an aerosolized or foodborne botulinum-toxin weapon could cause severe disease and would require swift public health action to control.

Foodborne

No cases of foodborne botulism were reported in Virginia during 2006. The last reported case occurred in 2002. It occurred in an infant but was determined to be foodborne botulism, not infant botulism. *Clostridium botulinum* toxin type A was not found in a stool specimen, but was found in home-canned baby food.

Intestinal (Infant)

No cases of intestinal botulism were reported in Virginia during 2006. The annual average for the preceding five years is 2.4 cases.

Brucellosis

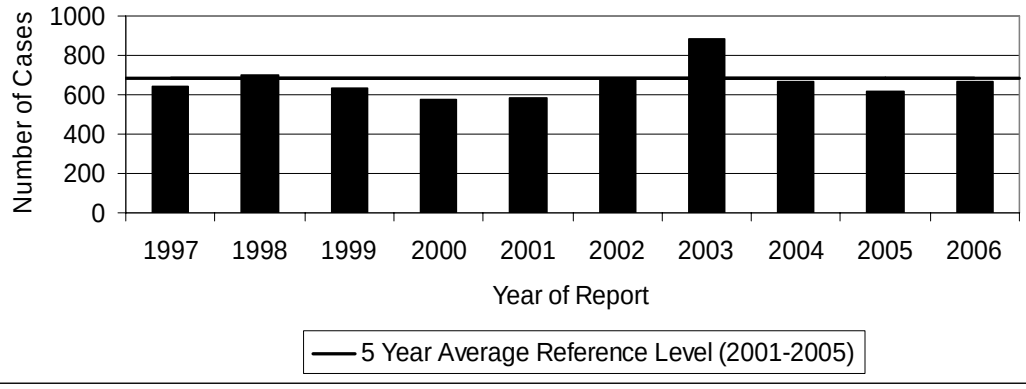
Agent: *Brucella* species (bacteria)
Mode of Transmission: Contamination of skin wounds with infected animal tissue or body fluids, ingestion of unpasteurized milk or milk products, and inhalation of the organism.
Signs/Symptoms: Intermittent and irregular fever, headache, chills, sweating, and muscle pain.
Prevention: Use rubber gloves when handling animal tissue. Do not consume unpasteurized dairy products, especially milk, cheese, or ice cream.
Other Important Information: Listed by the CDC as a category B bioterrorism agent because the organism may be relatively easily disseminated, may cause moderate injury and/or death, and may need enhanced surveillance for detection.

No cases of brucellosis were reported in 2006. One case of brucellosis was reported in 2005. The case was a male in the 50-59 year age group from the northern region. He had recently traveled to Mexico where he reported drinking raw goat's milk.

Campylobacteriosis

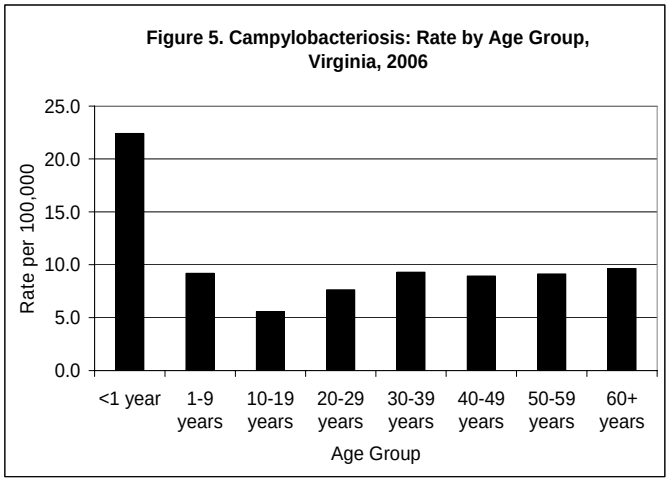
Agent: *Campylobacter* species (bacteria)
Mode of Transmission: Ingestion of contaminated food or direct contact with fecal material from infected animals or people.
Signs/Symptoms: Includes diarrhea (frequently with bloody stools), abdominal pain, malaise, fever, nausea and/or vomiting. In neonates and young infants, bloody diarrhea without fever may be the only manifestation of illness. Rarely, post-infectious complications include reactive arthritis, febrile convulsions or Guillain-Barré Syndrome.
Prevention: Careful hand hygiene after each toilet visit, before preparing and eating food and after contact with feces of dogs and cats is critical. Pasteurization of milk and chlorination of water supplies are important. Thoroughly cook all foods containing eggs and meats, particularly poultry.

Figure 4. Campylobacteriosis: Ten Year Trend, Virginia, 1997-2006

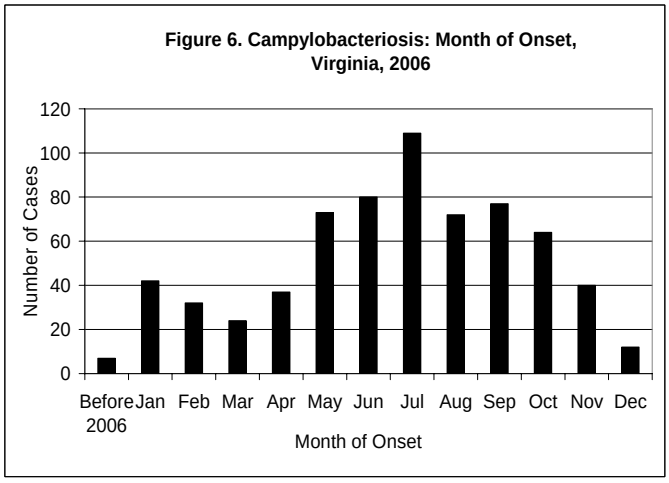


During 2006, 669 cases of campylobacteriosis were reported in Virginia. This is a 3% decrease from the five year average of 687.4 cases per year, but an 8% increase from the 618 cases reported in 2005 (Figure 4).

The highest rate of infection occurred in infants (22.4 per 100,000). Rates in the other age groups ranged between 5.6 and 9.6 per 100,000 (Figure 5). Race was missing for 39% of reported campylobacteriosis cases. Among cases for which race was reported, the white population had an incidence rate more than twice that of the black population (6.5 versus 2.5 per 100,000).



The rate among females (7.7 per 100,000) was slightly lower than the rate among males (9.8 per 100,000). By region, the northwest and southwest showed the highest rates of disease (10.2 and 10.1 per 100,000, respectively). The other regions reported rates between 6.8 and 9.4 per 100,000. Cases occurred throughout the year, but the largest proportion (72%) had onsets during the months of May to October (Figure 6). Two foodborne outbreaks were attributed to campylobacteriosis in 2006. One was related to consumption of raw milk and the other was related to surface contamination of cut watermelon (see Table 8).

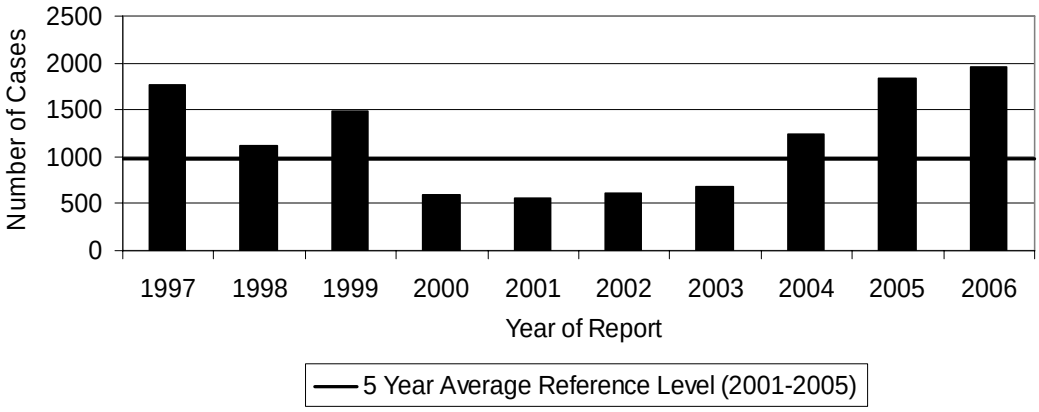


Chickenpox (Varicella)

Agent: Varicella-zoster virus
Mode of Transmission: Person-to-person by direct contact or through droplet or airborne spread of vesicle fluid or respiratory secretions from an infected person.
Signs/Symptoms: Acute onset of mild fever and skin eruptions. Successive crops of lesions appear first on the head and progress to the trunk and extremities. The skin lesions can appear on the scalp, armpit, and mucous membrane of the mouth and respiratory tract.
Prevention: Vaccination of children starting at age 12 months followed by a second dose at age 4-6 years.
Other Important Information: The disease is highly transmissible; susceptible household contacts have an 80%-90% risk of becoming infected.

There were 1,959 cases of chickenpox reported in Virginia during 2006. This is a 7% increase from 2005 and a 99% increase over the five year average of 984.8 cases per year (Figure 7). The increase in cases seen since 2002 may be attributed to more complete reporting by physicians and schools.

Figure 7. Chickenpox: Ten Year Trend, Virginia, 1997-2006



Varicella vaccine was licensed in 1995, and in 1999 vaccination became a requirement for entry into school and daycare in Virginia for all children born on or after January 1, 1997. However, outbreaks of chickenpox occur despite high vaccination coverage, as the vaccine is 80%-85% effective in preventing infection.

The majority of cases (94%) were reported in those less than 20 years of age. The 1-9 year age group had the highest incidence rate (137.3 per 100,000). This was followed by the 10-19 year age group (54.9 per 100,000) and the less than 1 year age group (48.7 per 100,000). The other age groups had between 0.5 cases per 100,000 (50-59 and 60 and older age groups) and 4.6 cases per 100,000 (20-29 year age group). The white population had a higher rate than the black population (23.4 and 10.1 per 100,000, respectively). Rates were similar among females and males (23.0 and 28.3, respectively).

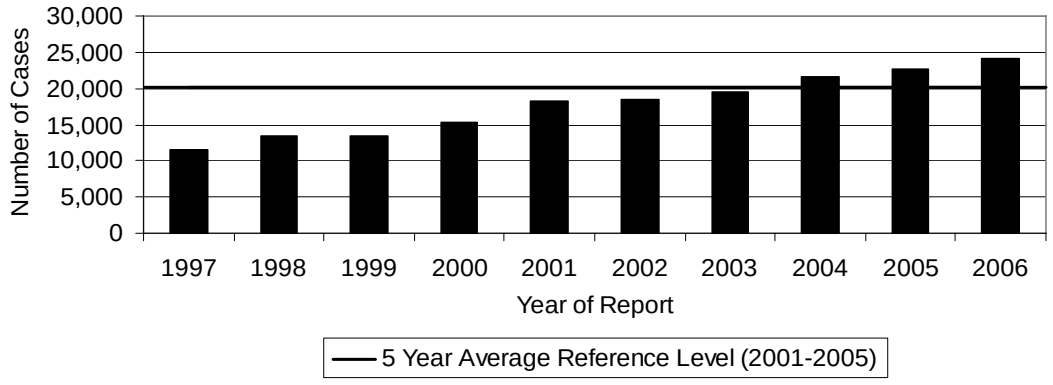
The highest incidence rate (34.2 per 100,000) was reported from the southwest region. Rates were between 31.0 and 16.9 cases per 100,000 in the other regions. Cases occurred throughout the year, with the smallest proportion of cases (12.9%) occurring during the summer months (June-August) when children were out of school. Forty-six outbreaks were reported in 2006 (see Table 10), with an average of 13 cases per outbreak. All but three of the outbreaks involved school-aged children. Despite high one-dose vaccination coverage, outbreaks of varicella have continued to occur, especially in elementary schools, where a large percentage of the students are vaccinated. This mirrors a nationwide trend and has led to new recommendations for a two-dose varicella vaccination schedule. While breakthrough infections have continued to occur in vaccinated individuals, on average, the illness in vaccinated individuals is much milder (less than 50 skin lesions, low or no fever, and a shorter duration of illness).

Chlamydia trachomatis Infection

Agent: *Chlamydia trachomatis* (bacteria)
Mode of Transmission: Person-to-person via sexual transmission, or from the genital tract of an infected mother to her infant during birth.
Signs/Symptoms:
Men: Urethritis, with discharge, itching, and burning upon urination.
Women: Cervical inflammation with discharge, fluid buildup, and easily induced vaginal bleeding.
Infants: Infections of the eyes and respiratory tract.
Prevention: Safer sexual practices; screening of young women under 25 years of age; and presumptive treatment for *Chlamydia* infection among people who are exposed.
Other Important Information: Approximately 70% of infected women are asymptomatic.

During 2006, a total of 24,081 of *C. trachomatis* infections were reported in Virginia (Figure 8.). The state rate in 2006 (318.2 per 100,000) has almost doubled since 1997. Even these high numbers are most likely an underestimate of the true number of infections because many cases are asymptomatic, those diagnosed with other sexually transmitted infections (e.g., gonorrhea) may be presumptively treated for *Chlamydia* infection and are not counted, and screening programs have been limited to high-risk females and the male partners of infected women. While it is expected that more females will be tested than males because of screening criteria, the incidence rate among males who were tested is more than 4 times the 1997 rate.

Figure 8. *Chlamydia trachomatis* Infection: Ten Year Trend, Virginia, 1997-2006

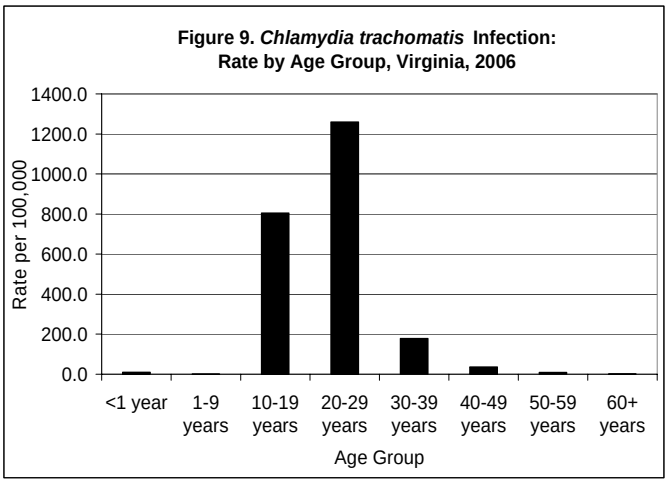


The increase in *Chlamydia* infection rates over time has been, in part, driven by increased incidence rates in the 20-29 year and 30-39 year age groups (Figure 9). Although the 10-19 year old age group has a relatively high rate (805.6 per 100,000), the rates in the 20-29 year and 30-39 year age groups have more than doubled since 1997 (from 520.8 to 1259.9 per 100,000 and from 63.0 to 178.8 per 100,000, respectively). Ten of the 11 *C. trachomatis* infections in the under 1 year age group were eye infections (see Ophthalmia Neonatorum section).

The incidence rates in both the black and white populations have also nearly doubled since 1997 (from 476.3 to 924.6 per 100,000 for blacks and from 49.7 to 102.0 per 100,000 for

whites). For any given year, the *Chlamydia* infection rate in blacks has been about nine times the rate in whites.

The eastern region had the highest rate among regions in Virginia and saw the sharpest increase in the *Chlamydia* infection rate from 2005 to 2006, from 505.6 to 546.6 per 100,000. Since 1997, the *Chlamydia* infection rate in this region has increased three-fold. No seasonal trend was observed for *Chlamydia* infection.



Creutzfeldt-Jakob Disease

Agent: Believed to be caused by a prion protein.
Mode of Transmission: The majority of classic cases are sporadic, with no known source. A small percentage of cases, 5%-15%, may be due to heredity or exposure to organ tissue contaminated with the prion. A form of the disease, variant CJD (vCJD), is thought to be transmitted through ingestion of beef from cattle infected with bovine spongiform encephalopathy (BSE, or mad cow disease).
Signs/Symptoms: Symptoms may begin with confusion, and they rapidly progress to a wide range of neurological signs and symptoms, including loss of coordination and dementia.
Prevention: Avoid organ and tissue transplants from infected individuals. For protection against vCJD, the federal government has regulations in place to prevent the spread of BSE in the United States.
Other Important Information: vCJD occurs in younger individuals, while sporadic CJD occurs more often in older individuals and has a slower progression. In Virginia, CJD is reportable when it occurs in persons under 55 years of age.

One case of Creutzfeldt-Jakob disease in persons less than 55 years of age was reported in Virginia during 2006. This infection was determined to be vCJD. It occurred in a male in the 20-29 year age range who had lived in the U.S. since 2005. Based on the patient's history, it was determined that he was most likely infected from contaminated cattle products consumed as a child when living in Saudi Arabia. This is the only case of vCJD ever diagnosed in a Virginia resident. It is the third case of vCJD reported in a U.S. resident. The two previously reported cases were born and raised in the United Kingdom, where they were believed to have been infected.

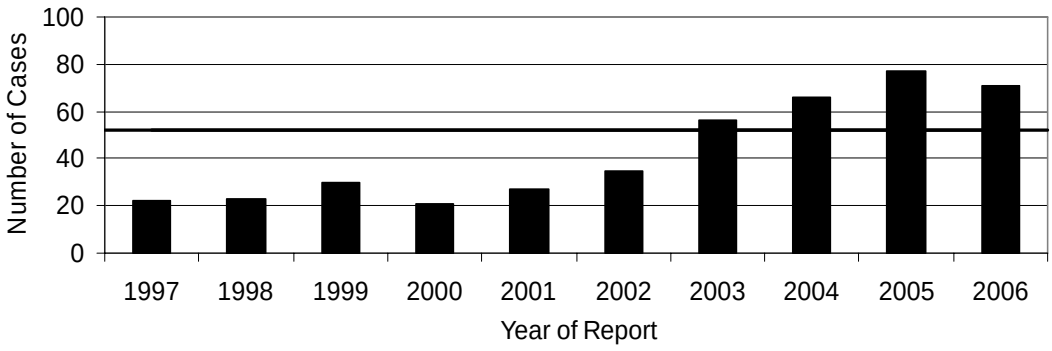
Past diagnoses of CJD in Virginia residents less than 55 years of age were classic CJD infections (five were reported between 1998 and 2002).

Cryptosporidiosis

Agent: *Cryptosporidium parvum* (parasite)
Mode of Transmission: Occurs via the fecal-oral route and can include person-to-person, animal-to-person, foodborne and waterborne transmission. *Cryptosporidium* oocytes can remain infectious for 2-6 months after being excreted from infected individuals. The oocytes are very resistant to chemicals used to purify drinking water.
Signs/Symptoms: Profuse watery diarrhea with cramping and abdominal pain. The diarrhea may be preceded by anorexia and vomiting in children. Cryptosporidiosis can also be asymptomatic.
Prevention: Careful hand hygiene after each toilet visit and before preparing and eating food. People with diarrhea should not enter public recreational water. Do not drink water from streams, lakes, springs or any unknown source. Water purification methods, including boiling water or filtration, should be considered when drinking water from natural or unknown sources.

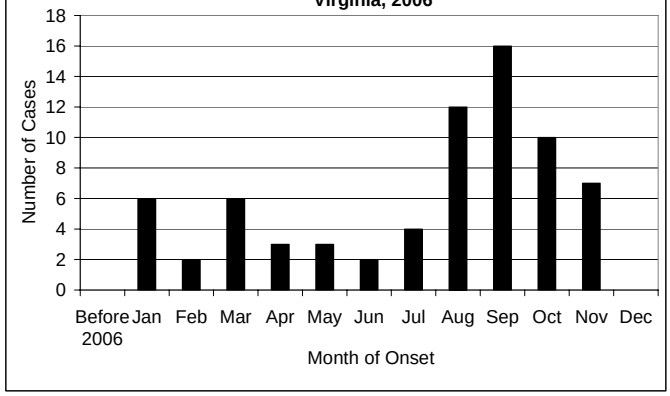
Seventy-one cases of cryptosporidiosis were reported in Virginia during 2006. This is an 8% decrease in cases from 2005, but a 36% increase in cases from the five year average of 52.2 cases per year (Figure 10).

Figure 10. Cryptosporidiosis: Ten Year Trend, Virginia, 1997-2006



Cases of cryptosporidiosis increased between 2000 and 2005, but appear to be leveling. In 2006, the smallest number of cases (three) but highest incidence rate (2.9 per 100,000) occurred among infants. The other age groups had rates between 0.4 and 1.6 per 100,000. Race was not reported for 14% of cases, but among those with information on race, the black and white populations had similar rates of infection (0.6 and 0.9 per 100,000, respectively).

Figure 11. Cryptosporidiosis: Month of Onset, Virginia, 2006



The female and male populations had similar rates of infection (0.8 and 1.0 per 100,000, respectively). By region, the highest incidence was reported from the southwest and northwest (1.9 and 1.7 per 100,000). The other regions had rates between 0.3 and 0.6 per 100,000. A seasonal trend was observed, with 54% of cases occurring in the August through October period. (Figure 11).

Cyclosporiasis

Agent: *Cyclospora cayetanensis* (parasite)
Mode of Transmission: Can be foodborne or waterborne. *Cyclospora* are resistant to chlorination. Direct person-to-person transmission has not been documented.
Signs/Symptoms: Profuse watery diarrhea commonly occurs, along with nausea, vomiting, anorexia, substantial weight loss, abdominal bloating or cramping and prolonged fatigue. Fever occurs in approximately half the patients.
Prevention: Fresh produce should be washed thoroughly before it is consumed.

No cases of cyclosporiasis were reported during 2006. This is a decrease from the three cases reported in 2005, and from the five year average of 1.8 cases per year.

Diphtheria

Agent: Toxin secreted by strains of the bacterium *Corynebacterium diphtheriae*
Mode of Transmission: Person-to-person via droplet spread. Rarely, transmission may occur from contact with skin lesions or articles soiled with discharges from the lesions of infected persons.
Signs/Symptoms: Sore throat, anorexia, nasal discharge, and formation of a bluish-white, grayish-green, or black adherent membrane in the throat. More severe cases can include swelling of the neck and airway passages.
Prevention: Diphtheria vaccination beginning at two months of age. Antibody levels wane over time making booster doses necessary every 10 years, beginning at age 11-12 years.
Other Important Information: The overall case-fatality rate for diphtheria is 5%-10%, with higher death rates in young children and those over 40 years of age.

In Virginia, no cases of diphtheria were reported during 2006. The last reported case in Virginia occurred in 1989. Nationally, zero to five cases of diphtheria are reported each year.

Ehrlichiosis

Agent(s): *Ehrlichia chaffeensis* and *E. ewingii* cause human monocytic ehrlichiosis (HME) and *Anaplasma phagocytophilum* causes human granulocytic anaplasmosis (HGA), formerly known as human granulocytic ehrlichiosis (HGE). All are bacteria.
Mode of Transmission: Through the bite of an infected tick. *Ehrlichia chaffeensis* and *E. ewingii* may infect adult or nymphal lone star ticks and *Anaplasma phagocytophilum* may infect adult or nymphal blacklegged ticks (formerly known as deer ticks). All of these pathogens may

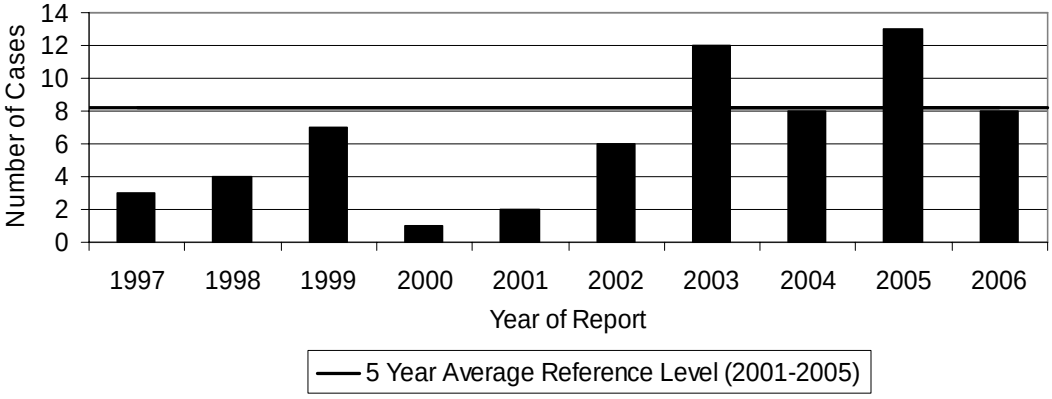
be transmitted to humans when an infected tick bites a human and stays attached (feeding) for a period of more than 24 hours.

Signs/Symptoms: Usually non-specific but commonly include fever, headache, nausea, anorexia, vomiting, and muscle pain. Untreated cases may result in prolonged fever, renal failure, respiratory distress, seizures, coma and death. Inflammation of the brain and the lining around the brain and spinal cord develops in 20% of patients with HME, but is very rare with HGA.

Prevention: Avoid being bitten by ticks. Avoid tick-prone habitats such as humid forest environments with dense undergrowth and/or heavy leaf litter, tall weeds along forest margins, tree lines, forest trails and forest clearings. When in tick-prone habitats, wear light-colored clothing with pants legs tucked into socks. Apply permethrin-based repellants to clothing and shoes and DEET, Picaridin, or Oil of Lemon Eucalyptus-based repellents to exposed areas of skin. Thoroughly check your body for ticks after visiting tick-prone habitats and remove attached ticks as soon as possible.

Eight cases of ehrlichiosis were reported in Virginia during 2006 and this is consistent with the five year average of 8.2 cases per year (Figure 12). Among the eight ehrlichiosis cases reported in 2006, two were specified as HGA and two were specified as HME. The specific disease was not reported for the remaining four cases.

Figure 12. Ehrlichiosis: Ten Year Trend, Virginia, 1997-2006

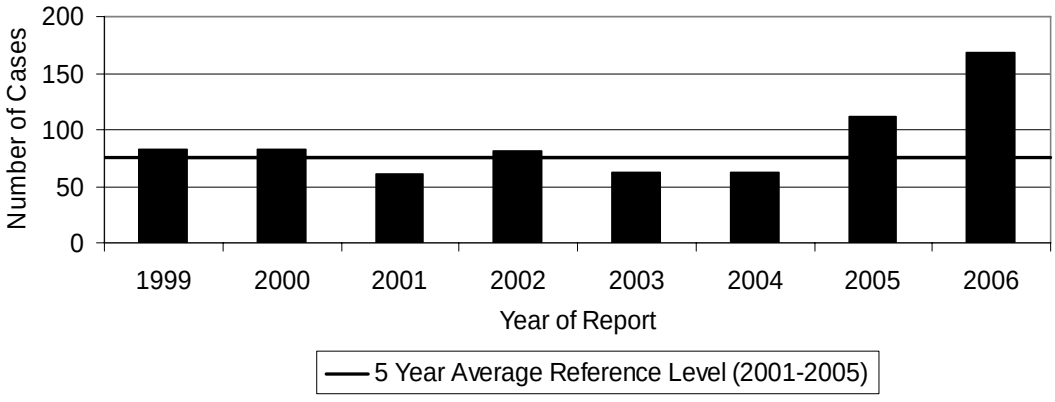


The 50-59 year age group had the highest incidence rate (0.3 per 100,000), followed by the 40-49 year age group (0.2 per 100,000). One case each was reported in the 20-29 year old, 30-39 year old and 60 and older age groups. No cases were reported from the other age groups. This age distribution fits the pattern that is seen for both HME and HGA in the United States in which most cases are in persons over the age of 50 years. The majority of cases (seven of eight) occurred in the white population. Females and males had the same incidence rate (0.1 per 100,000). Cases were recorded in all regions of the state and although the central region had the highest incidence rate (0.2 per 100,000), the rate was not much higher than the 0.1 per 100.000 incidence rates seen in all other regions. Six of the eight cases occurred during the second and third quarters of the year. One case occurred during the first quarter and one occurred during 2005, but was not reported until 2006.

Escherichia coli Infection, Shiga Toxin-Producing

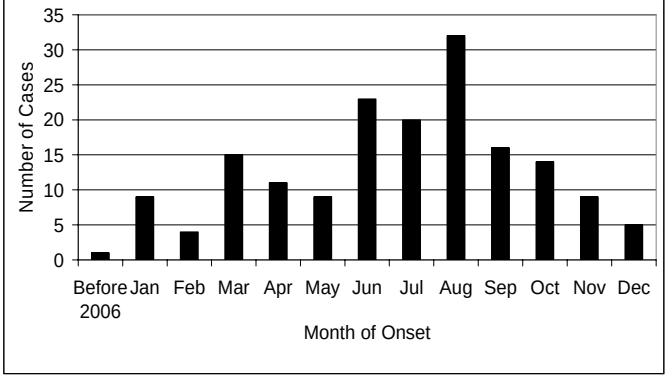
Agent: Shiga toxin-producing *Escherichia coli* (bacteria)
Mode of Transmission: From food or water contaminated with human or animal feces, or person-to-person from infected symptomatic people or from carriers. Fomites and contaminated environment may also play a role in transmission.
Signs/Symptoms: Non-bloody to completely-bloody diarrhea and severe abdominal cramps with little or no fever. In some people, including children under five years of age and the elderly, the infection can cause a complication called hemolytic uremic syndrome (HUS), in which the red blood cells are destroyed and the kidney fails.
Prevention: Careful hand hygiene after each toilet visit and before preparing and eating food. All ground beef should be cooked thoroughly until no pink meat remains and the juices are clear. Raw milk and unpasteurized juice products should not be consumed.

Figure 13. *Escherichia coli* Infection, Shiga Toxin-Producing: Eight Year Trend, Virginia, 1999-2006



Shiga toxin-producing *E. coli* infections have been a reportable condition in Virginia since 1999. During 2006, 168 cases were reported in Virginia. This is a 51% increase over 2005 and a 122% increase from the five year average of 75.6 cases per year (Figure 13). The highest incidence rates were in children less than 10 years old: 6.8 per 100,000 in infants and 6.0 per 100,000 in the 1-9 year age group. The other age groups had incidence rates between 0.5 and 2.9 per 100,000. Twenty-eight percent of cases did not have a reported race; however, among those with a race reported, the rate in the white population (2.0 per 100,000) was approximately four times the rate in the black population (0.5 per 100,000). Females and males had similar rates (2.1 and 2.2 per 100,000, respectively).

Figure 14. *Escherichia coli* Infection, Shiga Toxin-Producing: Month of Onset, Virginia, 2006



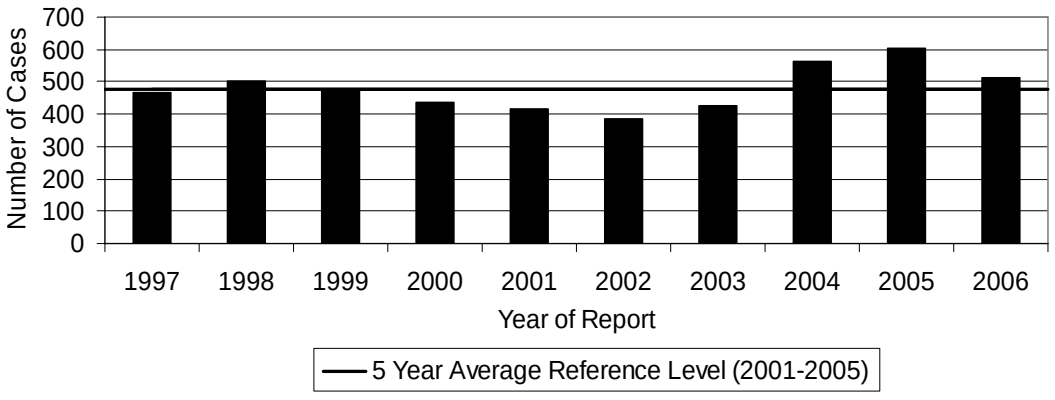
The northwest region reported the highest incidence rate (4.3 per 100,000), and the lowest rate was seen in the central region (0.9 per 100,000). Cases occurred more often in the warmer months than in the colder months of the year, with 45% occurring from June through August (Figure 14). Two of Virginia's Shiga toxin-producing *E.coli* infections were part of a nationwide outbreak involving spinach (see Table 8).

Giardiasis

Agent: *Giardia lamblia* (parasite)
Mode of Transmission: Person-to-person transmission by hand-to-mouth transfer of cysts from the feces of an infected person. Localized outbreaks are more often due to ingestion of cysts in fecally-contaminated drinking and recreational water than from fecally contaminated food. Another source is unfiltered stream and lake waters open to contamination by human and animal feces.
Signs/Symptoms: Symptoms may include diarrhea, abdominal pain, bloating, nausea and vomiting. A person may be asymptomatic or develop chronic illness.
Prevention: Careful hand hygiene after each toilet visit and before preparing and eating food. Do not drink recreational water or untreated water from shallow wells, lakes, rivers, springs, ponds and streams.

There were 514 cases of giardiasis reported in Virginia during 2006. This is a 15% decrease from 602 cases reported in 2005 and a 7% increase from the five year average of 478.8 cases per year (Figure 15). While this disease follows a cyclic trend, the increase over the last few years is more substantial than the small increase seen in the 1996-1998 period. The increased numbers of cases in 2004 and 2005 are at least partly attributed to infections identified through screening of refugees newly arrived in the US.

Figure 15. Giardiasis: Ten Year Trend, Virginia, 1997-2006



In 2006, the highest incidence rate was reported in the 1-9 year age group (17.0 per 100,000), followed by the less than one year age group, (11.7 per 100,000) (Figure 16). The lowest rate, 3.6 per 100,000, occurred in the 60 years and older age group. Rates in the other age groups ranged between 4.5 and 8.0 per 100,000. Race was not reported for 42% of the cases, but among those with a reported race, rates were higher in the black and "other" populations (5.1 and 5.7 per 100,000) than among the white population (3.5 per 100,000). A slightly higher rate was reported in the male population (7.5 per 100,000) than the female population (5.9 per 100,000). By region, the highest rate was seen in the northwest (9.9 per 100,000), followed by the northern region (9.3 per 100,000). Rates in the other regions ranged from 4.3 to 5.6 per 100,000. Onset peaked in August and September. *Giardia* was implicated as the agent in a waterborne outbreak that occurred in 2006 at a waterpark (see Table 11). One death due to giardiasis was reported during 2006.

Figure 16. Giardiasis: Rate by Age Group, Virginia, 2006

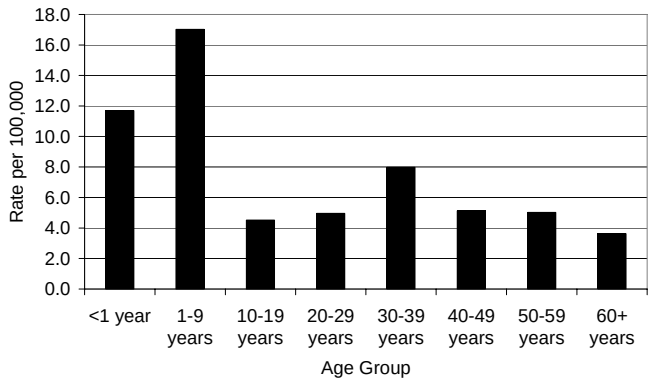
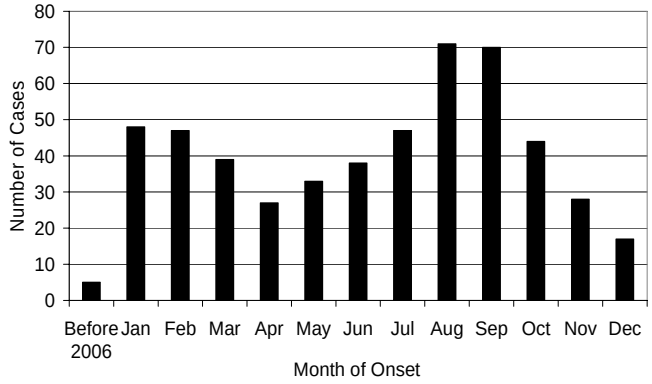
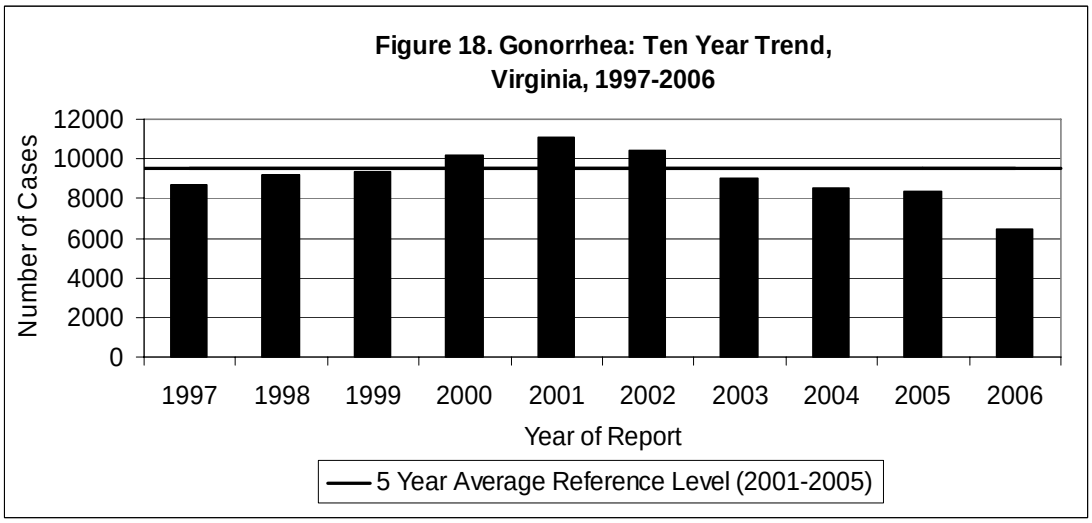


Figure 17. Giardiasis: Month of Onset, Virginia, 2006



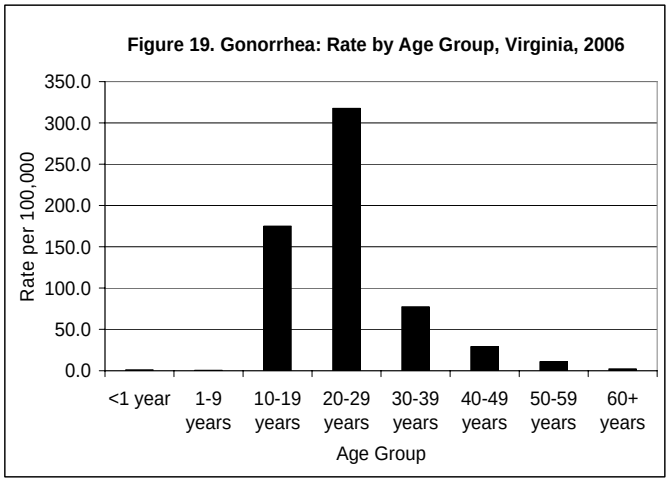
Gonorrhea

Agent: *Neisseria gonorrhoeae* (bacteria)
Mode of Transmission: Sexually transmitted through direct contact with infected areas.
Signs/Symptoms:
Men: Discharge from the urethra.
Women: Usually asymptomatic, although it may cause vaginal discharge or bleeding after intercourse.
Prevention: Safer sexual practices and ensuring that infected sexual contacts are treated.
Other Important Information: In 2004, the CDC stopped recommending fluoroquinolones as a first-line treatment of gonorrhea in men who have sex with men (MSM) because of an increase in fluoroquinolone resistance.



According to the CDC, gonorrhea is substantially under diagnosed and under reported, and approximately twice as many new infections are estimated to occur as are reported each year. Gonorrhea rates have been declining in Virginia since 2001, when the rate was 154.2 per 100,000. During 2006, 6,474 cases of gonorrhea were reported in Virginia (85.5 cases per 100,000) (Figure 18).

Among age groups, the highest incidence rate was in the 20-29 year age group (317.6 per 100,000), followed by the 10-19 year age group (175.1 per 100,000) (Figure 19). The rate in the black population was 338.4 per 100,000, which was 19 times the rate in whites. While this difference is high, it has decreased from 33 times the rate in whites in 1998.



Rates in females and males were similar (85.6 and 85.5 per 100,000, respectively). The eastern region continues to have the highest incidence rate (151.3 per 100,000), followed by the central region (149.7 per 100,000). No seasonal trend was observed.

Granuloma Inguinale

Agent: *Calymmatobacterium granulomatis* (bacteria)
Mode of Transmission: Direct contact with lesions, usually during sexual activity. Young children can be infected by contact with infectious secretions.
Signs/Symptoms: Skin lesions that eventually form fibrous tissue. This is a chronic condition that can lead to destruction of genital organs and spread to other parts of the body through autoinoculation.

Prevention: Sexual partners should be examined, counseled to practice safe sex, and offered antimicrobial therapy when needed.

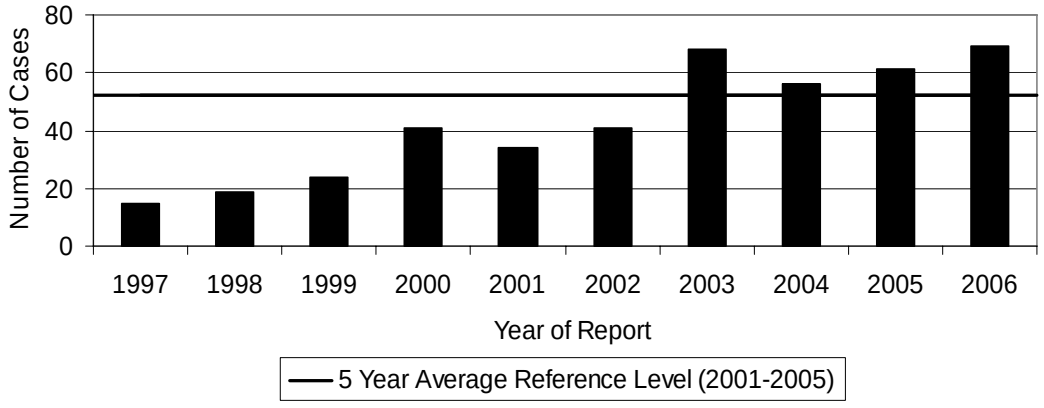
No cases of granuloma inguinale were reported in Virginia during 2006. The last reported case occurred in 2001.

Haemophilus influenzae Infection, Invasive

Agent: *Haemophilus influenzae* (bacteria)
Mode of Transmission: Person-to-person by inhalation of respiratory droplets or direct contact with nose and throat discharge during the infectious period.
Signs/Symptoms: Inflammation of the lining of the brain and spinal cord, inflammation of the epiglottis (which may lead to blockage of upper airway and death), pneumonia, skin infection, arthritis, or bloodstream infection.
Prevention: Vaccination with *Haemophilus influenzae* type b (Hib) conjugate vaccine beginning at 2 months of age.
Other Important Information: Since the licensure of conjugate Hib vaccine in the late 1980s, the incidence of invasive Hib disease has declined by more than 99% compared with the pre-vaccine era.

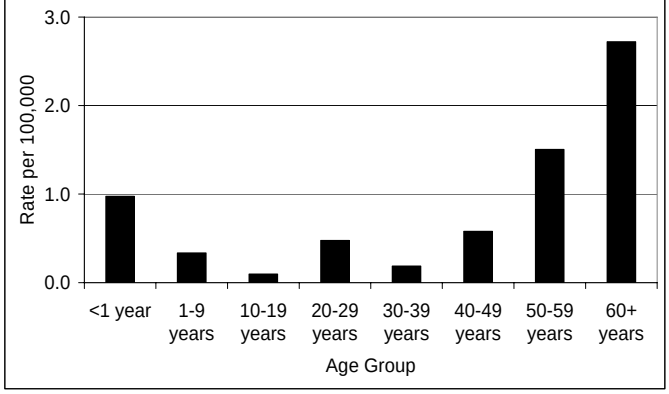
Sixty-nine cases of invasive *H. influenzae* infection were reported in Virginia during 2006. This is a 13% increase from the 61 cases reported in 2005, and a 33% increase from the five year average of 52 cases per year (Figure 20).

Figure 20. *Haemophilus influenzae* Infection, Invasive: Ten Year Trend, Virginia, 1997-2006



Incidence was highest in the elderly and the very young (Figure 21). The 60 and older age group had the highest incidence rate (2.7 per 100,000), followed by the 50-59 year age group (1.5 per 100,000) and infants (1.0 per 100,000). The other age groups had rates between 0.1 and 0.6 per 100,000. Twelve percent of cases had no race reported, but among those with a reported race, the black and white populations had similar rates of infection (0.9 and 0.8 per 100,000, respectively). Both females and males had incidence rates of 0.9 per 100,000. The southwest region had the greatest number of cases (20) and highest incidence rate (1.5 per 100,000), followed by the central region (18 cases, 1.4 per 100,000). The other regions had rates between 0.4 and 1.0 per 100,000. Cases occurred throughout the year with the highest percentage (33%) occurring in the second quarter. Laboratory typing was performed for only seven cases. None of the seven was type b, the type prevented by the Hib vaccine. Five deaths due to invasive *H. influenzae* infection were reported during 2006, two in the 50-59 year age group and three in the 60 and older age group.

Figure 21. *Haemophilus influenzae* Infection, Invasive: Rate by Age Group, Virginia, 2006



Hantavirus Pulmonary Syndrome

Agent: Hantavirus family
Mode of Transmission: Several different types of hantaviruses have been identified and each is associated with a different rodent species. Rodents infected with hantavirus do not become ill but they can transmit the virus to humans when their urine and feces are aerosolized and inhaled.
Signs/Symptoms: Fever, muscle pain, and gastrointestinal complaints followed by an abrupt onset of respiratory distress and decreased blood pressure. Respiratory failure and shock follow quickly.
Prevention: Exclude rodents from houses and other buildings. Disinfect rodent-contaminated areas with a spray disinfectant solution prior to cleaning. Contaminated areas should be cleaned with a wet mop and not be vacuumed or swept. Use approved respirators to avoid inhalation of dust when cleaning previously unoccupied areas.
Other Important Information: Although most common in the southwestern part of the country, hantavirus infections can occur anywhere.

Since May of 1993, when the syndrome was first recognized, 465 cases of hantavirus pulmonary syndrome (HPS) have been reported in the United States resulting in 163 deaths (35%). No cases of this disease were reported in Virginia during 2006. The only hantavirus case reported in Virginia occurred in 1993. In 2004, a resident of southwest Virginia died due to HPS following an exposure that occurred in West Virginia. For surveillance purposes, that case is attributed to West Virginia.

Hemolytic Uremic Syndrome

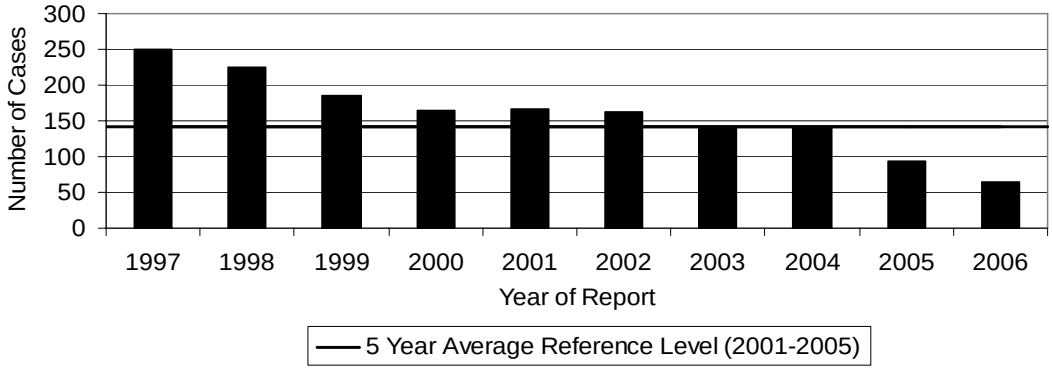
Agent: Serious sequelae associated with infection with the Shiga toxin-producing bacteria, such as *Escherichia coli* or *Shigella*.
Mode of Transmission: See section on *E. coli* Infection, Shiga Toxin-Producing or Shigellosis.
Signs/Symptoms: Kidney failure (often requiring dialysis) as well as neurological impairment (e.g., stroke or seizures). Eight percent of persons with diarrhea due to *E. coli* O157:H7 develop this syndrome, which occurs during the first two weeks after onset of diarrhea.
Prevention: See section on *E. coli* Infection, Shiga Toxin-Producing or Shigellosis.

Two cases of hemolytic uremic syndrome (HUS) were reported in 2006. This is similar to the five year average of 2.4 per year, but higher than the one case per year seen in 2003-2005. Both cases were females, but one was white and the other was black. One occurred in the 1-9 year age group while the other occurred in the 50-59 year age group. They were reported from the central and eastern regions and occurred during the second and third quarters of the year. One was due to infection with *E. coli* O157:H7.

Hepatitis A

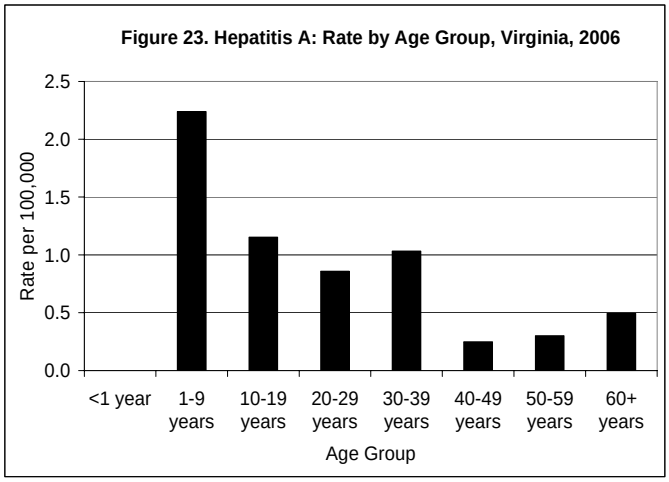
Agent: Hepatitis A virus (Picornaviridae family)
Mode of Transmission: Person-to-person by direct contact with fecal material from infected animals or people. Important vehicles for transmission include food or water contaminated by infected animals or people.
Signs/Symptoms: Fever, malaise, nausea, abdominal discomfort, and jaundice. In older children and adults, symptoms usually occur for several weeks, though prolonged or relapsing disease can last up to six months. Younger children often exhibit no symptoms.
Prevention: Safe food preparation, good personal hygiene (e.g., washing hands with soap after diaper changes in child care settings), and immunization. Administering Immune Globulin (IG) after exposure to hepatitis A can protect against symptomatic infection.
Other Important Information: This is an acute illness only, chronic infection does not occur. A vaccine was introduced in 1995 and has historically been targeted at international travelers, high-prevalence populations and contacts of cases in outbreak situations.

Figure 22. Hepatitis A: Ten Year Trend, Virginia, 1997-2006



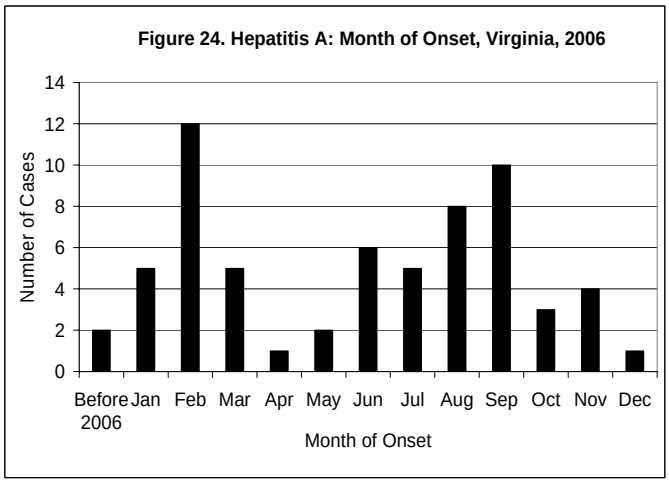
During 2006, 64 cases of hepatitis A infection were reported in Virginia. This represents a 31% decrease from the 93 cases reported in 2005 and a 55% decrease from the five year average of 140.8 cases per year (Figure 22). It continues a downward trend that began in the late 1990s. The decreasing trend can also be seen at the national level. There were 31,032 hepatitis A cases reported in the U.S. in 1996 and only 3,579 were reported in 2006. The hepatitis A vaccine that was introduced in 1995 is probably responsible for a substantial proportion of this decrease in disease.

In Virginia in 2006 the highest incidence rate occurred in the 1-9 year age group (2.2 per 100,000). The other age groups had incidence rates between 0.0 per 100,000 (in infants) and 1.2 per 100,000 (in 10-19 year olds) (Figure 23).



Thirty-one percent of reports were missing race data. Among cases with a race reported, the rate in the "other" race group (2.2 per 100,000) was higher than the rates among blacks and whites (0.1 and 0.6 per 100,000, respectively).

Females and males had similar rates of infection (0.9 and 0.8 per 100,000, respectively). By region, the northern region had the highest incidence rate (1.9 per 100,000), while the other regions had rates between 0.2 and 1.0 per 100,000. Cases occurred throughout the year, but occurred at highest frequency during February and August/September (Figure 24). One hepatitis A outbreak was reported in February 2006; person-to-person contact was responsible for six cases within a household (see Table 10).

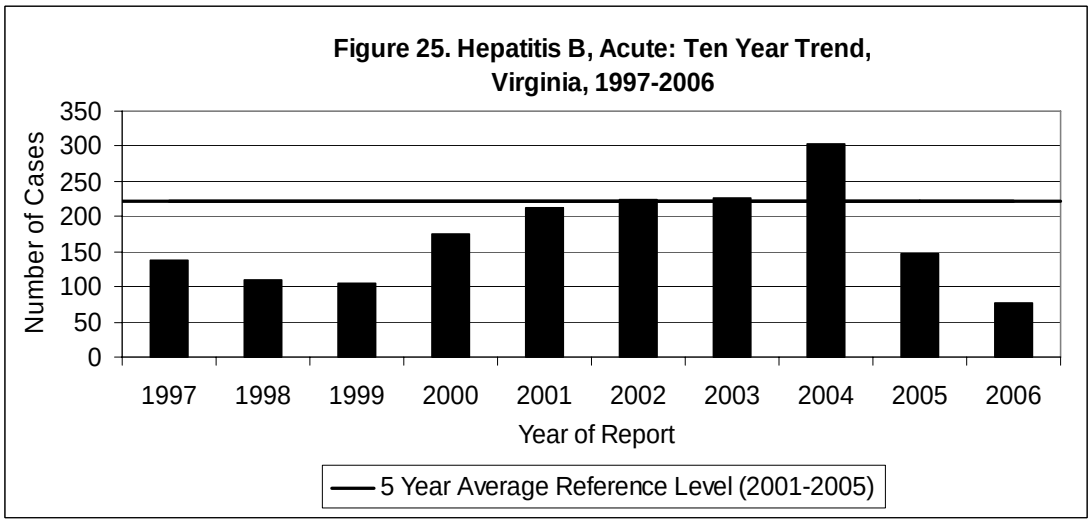


Hepatitis B, Acute

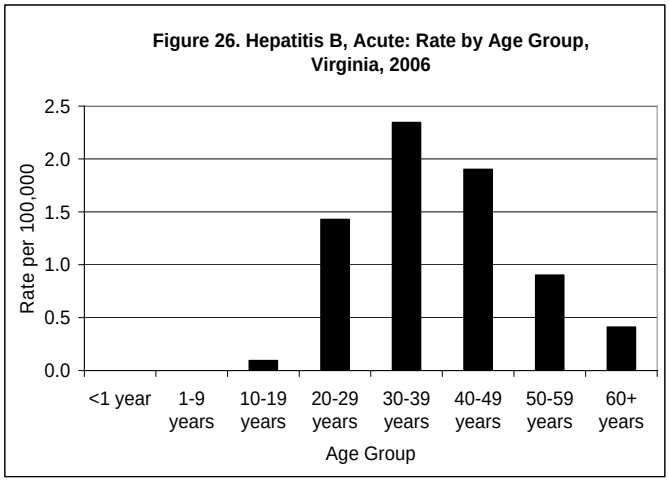
Agent: Hepatitis B virus (Hepadnavirus)
Mode of Transmission: Person-to-person by blood or body fluid exposure (e.g., sexual, perinatal, or through the skin, such as during injection drug use).
Signs/Symptoms: Fever, general feeling of illness, nausea, abdominal pain, and jaundice. Infection can be asymptomatic, and the likelihood of developing symptoms is age dependent.
Prevention: Strategies include: 1) immunization of people at increased risk of infection; 2) screening of all pregnant women and treatment of children born to positive women; 3) routine

immunization of infants; 4) routine immunization of adolescents who have not previously been immunized; and 5) screening of donated blood and organs.
Other Important Information: Infection with hepatitis B virus may lead to chronic (long-term) infection. Death from liver disease occurs in 15%-25% of those with chronic infection.

During 2006, 78 cases of acute hepatitis B infection were reported in Virginia. This represents a 47% decrease from the 146 reports in 2005 and a 65% decrease from the five year average of 222.6 cases per year (Figure 25).

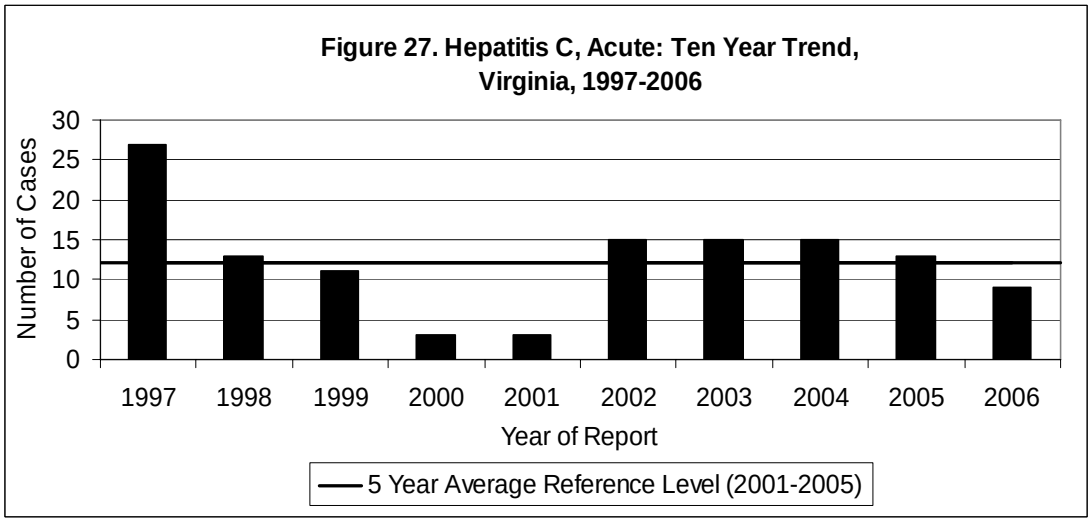


The highest incidence rates were in adults between the ages of 30-39 years (2.3 per 100,000) followed by those in the 40-49 year age group (1.9 per 100,000) (Figure 26). Only one case was reported in someone under the age of 20, and that occurred in the 10-19 year age group. Nineteen percent of reports were missing race. Among cases with a race reported, the rate in the black population was five times the rate in the white population (2.5 and 0.5 per 100,000, respectively). A slightly higher incidence rate was reported in the male population (1.2 per 100,000) than in the female population (0.8 per 100,000). The central and eastern regions had the highest rate of acute hepatitis B infections (1.5 per 100,000 in each region), followed by the southwest region (1.3 per 100,000). No seasonality in disease occurrence was noted.

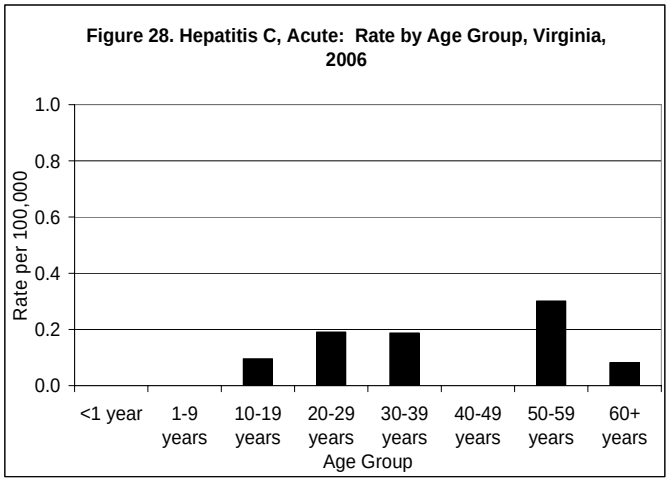


Hepatitis C, Acute

Agent: Hepatitis C virus (HCV) (Flaviviridae family)
Mode of Transmission: Person-to-person through perinatal transmission; through the skin, such as during injection drug use; or (rarely) through sexual exposure to blood or body fluids.
Signs/Symptoms: Loss of appetite, nausea, abdominal discomfort, or jaundice.
Prevention: Screening of donated blood and organs and avoidance of injection drug use.
Other Important Information: Only 10% of new infections cause symptoms, but 80% of new infections become chronic, resulting in carriers capable of spreading infection. As people with chronic HCV infection age, they are at higher risk for developing chronic liver disease, cirrhosis, and liver cancer.



Nine cases of acute hepatitis C infection were reported in Virginia during 2006. This is slightly less than the five year average of 12.2 cases per year. The incidence rate was highest in the 50-59 year age group (0.3 per 100,000), followed by the 20-29 and 30-39 year age groups (0.2 per 100,000 in each age group). No cases were reported among children less than age ten years and only one case was reported in the 10-19 year age group (Figure 28). Rates of disease reported among the black and white populations were the same (0.1 per 100,000) and females and males had similar rates (0.1 and 0.2 per 100,000, respectively). Every region reported at least one case, and the highest number (four) was reported from the central region. The largest proportion of cases (57%) had onset during the third quarter of the year. An outbreak of hepatitis C affecting seven individuals was identified in an ambulatory care facility (a dialysis center) in 2006 (see Table 9).

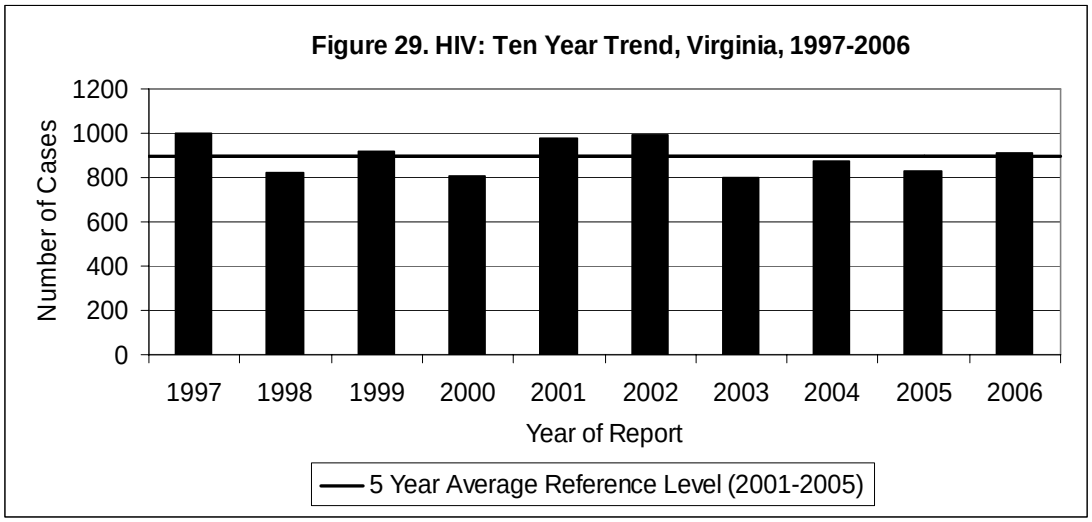


Human Immunodeficiency Virus (HIV) Infection and Acquired Immunodeficiency Syndrome (AIDS)

Agent: Human Immunodeficiency Virus (retrovirus)
Mode of Transmission: Person-to-person via unprotected intercourse, contact of cut or abraded skin with body secretions carrying the virus, use of contaminated needles, blood transfusions and transplants with organs from infected donors, or from mother to child before or during birth and through breastfeeding.
Signs/Symptoms: Initial infection with HIV can cause an acute illness of fever, muscle pain, and sore throat, after which the person can be asymptomatic for several years. Eventually the immune system is affected, causing AIDS.
Prevention: Safer sexual practices; screening of blood and plasma; and among infected mothers, antiretroviral prophylaxis, cesarean delivery before labor, and avoidance of breastfeeding.
Other Important Information: Rapid tests (which provide results within 30 minutes) are becoming more widely available and are used at some testing sites in Virginia. For more information, see: http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5524a2.htm or call your local health department.

HIV

During 2006, 914 cases of HIV infection were reported in Virginia. This is a 10% increase over the 833 cases reported in 2005 (Figure 29).

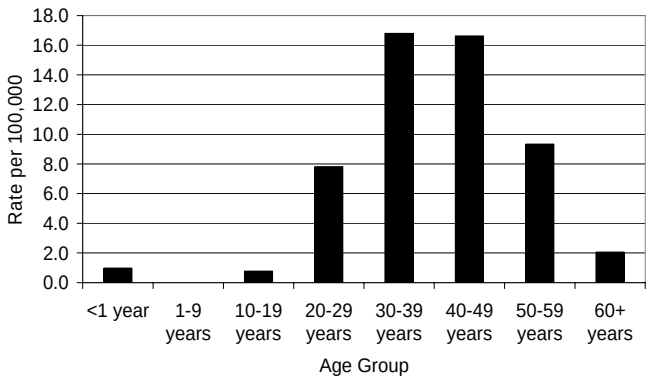


The highest incidence rates were in the 30-39 and 20-29 year age groups (26.2 and 25.0 per 100,000, respectively). The 40-49 year old population followed, with an incidence rate of 17.1 per 100,000. Rates in males have been consistently higher than rates in females. In 2006, the rate in the black population (37.7 per 100,000) was approximately 8 times the rate in the white population (4.5 per 100,000). Despite the disparity, HIV/AIDS rates in black males in Virginia and the U.S. have declined substantially since the early 1990s. The central, eastern and northern regions reported the highest incidence rates (19.4, 15.5 and 13.5 per 100,000, respectively).

AIDS

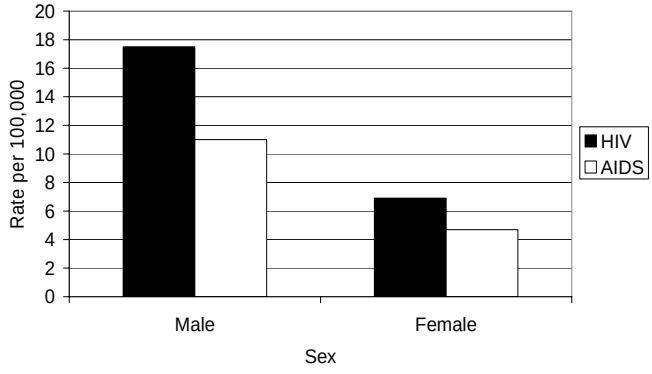
Prior to 1996, it was estimated that about 50% of people infected with HIV would develop AIDS within 10 years; however, this interval increased with the introduction of anti-viral medications. The annual number of new AIDS cases reported in Virginia decreased for the fifth consecutive year (from 970 cases reported in 2001 to 589 reported in 2006). The highest incidence rates were seen in the 30-39 year age group and the 40-49 year age group (16.8 and 16.6 per 100,000, respectively) (Figure 30).

Figure 30. AIDS: Rate by Age Group, Virginia, 2006



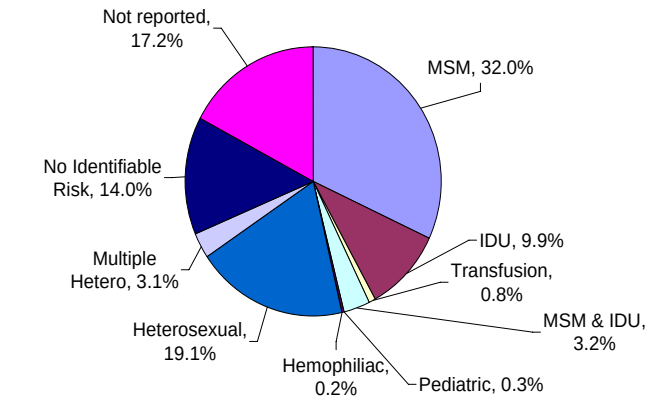
Similar to what was seen for HIV, the AIDS incidence rate in the black population was almost 8 times the rate in the white population (23.3 and 3.0 per 100,000, respectively). Likewise, the male population had a higher rate (11.0 per 100,000) than the female population (4.7 per 100,000) (Figure 31). Females have had sharper declines in AIDS incidence since 2004 than males. A decrease in the AIDS incidence rates was noted in all but the northern region, which saw an increase from 9.7 per 100,000 in 2005 to 12.2 per 100,000 in 2006.

Figure 31. A Comparison of the Rate of HIV Infections and AIDS Cases by Sex, Virginia, 2006



The most common modes of transmission among those diagnosed with AIDS in 2005 were men having sex with men (MSM) (32%), followed by heterosexual contact (19%), no identifiable risk (14%) and intravenous drug use (IDU) (10%) (Figure 32).

Figure 32. AIDS: Mode of Transmission, Virginia, 2006



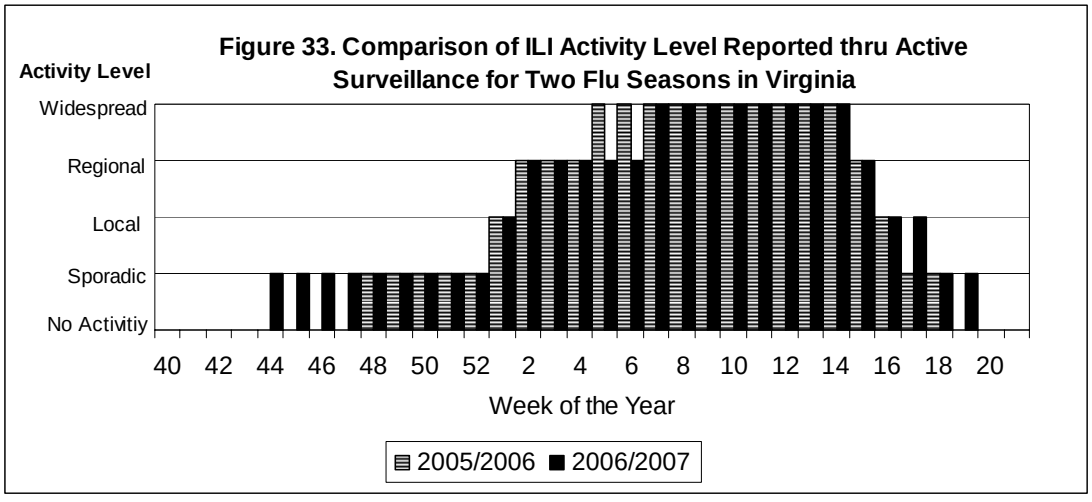
Influenza

Agent: The influenza virus; Types A, B and (rarely) C cause human disease.
Mode of Transmission: Person-to-person primarily through inhalation of droplets released through coughing or sneezing.
Signs/Symptoms: Fever, headache, muscle pain, exhaustion, sore throat and cough; influenza can also lead to pneumonia, especially in those with existing health conditions (e.g., lung or heart disease).
Prevention: Annual vaccination is the primary prevention strategy; antiviral medications are sometimes used with high-risk populations (e.g., nursing home residents) to prevent illness. Transmission may be reduced by frequent hand washing; avoidance of touching the eyes, nose, and mouth with contaminated hands; and covering the nose and mouth with a tissue when coughing or sneezing.
Other Important Information: The influenza virus changes slightly from year to year (antigenic drift), making it necessary to prepare a new vaccine each year. Periodically, the virus will change to form a completely new subtype (antigenic shift) which can lead to pandemics.

Influenza Activity Levels

In Virginia, influenza generally begins to increase in November and starts to decrease in March or April. During that time, the Virginia Department of Health conducts active surveillance with sentinel physicians around the state who report the weekly number of cases of influenza-like illness (ILI) seen at their office. An ILI case is defined as any person with a fever greater than or equal to 100° F and a cough and/or sore throat in the absence of another known cause. Six weeks of baseline data are collected and a threshold level is determined. The influenza activity level for the state is assigned based on the number of regions above threshold level. Levels, in order of progressing severity, include: sporadic, local, regional, and widespread.

Virginia began collecting baseline data for the 2005-2006 and the 2006-2007 influenza seasons in October of each year and active data collection continued through May of each year (Figure 33). This data source indicates that peak activity occurred from early February to early April in the 2005-2006 season and from mid-February to early April in the 2006-2007 season.



Influenza Types and Subtypes in Virginia

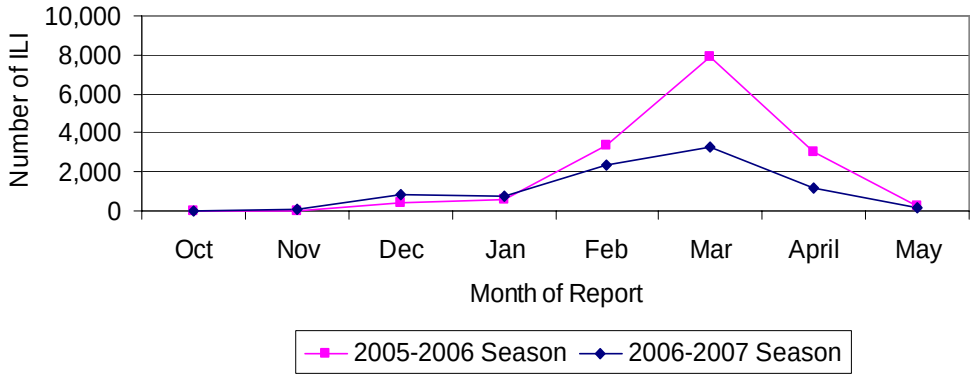
Of the 309 specimens tested by the Division of Consolidated Laboratory Services (DCLS) for influenza virus during the 2005-2006 season, 94 (30%) were influenza A and 6 (2%) were influenza B. Subtyping revealed that among the 94 influenza A isolates, 8 were subtype H1 and 86 were subtype H3. Fourteen influenza A/H3 isolates were further subtyped at CDC with the following results: 8 influenza A/California/07/2004 (H3N2), 5 influenza A/Wisconsin/67/2005 (H3N2), 1 influenza A/New York/55/2004 (H3N2). Eight influenza A/H1 isolates were further subtyped at CDC; all 8 were influenza A/New Caledonia/20/99 (H1N1). Six influenza B virus isolates were subtyped at CDC; 5 were influenza B/Ohio/01/2005 and 1 was influenza B/Florida/07/2004.

For the 2006-2007 season, of the 95 positive influenza specimens confirmed at DCLS, 67 (71%) were influenza A and 28 (29%) were influenza B. Subtyping revealed 25 type A/H1 and 42 type A/H3.

Passive Surveillance

Influenza is also reported through a passive surveillance system throughout the calendar year. Overall, fewer cases of influenza-like illness and laboratory confirmed influenza were reported in the 2006-2007 season than the 2005-2006 season.

Figure 34. Influenza-like Illness Reported Through Passive Surveillance in Two Flu Seasons in Virginia



These reports suggest that activity peaked in March during both the 2005-2006 and 2006-2007 seasons (Figure 34).

Outbreaks

Thirty-one outbreaks reported in 2006 were attributed to influenza. Of these, five occurred in schools, five were in assisted living facilities or retirement homes and 21 occurred in long-term care facilities (see Tables 9 and 10 on pages 54 and 59). Influenza was laboratory confirmed in

28 outbreaks (18 were influenza A and the type was unknown for 10) and was the suspected agent in the remaining three outbreaks.

Pediatric Deaths

Three influenza-associated pediatric deaths were reported to VDH during 2006. One death occurred in a resident of the southwest region, one occurred in the eastern region, and one occurred in the central region. The deaths were all in young children under five years of age.

Kawasaki Syndrome

Agent: Unknown – toxin or infectious agent suspected.
Mode of Transmission: Unknown.
Signs/Symptoms: High fever, rash, swelling of the hands and feet, irritability, conjunctivitis, swollen lymph nodes, inflammation of mouth/lips/throat.
Prevention: Unknown.
Other Important Information: Children less than five years of age make up approximately 80% of cases worldwide.

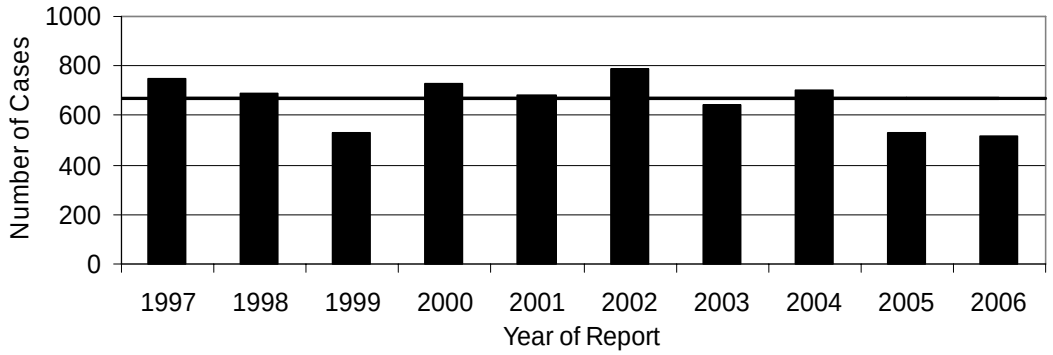
Six cases of Kawasaki syndrome were reported in Virginia during 2006. This is a 68% decrease from the 19 cases reported in 2005, and a 65% decrease from the five year average of 17 cases per year. All cases but one were reported in children less than ten years of age. By race, the highest incidence rate (0.2 per 100,000) was reported in the "other" population, followed by the white population (0.1 per 100,000). No cases were reported in the black population. Three cases were reported from the southwest region (0.2 per 100,000), two cases were reported from the northwest region (0.2 per 100,000) and a single case was reported from the northern region (0.0 per 100,000). The central and eastern regions reported no cases. The largest proportion of cases (50%) had onset during the first quarter of the year.

Lead - Elevated Blood Levels in Children

Agent: Lead (metal)
Mode of Transmission: Chewing objects painted with lead paint; ingesting contaminated dust, soil or water; or using glassware, healthcare products or folk remedies containing lead.
Signs/Symptoms: Even at low levels, lead in children can cause nervous system damage, learning disabilities, behavior problems, muscle weakness, decreased growth, hearing damage, or anemia.
Prevention: Avoid ingestion of lead-contaminated materials or use of lead-containing objects. Education of healthcare professionals and parents is important in reducing and detecting lead exposure.
Other Important Information: The primary source of lead for children is exposure to deteriorated paint in housing built before 1978. There is an increased awareness of new sources of lead exposures, including improper renovation of older homes; imported toys; candies popular among some ethnic groups; traditional Hispanic, Indian, and Middle Eastern folk remedies; and ceramics from foreign countries.

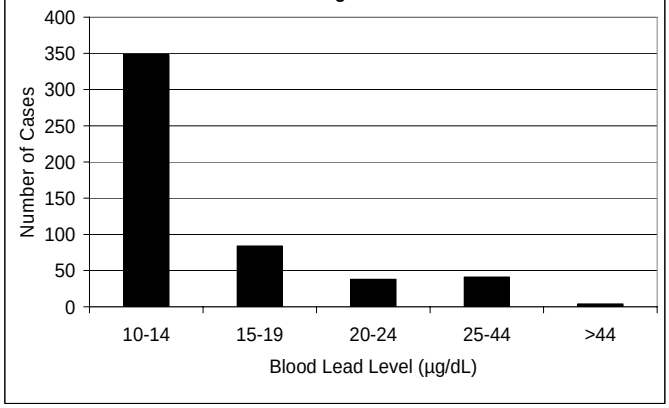
Virginia law requires reporting of elevated childhood blood lead levels (>9 μg/dL). There were 515 cases of elevated blood levels reported in children less than 16 years old during 2006. This is a significant decrease (23%) from the five year average of 669.2 cases per year (Figure 35). Blood lead levels in the 10-14 μg/dL range are above normal, but only require lead education and follow-up monitoring. Blood lead levels in the 15-19 μg/dL range require nutritional and environmental education and more frequent screening, while a finding in the range of 20-24 μg/dL requires medical and environmental evaluation and environmental remediation. Blood lead levels greater than 24 μg/dL require medical and environmental interventions. Among children reported with elevated blood lead levels, 348 cases (68%) fell in the 10-14 μg/dL range, 84 cases (16%) fell in the 15-19 μg/dL range, 38 cases (7%) fell in the 20-24 μg/dL range, and 41 cases (8%) fell in the 25-44 μg/dL range. Four children (1%) had lead levels greater than 44 μg/dL (Figure 36).

Figure 35. Elevated Blood Lead Levels in Children: Ten Year Trend, Virginia, 1997-2006



The majority of elevated blood lead levels (92%) and the highest rate occurred in 1-9 year olds (476 cases, 53.3 per 100,000). This was followed by infants (29.2 per 100,000 population) and 10-15 year olds (1.5 per 100,000). Twenty-seven percent of reports were missing race data, including twenty-six (5%) that reported Hispanic as a race. Among reports with a race, the black population had an incidence rate more than four times that of the white population (58.5 versus 12.7 per 100,000, respectively). The "other" race category had an incidence rate of 13.7 per 100,000. The male population had a higher incidence rate than the female population (34.1 and 29.7 per 100,000, respectively). The central region had the highest rate of elevated blood lead levels in children,

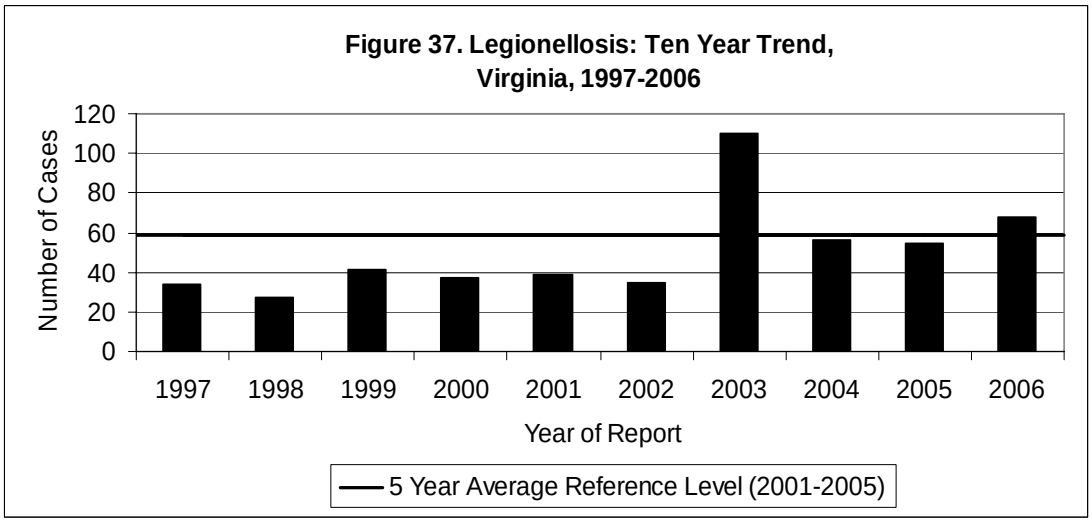
Figure 36: Elevated Blood Lead Levels: Range of Elevation, Virginia 2006



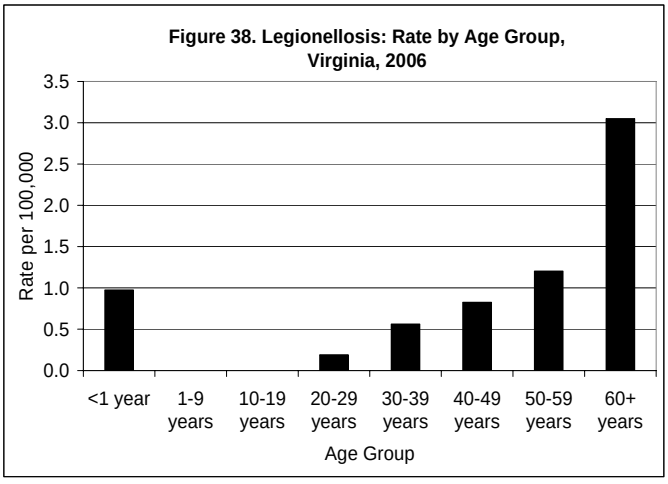
with 61.7 per 100,000. This was followed by the southwest region with 43.3 per 100,000. The other regions had rates between 17.3 and 27.7 per 100,000.

Legionellosis

Agent: *Legionella* species (bacteria); most infections in the United States are caused by *Legionella pneumophila.*
Mode of Transmission: Inhalation of contaminated aerosols (e.g., water sprays, mists).
Signs/Symptoms: Infection with *L. pneumophila* causes two distinct illnesses: Legionnaire disease, characterized by fever, muscle aches, headaches, malaise, cough, and pneumonia; and Pontiac fever, a mild influenza-like illness without pneumonia. Pontiac fever and Legionnaire disease are referred to as "legionellosis", separately or together.
Prevention: For outbreaks, disinfection of contaminated water sources by chlorination or superheating of water to 160° - 170°F, and appropriate mechanical cleaning.
Other Important Information: Legionellosis is more common among people who smoke or have chronic medical conditions.



Sixty-eight cases of legionellosis were reported in Virginia during 2006. This is a 24% increase from the 55 cases reported in 2005, and a 15% increase from the five year average of 59 cases per year (Figure 37).



The highest incidence rates occurred among adults age 60 and over (3.1 per 100,000) (Figure 38). No cases were reported among the 1-9 and 10-19 years age groups. The same rates were reported for the black and white populations (0.8 per 100,000). Males had

a higher incidence rate than females (1.5 and 0.3 per 100,000, respectively). The southwest region had the highest incidence rates (1.4 per 100,000), followed by the northwest region (1.1 per 100,000). In 2006, the largest proportion of cases (34%) had onset during the third quarter of the year, but this disease is not known to have a seasonal pattern. Three deaths due to legionellosis were reported during 2006; one occurred in a 30-39 year old and the other two were in persons age 60 and older.

Leprosy (Hansen Disease)

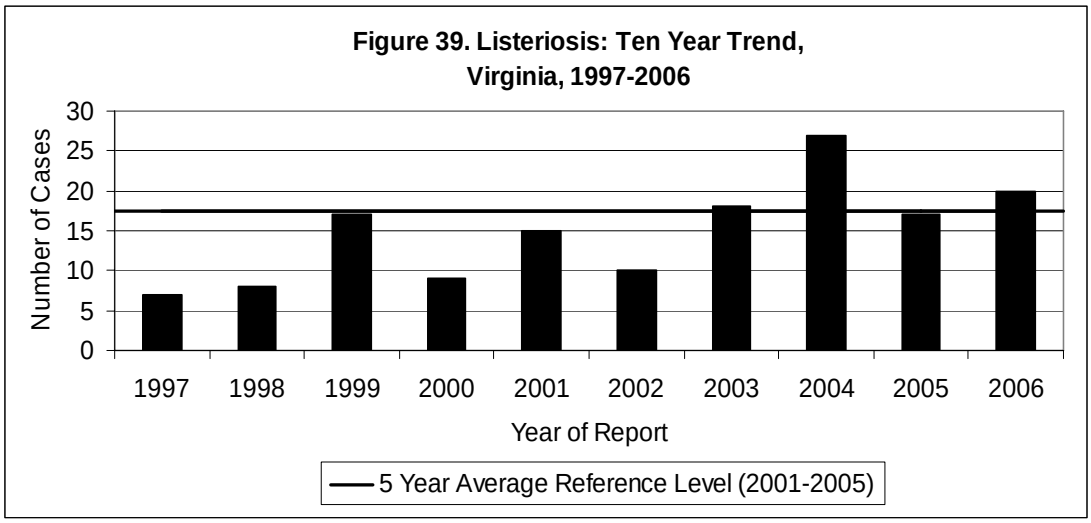
Agent: *Mycobacterium leprae* (bacteria)
Mode of Transmission: Person-to-person, probably through nasal secretions from persons with untreated lepromatous disease (those with discolored spots on the skin).
Signs/Symptoms: A chronic disease with varying symptoms, including skin lesions (tuberculoid leprosy); discolored, flat spots on the skin (lepromatous leprosy); nasal congestion; nosebleeds; and nerve damage.
Prevention: Early diagnosis and treatment is important. Hand washing when in contact with patients with lepromatous leprosy and disinfection of surfaces contaminated with infectious nasal secretions should be performed until treatment is established.

One case of leprosy was reported in Virginia during 2006. It occurred in an Asian male in the 30-39 year age group from the northern region. The last reported case had occurred in 2001.

Listeriosis

Agent: *Listeria monocytogenes* (bacteria)
Mode of Transmission: Ingestion of contaminated foods or beverages.
Signs/Symptoms: Typically, fever, headache, nausea, and vomiting. Infection can lead to serious disease, including shock and inflammation of the brain and the fluid surrounding the brain and spinal cord. Miscarriage may occur.
Prevention: Safe food preparation (e.g., thoroughly cooking raw food from animals and wash vegetables) and avoidance of high risk foods (e.g., unpasteurized dairy products).
Other Important Information: Persons at higher risk include pregnant women and persons with weakened immune systems.

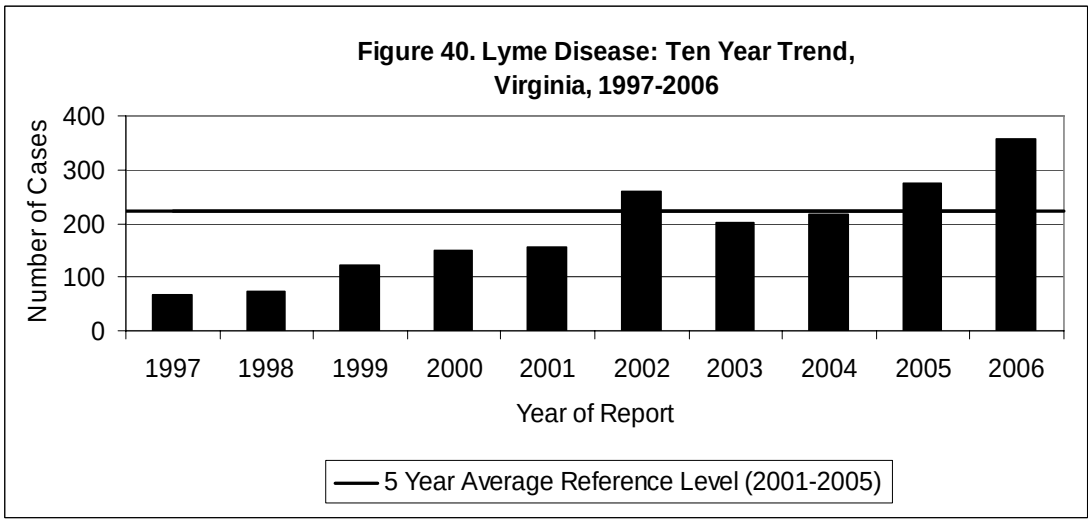
The 20 cases of listeriosis reported in Virginia during 2006 represent a 15% increase from the five year average of 17.4 cases per year (Figure 39).



The 20-29 year age group had the greatest number of cases (4 cases, 0.4 per 100,000), but the highest rate occurred among infants (2 cases, 1.9 per 100,000). The other age groups had incidence rates between 0 and 1.0 per 100,000. Incidence rates were similar in the black and white populations (0.1 and 0.3 per 100,000, respectively) and in females and males (0.3 and 0.2 per 100,000, respectively). Incidence rates in the regions ranged from 0.2 to 0.4 per 100,000, with the highest rate in the southwest region. Cases occurred throughout the year with peak activity occurring in the third quarter. One death due to listeriosis was reported.

Lyme Disease

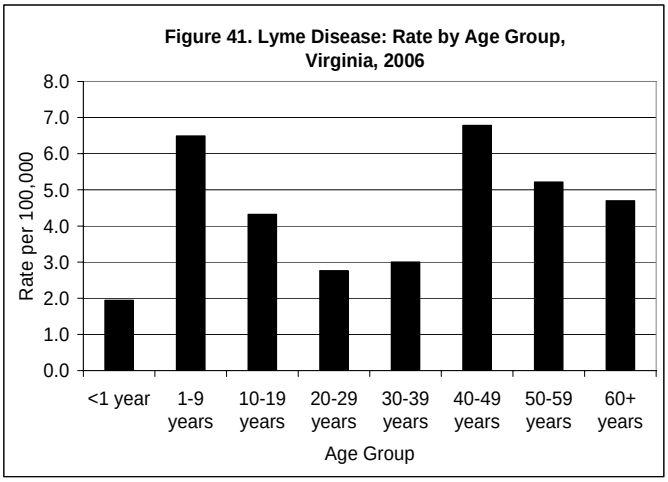
Agent**:** *Borrelia burgdorferi* (spirochete bacteria)
Mode of Transmission**:** Transmitted to humans from the bite of infected nymphal or adult blacklegged ticks (formerly known as deer ticks). No other tick species plays a role in Lyme disease transmission. Infected ticks must bite a human and remain attached (feeding) for a minimum of 24 to 36 hours to be able to transmit the Lyme disease pathogen.
Signs/Symptoms**:** Initial symptoms include fever, headache, fatigue, and a characteristic skin rash called erythema migrans, or EM rash. If untreated, infection can affect the joints, the heart, and the nervous system.
Prevention**:** Avoid being bitten by ticks. Avoid tick-prone habitats such as humid forest environments with dense undergrowth and/or heavy leaf litter, tall weeds along forest margins, tree lines, forest trails and forest clearings. When in tick-prone habitats, wear light-colored clothing with pants legs tucked into socks. Apply permethrin-based repellents to clothing (shoes, pants, and socks). Apply DEET, Picaridin, or Oil of Lemon Eucalyptus-based repellents to exposed areas of skin (legs and arms). Thoroughly check your body for ticks after visiting tick-prone habitats and remove attached ticks as soon as possible.
Other Important Information: Lyme disease is diagnosed based on symptoms, physical findings (e.g., rash), and the possibility of prolonged exposure to an infected deer tick. The EM rash is the only physical manifestation that is distinctive enough to allow a definitive diagnosis without laboratory testing. The EM rash may be overlooked or may not occur in up to 30% of persons with Lyme disease.



The 357 cases reported in 2006 represent a 30% increase from the 274 cases reported in 2005 and were 61% higher than the five year average (Figure 40). The increased numbers of reported cases of Lyme disease may be partly due to increased awareness of the disease by the public and healthcare professionals, as well as to increased case follow-up by local health departments. However, it is also possible that increasing suburbanization of some parts of Virginia may enhance the environment for white tailed deer, which play a role in tick reproduction, and white-footed mice, which play a role in transmission of the Lyme disease agent to ticks. Suburbanized forest areas may also bring more persons into contact with the tick vector.

Although Lyme disease cases were reported in every quarter during 2006, there was a seasonal pattern, with the majority of cases (80%) reported from April-September. The seasonality of Lyme disease is strongly related to the period when nymphal black-legged ticks are active. Nymphal-stage blacklegged ticks are the primary vectors of Lyme disease and are active during a period from mid-April through mid-July.

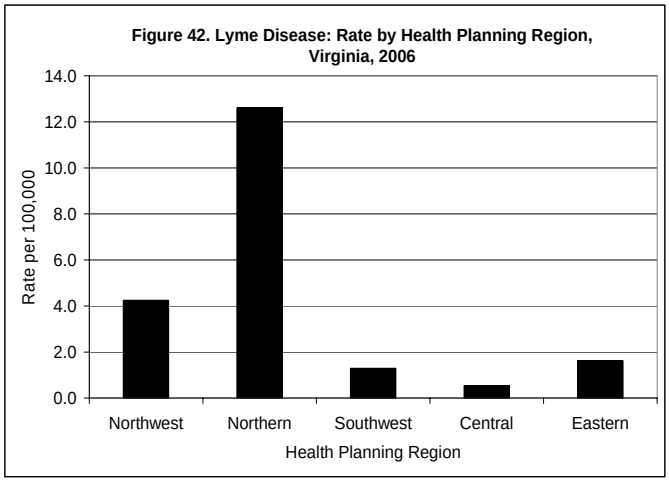
There was a bimodal peak in infections by age group, with children in the 1-9 year age group and adults in the 40-49 year age group having nearly seven cases per 100,000 population (Figure 41). This bimodal age group risk for Lyme disease is typical of what is observed in other regions of the U.S.



Among cases for which race was recorded, white individuals had an incidence of 3.7 per 100,000, compared to 0.6-1.0 per 100,000 for the other races. Racial differences may in part be related to differences in healthcare access and exposure to suburban and rural tick habitats, and possibly to easier detection of the erythema migrans

lesion in individuals with lighter skin pigmentation. Males had a slightly higher incidence of Lyme disease than females (5.0 and 4.3 per 100,000, respectively) and this might indicate that males have slightly higher rates of activity in tick prone habitats.

Cases were reported from all regions of the state; however, the incidence of Lyme disease was highest in the northern region (12.6 per 100,000). Rates in other regions ranged from 0.5 to 4.2 per 100,000 (Figure 42).



Lymphogranuloma Venereum

Agent: Specific immunotypes of the bacteria, *Chlamydia trachomatis*
Mode of Transmission: Sexually transmitted through contact with the lesions of an infected person.
Signs/Symptoms: Small, painless lesions on the penis or vulva, which usually go unnoticed. Fever, chills, headache, anorexia, and joint pain may also be present.
Prevention: Safer sexual practices.
Other Important Information: This disease rarely occurs in most developed countries, but as of September 2004, the Netherlands reported as many as 92 cases among men who have sex with men.

No cases of lymphogranuloma venereum were reported in Virginia in 2006. Three cases were reported in 2005.

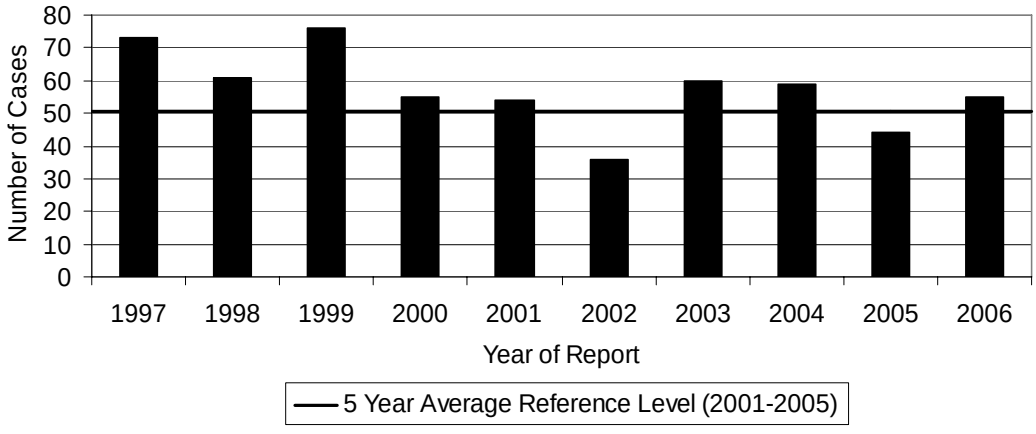
Malaria

Agent(s): Four different species of protozoan parasites: *Plasmodium falciparum*, *P. vivax*, *P. ovale*, and *P. malariae*.
Mode of Transmission: In Virginia, malaria could be transmitted to humans by infected Anopheline mosquitoes of the species *Anopheles quadrimaculatus* or by *An. punctipennis*. Malaria may also be transmitted by blood transfusion or transplanted organs from infected donors.
Signs/Symptoms: Typically, high fevers, shaking, chills, sweats, severe headache, muscle and joint pain, anorexia, nausea, flu-like illness, anemia and an enlarged spleen. *P. falciparum* infections may progress to severe malaria if not treated promptly; symptoms include acute alteration of brain structure and function, severe anemia, jaundice, renal failure and coma.
Prevention: Appropriate medication for malaria prophylaxis should be taken by travelers to malaria endemic countries. Anopheline mosquitoes bite only at dusk, dawn or during night-time hours and tend to enter buildings. Avoid mosquito bites at these times by staying in

structures with adequate screening and/or equipped with bed nets, and when outdoors, by wearing longsleeved, loose fitting, light-colored clothing and mosquito repellents.
Other Important Information: Humans and certain *Anopheles* mosquito species are the only natural reservoirs for malaria. Although no form of malaria is currently endemic to Virginia, it may be brought to this region by travelers or immigrants with dormant or inapparent infections. Various forms of malaria might also arrive in Virginia carried by infected mosquitoes transported in aircraft arriving from foreign destinations. Almost all infections reported in Virginia occur in individuals who were infected in other countries.

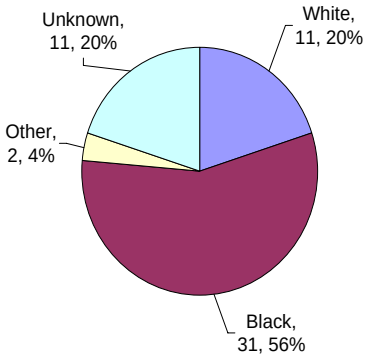
In 2006, 55 cases of malaria were reported in Virginia. This is a 25% increase from the 44 cases reported in 2005, and a 9% increase from the five year average of 50.6 cases per year (Figure 43).

Figure 43. Malaria: Ten Year Trend, Virginia, 1997-2006



Incidence rates were highest for the 1-9 and 30-39 year age groups (1.1 per 100,000 each). Over half of the reported cases occurred among the black population (Figure 44), which had a much higher incidence rate than the white population (2.1 and 0.2 per 100,000, respectively). The male population had a slightly higher incidence rate than the female population (0.9 and 0.6 per 100,000, respectively). Among regions, the northern region had the highest incidence rate (1.7 per 100,000). Rates in other regions ranged between 0.3 and 0.5 per 100,000. No deaths due to malaria were reported in 2006.

Figure 44. Malaria: Proportion of Cases by Race, Virginia, 2006



All cases reported a history of travel outside of the United States within the four years prior to disease onset. Information on malaria prophylaxis usage was obtained for 50 cases (91%). Of

these, 19 (38%) reported receiving prophylaxis for malaria, although two of these cases reported missing at least one dose.

Measles

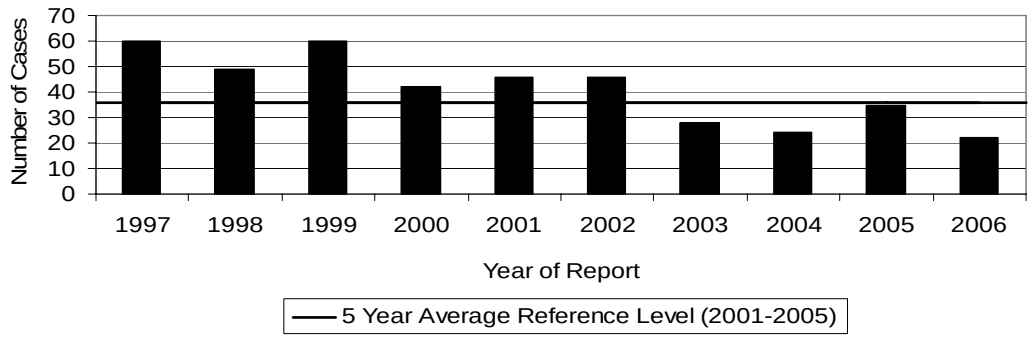
Agent: Measles virus
Mode of Transmission: Primarily person-to-person by inhalation of respiratory droplets or direct contact with nasal or throat secretions of infected people; however, airborne transmission via aerosolized droplet nuclei has been documented.
Signs/Symptoms: Fever, cough, conjunctivitis, coryza, and a typical rash on the third to seventh day after onset of symptoms.
Prevention: Measles vaccine should be given as part of the measles, mumps, and rubella (MMR) series beginning at 12-15 months of age followed by a second dose at age 4-6 years.
Other Important Information: Measles is highly communicable, with >90% secondary attack rates among susceptible people. Although measles is no longer endemic in the United States, imported cases continue to cause occasional limited transmission of measles.

No cases of measles were reported in Virginia during 2006. Virginia's last reported case occurred in 2001.

Meningococcal Infection

Agent: *Neisseria meningitidis* (bacteria)
Mode of Transmission: Transmission occurs through contact with respiratory droplets from the nose or throat of infected people (e.g., through coughing or kissing).
Signs/Symptoms: Sudden onset of fever, headache, stiff neck, vomiting, and photophobia (fear of light). A rash may also be present.
Prevention: Vaccination protects against two of the three types of infection that are common in the United States.
Other Important Information: Crowding, exposure to tobacco smoke, and coexisting respiratory tract infections increase the risk of disease. Five percent to 10% of people carry *N. meningitidis* in their nose without having any symptoms of disease; those who develop disease are usually infected by a carrier who does not have symptoms.

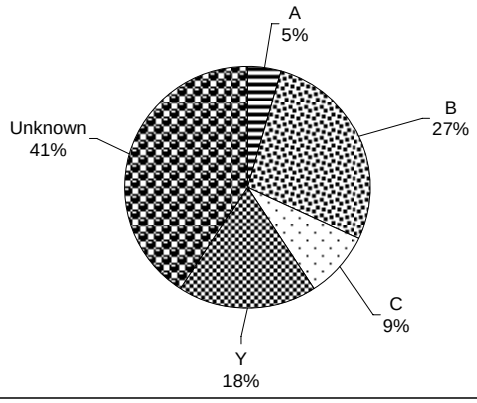
Figure 45. Meningococcal Infection: Ten Year Trend, Virginia, 1997-2006



During 2006, 22 cases of meningococcal infection were reported in Virginia. This is a 37% decrease from the 35 cases reported in 2005, and a 39% decrease from the five year average of 35.8 cases per year (Figure 45).

The highest rate of infection occurred in the infant population (2.9 per 100,000). Rates in the other age groups ranged from 0.2 to 0.4 per 100,000. The black and white populations had the same incidence rates (0.3 per 100,000). The rate was higher in males than in females (0.4 and 0.2 per 100,000, respectively). Among the 59% of cases for which a serogroup was identified, six were group B, four were group Y, two were group C and one was group A. (Figure 46).

Figure 46. Meningococcal Serogroups, Virginia, 2006



All five regions showed similar incidence rates (0.2 to 0.3 per 100,000). By onset, the largest proportion of cases (45%) occurred in the first quarter of the year and the smallest proportion (5%) occurred during the third quarter. Two deaths were reported in individuals whose infections developed into meningitis. One occurred in the 10-19 year age group and was determined to be serogroup B; the other death occurred in an infant but the serogroup was not determined for this case.

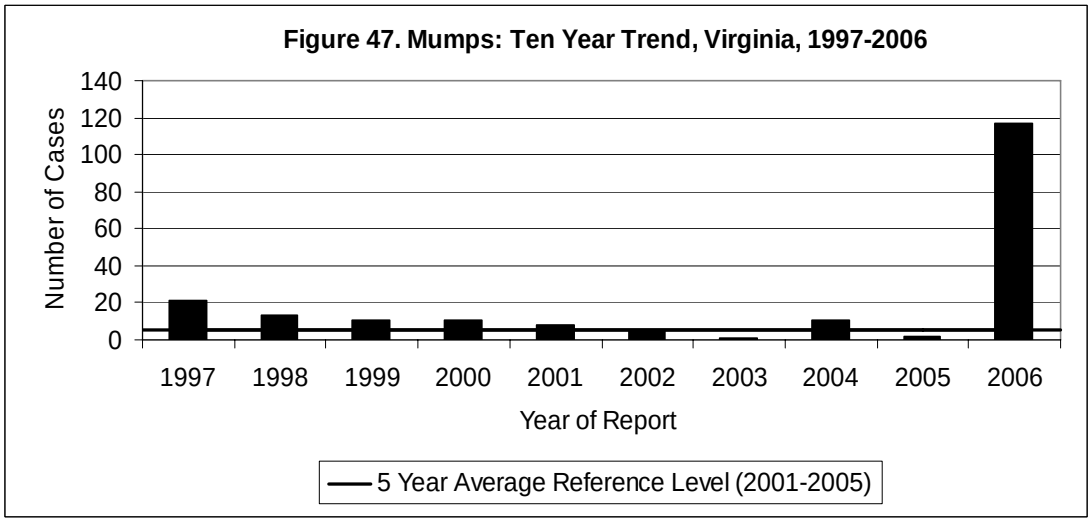
Monkeypox

Agent: Monkeypox virus (genus *Orthopoxvirus*)
Mode of Transmission: From the bite of or direct contact with lesions or body fluids of an infected animal. Though less common, infection can be transmitted from person to person by respiratory droplets or by direct contact with body fluids of an infected person, or with virus-contaminated objects such as bedding.
Signs/Symptoms: Similar to smallpox, though more mild. Initial symptoms include fever, headache, backache, sore throat, cough and swollen lymph nodes. Three days after fever onset, a rash develops.
Prevention: Avoid contact with exotic or wild mammals that originate from areas where monkeypox has occurred.
Other Important Information: In 2003, a monkeypox outbreak was reported in the United States among persons exposed to native prairie dogs that had contact with imported African rodents.

Monkeypox became a reportable disease in Virginia in 2004. No cases of monkeypox have ever been reported in Virginia.

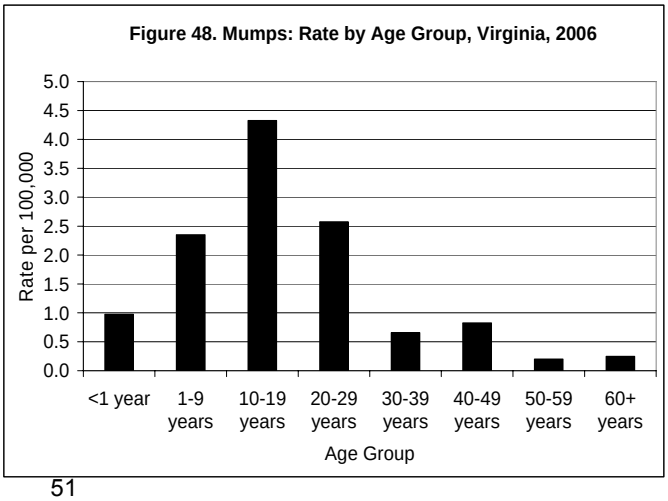
Mumps

Agent: Mumps (virus)
Mode of Transmission: Person-to-person through respiratory droplets, as well as through direct contact with saliva of an infected person.
Signs/Symptoms: Fever, swelling and tenderness of one or more salivary glands. In children under age five, 40%-50% of cases are associated with respiratory symptoms. As many as 20% of mumps infections are asymptomatic.
Prevention: Vaccination, preferably administered as MMR, beginning at age 12 months. Two doses of mumps-containing vaccine are recommended for school-aged children, healthcare workers, international travelers, and college students.



The 117 cases of mumps reported in 2006 were a dramatic increase over the two cases of mumps reported in 2005 and the average of 5.4 per year during the preceding five years. This is attributed to elevated awareness due to a widespread outbreak in the mid-western part of the country and a university-based outbreak in Virginia, coupled with the lack of a sensitive and specific lab test that would effectively confirm or rule out mumps. Of Virginia's 117 cases, 81 were classified as probable because there was no lab confirmation of infection and they could not conclusively be linked to another case.

The highest incidence rate was seen in the 10-19 age group (4.3 per 100,000), followed by the 20-29 and 1-9 age groups (2.6 and 2.4 per 100,000, respectively). Overall, 50% of the cases occurred in individuals 15-24 years of age. Rates were higher among those of "other" races (1.8 per 100,000) and among whites (1.3 per 100,000) than among blacks (0.7 per 100,000). Of reported cases, 61% were female.



Although cases were reported in all regions of the state, 49% of cases occurred in the northwest region (4.9 per 100,000). One outbreak of mumps, on a college campus, occurred in 2006 (see Table 10).

Ophthalmia Neonatorum

Agent: *Chlamydia trachomatis* (bacteria) or *Neisseria gonorrhoeae* (bacteria), though *C. trachomatis* is most common.
Mode of Transmission: Infants are exposed to the organism in the birth canal during childbirth.
Signs/Symptoms: Redness or swelling of one or both eyes beginning five to fourteen days after birth.
Prevention: Screening of all pregnant women for chlamydia and gonorrhea infection, followed with appropriate treatment for infected women and their partner(s).

Eleven infants were reported with ophthalmia neonatorum in 2006. Of these, 10 were caused by *C. trachomatis* and 1 was caused by *N. gonorrhoeae*.

Outbreaks

Foodborne

During 2006, 24 foodborne outbreaks were reported in Virginia (see Table 8). The number of ill persons per outbreak ranged from four attendees at a party to 203 staff and inmates at a correctional facility. The etiologic agent was confirmed or suspected to be viral for 10 outbreaks (all norovirus), bacterial for 10, and biologically produced toxins in the remaining four. Of the bacterial outbreaks, five were attributed to *Salmonella* (ser. Enteritidis, Javiana, Tennesee and Typhimurium), two were due to *Campylobacter jejuni*, and two were due to *Staphylococcus aureus*. Scombroid fish poisoning was believed to be responsible for two outbreaks. *Clostridium perfringens* was responsible for a single outbreak and a bacterial toxin was suspected in another. Factors contributing to the outbreaks included improper food handling (i.e., not keeping the food at the correct temperature or not cooking it at the proper temperature), infected food handlers, and ingestion of contaminated raw products.

Table 8. Foodborne Outbreaks Reported in Virginia, 2006

Onset Date	Health District	Number of Cases	Etiologic Agent	Vehicle	Place Where Outbreak Occurred
January	Statewide	44 VA 714 US	*Salmonella* ser. Tennessee	Peanut butter	Community
1/24/2006	New River	24	Norovirus	Hot dog buns suspected	School
2/4/2006	Rappahannock	12	Norovirus	Food vehicle undetermined	Restaurant
2/6/2006	Mount Rogers	4	Norovirus	Pizza, chicken wraps	Private Group/Party
2/13/2006	Chesterfield	40	*Salmonella* ser. Typhimurium	Turkey	Correctional Facility

Table 8. Foodborne Outbreaks Reported in Virginia, 2006 (Continued)

Onset Date	Health District	Number of Cases	Etiologic Agent	Vehicle	Place Where Outbreak Occurred
2/24/2006	Chesterfield	10	Norovirus	Food vehicle undetermined	Restaurant
3/18/2006	Peninsula	6	Histamine (Scombroid)	Tuna	Restaurant
3/29/2006	Central Virginia	6	*Clostridium perfringens*	Food vehicle undetermined	Restaurant
4/14/2006	Thomas Jefferson	25	Norovirus	Food vehicle undetermined	Private Club
4/16/2006	Loudoun	36	*Staphylococcus aureus*	Beef apanado de res, potato salad, rice	Church Dinner
4/26/2006	Mount Rogers	6	Norovirus suspected	Food vehicle undetermined	Restaurant
5/8/2006	Three Rivers	9	*Campylobacter jejuni*	Unpasteurized milk	Community
5/9/2006	Western Tidewater	28	Norovirus	Food vehicle undetermined	Private Group
6/25/2006	Lenowisco	15	Norovirus	Ham salad	Private Group/Party
7/23/2006	Chickahominy	15	*Campylobacter jejuni*	Watermelon	Private Group/Party
8/5/2006	Mount Rogers, Loudoun	2 VA 199 US	*Escherichia coli*	Spinach	Community
8/18/2006	Chesapeake	203	Bacterial toxin suspected	Rice suspected	Correctional Facility
9/16/2006	Central Virginia	80	*Staphylococcus aureus*	Ham biscuits, chicken, and/or potato salad	Catered Event
9/16/2006	Fairfax, Cumberland Plateau	3 VA 190 US	*Salmonella* ser. Typhimurium	Tomatoes suspected	Community
9/19/2006	Richmond	9	Norovirus	Salad (lettuce, arugula, grape tomotoes)	Catered Event
10/5/2006	Alexandria	40	Norovirus	Salad, fruit appetizer	Cruise Ship
11/1/2006	Statewide	46 VA 61 US	*Salmonella* ser. Javiana	Food vehicle undetermined	Community
11/24/2006	Alexandria	6	Histamine (Scombroid) suspected	Tuna suspected	Restaurant
12/16/2006	Alexandria	7	*Salmonella* ser. Enteritidis	Food vehicle undetermined	Restaurant

Healthcare-Associated

A healthcare-associated outbreak is a group of illnesses with a common etiology among patients in a medical care facility (hospital or nursing home), where the patients acquired the illness while confined to that facility. There were 116 healthcare-associated outbreaks reported in Virginia during 2006 (see Table 9.) This is an increase from 90 in 2005 and 46 in 2004 and is likely to reflect increased reporting due to outreach by health districts to assist healthcare facilities in controlling outbreaks. Healthcare-associated outbreaks were primarily attributed to person-to-person transmission. The exceptions among events reported in 2006 were one due to

bloodborne transmission, one associated with intravenous fluid administration and one that involved environmental exposure. Etiologic agents were confirmed in 89 of the 116 outbreaks, suspected in 25 and unknown in two. Norovirus was confirmed as the responsible agent in 58 outbreaks, 20 were confirmed as due to influenza, four were due to *Chlamydophila pneumonia*, two were due to rotavirus and two were due to scabies. Acinetobacter, hepatitis C, and methicillin-resistant *Staphylococcus aureus* were each responsible for one outbreak.

Table 9. Healthcare-Associated Outbreaks Reported in Virginia, 2006

Onset Date	Health District	Number of Cases	Etiologic Agent	Vehicle	Place Where Outbreak Occurred
12/20/2005	Lenowisco	8	Acinetobacter	Person-to-Person	Long-Term Care Facility
1/3/2006	Fairfax	51	Norovirus	Person-to-Person	Long-Term Care Facility
1/6/2006	Henrico	16	Norovirus	Person-to-Person	Long-Term Care Facility
1/8/2006	Cumberland Plateau	17	Influenza A	Person-to-Person	Long-Term Care Facility
1/10/2006	Arlington	37	Norovirus	Person-to-Person	Long-Term Care Facility
1/11/2006	Chesterfield	120	Norovirus	Person-to-Person	Long-Term Care Facility
1/13/2006	Rappahannock-Rapidan	54	Norovirus suspected	Person-to-Person	Long-Term Care Facility
1/14/2006	Chesterfield	92	Norovirus	Person-to-Person	Long-Term Care Facility
1/18/2006	Loudoun	61	Norovirus	Person-to-Person	Long-Term Care Facility
1/18/2006	Alexandria	38	Norovirus	Person-to-Person	Long-Term Care Facility
1/23/2006	West Piedmont	11	Norovirus suspected	Person-to-Person	Long-Term Care Facility
1/24/2006	Henrico	17	Norovirus suspected	Person-to-Person	Long-Term Care Facility
February	Fairfax	18	Scabies	Person-to-Person	Long-Term Care Facility
2/1/2006	Richmond	7	Hepatitis C	Bloodborne	Ambulatory Care Facility
2/1/2006	Three Rivers	11	Influenza A	Person-to-Person	Long-Term Care Facility
2/1/2006	Three Rivers	66	Norovirus	Person-to-Person	Long-Term Care Facility
2/8/2006	Crater	36	Norovirus	Person-to-Person	Long-Term Care Facility
2/10/2006	Loudoun	53	Norovirus	Person-to-Person	Long-Term Care Facility
2/12/2006	Southside	36	Norovirus suspected	Person-to-Person	Long-Term Care Facility
2/15/2006	Mount Rogers	9	Influenza	Person-to-Person	Long-Term Care Facility
2/15/2006	Henrico	7	Norovirus suspected	Person-to-Person	Long-Term Care Facility

Table 9. Healthcare-Associated Outbreaks Reported in Virginia, 2006 (Continued)

Onset Date	Health District	Number of Cases	Etiologic Agent	Vehicle	Place Where Outbreak Occurred
2/19/2006	New River	28	Influenza	Person-to-Person	Long-Term Care Facility
2/19/2006	Chesterfield	18	Norovirus	Person-to-Person	Long-Term Care Facility
2/20/2006	Pittsylvania-Danville	87	Influenza A	Person-to-Person	Long-Term Care Facility
2/20/2006	West Piedmont	15	Influenza A	Person-to-Person	Long-Term Care Facility
2/21/2006	Mount Rogers	9	Influenza	Person-to-Person	Long-Term Care Facility
2/21/2006	Alleghany	82	Norovirus suspected	Person-to-Person	Long-Term Care Facility
2/23/2006	Eastern Shore	13	Influenza A	Person-to-Person	Long-Term Care Facility
2/26/2006	Chickahominy	69	Influenza A	Person-to-Person	Rehabilitation Facility
2/27/2006	Fairfax	139	Norovirus	Person-to-Person	Long-Term Care Facility
3/1/2006	Central Virginia	37	Unknown respiratory condition	Person-to-Person	Long-Term Care Facility
3/5/2006	Eastern Shore	7	Influenza A	Person-to-Person	Long-Term Care Facility
3/8/2006	Peninsula	7	Norovirus suspected	Person-to-Person	Long-Term Care Facility
3/9/2006	Crater	13	Influenza A	Person-to-Person	Long-Term Care Facility
3/9/2006	Richmond	21	Influenza	Person-to-Person	Long-Term Care Facility
3/11/2006	Central Virginia	10	Influenza A	Person-to-Person	Long-Term Care Facility
3/11/2006	West Piedmont	30	Norovirus	Person-to-Person	Long-Term Care Facility
3/12/2006	Norfolk	17	Rotavirus	Person-to-Person	Long-Term Care Facility
3/15/2006	Peninsula	5	Influenza A	Person-to-Person	Long-Term Care Facility
3/20/2006	Crater	27	Influenza A	Person-to-Person	Long-Term Care Facility
3/22/2006	Henrico	4	Influenza	Person-to-Person	Long-Term Care Facility
3/22/2006	Peninsula	14	Influenza A	Person-to-Person	Long-Term Care Facility
3/25/2006	Henrico	20	Influenza suspected	Person-to-Person	Long-Term Care Facility
3/25/2006	New River	17	Influenza A	Person-to-Person	Long-Term Care Facility
3/26/2006	Peninsula	7	Influenza	Person-to-Person	Long-Term Care Facility
3/27/2006	Hampton	17	Norovirus suspected	Person-to-Person	Long-Term Care Facility

Table 9. Healthcare-Associated Outbreaks Reported in Virginia, 2006 (Continued)

Onset Date	Health District	Number of Cases	Etiologic Agent	Vehicle	Place Where Outbreak Occurred
4/3/2006	Peninsula	3	Influenza A	Person-to-Person	Long-Term Care Facility
4/5/2006	Chesterfield	11	Norovirus	Person-to-Person	Long-Term Care Facility
4/12/2006	Chesterfield	28	Norovirus	Person-to-Person	Long-Term Care Facility
4/17/2006	Alexandria	49	Norovirus	Person-to-Person	Long-Term Care Facility
4/27/2006	Richmond	8	Norovirus	Person-to-Person	Long-Term Care Facility
4/27/2006	Thomas Jefferson	35	Norovirus	Person-to-Person	Long-Term Care Facility
5/1/2006	Peninsula	30	Norovirus	Person-to-Person	Long-Term Care Facility
5/1/2006	Central Virginia	42	Norovirus	Person-to-Person	Long-Term Care Facility
5/5/2006	Three Rivers	13	Norovirus suspected	Person-to-Person	Long-Term Care Facility
5/22/2006	Virginia Beach	42	*Chlamydophila pneumoniae*	Person-to-Person	Long-Term Care Facility
5/25/2006	Chickahominy	16	Norovirus suspected	Person-to-Person	Long-Term Care Facility
6/5/2006	Norfolk	6	Rotavirus	Person-to-Person	Long-Term Care Facility
6/9/2006	Chesapeake	13	*Chlamydophila pneumoniae*	Person-to-Person	Long-Term Care Facility
6/10/2006	Roanoke	4	*Staphylococcus aureus*, methicillin-resistant	Person-to-Person/Environment	Hospital
6/16/2006	Thomas Jefferson	32	Unknown	IV related	Hospital
6/18/2006	Eastern Shore	44	Norovirus	Person-to-Person	Long-Term Care Facility
6/23/2006	Chesterfield	145	*Chlamydophila pneumoniae*	Person-to-Person	Long-Term Care Facility
7/5/2006	Peninsula	26	*Chlamydophila pneumoniae*	Person-to-Person	Long-Term Care Facility
7/7/2006	Virginia Beach	40	Norovirus	Person-to-Person	Long-Term Care Facility
7/10/2006	Hampton	42	Norovirus	Person-to-Person	Hospital
7/11/2006	West Piedmont	22	Norovirus	Person-to-Person	Long-Term Care Facility
7/13/2006	Cumberland Plateau	36	Norovirus	Person-to-Person	Long-Term Care Facility
7/14/2006	Hampton	27	Norovirus	Person-to-Person	Long-Term Care Facility
7/16/2006	Central Virginia	19	Norovirus suspected	Person-to-Person	Long-Term Care Facility
7/20/2006	New River	42	Norovirus	Person-to-Person	Long-Term Care Facility

Table 9. Healthcare-Associated Outbreaks Reported in Virginia, 2006 (Continued)

Onset Date	Health District	Number of Cases	Etiologic Agent	Vehicle	Place Where Outbreak Occurred
8/3/2006	New River	97	Norovirus	Person-to-Person	Long-Term Care Facility
9/13/2006	Mount Rogers	24	Norovirus	Person-to-Person	Long-Term Care Facility
9/29/2006	Henrico	38	Norovirus suspected	Person-to-Person	Long-Term Care Facility
10/5/2006	Lord Fairfax	24	Norovirus	Person-to-Person	Long-Term Care Facility
10/16/2006	Central Shenandoah	165	Norovirus	Person-to-Person	Long-Term Care Facility
10/18/2006	Rappahannock	71	Norovirus	Person-to-Person	Long-Term Care Facility
10/27/2006	Central Virginia	31	Norovirus	Person-to-Person	Long-Term Care Facility
11/1/2006	Alexandria	36	Norovirus	Person-to-Person	Long-Term Care Facility
11/6/2006	Three Rivers	6	Norovirus	Person-to-Person	Long-Term Care Facility
11/6/2006	Alleghany	85	Norovirus suspected	Person-to-Person	Long-Term Care Facility
11/7/2006	Fairfax	77	Norovirus	Person-to-Person	Long-Term Care Facility
11/22/2006	Central Virginia	47	Norovirus	Person-to-Person	Long-Term Care Facility
11/23/2006	Alleghany	27	Norovirus suspected	Person-to-Person	Long-Term Care Facility
11/23/2006	Alleghany	23	Norovirus suspected	Person-to-Person	Long-Term Care Facility
11/24/2006	Rappahannock-Rapidan	46	Norovirus	Person-to-Person	Long-Term Care Facility
11/24/2006	Alleghany	11	Norovirus suspected	Person-to-Person	Long-Term Care Facility
11/27/2006	Henrico	86	Norovirus	Person-to-Person	Long-Term Care Facility
11/28/2006	West Piedmont	31	Norovirus	Person-to-Person	Long-Term Care Facility
11/29/2006	Peninsula	74	Norovirus	Person-to-Person	Long-Term Care Facility
11/30/2006	West Piedmont	25	Norovirus suspected	Person-to-Person	Long-Term Care Facility
12/1/2006	Mount Rogers	17	Norovirus suspected	Person-to-Person	Long-Term Care Facility
12/1/2006	Mount Rogers	57	Norovirus	Person-to-Person	Long-Term Care Facility
12/1/2006	West Piedmont	13	Norovirus	Person-to-Person	Long-Term Care Facility
12/5/2006	Pittsylvania-Danville	40	Norovirus	Person-to-Person	Long-Term Care Facility
12/5/2006	Roanoke	107	Norovirus suspected	Person-to-Person	Long-Term Care Facility

Table 9. Healthcare-Associated Outbreaks Reported in Virginia, 2006 (Continued)

Onset Date	Health District	Number of Cases	Etiologic Agent	Vehicle	Place Where Outbreak Occurred
12/8/2006	Central Shenandoah	69	Norovirus	Person-to-Person	Long-Term Care Facility
12/11/2006	Henrico	50	Norovirus	Person-to-Person	Long-Term Care Facility
12/11/2006	Hampton	37	Norovirus	Person-to-Person	Long-Term Care Facility
12/11/2006	Alleghany	40	Norovirus suspected	Person-to-Person	Long-Term Care Facility
12/12/2006	Fairfax	27	Norovirus	Person-to-Person	Long-Term Care Facility
12/12/2006	Mount Rogers	26	Norovirus	Person-to-Person	Long-Term Care Facility
12/12/2006	Henrico	4	Scabies	Person-to-Person	Long-Term Care Facility
12/13/2006	Crater	52	Norovirus	Person-to-Person	Long-Term Care Facility
12/13/2006	Roanoke	6	Norovirus suspected	Person-to-Person	Long-Term Care Facility
12/16/2006	Alleghany	10	Norovirus suspected	Person-to-Person	Long-Term Care Facility
12/17/2006	Chesterfield	170	Norovirus	Person-to-Person	Long-Term Care Facility
12/20/2006	Southside	44	Norovirus	Person-to-Person	Long-Term Care Facility
12/21/2006	Southside	64	Norovirus	Person-to-Person	Long-Term Care Facility
12/24/2006	Crater	12	Norovirus	Person-to-Person	Hospital
12/27/2006	Lord Fairfax	11	Norovirus	Person-to-Person	Long-Term Care Facility
12/28/2006	Loudoun	54	Norovirus	Person-to-Person	Long-Term Care Facility
12/29/2006	Mount Rogers	35	Norovirus suspected	Person-to-Person	Long-Term Care Facility
12/29/2006	Pittsylvania-Danville	50	Norovirus suspected	Person-to-Person	Long-Term Care Facility
12/30/2006	Crater	22	Norovirus	Person-to-Person	Long-Term Care Facility
12/31/2006	Peninsula	99	Norovirus	Person-to-Person	Long-Term Care Facility

Other

One hundred twenty-four outbreaks were reported in Virginia during 2006 that were not foodborne, healthcare-associated or waterborne (see Table 10). The etiologic agent was confirmed in 109 (88%), was suspected in 13 (10%) and was unknown in two. Among the outbreaks where an agent was confirmed, 110 were attributed to viruses, including chickenpox, norovirus, influenza, rotavirus, hepatitis A, mumps, and *Molluscipoxvirus*. Eight were attributed

to bacterial agents, including a methicillin-resistant *Staphylococcus aureus* (MRSA) outbreak in a daycare facility. Two were caused by environmental factors (heat, and heat with sociogenic illness), one outbreak was attributed to mites and one to a fungus. Fifty-seven of the outbreaks occurred in schools (including one in a university), 31 were in assisted living facilities and 14 occurred in child or adult daycare settings.

Table 10. Other Outbreaks Reported in Virginia, 2006

Onset Date	Health District	Number of Cases	Etiologic Agent	Vehicle	Place Where Outbreak Occurred
11/2/2005	Crater	9	Ringworm	Person-to-Person	School
1/1/2006	Crater	53	Unknown gastrointestinal illness	Person-to-Person	School
1/3/2006	Arlington	26	Norovirus	Person-to-Person	Assisted Living
1/5/2006	Virginia Beach	47	Varicella (Chickenpox)	Person-to-Person	Elementary School
1/10/2006	Lenowisco	61	Varicella (Chickenpox)	Person-to-Person	Elementary School
1/11/2006	Central Virginia	18	Varicella (Chickenpox)	Person-to-Person	Elementary School
1/12/2006	Fairfax	21	Norovirus	Person-to-Person	Adult Day Care
1/12/2006	Fairfax	5	Varicella (Chickenpox)	Person-to-Person	Daycare Center and Assisted Living
1/14/2006	Fairfax	14	Norovirus suspected	Person-to-Person	Assisted Living
1/16/2006	Three Rivers	13	Varicella (Chickenpox)	Person-to-Person	Elementary School
1/20/2006	Lenowisco	8	Varicella (Chickenpox)	Person-to-Person	Middle School
1/22/2006	Central Shenandoah	11	Varicella (Chickenpox)	Person-to-Person	Middle School
1/23/2006	Fairfax	13	Norovirus	Person-to-Person	Adult Day Care
1/24/2006	Lenowisco	5	Varicella (Chickenpox)	Person-to-Person	Primary School
1/27/2006	Thomas Jefferson	6	Varicella (Chickenpox)	Person-to-Person	Elementary Schools
2/1/2006	Cumberland Plateau	18	Influenza A	Person-to-Person	Retirement Home
2/1/2006	Crater	5	Varicella (Chickenpox)	Person-to-Person	Elementary School
2/3/2006	Fairfax	7	Unknown gastrointestinal illness	Person-to-Person	Adult Day Care
2/9/2006	Lenowisco	7	Varicella (Chickenpox)	Person-to-Person	Schools
2/9/2006	Lenowisco	5	Varicella (Chickenpox)	Person-to-Person	Middle School
2/10/2006	Thomas Jefferson	6	Hepatitis A	Person-to-Person	Household
2/10/2006	Crater	152	Influenza A	Person-to-Person	School
2/13/2006	Prince William	50	Norovirus	Person-to-Person	Assisted Living

Table 10. Other Outbreaks Reported in Virginia, 2006 (Continued)

Onset Date	Health District	Number of Cases	Etiologic Agent	Vehicle	Place Where Outbreak Occurred
2/14/2006	Peninsula	9	Influenza A	Person-to-Person	Assisted Living
2/14/2006	Loudoun	9	Norovirus suspected	Person-to-Person	Private Business (non-restaurant)
2/14/2006	Fairfax	8	Varicella (Chickenpox)	Person-to-Person	School and Long-Term Care Facility
2/16/2006	Mount Rogers	6	Influenza	Person-to-Person	Retirement Home
2/21/2006	Prince William	27	Rotavirus	Person-to-Person	Daycare Center
2/21/2006	Fairfax	30	Norovirus	Person-to-Person	Assisted Living
2/22/2006	Virginia Beach	24	Varicella (Chickenpox)	Person-to-Person	Elementary School
2/26/2006	Cumberland Plateau	15	Influenza A	Person-to-Person	Assisted Living
2/27/2006	Lenowisco	5	Varicella (Chickenpox)	Person-to-Person	Primary School
2/28/2006	Henrico	56	Norovirus	Person-to-Person	Assisted Living
3/1/2006	Lord Fairfax	7	Norovirus	Person-to-Person	School
3/2/2006	Virginia Beach	29	Influenza suspected	Person-to-Person	School
3/2/2006	Thomas Jefferson	19	Norovirus	Person-to-Person	Assisted Living
3/3/2006	Crater	12	Molluscum contagiosum	Person-to-Person	Daycare Center
3/4/2006	Alexandria	14	Norovirus	Person-to-Person	Assisted Living
3/6/2006	Loudoun	39	Influenza suspected	Person-to-Person	School
3/8/2006	Arlington	27	Rotavirus	Person-to-Person	Daycare Center
3/10/2006	Virginia Beach	7	Varicella (Chickenpox)	Person-to-Person	Elementary School
3/10/2006	Prince William	5	Varicella (Chickenpox)	Person-to-Person	Elementary School
3/12/2006	New River	11	Varicella (Chickenpox)	Person-to-Person	Middle School
3/13/2006	Cumberland Plateau	14	Varicella (Chickenpox)	Person-to-Person	Elementary School
3/14/2006	Rappahannock, Lenowisco	2 VA 56 US	*Salmonella* ser. Montevideo	Point Source	Community
3/14/2006	Arlington	14	Varicella (Chickenpox)	Person-to-Person	Elementary School
3/20/2006	Fairfax	5	Varicella (Chickenpox)	Person-to-Person	School
3/22/2006	Prince William	9	Varicella (Chickenpox)	Person-to-Person	Elementary School
3/23/2006	Peninsula	6	Influenza	Person-to-Person	Assisted Living

Table 10. Other Outbreaks Reported in Virginia, 2006 (Continued)

Onset Date	Health District	Number of Cases	Etiologic Agent	Vehicle	Place Where Outbreak Occurred
3/24/2006	Cumberland Plateau	14	Varicella (Chickenpox)	Person-to-Person	Elementary School
3/27/2006	Crater	234	Influenza	Person-to-Person	School
3/27/2006	Western Tidewater	210	Influenza	Person-to-Person	School
3/28/2006	Rappahannock-Rapidan	21	Varicella (Chickenpox)	Person-to-Person	Elementary School
3/30/2006	Thomas Jefferson	24	Norovirus suspected	Person-to-Person	Assisted Living
4/1/2006	Henrico	20	Norovirus suspected	Person-to-Person	Assisted Living
4/2/2006	Fairfax	6	Varicella (Chickenpox)	Person-to-Person	Elementary School
4/3/2006	Loudoun	6	Varicella (Chickenpox)	Person-to-Person	Elementary School
4/9/2006	Thomas Jefferson	7	Norovirus	Person-to-Person	Assisted Living
4/9/2006	Alexandria	13	Rotavirus	Person-to-Person	Private Business (non restaurant)
4/25/2006	Rappahannock-Rapidan	4	*Salmonella* ser. Infantis	Point Source	Daycare Center
4/25/2006	Fairfax	9	Varicella (Chickenpox)	Person-to-Person	Elementary School
5/1/2006	Rappahannock-Rapidan	8	Varicella (Chickenpox)	Person-to-Person	School
5/8/2006	Chesterfield	9	Norovirus	Person-to-Person	Assisted Living
5/9/2006	Fairfax	5	Varicella (Chickenpox)	Person-to-Person	Elementary School
5/11/2006	Fairfax	11	Varicella (Chickenpox)	Person-to-Person	Elementary School
5/18/2006	Fairfax	13	Norovirus	Person-to-Person	Rehabilitation Center
5/23/2006	Henrico	8	Varicella (Chickenpox)	Person-to-Person	Middle School
June	Fairfax	8	Norovirus	Person-to-Person	Swim Team
6/7/2006	Peninsula	2	*Bordetella pertussis*	Person-to-Person	Military Base
6/12/2006	Arlington	5	Varicella (Chickenpox)	Person-to-Person	Daycare Center
6/13/2006	Fairfax	16	Norovirus	Person-to-Person	Private Group/Party
7/3/2006	Three Rivers	96	Norovirus	Person-to-Person	Campground
7/10/2006	Peninsula	16	Norovirus	Person-to-Person	Daycare Center
8/1/2006	Fairfax	8	*Staphylococcus aureus*, methicillin-resistant	Person-to-Person/Environment	Daycare Center
8/5/2006	Hampton	11	Norovirus	Person-to-Person	Assisted Living
8/14/2006	Fairfax	9	Scabies	Person-to-Person	Daycare Center

Table 10. Other Outbreaks Reported in Virginia, 2006 (Continued)

Onset Date	Health District	Number of Cases	Etiologic Agent	Vehicle	Place Where Outbreak Occurred
8/28/2006	Fairfax	7	*Shigella*	Person-to-Person	Daycare Center
8/29/2006	Crater	8	Varicella (Chickenpox)	Person-to-Person	Military Base
8/31/2006	Cumberland Plateau	33	Viral conjunctivitis suspected	Person-to-Person	School
8/31/2006	Pittsylvania-Danville	33	Varicella (Chickenpox)	Person-to-Person	Elementary School
8/31/2006	Rappahannock-Rapidan	13	Varicella (Chickenpox)	Person-to-Person	Elementary School
9/7/2006	Henrico	15	Varicella (Chickenpox)	Person-to-Person	Elementary School
9/13/2006	Central Shenandoah	36	Varicella (Chickenpox)	Person-to-Person	Elementary School
9/13/2006	Crater	14	Varicella (Chickenpox)	Person-to-Person	Elementary School
9/13/2006	Fairfax	4	Varicella (Chickenpox)	Person-to-Person	Elementary School
9/20/2006	Alexandria	14	Norovirus	Person-to-Person	School
9/24/2006	Thomas Jefferson	64	Mumps	Person-to-Person	University
9/25/2006	Chesterfield	31	*Shigella sonnei*	Person-to-Person	School
9/27/2006	Mount Rogers	24	Varicella (Chickenpox)	Person-to-Person	Elementary School
10/2/2006	Virginia Beach	123	Norovirus	Person-to-Person	School
10/4/2006	Southside	13	Heat Exhaustion and Sociogenic Illness	Environmental/ Sociogenic	School
10/6/2006	Mount Rogers	27	Varicella (Chickenpox)	Person-to-Person	Elementary School
10/7/2006	Mount Rogers	10	Varicella (Chickenpox)	Person-to-Person	Middle School
10/9/2006	Fairfax	19	Norovirus	Person-to-Person	Assisted Living
10/10/2006	Western Tidewater	3	Norovirus	Person-to-Person	Cruise Ship
10/10/2006	Virginia Beach	15	Norovirus	Person-to-Person	Private Business (non-restaurant)
10/10/2006	Fairfax	8	Varicella (Chickenpox)	Person-to-Person	Elementary School
10/15/2006	Virginia Beach	5	Norovirus	Person-to-Person	Hotel
10/15/2006	Henrico	3	Heat Exposure	Environmental	Independent Living Facility
10/17/2006	New River	12	Varicella (Chickenpox)	Person-to-Person	Elementary School
10/19/2006	Lord Fairfax	5	Norovirus suspected	Person-to-Person	Assisted Living
10/22/2006	Peninsula	187	Norovirus	Person-to-Person	School
10/30/2006	Alexandria	9	Varicella (Chickenpox)	Person-to-Person	Elementary School
11/1/2006	Peninsula	35	Norovirus	Person-to-Person	Assisted Living

Table 10. Other Outbreaks Reported in Virginia, 2006 (Continued)

Onset Date	Health District	Number of Cases	Etiologic Agent	Vehicle	Place Where Outbreak Occurred
11/2/2006	Loudoun	4	*Bordetella pertussis*	Person-to-Person	Community
11/2/2006	Alleghany	11	Norovirus	Person-to-Person	Private Business (non-restaurant)
11/7/2006	Lord Fairfax	29	Norovirus	Person-to-Person	Assisted Living
11/11/2006	Fairfax	9	Norovirus	Person-to-Person	Private group/party
11/15/2006	Alleghany	44	Norovirus suspected	Person-to-Person	Assisted Living
11/24/2006	Portsmouth	30	Norovirus suspected	Person-to-Person	Assisted Living
11/30/2006	Norfolk	47	Norovirus	Person-to-Person	Military Base
12/6/2006	Alleghany	124	Norovirus suspected	Person-to-Person	Assisted Living
12/9/2006	Henrico	45	Norovirus	Person-to-Person	Daycare Center
12/10/2006	Chesterfield	39	Norovirus suspected	Person-to-Person	Assisted Living
12/10/2006	Fairfax	47	Norovirus	Person-to-Person	Retirement Home
12/13/2006	New River	26	Norovirus	Person-to-Person	Assisted Living
12/17/2006	Chickahominy	13	Norovirus suspected	Person-to-Person	Assisted Living
12/18/2006	Lord Fairfax	20	Norovirus	Person-to-Person	Assisted Living
12/18/2006	Lord Fairfax	20	Norovirus	Person-to-Person	Assisted Living
12/20/2006	Arlington	11	Norovirus	Person-to-Person	Private Business (non-restaurant)
12/22/2006	Henrico	45	Norovirus	Person-to-Person	Assisted Living
12/26/2006	Thomas Jefferson	49	Norovirus suspected	Person-to-Person	Assisted Living
12/27/2006	Lord Fairfax	20	Norovirus	Person-to-Person	Assisted Living

Waterborne

The two waterborne outbreaks reported during 2006 involved a hotel and a waterpark. The agent was not determined in one, but *Giardia lamblia* was confirmed as the agent in the other event. (See Table 11)

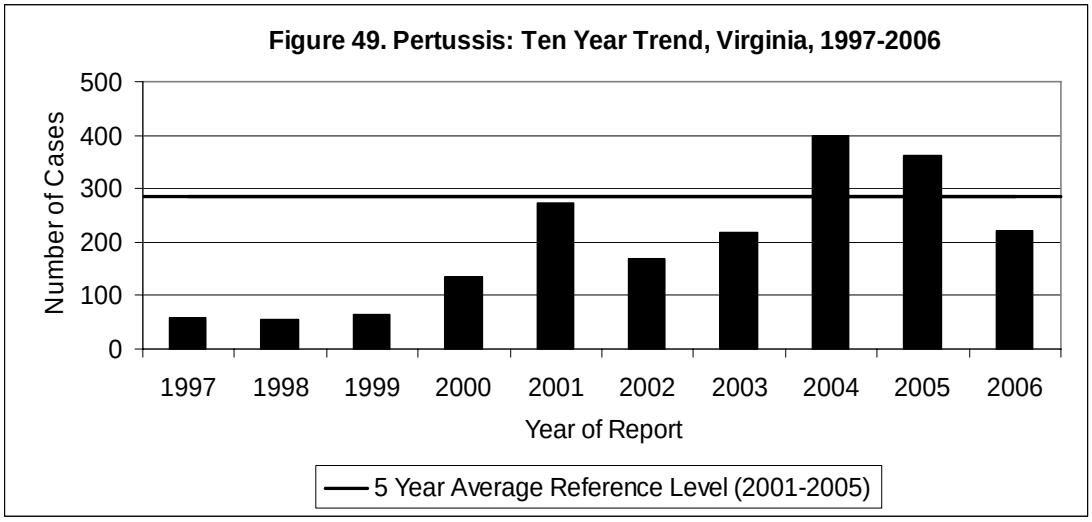
Table 11. Waterborne Outbreaks Reported in Virginia, 2006

Onset Date	Health District	Number of Cases	Etiologic Agent	Vehicle	Place Where Outbreak Occurred
3/18/2006	Fairfax	30	Unknown - rash	Waterborne	Hotel
7/15/2006	Rappahannock	12	*Giardia lamblia*	Waterborne	Waterpark

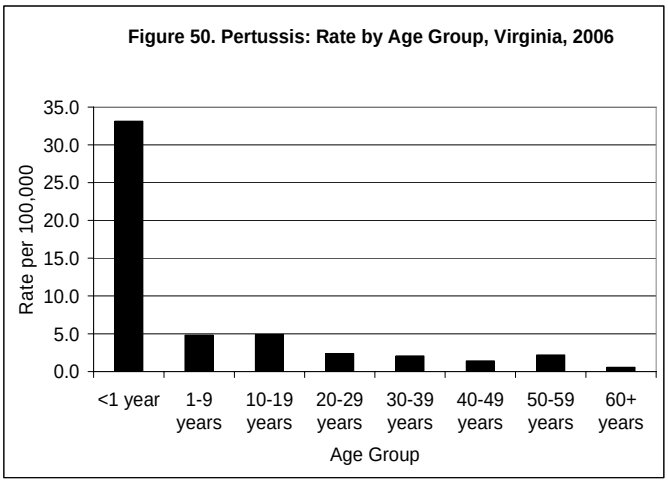
Pertussis

Agent: *Bordetella pertussis* (bacteria)
Mode of Transmission: Contact with droplet respiratory secretions from infected patients.
Signs/Symptoms: Insidious cough that progresses to paroxysmal coughing (severe, sequential coughs with difficulty inhaling) and may be accompanied by post-cough vomiting.
Prevention: Vaccination beginning at 2 months of age.
Other Important Information: In vaccinated populations the case-fatality rate is low. When deaths occur, they are generally in children less than six months old who are too young to have received the vaccine.

In 2006, 221 cases of pertussis were reported in Virginia. This is a 39% decrease from the 363 cases reported in 2005 and a 22% decrease from the five year average of 284.4 per year (Figure 49). Cases of pertussis typically occur in waves, with peak numbers appearing every 3-4 years. A high of 400 cases was reported in 2004. This general downward trend in pertussis cases since 2004 has also been noted nationally.



In Virginia, pertussis cases were reported from every age group, but those under one year of age had the highest incidence rate, with 33.1 per 100,000 population. This was followed by the 10-19 and 1-9 year age groups, with 4.9 and 4.8 cases per 100,000, respectively (Figure 50). The incidence rate in the white population was more than twice the rate in the black population (3.1 and 1.3 per 100,000, respectively). Females had a higher incidence rate than males (3.3 and 2.5 per 100,000, respectively).



Among regions, the northern region had the highest incidence rate (4.5 per 100,000). This was followed by the northwest region with 3.6 per 100,000 and the eastern region with 2.6 per 100,000. There were no clear seasonal trends. Two small outbreaks were reported in 2006 (see Table 10 on page 59). One involved 4 family members; the other occurred at a military facility with 2 cases reported. No deaths due to pertussis were reported during 2006.

Plague

Agent: *Yersinia pestis* (bacteria)
Mode of Transmission: Transmitted to humans through the bite of infected fleas or through bites or scratches from infected animals (e.g., cats). If the disease attacks the lungs, it may be spread from person to person by droplets released when coughing.
Signs/Symptoms: Fever, chills, nausea, headache and body aches. Specific types of plague also lead to other symptoms, such as swollen lymph nodes ("buboes"), bloodstream infections, and pneumonia.
Prevention: In areas where plague occurs, travelers should avoid contact with rodents and fleas and avoid handling stray animals. Persons with plague that results in pneumonia should be isolated until 48 hours after antibiotics have been started.
Other Important Information: Fewer than 20 people in the United States are diagnosed with plague every year. Plague is considered to be one of the agents that could be used for bioterrorism because the disease can be spread from person to person and would cause increased illness and death in the population if used as a weapon.

No cases of plague have been reported in Virginia since the nineteenth century.

Poliomyelitis

Agent: Polio virus
Mode of Transmission: Person-to-person through ingestion of contaminated food or direct contact with fecal material from infected people.
Signs/Symptoms: Ten percent of infections will develop into a non-specific syndrome with fever, malaise, headache, nausea, and vomiting. Flaccid paralysis occurs in 1% of poliovirus infections.
Prevention: Vaccination beginning at 2 months of age.
Other Important Information: Polio eradication programs have led to the elimination of the disease in the Western Hemisphere; however, at the end of 2004 six countries still had endemic polio: Afghanistan, Egypt, India, Niger, Nigeria, and Pakistan.

The last reported case of poliomyelitis in Virginia occurred in 1978.

Psittacosis

Agent: *Chlamydophila psittaci* (formerly known as *Chlamydia psittaci*) (bacteria)
Mode of Transmission: Transmission occurs when the bacteria are inhaled from aerosolized dried feces, from respiratory tract secretions, or from dust from feathers of infected birds.
Signs/Symptoms: Most commonly fever, headache, weakness, loss of appetite, muscle aches, chills, sore throat, and cough. They can present as a mild flu-like illness or can be very severe, especially in older persons.
Prevention: Proper design and management of facilities that raise and sell birds and use of protective clothing (e.g., wearing of masks or respirators and gloves) by those working with birds. Bird cages should be cleaned regularly with disinfectants and the contents of the cage should be disposed of properly.
Other Important Information: Birds may or may not show signs of illness when infected. Birds in the parrot family (e.g., cockatiels, parakeets, parrots, macaws) are most commonly responsible for human infection, but any bird species can be infected and, thus, be a source for human disease.

No cases of psittacosis were reported in Virginia during 2006. One case was reported in 2003 and previous to that, one case was reported in 1998.

Q Fever

Agent: *Coxiella burnetii* (bacteria)
Mode of Transmission: Inhalation of air contaminated with dried placental material, birth fluids, or excreta of infected animals; direct exposure to infected animals or tissues; exposure to contaminated material, such as wool, straw, fertilizer, or laundry.
Signs/Symptoms: High fever, severe headache, malaise, muscle aches, confusion, non-productive cough, nausea, diarrhea, abdominal pain, and/or chest pain.
Prevention: Appropriate disposal of potentially infectious tissues and proper hygiene when handling animal birth material.

Other Important Information: Q fever is classified by the Centers for Disease Control and Prevention (CDC) as a potential bioterrorist agent because it is an agent that could be rather easily disseminated and result in a moderate amount of illness.

In Virginia, four probable cases of Q fever were reported in 2006. All occurred in males, and three of the four were in the 60 and older age group. The fourth was in the 30-39 year age group. Race was reported for three of the cases, all of whom were white. One case was from the central region and three were from the eastern region. Two of the cases had no obvious exposures. One case stated that he was a rancher. The final case may have been exposed while traveling in the Middle East. Two probable cases of Q fever were reported in Virginia in 2005. These were the first cases of Q fever reported in Virginia since 1999.

Rabies

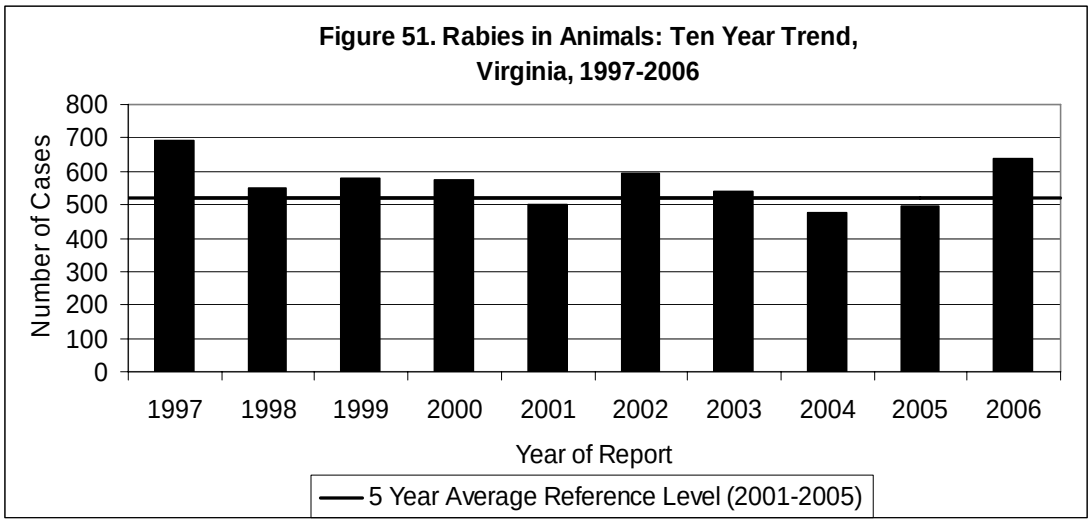
Agent: Rabies virus, a rhabdovirus of the genus *Lyssavirus*.
Mode of Transmission: Most commonly transmitted through the bite of an infected animal, but may be transmitted through any method by which virus-infected saliva or central nervous system tissue enters the body.
Signs/Symptoms: Vary widely, but often include an initial headache, fever and apprehension which progresses to paralysis, spasms of the muscles used for swallowing, delirium and convulsions. Once symptoms appear, rabies is almost invariably fatal.
Prevention: Important prevention methods include vaccinating cats and dogs, eliminating stray animals, and avoiding handling wildlife. A pre-exposure vaccine should be given to people at high risk of infection (e.g., veterinarians and laboratorians working with rabies virus). Post-exposure vaccine should be administered to anyone possibly exposed to a rabid animal.
Other Important Information: The main reservoir of rabies in the United States is wildlife. In most other countries, the main reservoir is dogs.

Human

No human cases of rabies were reported in Virginia during 2006. The last reported case was in 2003 in an adult male from the northern region who was infected with a raccoon rabies variant. Though no specific exposure could be determined, the case had lived and worked in an area with endemic raccoon rabies. This was the first instance of a raccoon-variant human rabies infection reported in the United States.

Animal

The number of animals testing positive for rabies increased from 495 in 2005 to 637 in 2006 (a 27% increase) (Figure 51) and the proportion of tested animals that were positive increased from 14% to 15%. The Central Shenandoah Health District reported the most positive animals (66 positives, 10% of Virginia's positives), followed by Fairfax (59 positives, 9%) and Lord Fairfax (48 positives, 8%).



Among the 4,183 specimens tested, the most commonly tested animals were cats (1,030), bats (798), raccoons (659), dogs (587), skunks (223), foxes (190) and opossums (189). Animals with the highest percentage of positive rabies tests included bobcats (86%), skunks (70%), raccoons (47%), sheep (46%) and fox (42%) (See Table 12).

During 2006, reports were received of human exposures to 127 animals that tested positive for rabies. These human exposures included 11 animal species (Table 12). A total of 728 people were reported to have received pre-exposure prophylaxis and 1,150 people were reported to have received post-exposure prophylaxis in 2006.

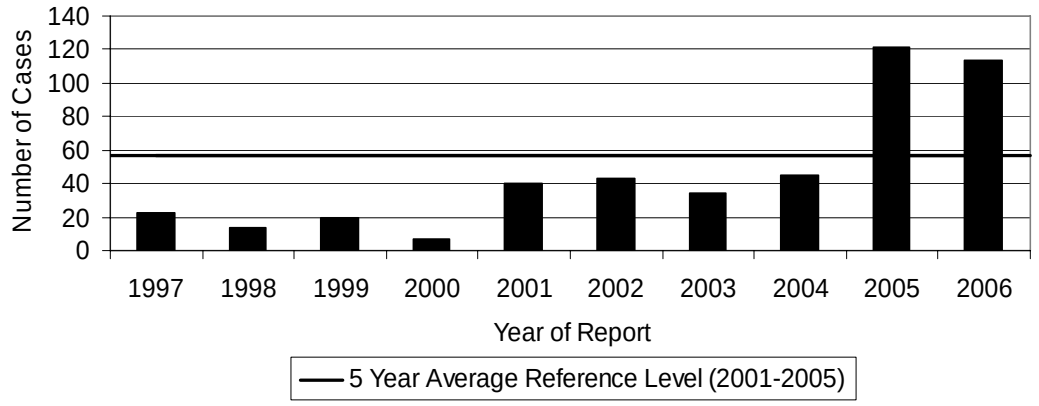
Table 12. Animals Testing Positive for Rabies and Resulting Number of Human Exposures, by Species

Animal Species	Animals Tested	Animals Positive		Positives with Human Exposures
		Number	Percent	
Bat	798	17	2.1	8
Bobcat	7	6	85.7	1
Cow	77	8	10.4	7
Cat	1,030	39	3.8	34
Dog	587	6	1.0	5
Horse	45	2	4.4	2
Fox	190	80	42.1	25
Goat	33	1	3.0	0
Groundhog	115	5	4.3	3
Opossum	189	0	0.0	0
Raccoon	659	311	47.2	33
Sheep	13	6	46.2	2
Skunk	223	156	70.0	7
Other	217	0	0.0	0
TOTAL	4,183	637	15.2	127

Rocky Mountain Spotted Fever

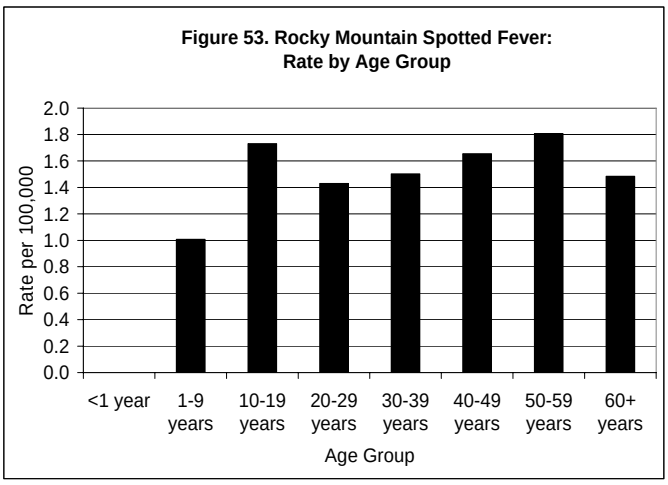
Agent**:** *Rickettsia rickettsi* (bacteria)
Mode of Transmission: Transmitted to humans by the bite of an infected American dog tick. Ticks must be attached (feeding) for at least 4 to 6 hours to transmit infection.
Signs/Symptoms**:** Initially include sudden onset of fever, severe headache, and muscle pain. May be followed after four days by development of rash that starts on the hands and feet and spreads to the rest of the body. The rash occurs in only 40% to 60% of cases and does not occur until late in the progression of the disease, at which point fatalities begin to occur.
Prevention**:** Avoid being bitten by ticks. Avoid tick-prone habitats, wear light-colored clothing with pants legs tucked into socks, apply approved repellant, thoroughly check your body for ticks after visiting tick-prone habitats and remove attached ticks as soon as possible.
Other Important Information: The disease can be difficult to diagnose in the early stages, but without early intervention, may be fatal in up to 25% of untreated patients.

Figure 52. Rocky Mountain Spotted Fever: Ten Year Trend, Virginia, 1997-2006

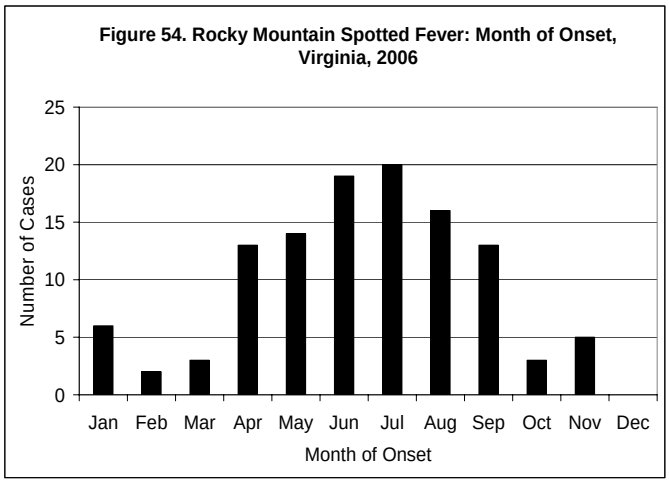


In 2006, 114 cases of Rocky Mountain spotted fever (RMSF) were reported in Virginia. This is only slightly fewer cases than the high of 121 cases reported in 2005 and represents more than double the number of cases seen in 2004 and earlier years (Figure 52). This large increase in cases may be attributed to the fact that more local health department resources are being devoted to following up on laboratory reports of RMSF, but it could also represent an increase in RMSF activity.

Figure 53. Rocky Mountain Spotted Fever: Rate by Age Group



Incidence rates were similar among those age ten and older and ranged from 1.4-1.7 cases per 100,000. The rate in the 1-9 year age group was lower (1.0 per 100,000) and no cases were seen in those under age one (Figure 53). This age pattern is similar to the pattern observed in Virginia in 2005, but differs greatly from the national pattern in which the majority of RMSF cases occur in the 1-9 year age group.



The white population had an incidence rate of 1.5 per 100,000, while the black and "other" race groups had rates of 0.5 and 0.2 per 100,000, respectively. The male and female populations had the same rate (1.5 per 100,000). The central and southwest regions had the highest incidence (2.2 and 2.1 per 100,000, respectively), followed by the eastern region (1.6 per 100,000). The majority of cases (83%) had onsets during the period from April through September (Figure 54).

Rubella

Agent: Rubella virus
Mode of Transmission: Person-to-person through contact with nose and throat secretions from infected people. It may also be transmitted from mother to child during pregnancy, causing congenital rubella syndrome in the infant.
Signs/Symptoms: Fever and rash, with frequent occurrences of arthralgia, arthritis, and lymphadenopathy.
Prevention: Vaccination, preferably administered as MMR, beginning at 12 months of age.
Other Important Information: Approximately half of the reported cases of rubella in the U.S. since 2001 have occurred among persons born outside of the country, most of whom were born outside of the Western Hemisphere. In 2004, a panel convened by the Centers for Disease Control and Prevention concluded that sustained transmission of rubella has been interrupted and rubella is no longer endemic in the U.S.

No cases of rubella were reported in Virginia during 2006. The last Virginia case was reported in 1998.

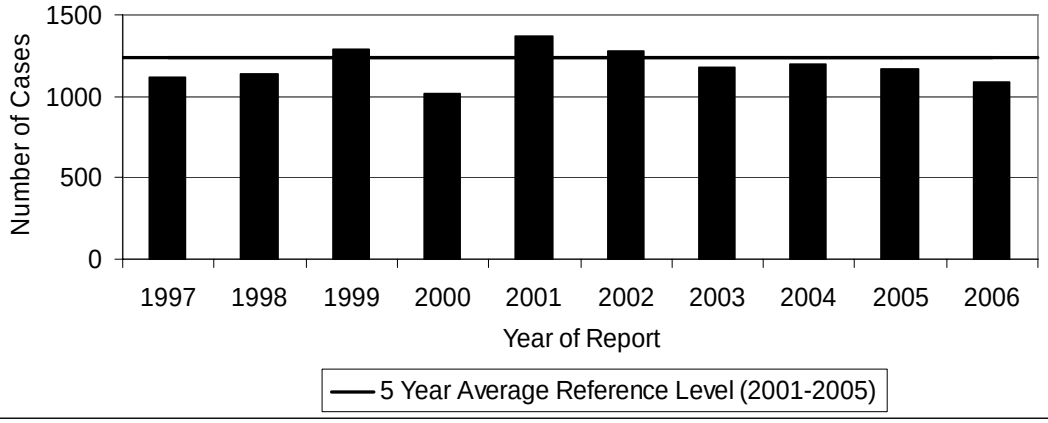
Congenital Rubella Syndrome

No cases of congenital rubella syndrome (CRS) were reported in Virginia during 2006. One case was reported in 2001 in an infant whose mother was an immigrant from South America. That was the first reported case of CRS in Virginia since 1981.

Salmonellosis

Agent: *Salmonella* (bacteria)
Mode of Transmission: Eating contaminated food or drinking contaminated water. Infected persons can spread the bacteria by not washing their hands after going to the bathroom and then handling food that other people will eat. Another way to get this disease is by having direct contact with feces from an infected person or animal and then transferring the bacteria to the mouth from the hands.
Signs/Symptoms: Sudden onset of headache, fever, abdominal pain, diarrhea and sometimes vomiting. Dehydration, especially in the elderly and young children, can be a severe complication.
Prevention: Proper sanitation methods for food preparation (including preventing cross-contamination of food preparation surfaces), sanitation of water supplies, proper hand hygiene, sanitary sewage disposal, exclusion of infected people from handling food or providing healthcare, prohibiting the sale of pet turtles and restricting the sale of other reptiles for pets. Eggs and other foods of animal origin should be cooked thoroughly.
Other Important Information: The incidence rate is highest among infants and young children. Rates of mortality are higher in infants, the elderly and people with immunosuppressive conditions.

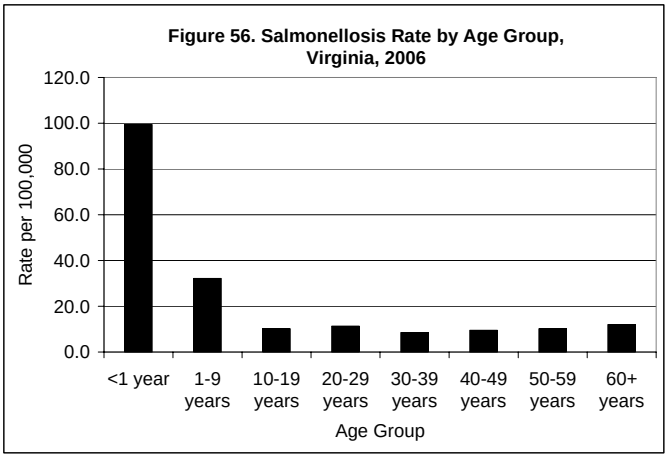
Figure 55. Salmonellosis: Ten Year Trend, Virginia, 1997-2006



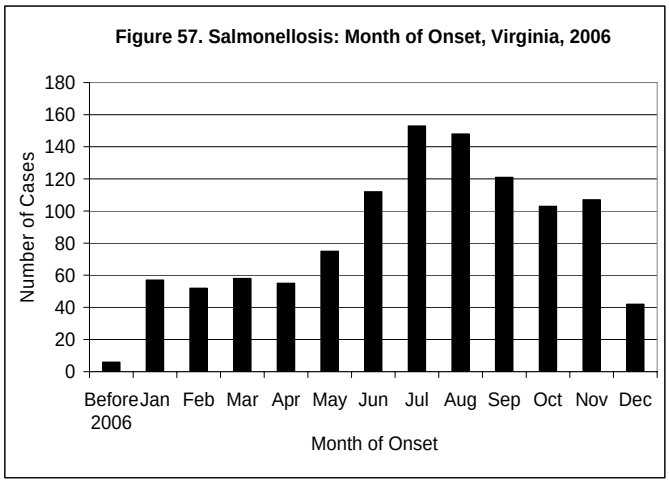
During 2006, 1,089 cases of salmonellosis were reported in Virginia. This is a 7% decrease from the 1,172 cases reported in 2005 and a 12% decrease from the five year average of 1,237.6 cases per year (Figure 55).

By far, the highest incidence rate was observed in infants (99.4 per 100,000). This was followed by the 1-9 year age group (32.1 per 100,000). The other age

Figure 56. Salmonellosis Rate by Age Group, Virginia, 2006



groups all showed similar rates of infection (between 8.5 and 12.0 per 100,000). Incidence rates appeared similar in the black and white populations (8.0 and 9.0 per 100,000, respectively) although information on race was missing for 41% of the cases. Rates were similar among females and males (14.4 and 14.0 per 100,000, respectively).



The central region had the highest incidence rate (16.9 per 100,000), followed by the northwest, with 16.0 cases per 100,000 population. While salmonellosis occurred throughout the year, there was a notable increase starting in mid year; 69% of cases had onsets from June through November (Figure 57). During 2006, seven outbreaks involving salmonellosis were reported (see Tables 8 and 10). Five of the seven outbreaks were foodborne. Four were multi-state outbreaks in which Virginians were involved. Serogroups implicated in the outbreaks were Enteritidis, Infantis, Javiana, Montevideo, Tennessee, and Typhimurium (2 outbreaks). Among Virginia salmonellosis cases reported in 2006, the most commonly identified serotype was *Salmonella* ser. Typhimurium (Table 13).

Table 13. Number and Percent of *Salmonella* Infections by Serotype, Virginia, 2006

Serotype Causing Infection	Number	Percent		Serotype Causing Infection	Number	Percent
S. ser. Typhimurium	251	23.0		*S*. ser. Infantis	16	1.5
S. ser. Enteritidis	197	18.0		*S*. ser. Oranienburg	16	1.5
S. ser. Newport	97	8.9		*S*. ser. Montevideo	14	1.3
S. ser. Javiana	75	6.9		*S*. ser. Thompson	14	1.3
S. ser. Heidelberg	35	3.2		Unspecified	171	15.6
S. ser. Bareilly	30	2.7		All Others	177	16.2
				TOTAL*	1,093	100
*The total number of serotypes (1,093) is larger than the total number of *Salmonella* infections (1,089) because a person may be infected with more than one serotype.						

Severe Acute Respiratory Syndrome

Agent: Severe acute respiratory syndrome-associated coronavirus (SARS-CoV)
Mode of Transmission: Most likely transmitted from person to person through coughing and sneezing; spread can also occur by touching a contaminated surface or object and then touching the mouth, nose, or eyes. It is possible that SARS-CoV might be spread more broadly through the air or by other routes that are not yet known.
Signs/Symptoms: Weakness, muscle pain, and fever followed by respiratory symptoms, such as cough and shortness of breath. Diarrhea may occur.

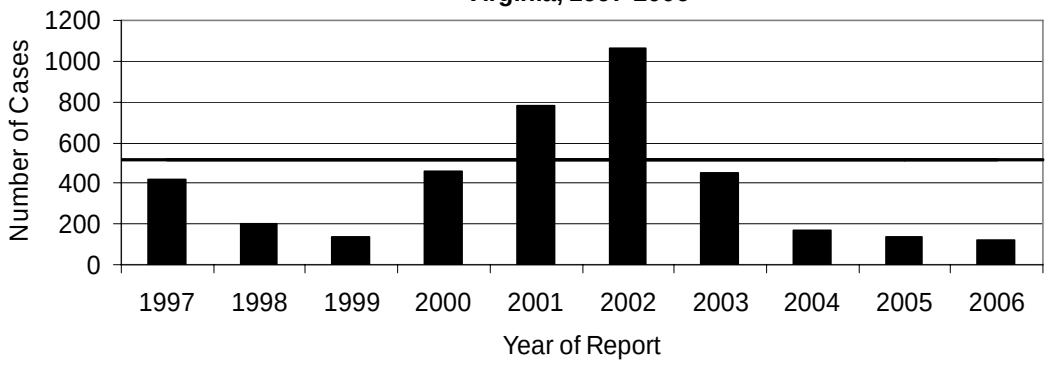
Prevention: Factors that may reduce transmission include: frequent hand washing; avoidance of touching the eyes, nose, and mouth with contaminated hands; and covering the nose and mouth with a tissue when coughing or sneezing.
Other Important Information: Major outbreaks of SARS occurred between November 2002 and July 2003 in Canada, China, Singapore and Vietnam. In the United States, eight people had laboratory evidence of SARS-CoV infection. SARS is thought to have originated in China.

One case of SARS was confirmed in Virginia during the international outbreaks in 2003. The case was a female in the 50 years and older age group who had traveled to Taiwan, Malaysia and Singapore in the four weeks before onset of symptoms. Her exposure most likely occurred in a Singapore hospital, where she had direct contact with patients being treated for SARS. No cases of SARS were reported in Virginia during 2006. Active global surveillance for SARS has detected no person-to-person transmission of SARS since July 2003.

Shigellosis

Agent: *Shigella* (bacteria)
Mode of Transmission: The primary mode is fecal-oral via person-to-person contact. Additionally, contact with a contaminated inanimate object, ingestion of contaminated food or water and sexual contact may spread the disease.
Signs/Symptoms: Characterized by diarrhea (ranging from watery and loose to mucoid with or without blood), fever and sometimes nausea, vomiting, abdominal cramps and painful straining at stool or urination. Mild and asymptomatic infections can occur.
Prevention: Strict attention to hand hygiene is essential to limit transmission. Additional control measures include improved sanitation, chlorination of drinking water, proper cooking and storage of food, the exclusion of infected persons as food handlers and measures to decrease contamination of food by houseflies.

Figure 58. Shigellosis: Ten Year Trend, Virginia, 1997-2006



During 2006, 120 cases of shigellosis were reported in Virginia. This is a 10% decrease from the 134 cases reported in 2005, and a 77% decrease from the five year average of 519.4 cases per year (Figure 58).

The 1-9 year age group had the highest incidence rate (4.0 per 100,000), followed by infants (3.9 per 100,000). The other age groups had rates between 0.6 and 1.7 per 100,000 (Figure 59). Race data were missing for 49% of reports. Among reports with a reported race, the black population had a higher rate (1.3 per 100,000) than the white population (0.7 per 100,000) and the "other" race population (0.6 per 100,000). Females had a slightly higher rate than males (1.7 versus 1.4 per 100,000, respectively).

The northern region showed the highest incidence rate (3.1 per 100,000). The other regions had rates between 0.6 and 1.5 per 100,000. A seasonal trend was observed, with 60% of cases occurring from August through November (Figure 60). Two outbreaks due to shigellosis were identified during the year; one occurred in a daycare setting and the other occurred in a school (see Table 10 on page 59).

Figure 59. Shigellosis Rate by Age Group, Virginia, 2006

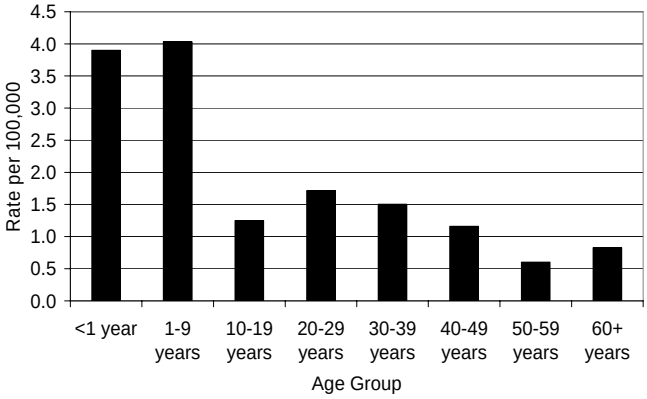
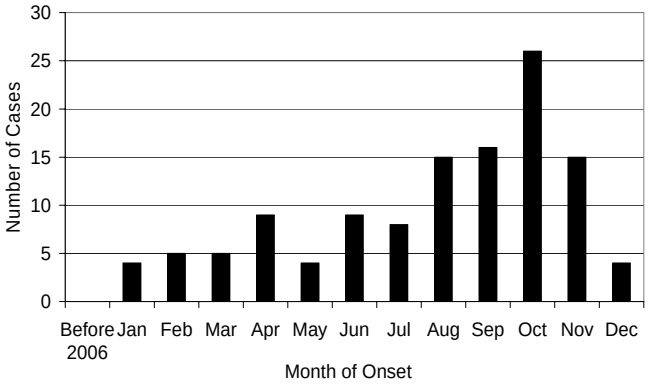


Figure 60. Shigellosis: Month of Onset, Virginia, 2006



Smallpox

Agent: Variola virus
Mode of Transmission: Spread from person to person through contact with respiratory droplets, airborne particles (rare), and skin lesions of an infected person. Smallpox can also be transmitted through contact with contaminated clothing or bedding.
Signs/Symptoms: Sudden onset of fever, headache, weakness and exhaustion followed by development of a rash that first appears on the face and extremities.
Prevention: Routine vaccinations among the American public stopped in 1972.
Other Important Information: The last case of smallpox in the United States was in 1949; the last naturally occurring case in the world was in Somalia in 1977. Smallpox is considered to be one of the agents that could be used for bioterrorism because the disease can be spread from person to person and would cause increased illness and death in the population if used as a weapon.

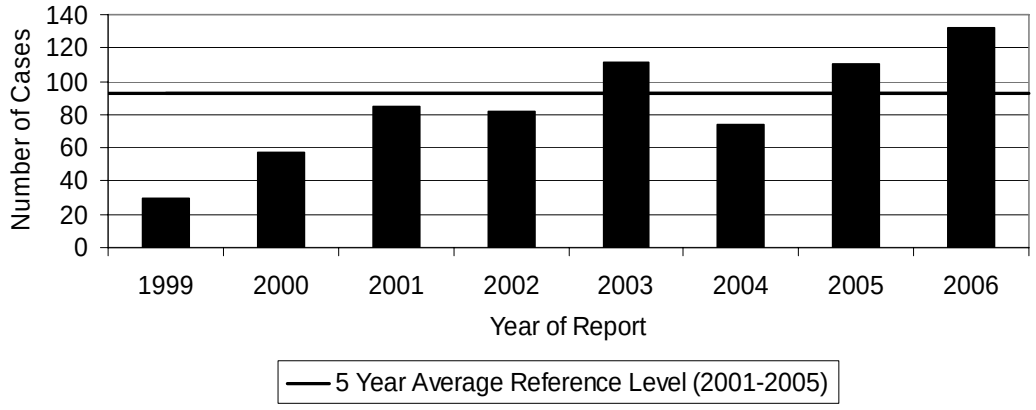
The last case of smallpox in Virginia occurred in 1944.

Streptococcal Disease, Group A, Invasive

Agent: *Streptococcus pyogenes* (bacteria)
Mode of Transmission: Person-to-person by respiratory droplets or through direct contact.
Signs/Symptoms: Depending on the site of infection (e.g., skin, blood, throat, etc.), infection can result in no illness; mild illness (sore throat, fever, or skin infections); or severe illness (infection of the soft tissue or toxic shock syndrome).
Prevention: Prompt identification and treatment of cases and temporary exclusion of infected healthcare employees from work for the first 24 hours of antibiotic therapy.

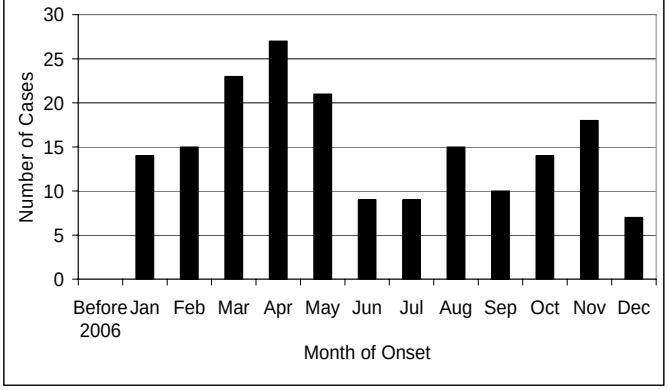
During 2006, 132 cases of invasive group A streptococcal disease (GAS) were reported in Virginia. This is a 20% increase from the 110 cases reported in 2005, and a 43% increase over the five year average of 92.4 cases per year (Figure 61).

Figure 61. Streptococcal Disease, Group A, Invasive: Eight Year Trend, Virginia, 1999-2006



The highest incidence rate was seen in the less than 1 year age group (4.9 per 100,000), followed by the 60 years and older age group (4.3 per 100,000). The black population had a higher incidence rate (1.7 per 100,000) than the white population (1.2 per 100,000). Females had a higher incidence rate than males (1.9 and 1.5 per 100,000, respectively). Among the regions, the northwest region had the highest incidence rate (2.7 per 100,000). The largest proportion of cases (67%) was reported during the first half of the year (Figure 62). Twelve deaths due to group A streptococcal infection were reported in 2006. Five of the deaths occurred in the 60 and older age group. The 50-59 and 1-9 age groups each experienced two deaths. No other

Figure 62. Streptococcal Disease, Group A, Invasive: Month of Onset, Virginia, 2006



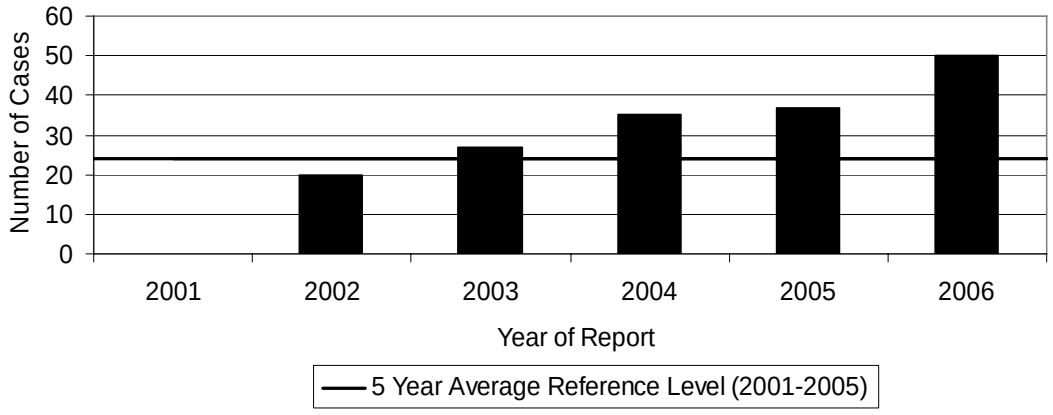
age groups had more than one death. Among the cases that died, seven were female and five were male. No cases of toxic shock due to group A streptococcal infection were reported.

Streptococcus pneumoniae, Invasive, in Children Less than 5 Years of Age

Agent: *Streptococcus pneumoniae* (bacteria)
Mode of Transmission: Person-to-person via droplet spread or by direct contact with oral secretions from persons carrying the bacteria in their upper respiratory tract.
Signs/Symptoms: Pneumonia (a lung infection), bacteremia (bloodstream infection), and meningitis (infection of the lining of the brain and spinal cord).
Prevention: Routine immunization with pneumococcal conjugate vaccine as a 4-dose series for infants at 2, 4, 6, and 12 to 15 months of age.
Other Important Information: With the decline of invasive *Haemophilus influenzae* infections, *S. pneumoniae* has become the leading cause of bacterial meningitis among children less than 5 years of age in the United States.

Fifty cases of invasive *S. pneumoniae* infection in children less than 5 years of age were reported in Virginia during 2006. This represents a 35% increase over the 37 cases reported in 2005, a 110% increase over the five year average of 23.8 cases per year, and the fifth consecutive increase in reported cases since 2001, when the condition became reportable (Figure 63).

Figure 63. *Streptococcus pneumoniae,* Invasive, in Children Less Than 5 Years of Age: Six Year Trend, Virginia 2001-2006



A higher incidence rate was seen in infants (18.5 cases per 100,000 population) than in children between 1-4 years of age (7.6 per 100,000). Information on race was missing on 22% of records. Among those where race was reported, the black population had a higher incidence rate (10.5 per 100,000) than the white population (7.4 per 100,000) or the "other" race group (2.1 per 100,000). The rate of *S. pneumoniae* infection in males was more than twice the rate in females (13.7 and 5.2 per 100,000, respectively). Incidence rates were highest in the northwest and eastern regions (11.1 and 11.0 per 100,000) and lowest in the northern and southwest regions (8.8 and 8.4 per 100,000). Cases occurred throughout the year, with 40% of cases

occurring during the fourth quarter. One death due to *S. pneumoniae* infection was reported in an infant.

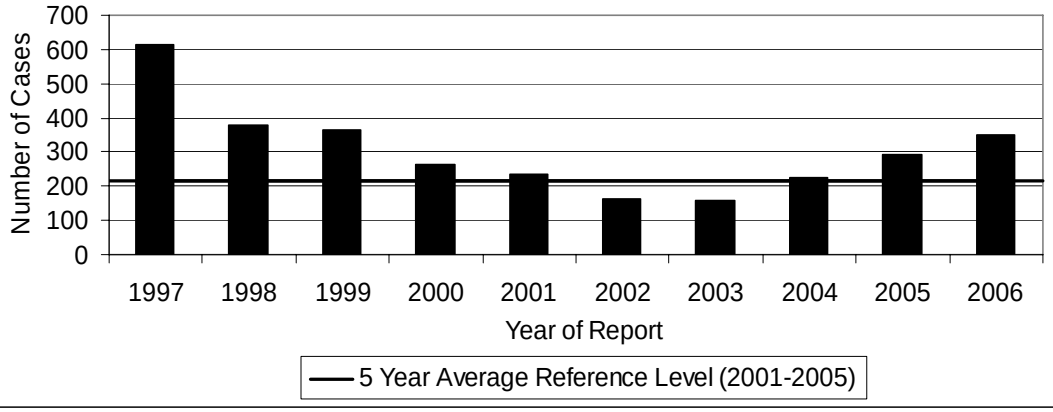
Syphilis

Agent: *Treponema pallidum* (bacteria)
Mode of Transmission: Through sexual intercourse, from mother to child through the placenta, and via blood transfusion from an infected donor in the early stage of disease.
Signs/Symptoms: The primary stage is characterized by a chancre. The secondary stage includes a skin rash and lesions of the mucous membranes. A latent period follows with no clinical symptoms. In late syphilis, the central nervous system may become sufficiently damaged to cause death.
Prevention: Safer sexual practices, screening of all women during early pregnancy to prevent infection of infants, and treatment of infected partners.
Other Important Information: Nationwide, the rate of primary and secondary syphilis is on the rise for two important populations: men who have sex with men (MSM) and blacks.

Early Syphilis

Early syphilis includes the primary and secondary stages and early latent syphilis (cases diagnosed within one year from the time of infection).

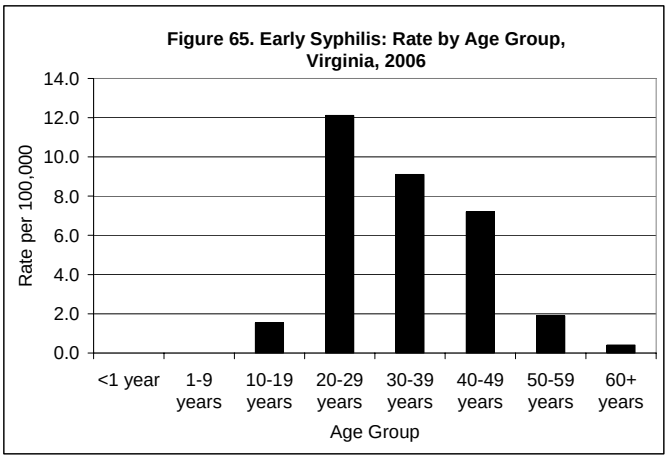
Figure 64. Early Syphilis: Ten Year Trend, Virginia, 1997-2006



There were 351 cases of early syphilis reported in Virginia during 2006 (Figure 64). Since 2002, the incidence rate has doubled from 2.3 to 4.6 per 100,000 in 2006.

The highest incidence rate occurred in the 20-29 year age group (12.1 per 100,000), followed by the 30-39 year age group (9.1 per 100,000) (Figure 65). The rate in the black population was over seven times the rate in the white population (14.7 and 2.0 per 100,000, respectively), and the rate in males was almost six times the rate in females (8.0 and 1.4 per 100,000). The male to female ratio has risen from approximately 1:1 to 6:1 over the past ten years, which may be

indicative of a rising syphilis incidence among MSM. Since 2002, the rate of early syphilis has doubled in the central, northern and northwest regions and has tripled in the eastern region.



Congenital Syphilis

Five cases of congenital syphilis were reported in Virginia during 2006, compared to four cases reported in 2005. All five cases were seen in the black population. Four occurred in the eastern region and one was from the northern region. A rise in total early syphilis cases has contributed to an increase in congenital syphilis. In 2006, for the first time since the 1980s, a newborn meeting the case definition for syphilis stillbirth was reported in Virginia. This occurred in the eastern region.

Late Syphilis

In 2006, 343 cases of late syphilis were reported in Virginia. This is a 5% decrease from the 361 cases reported in 2005. The incidence rate in the black population was higher than the rate in the white population (12.1 and 0.9 per 100,000, respectively) and the rate in males (5.3 per 100,000) was higher than the rate in females (3.7 per 100,000).

The highest incidence rate was reported in the 30-39 year old age group (8.7 per 100,000). The northern and eastern regions reported the highest incidence rates, at 7.2 and 5.1 per 100,000, respectively.

Tetanus

Agent: Toxin secreted by the bacteria *Clostridium tetani*
Mode of Transmission: Usually transmitted when a wound is infected by contaminated soil, dust, or animal or human feces.
Signs/Symptoms: A descending pattern of painful muscle contractions, particularly of the neck muscles; difficulty swallowing; and abdominal rigidity.
Prevention: Tetanus vaccine is available as part of the diphtheria/tetanus/pertussis (DTaP) vaccine for children and as a new combination tetanus/diphtheria/pertussis (Tdap) vaccine for adolescents and adults. One dose of Tdap should be given at 11 to 12 years of age with booster doses of Td following every ten years after that.
Other Important Information: The case-fatality rate of tetanus ranges from 10% to 80% and depends on the length of incubation and the recognition of symptoms as indicative of tetanus.

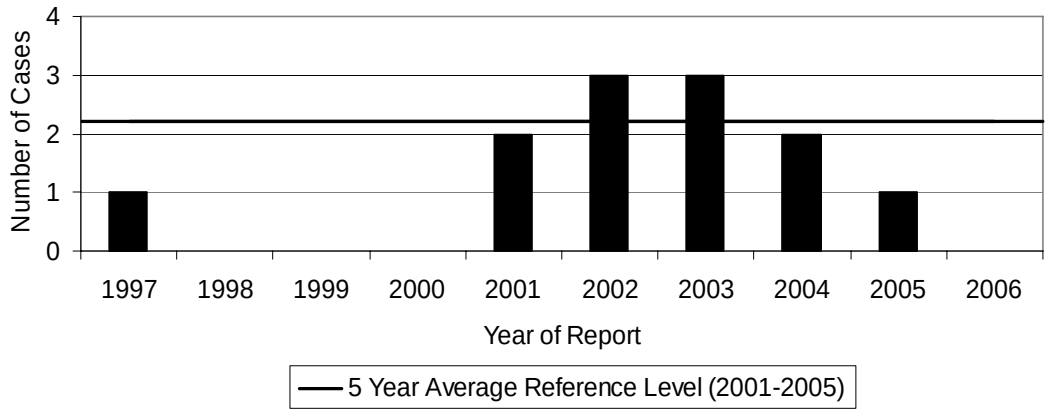
No cases of tetanus were reported in Virginia in 2006. Single cases were reported in 2005 and in 2004. Prior to 2004, the last reported case of tetanus in Virginia occurred in 1998.

Toxic Shock Syndrome

Agent: *Staphylococcus aureus* or beta-hemolytic streptococci (bacteria)
Mode of Transmission: Person-to-person spread through direct contact or through contact with contaminated materials or surfaces.
Signs/Symptoms: Sudden onset of high fever, rash, vomiting, watery diarrhea, and muscle pain, followed by a drop in blood pressure, and shock (severe cases).
Prevention: Practice good hand hygiene, clean skin abrasions, and eradicate *S. aureus* and *Streptococcus pyogenes* from draining wounds.
Other Important Information: The majority of early cases were reported in women during menses; however, in recent years only 55% of cases have been reported among women of child-bearing age.

No cases of toxic shock syndrome due to *Staphylococcus aureus* were reported in Virginia during 2006. The highest number of reported cases occurred in 2002 and 2003, with three reported cases each year (Figure 66). For information on toxic shock syndrome cases due to infection with group A *Streptococcus*, see the "Streptococcal Disease, Group A, Invasive" section in this report.

Figure 66. Toxic Shock Syndrome: Ten Year Trend, Virginia, 1997-2006

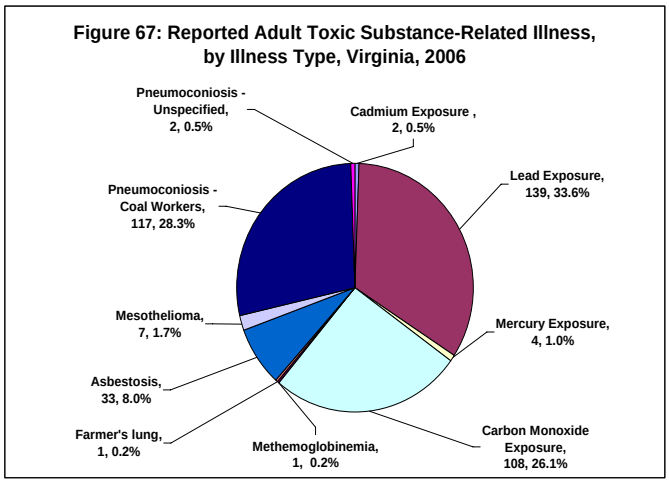


Toxic Substance-Related Illness

Agent: Multiple, including pesticides, heavy metals (lead, cadmium, mercury, arsenic), occupational dusts or fibers (coal, silica, asbestos), gases (carbon monoxide, methane) or radioactive materials.
Mode of Transmission: Varies depending on agent; can include absorption through skin, ingestion, or inhalation.
Signs/Symptoms: Varies depending on agent. Chronic occupational dust or fiber exposure may increase the risk of lung cancer, mesothelioma and nonmalignant lung disorders. Heavy metals, gases and pesticides may damage nervous, digestive, or reproductive systems.

Prevention: Do not eat, drink, or smoke in contaminated work areas. Wash hands and face after contacting toxic materials; after working with potential toxic substances, shower and change clothes at work, if possible. Always follow safety guidelines and requirements.
Other Important Information: Improving public and healthcare professional awareness and recognition of various toxic substance exposures can help reduce subsequent illness.

During 2006, 414 cases of adult toxic substance-related illness were reported in Virginia. An incidence of exposure is based on a physician's diagnosis or on a laboratory finding above expected normal values. The three most frequently reported toxic substance-related illnesses were lead exposure, pneumoconiosis, and carbon monoxide exposure (Figure 67). Additional toxic substance-related illness reported during 2006 included exposures to asbestos, cadmium, mercury, oxidizing agents causing methemoglobinemia, and mold spores (resulting in farmer's lung).



Among those with lead exposures, 35% worked in battery manufacturing, while among those reported with pneumoconioses (including coal workers pneumoconiosis), 94% worked in the coal mining industry. The carbon monoxide exposures all involved a malfunctioning boiler in a dormitory.

Where age was reported, the mean age was 51 years. Three-quarters of all cases occurred in males. The southwest region, where coal and battery manufacturing industries are focused, had the highest number of reported exposures (293, 71%), followed by the eastern region (53, 13%).

Children with exposure to lead are not discussed in this section. For this information, see the "Lead - Elevated Blood Levels in Children" section.

Trichinosis

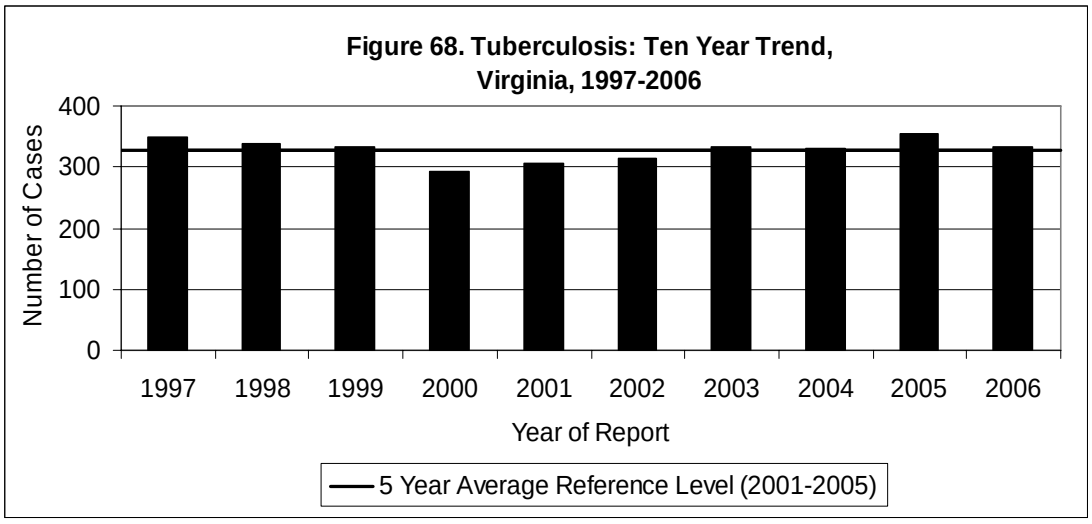
Agent: Roundworms of genus *Trichinella* (*T. spiralis* is the most common cause of human infection).
Mode of Transmission: Eating undercooked contaminated meat (including bear, pork, wild feline [such as a cougar], fox, dog, wolf, horse, seal, or walrus).
Signs/Symptoms: Nausea, diarrhea, vomiting, fatigue, fever, and abdominal discomfort. Headaches, fevers, chills, cough, eye swelling, aching joints and muscle pains, itchy skin, diarrhea, or constipation may follow. Individuals may be asymptomatic, but severe infections can cause death.
Prevention: Cook all pork products and meat from wild animals to an internal temperature of 160 degrees Fahrenheit.

Other Important Information: Trichinosis is not transmitted from person to person. Infected meat will remain infective until it has been properly cooked, cured, frozen or irradiated.

No cases of trichinosis were reported in Virginia in 2006. One case of trichinosis was reported in Virginia during 2005.

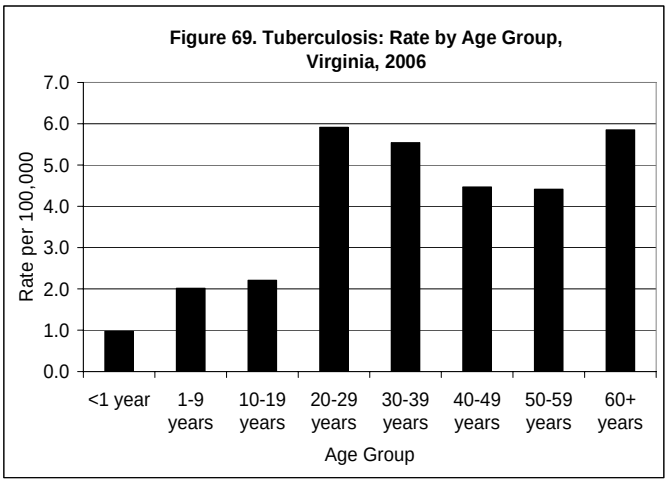
Tuberculosis

Agent: *Mycobacterium tuberculosis* (bacteria)
Mode of Transmission: Inhalation of tubercle bacilli via airborne droplet nuclei produced when patients with pulmonary or respiratory tract tuberculosis exhale the bacilli through coughing, singing, or sneezing.
Signs/Symptoms: Dependent on the organ(s) affected. General systemic signs and symptoms include fever, chills, night sweats, weight loss and fatigue. Symptoms of pulmonary tuberculosis include the systemic symptoms and may also include a prolonged productive cough (greater than 3 weeks) and coughing up blood.
Prevention: Prompt identification, diagnosis and treatment of persons with infectious tuberculosis. Timely contact investigations to identify and treat additional persons with active tuberculosis disease and persons with latent tuberculosis infection. Infection control measures in high-risk settings.
Other Important Information: About 10% of those infected with tuberculosis will develop active disease during their lifetime, with the greatest risk for disease progression during the two years following infection. Co-infection with HIV and other immune suppressing conditions represent the greatest risks for progression to active disease.

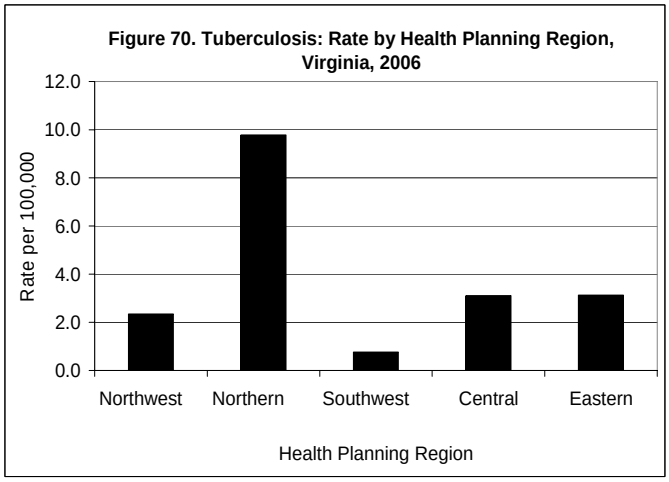


The 332 tuberculosis cases reported in 2006 was a 6% decrease from the 355 cases reported in 2005 and slightly higher than the five year average of 327.4 cases per year (Figure 68). Drug resistance was found in 27 cases, five of which were multi-drug resistant. No cases of extensively drug resistant (XDR) tuberculosis were reported. The majority of cases (69%) were reported among foreign-born persons. The top five countries of origin included Vietnam, Mexico, Ethiopia, the Philippines and South Korea.

Rates in adults were higher than rates in children and adolescents. Among age groups, the highest incidence rate occurred in the 20-29 year age group and the 60 years and older age group with 5.9 cases per 100,000 population. The lowest rate was seen among infants (1.0 per 100,000) (Figure 69). By race, the highest incidence was observed in the "other" race population (21.2 per 100,000) followed by the black population (7.5 per 100,000) and the white population (2.0 per 100,000).



Males had a higher rate (5.1 per 100,000) than females (3.7 per 100,000). The northern region reported the highest number of cases and highest incidence rate (199 cases, 9.8 per 100,000) and the lowest number and rate were seen in the southwest region (10 cases, 0.8 per 100,000) (Figure 70).



Tularemia

Agent: *Francisella tularensis* (bacteria)
Mode of Transmission: In the United States, by the bite of an infected tick such as the American dog tick or the lone star tick, or occasionally by the bite of an infected deer fly. Hunters can contract the disease while cleaning infected game or when eating poorly cooked, infected meat. Humans may also become infected by drinking contaminated water, or by breathing *F. tularensis* spores from the dried carcasses or pelts of animals that died from tularemia.
Signs/Symptoms: Vary depending on the mode of transmission, but usually include sudden onset of high fever, chills, fatigue, general body aches, headache and nausea. Pneumonia may complicate the disease and requires prompt identification and specific treatment to prevent development of serious, life-threatening illness.
Prevention: Avoid the bites of ticks or deer flies and avoid untreated water in areas where tularemia is prevalent among wild animals. Use impervious protective gloves when skinning rabbits and other wild game. Avoid contaminating other food items with utensils used for preparing meat from game and do not eat undercooked meat.
Other Important Information: Tularemia is classified as a potential bio-weapon because its spores are relatively easy to disseminate as a breathable aerosol or as a food and water contaminant.

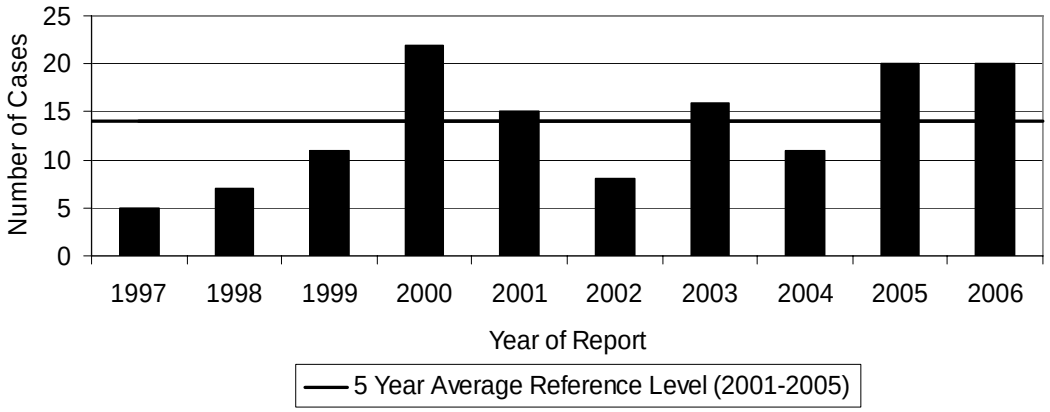
No cases of tularemia were reported in Virginia during 2006, 2005 or 2004. Four cases were reported in 2003.

Typhoid Fever

Agent: *Salmonella* serovar Typhi (bacteria)
Mode of Transmission: Ingestion of food or water contaminated by feces or urine of patients and carriers. The bacteria live only in humans.
Signs/Symptoms: Include a sustained fever, headache, malaise, change in mental status, lethargy, anorexia, fast heart rate, enlarged spleen, a non-productive cough and constipation.
Prevention: Access to safe water and proper sanitation as well as following safe food handling practices are essential. Typhoid fever vaccine should be considered for travelers to a country where the disease is common.

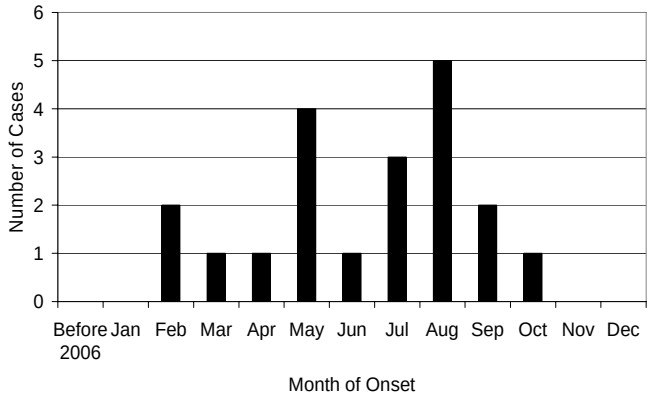
During 2006, 20 cases of typhoid fever were reported in Virginia. This is the same number of cases reported in 2005 and a 43% increase from the five year average of 14 cases per year (Figure 71). Travel histories were obtained for 12 (60%) of these cases, and all had traveled outside of the United States in the 30 days prior to onset of illness.

Figure 71. Typhoid Fever: Ten Year Trend, Virginia, 1997-2006



The 1-9 year age group had the highest incidence rate (1.2 per 100,000), followed by the less than 1 year age group (1.0 per 100,000). The other age groups had rates between 0 and 0.3 cases per 100,000 population. No race information was available for 35% of the cases, but among cases with a race reported, the "other" race category had the highest number of cases and the highest incidence rate (9 cases, 1.8 per 100,000). Females and males had

Figure 72. Typhoid Fever: Month of Onset, Virginia, 2006



similar rates (0.2 and 0.3 per 100,000, respectively). Fourteen cases (70%) were reported from the northern region (0.7 per 100,000 population), five were from the central region (0.4 per 100,000 population) and one was from the northwest (0.1 per 100,000). Onset occurred during the second and third quarters for 80% of cases (Figure 72).

Typhus

Agent**:** Any of three distinct rickettsial bacteria species. Epidemic typhus is caused by *Rickettsia prowazekii.* Endemic typhus is caused by *R. typhi* or *R. felis*. Scrub typhus is caused by *Orientia tsutsugamushi*.
Mode of Transmission**:** Epidemic typhus is transmitted by human lice or by squirrel fleas. Endemic typhus is carried by rat fleas. Epidemic and endemic typhus may be also be contracted by inhalation of dust containing infected louse or flea feces. Scrub typhus is transmitted only by the bite of infected mites.
Signs/Symptoms**:** Epidemic typhus often presents with sudden headache, fever, chills, prostration, and body pain. A macular rash erupts on the fifth or sixth day in approximately half of the patients. The clinical course of endemic typhus is similar to that for epidemic typhus, but milder. The initial symptom of scrub typhus is usually a skin ulcer at the site of the mite bite followed by a febrile illness with headache, profuse sweating, conjunctival injection and enlargement of lymph nodes.
Prevention**:** Typhus-infected patients serve as the disease reservoirs for lice in epidemic typhus, so identification, isolation/quarantine, and treatment of infected patients is necessary to stop the transmission cycle. Other important practices include improved sanitation and the use of insecticides for delousing infested people or for controlling rat fleas before using rodenticides (for endemic typhus). These diseases are rare in the United States.

No cases of typhus were reported in Virginia during 2006. The last case was flea-borne (endemic) typhus reported in 1993.

Vaccinia, Disease or Adverse Event

Agent: The vaccinia virus, which is used in smallpox vaccine.
Mode of Transmission: Transmitted through injection with the smallpox vaccine or through direct contact with the vaccine site or contaminated materials.
Signs/Symptoms: Include rash, fever and head and body aches. Some individuals, especially those with certain skin conditions or weakened immune systems, may experience more serious effects such as a toxic or allergic reaction at the site of the vaccination or spread of the virus to other parts of the body.
Prevention: When smallpox is not circulating, in order to prevent serious reactions to the vaccine, only laboratory workers who handle smallpox and certain healthcare workers are recommended to receive the smallpox vaccine.
Other Important Information: The U.S. government has enough smallpox vaccine to vaccinate every person in the United States in the event of a smallpox emergency.

Vaccinia became a reportable condition in Virginia in 2003. Since then, no cases of vaccinia have been reported in Virginia.

Vancomycin-Resistant *Staphylococcus aureus* Infection

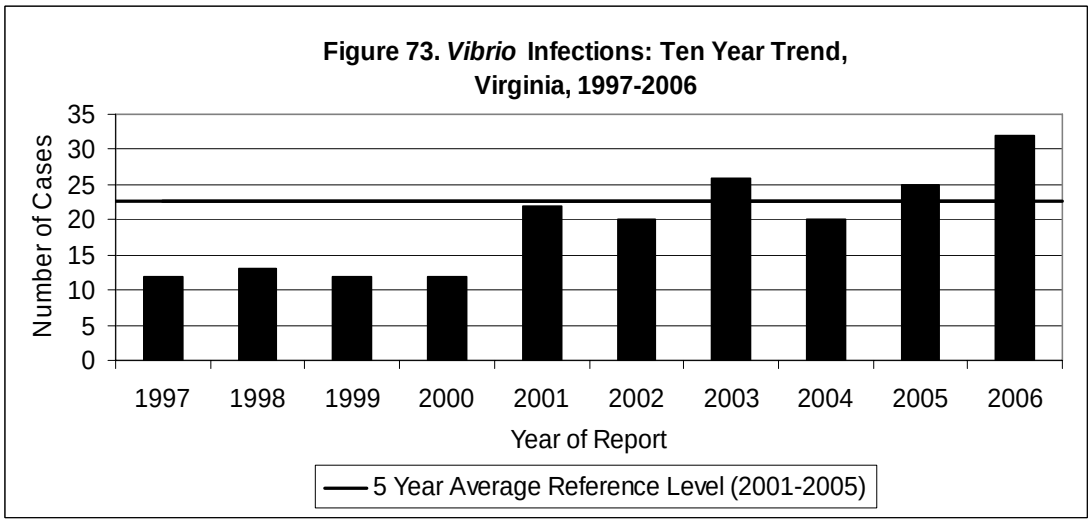
Agent: *Staphylococcus aureus* (bacteria) that has developed resistance to the antibiotic vancomycin.
Mode of Transmission: Person-to-person spread through direct contact or through contact with contaminated materials or surfaces.
Signs/Symptoms: Depends on site of infection (e.g., skin, bone, urinary and respiratory tract) and may cause toxic shock syndrome (see TSS section above); asymptomatic colonization can occur.
Prevention: Appropriate use of antibiotics to treat infections, good hand hygiene, and proper cleaning of contaminated surfaces.

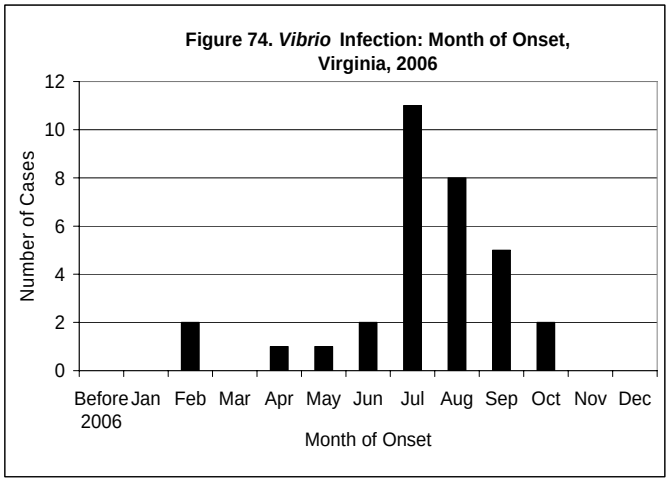
No cases of VRSA infections have ever been reported in Virginia.

Vibrio Infection

Agent: *Vibrio* (bacteria)
Mode of Transmission: Gastroenteritis is usually related to the consumption of raw or undercooked seafood, particularly shellfish. Wound infections arise from environmental exposures, usually from brackish waters or from occupational injuries (e.g., among fishermen).
Signs/Symptoms: Syndromes associated with *Vibrio* infection include diarrhea, wound infection, and septicemia. Diarrheal illness is most common and includes watery stools, cramping, and abdominal pain. Low-grade fever, headache and chills are seen in half of those ill with diarrheal illness, and vomiting is present in 30%. Wound infection is usually severe in those who have liver disease or are immunosuppressed.
Prevention: Seafood should be cooked adequately and should be refrigerated. Abrasions suffered by ocean bathers should be rinsed with clean, fresh water. Children, immunosuppressed persons and those with chronic liver disease should not eat raw oysters or clams.
Other Important Information: Most *Vibrio* infections occur during summer and fall months, when levels of bacteria in brackish waters and estuaries are highest.

During 2006, 32 cases of *Vibrio* infection were reported in Virginia. This is a 28% increase over the 25 cases reported in 2005 and a 42% increase over the five year average of 22.6 cases per year (Figure 73). The species breakdown among the 32 *Vibrio* infections included 14 infections caused by *V. parahaemolyticus*, five caused by *V. vulnificus*, one caused by both *V. parahaemolyticus* and *V. vulnificus*, 11 caused by other various species of *Vibrio* and one case with no species identified. Illnesses included 17 gastrointestinal infections, eight wound infections, three septicemia cases and four ear infections. *V. parahaemolyticus* was primarily associated with causing gastrointestinal infection (12/14 cases). *V. vulnificus* was associated with wound (2/5 cases) or septicemic infections (3/5 cases). All of the ear infections caused by the bacteria were confirmed as *V. alginolyticus*.





Fifty percent of reported cases occurred in the 60 year and older age group and the incidence rate was highest in this age group (1.3 per 100,000). No cases were reported in persons under 10 years old. Rates were the same in whites and blacks. Among the 32 cases reported in Virginia in 2006, *Vibrio* infection predominantly affected males. Sixty-nine percent of infections occurred among males and the incidence rate among males was twice the rate for females (0.6 and 0.3 per 100,000, respectively). Geographically, the eastern region had the largest proportion of cases and the highest incidence rate (63%, 1.1 per 100,000), followed by the northern region (22%, 0.3 per 100,000). Seventy-three percent of cases occurred from July to September (Figure 74). One death due to *Vibrio vulnificus* infection was reported during 2006.

Cholera

No cases of cholera were reported in Virginia in 2006. The last case of cholera in Virginia occurred in 1994.

Viral Hemorrhagic Fever

Agent(s): Multiple, including *Arenaviruses* (Argentinian, Bolivian, Venezuelan, and Brazilian hemorrhagic fevers, and Lassa fever), *Filoviruses* (Ebola and Marburg hemorrhagic fevers), *Bunyaviruses* (Crimean-Congo hemorrhagic fever [CCHF] and Rift Valley fever [RVF]), and *Flaviviruses* (Omsk hemorrhagic fever [OHF] and dengue hemorrhagic fever [DHF]).

Mode of Transmission**:** Vary by agent. *Arenaviruses* are carried by rodents and are contracted by breathing dust contaminated with saliva, feces and urine of infected rodents, but may also be transmitted person-to-person by infected patients. *Filovirus* hemorrhagic fevers are contracted through direct contact with blood or fluids from infected animals or persons. *Bunyaviruses* are typically transmitted by the bites of arthropods but may also be contracted through contact with the blood and body fluids of infected livestock or people. Hemorrhagic fevers caused by *Flaviviruses* are typically transmitted by the bites of arthropods. Among these, only DHF has been found to occur naturally in North America.
Signs/Symptoms**:** Vary by type, including, but not limited to; malaise, headache, fever, bleeding from nose and gums, rash, appearance of blood in the eyes, or vomiting. Case-fatality rates can range from 1% (Dengue) to 90% (Ebola).
Prevention**:** Depending on agent, exposure to hemorrhagic diseases can be reduced by rodent control around the home in endemic areas, by isolation of infected persons during their febrile period, by preventing contact with blood or body fluids of sick or dead animals, and by avoiding the bites of mosquito or tick vectors.
Other Important Information: Viral hemorrhagic fevers are classified as potential bio-weapons because they can cause high mortality and public panic and social disruption, and they require a great deal of planning to protect the public's health.

No cases of viral hemorrhagic fever have ever been reported in Virginia.

Yellow Fever

Agent**:** Yellow fever virus
Mode of Transmission: Through the bite of several species of *Aedes* mosquitoes, most notably the yellow fever mosquito, which breeds in containers of water occurring around human habitations. The Asian tiger mosquito (*Ae. albopictus*), which is a common container breeder in Virginia, is also a competent yellow fever vector.
Signs/Symptoms: Varying levels of severity; include a sudden onset of fever, chills, headache, backache, generalized muscle pain, prostration, nausea, and vomiting. Jaundice is usually mild in early disease but intensifies later. Among cases with jaundice, fatality is 20% to 50%.
Prevention**:** Vaccination against the yellow fever virus prior to visiting yellow fever endemic regions of the world.

No cases of yellow fever have been reported in Virginia since the nineteenth century.

Yersiniosis

Agent: *Yersinia* species (bacteria)
Mode of Transmission: Ingestion of contaminated foods (raw or incompletely cooked pork products and unpasteurized milk), or contaminated surface or well water, or by direct or indirect contact with infected people or animals.
Signs/Symptoms: Vary depending on age, but may include fever, abdominal pain, bloody diarrhea.

Prevention: Safe food preparation and pasteurization of dairy products. People handling pork intestines should wash their hands and environmental surfaces thoroughly after contact and should not care for a young infant at the same time.
Other Important Information: Most infections occur during the winter.

Ten cases of yersiniosis were reported in Virginia during 2006. The largest proportion of cases was reported in infants (4 cases, 3.9 per 100,000). Data on race were missing for all but one case. Eight of the 10 cases were female and five of the 10 cases were from the southwest region. Ninety percent of cases occurred during the first and second quarters of the year.