

Vaccine Preventable Diseases in Colorado: 2016 Surveillance Report



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Department of Public
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Introduction

This report is published by the Vaccine Preventable Disease Unit, part of the Communicable Disease Branch within the Disease Control and Environmental Epidemiology Division of the Colorado Department of Public Health and Environment (CDPHE). The tables and graphs in this report summarize 2016 surveillance data for confirmed and probable cases of selected vaccine preventable diseases (VPD) in Colorado and describe the burden and distribution of disease, as well as trends over time.

Surveillance

Colorado Board of Health regulations require health care providers and laboratories to report cases of diphtheria, invasive *Haemophilus influenzae*, measles, meningococcal disease, mumps, pertussis, invasive pneumococcal disease, polio, rubella, tetanus, and varicella, among others, to CDPHE. Health care providers can include a physician, nurse, physician assistant, or other person knowing of or suspecting a case (including but not limited to coroners, infection preventionists, school nurses, or licensed daycare providers). Laboratories include Colorado laboratories, out-of-state laboratories that maintain a physical presence in Colorado and in-state laboratories that send specimens to out-of-state referral laboratories.

CDPHE receives funding to conduct enhanced statewide surveillance for meningococcal disease and varicella. In addition, CDPHE also receives funding to conduct active, population-based surveillance for invasive *Haemophilus influenzae*, invasive pneumococcal disease, pertussis and several other invasive bacterial infections in the five county metro area (Adams, Arapaho, Denver, Douglas, and Jefferson) as part of the Emerging Infections Program Active Bacterial Core Surveillance System. Enhanced surveillance involves additional data collection and validation.

All cases are to be reported with patient's name, date of birth, sex, race, ethnicity, and address (including city and county) and name and address of responsible physician or other health care provider in order to locate the patient for follow up.

Data Sources

The data that form the basis of this report are principally reports of VPD among people living in Colorado at the time their illness was reported to CDPHE. Most cases of VPD are reported via electronic laboratory reporting (ELR) and are triaged by the Integrated Disease Reporting Program (IDRP) and entered into the Colorado Electronic Disease Reporting System (CEDRS). Other reports are called or faxed in to CDPHE or a local public health agency (LPHA). The VPD unit also request death certificate matches from the CDPHE Office of Vital Statistics twice a year to detect VPD-related deaths not reported by providers or laboratories.

Laboratory and clinical data are obtained from healthcare providers directly, from review of medical records, or from patient interviews. Data on immunization history are obtained from the Colorado Immunization Information System and from cases and providers.

Colorado rates were calculated as cases per 100,000 population using final 2016 population estimates from the Demography Section, Colorado Division of Local Government.

Reported Cases of Selected Vaccine Preventable Diseases, Colorado, 2011 - 2016

Report Year	Invasive <i>H. influenzae</i> type b (Hib)	Measles	Meningococcal Disease	Mumps	Pertussis (Whooping Cough)	Invasive Pneumococcal Disease	Varicella (Chickenpox)
2016	0	1	4	18	718	513	330
5-Year Average (2011-2015)	1.0	0.8	7.6	5.6	1,090.2	480.4	395.0
2015	2	1	6	6	914	506	311
2014	1	1	7	4	1,259	459	386
2013	0	2	9	4	1,431	511	352
2012	2	0	6	7	1,432	432	479
2011	0	0	10	7	415	494	447

Note: During 2011-2016 no congenital rubella, diphtheria, polio, or rubella cases were reported. One tetanus case was reported during 2012 and 2 were reported during 2015. Case counts for hepatitis A, hepatitis B, and influenza are available in other CDPHE surveillance reports, as described below.

Diphtheria

Diphtheria, which is an extremely rare disease in the United States, is caused by infection with toxigenic (toxin-producing) strains of the bacterium *Corynebacterium diphtheriae*. Important sites of infection are the respiratory mucosa (respiratory diphtheria) and the skin (cutaneous diphtheria).

No cases of diphtheria were reported in Colorado or the United States during 2016. The last case of diphtheria reported in Colorado was in 1985.

CDC's Advisory Committee on Immunization Practice recommends routine vaccination with diphtheria-containing vaccine, DTaP (diphtheria, tetanus, and acellular pertussis vaccination) at 2, 4, 6, and 15 through 18 months and 4 through 6 years, followed by a dose of Tdap at 11-12 years of age. Pregnant women are recommended a single dose of Tdap during every pregnancy and adults should receive a single dose of Td vaccine every 10 years. A dose

of Tdap can replace one of the 10-year Td booster doses. Adults who have never received Tdap also are recommended to receive a booster dose of Tdap.¹

Haemophilus influenzae (Hi)

Haemophilus influenzae, a type of bacteria, can cause many different kinds of infections ranging from mild ear infections to severe diseases, like bloodstream infections. Only *H. influenzae* infections in normally sterile sites of the body such as blood, spinal fluid, and joint fluid are reported to CDPHE. These types of infections with *H. influenzae* are usually severe, requiring treatment in a hospital, and can sometimes result in death. The most common types of invasive disease caused by *H. influenzae* are: pneumonia (infection in the lungs), bacteremia (infection in the blood), meningitis (infection of the tissue covering of the brain and spinal cord), epiglottitis (swelling in the throat), and infectious arthritis (inflammation of the joint). CDPHE does not track noninvasive *H. influenzae* disease, such as ear infections.

There are six serotypes, or strains, of *H. influenzae* (a through f), depending on the outer covering of the bacteria, or polysaccharide capsule. There is also a strain of *H. influenzae* called non-typeable because this strain lacks a capsule around the bacteria. CDPHE requires labs to send isolates from all invasive *H. influenzae* cases to determine the serotype and track trends in disease. Occasionally, a laboratory discards an isolate before submitting it for serotyping. This is why a few cases every year have an unknown serotype.

Before the introduction of effective vaccines, *H. influenzae* type b (Hib) caused more than 95% of invasive disease in children less than 5 years old. In the post-vaccine era, non-typeable *H. influenzae* causes the majority of invasive disease in all age groups. Only Hib is preventable by vaccination; the other types of *H. influenzae* are not.

CDC's Advisory Committee on Immunization Practice recommends routine vaccination with a conjugate Hib vaccine beginning at 2 months of age, in either a 2 dose or a 3 dose series, depending on the vaccine chosen. A booster of any licensed conjugate Hib vaccine at age 12 through 15 months is recommended.²

¹ CDC. Prevention of Pertussis, Tetanus, and Diphtheria with Vaccines in the United States: Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2018 Apr 27; 67(2);1-44.

² CDC. Prevention and Control of *Haemophilus influenzae* Type b Disease: Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2014 Feb 28 ; 63 (RR01); 1-14

Figure 1: Reported Cases, Deaths, and Incidence Rates of *Haemophilus influenzae* (all serotypes), Colorado, 2016

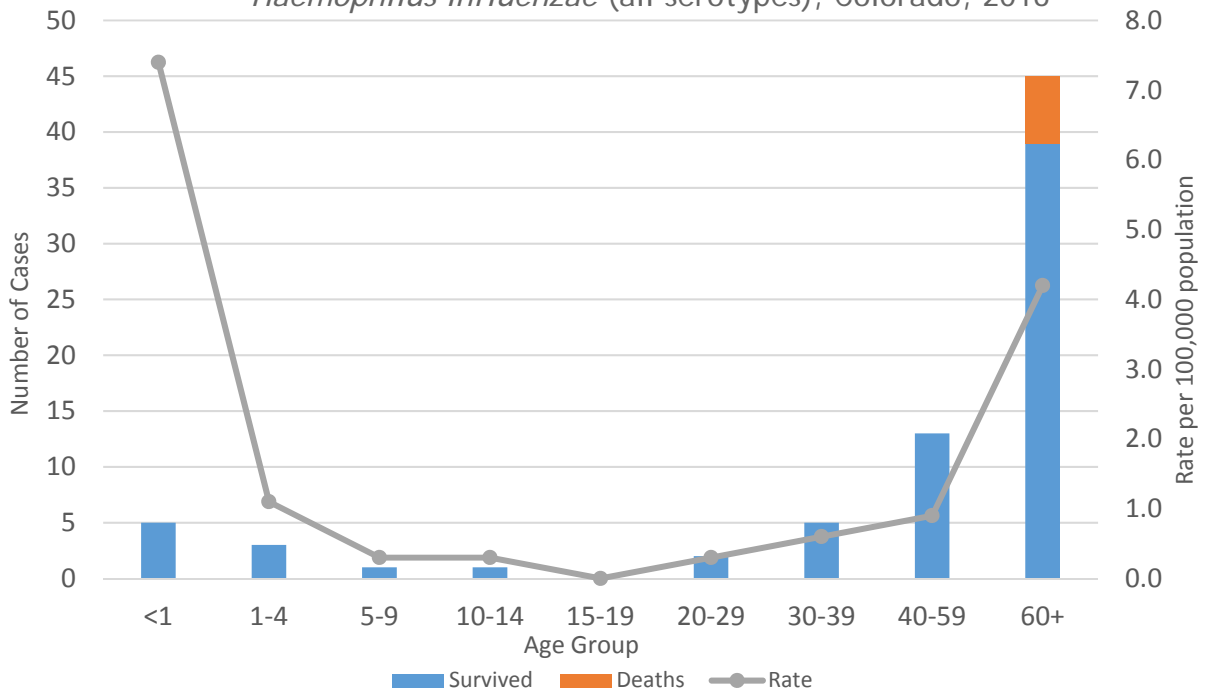


Figure 2: Reported Cases of Invasive *Haemophilus influenzae* by Year and Serotype, Colorado, 2007 - 2016

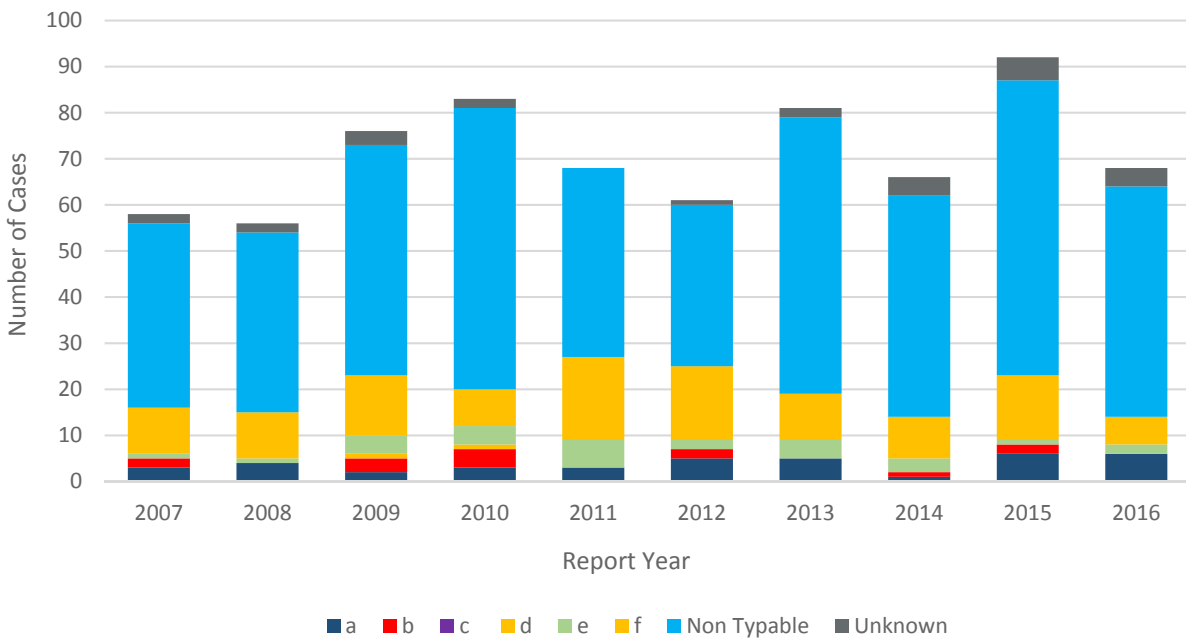
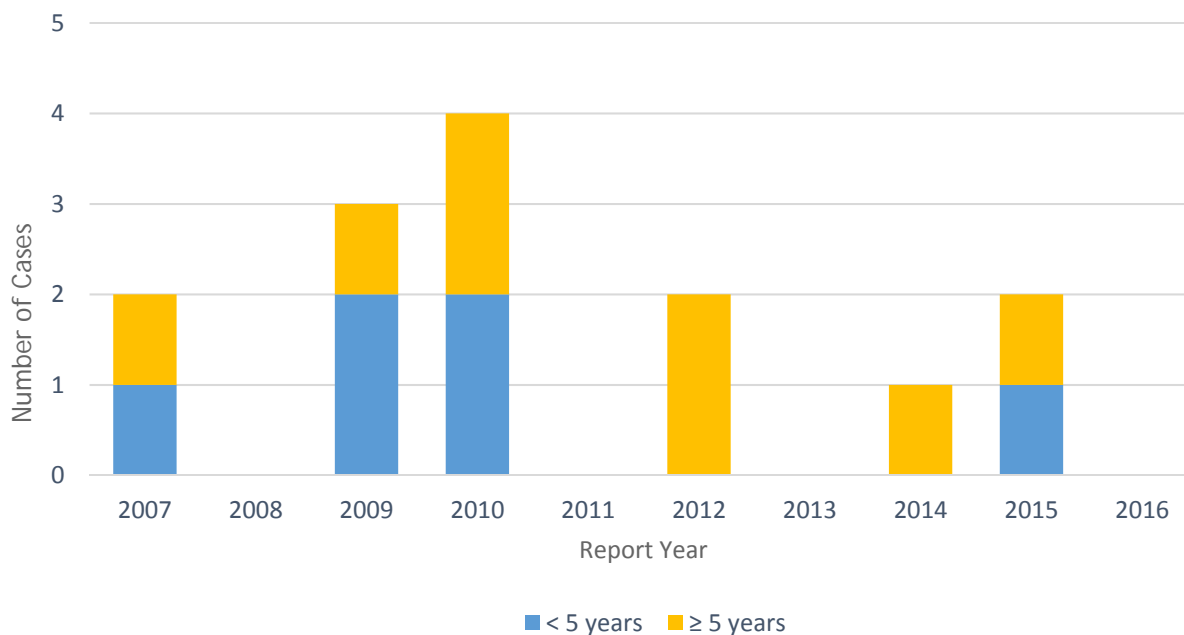


Figure 3: Reported Cases of Invasive *H. influenzae* Serotype b (Hib) by Age Group, Colorado, 2007-2016



Note: Of the 6 cases of Hib <5 years of age reported 2007-2016, 5 were unvaccinated and 1 case was not appropriately vaccinated for their age.

Hepatitis A and B

Hepatitis A infection is reportable in Colorado and is typically a foodborne illness that appears only as an acute (newly occurring) infection, which does not become chronic. The virus is transmitted by eating or drinking contaminated food or water, or by contact with an infected person. People with hepatitis A infection can have a mild illness lasting a few weeks to a more severe illness requiring hospitalization; infected people usually improve without treatment.

A vaccine to prevent hepatitis A infection was introduced in 1995. CDC's Advisory Committee on Immunization Practice recommends all children should receive two doses of Hepatitis A vaccine at one year of age, with a minimum of 6 months between doses.³ Alternatively, a 3 dose series using a combined hepatitis A and hepatitis B vaccine at 0, 1, and 6 months of age can be followed.⁴ Two or three doses of Hepatitis A vaccine are recommended for adults who want protection from hepatitis A or who are at risk for infection.

³ CDC. Recommended Immunization Schedules for Persons Aged 0 Through 18 Years, United States, 2016.

⁴ CDC. Notice to Readers: FDA Approval of an Alternate Dosing Schedule for a Combined Hepatitis A and B Vaccine (Twinrix®). 2007 Oct 12; 56 (40); 1057.

Hepatitis B, a reportable condition in Colorado, is typically a bloodborne illness that can occur as acute or chronic infection. It can range in severity from a mild illness that clears on its own to a serious, lifelong illness that can result in death. The virus can replicate in the liver for years causing damage, oftentimes without symptoms.

CDC's Advisory Committee on Immunization Practice recommends children receive a 3 dose series of hepatitis B vaccines at age 0, 1, and 6 through 18 months. Also, all children not previously vaccinated with hepatitis B vaccine should be vaccinated at 11 or 12 years of age with age-appropriate vaccine. Hepatitis B vaccination is recommended for all unvaccinated adults at risk for HBV infection and for all adults requesting protection from HBV infection. Acknowledgment of a specific risk factor should not be a requirement for vaccination.⁵

See the full viral hepatitis reports at: <https://www.colorado.gov/pacific/cdphe/hepatitis-data>

Influenza

Influenza (also known as flu) is a contagious respiratory illness caused by flu viruses. It can cause mild to severe illness, and at times can lead to death. Most people who get flu will recover in a few days to less than two weeks, but some people will develop complications, such as pneumonia, inflammation of the heart (myocarditis) or brain (encephalitis), and multi-organ failure.

Hospitalizations due to influenza and influenza-associated deaths in children less than 18 years of age are reportable in Colorado. In addition, CDPHE conducts additional influenza surveillance activities including: reporting of influenza-like illness visits by selected clinical sites, reporting of influenza testing activity by sentinel hospital labs, monitoring circulating influenza viruses through molecular typing at the CDPHE laboratory, and reporting of outbreaks of influenza in schools and group residential settings.

CDC's Advisory Committee on Immunization Practice recommends routine annual influenza vaccination for all persons aged greater than 6 months who do not have contraindications.⁶

See the full influenza summary report at: <https://www.colorado.gov/pacific/cdphe/influenza>

Measles

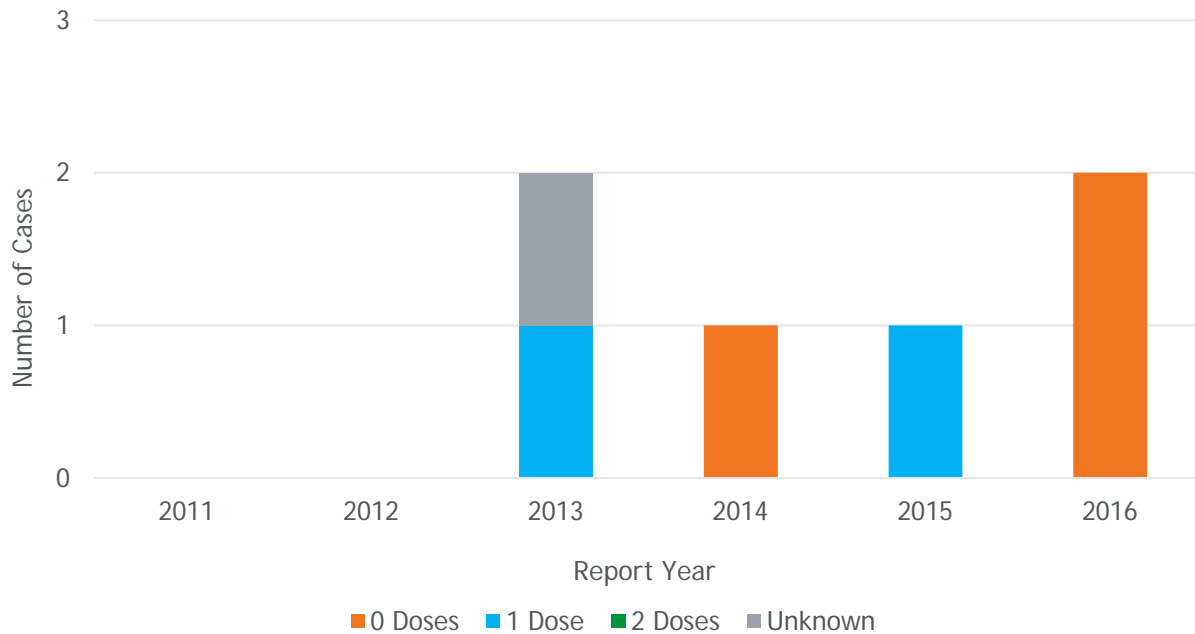
Measles is an acute illness caused by a virus in the family paramyxovirus, genus Morbillivirus. In 2000, measles was declared eliminated from the United States. Although endemic (acquired in the US) measles has been eliminated in the United States, importation of measles will continue to occur as measles remains endemic in many other parts of the world. Thus, current measles epidemiology in the United States and Colorado is determined by characteristics of the imported cases and their susceptible contacts.

⁵ CDC. Epidemiology and Prevention of Vaccine-Preventable Disease. Hamborsky J, Kroger A, Wolfe S, eds. 13th ed. Washington D.C. Public Health Foundation, 2015.

⁶ MMWR. Prevention and Control of Influenza with Vaccines: Recommendations of the Advisory Committee on Immunization Practices, United States, 2015-2016 Influenza Season. 2015 Aug 7; 64(30); 818-825.

CDC’s Advisory Committee on Immunization Practice recommends routine vaccination with the measles, mumps, and rubella (MMR) vaccine at age 12 through 15 months and a second dose at age 4 through 6 years. Adults with no evidence of immunity should get at least one dose of MMR vaccine. People who attend college, travel internationally, or who work in healthcare settings should have two doses of MMR vaccine.⁷

Figure 4: Reported Measles Cases by MMR Vaccination Status, Colorado, 2011-2016



Note: The unvaccinated case reported in 2014 and one of the unvaccinated cases from 2016 were too young to receive measles vaccination. The case in 2015 had one recorded vaccine, but it was administered prior to the recommended age for vaccination. The 2nd unvaccinated case in 2016 was an adult eligible for vaccination.

Meningococcal Disease

Meningococcal disease is a serious and often life-threatening infection caused by the bacterium *Neisseria meningitidis*. Meningococcal disease happens when the bacteria infects parts of the body that are sterile, or free from germs like the blood or spinal fluid. There are several different strains, or serogroups of the bacteria that causes meningococcal disease. Serogroups A, B, C, W, and Y are the main causes of meningococcal disease.

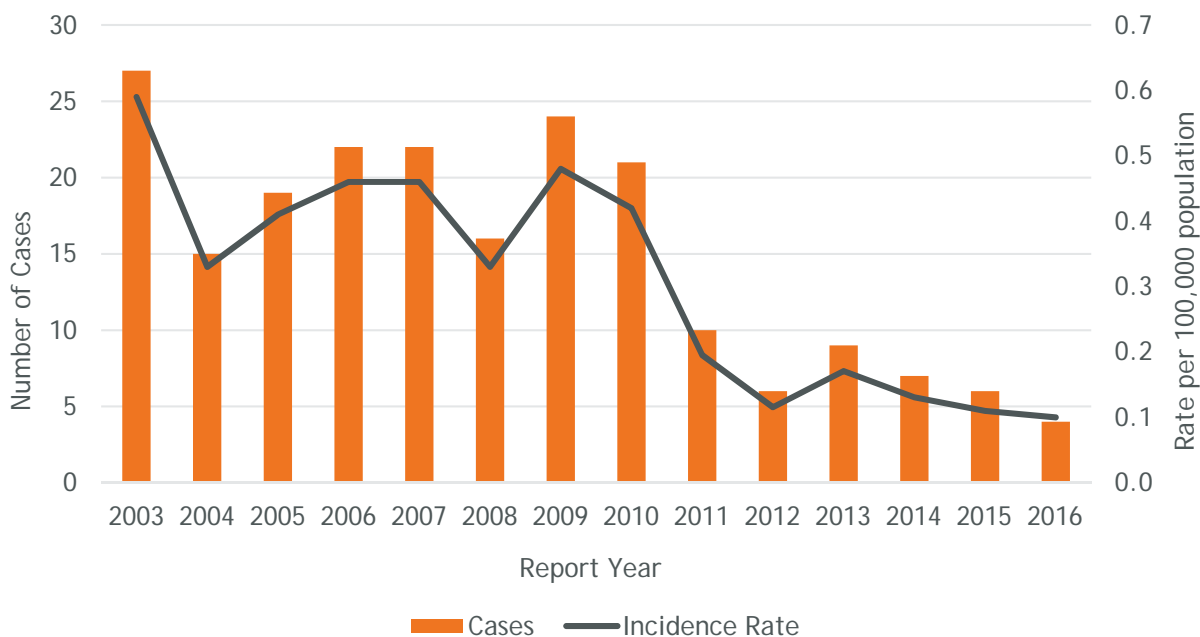
Invasive infection with *N. meningitidis* can cause several types of illnesses, including meningitis (inflammation of the membrane around the brain and spinal cord), sepsis (infection of the blood), or pneumonia (infection of the lungs). About 10-14% of cases of meningococcal disease are fatal. Among those who survive, 10%-20% have limb

⁷ CDC. Prevention of Measles, Rubella, Congenital Rubella Syndrome and Mumps, 2013: Summary Recommendations of the Advisory Committee on Immunization Practices (ACIP). 2013 Jun 14; 62 (RR04); 1-34.

loss, extensive skin scarring, hearing loss, mild to moderate cognitive defects, or seizure disorders. Meningococcal disease occurs throughout the year in Colorado but the highest incidence is in the winter. Serogroups B, C, and Y cause many of the cases reported in Colorado, with serogroup Y being the most common.

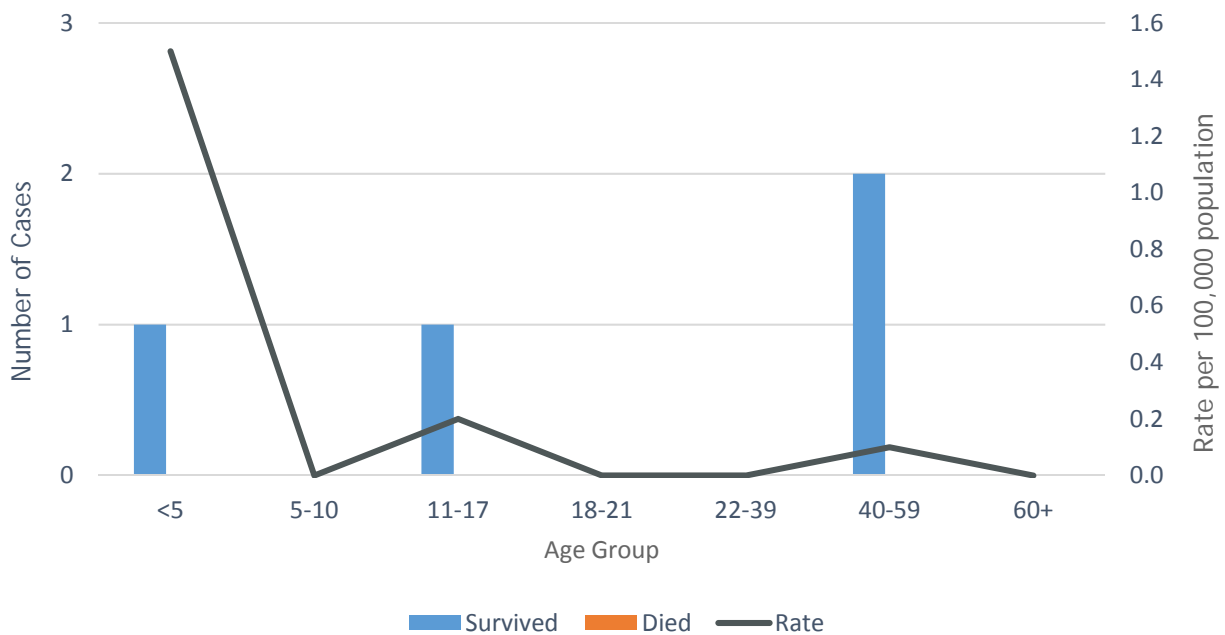
CDC's Advisory Committee on Immunization Practice (ACIP) recommends routine vaccination with a quadrivalent meningococcal conjugate vaccine (MenACWY) among children ages 11 to 12 years with a booster dose at 16 years. ACIP also recommends routine vaccination for people at increased risk for meningococcal disease.⁸ In the fall of 2015, ACIP began recommending that children and young adults aged 16 to 23 years may be vaccinated with a serogroup B meningococcal (MenB) vaccine to provide short-term protection against most strains of serogroup B meningococcal disease.⁸

Figure 5: Reported Meningococcal Disease Cases and Incidence Rates by Year, Colorado, 2007-2016



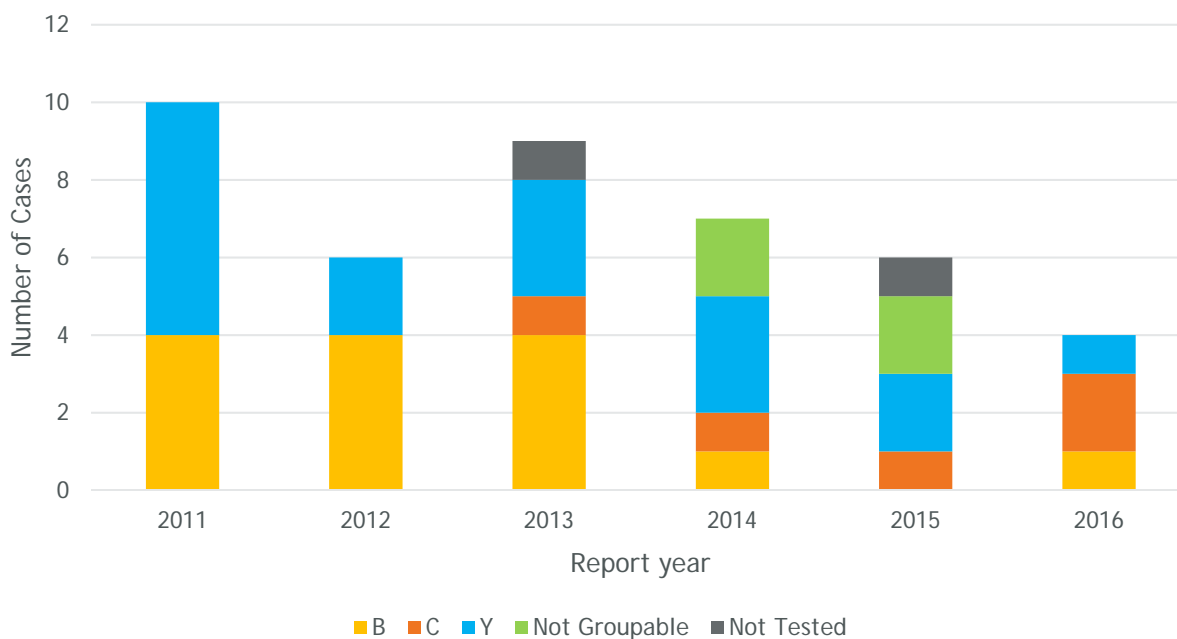
⁸ CDC. Use of Serogroup B Meningococcal Vaccines in Adolescents and Young Adults: Recommendations of the Advisory Committee on Immunization Practices, 2015. MMWR 2015 Oct 23; 64(41):1171-6.

Figure 6: Reported Meningococcal Disease Cases and Incidence Rates by Age Group in Colorado, 2016



Note: There were no deaths from meningococcal disease during 2016

Figure 7: Reported Meningococcal Disease Cases by Year and Serogroup, Colorado 2011-2016



Note: Meningococcal conjugate vaccines routinely available during 2016 contain antigens from serogroups A, C, Y and W-135. Of the three cases in 2016 with disease caused by these serogroups, none were vaccinated against meningococcal disease. In the fall of 2015, ACIP published a recommendation for individuals at high risk of meningococcal disease to be vaccinated against serogroup B. The 2016 case of MenB was not vaccinated with MenB vaccine. There were no cases of meningococcal disease caused by serogroups A or W135 during 2011-2016.

Mumps

Mumps is an acute viral illness caused by a paramyxovirus. The classic symptom of mumps is swelling of the parotid gland (parotitis) or other salivary glands along the jaw. Swelling usually lasts at least 2 days, but may last as long 10 days. Other symptoms of mumps include jaw pain, fatigue or tiredness, and swelling of the testicles or ovaries. Some people with mumps only have respiratory symptoms or no symptoms at all.

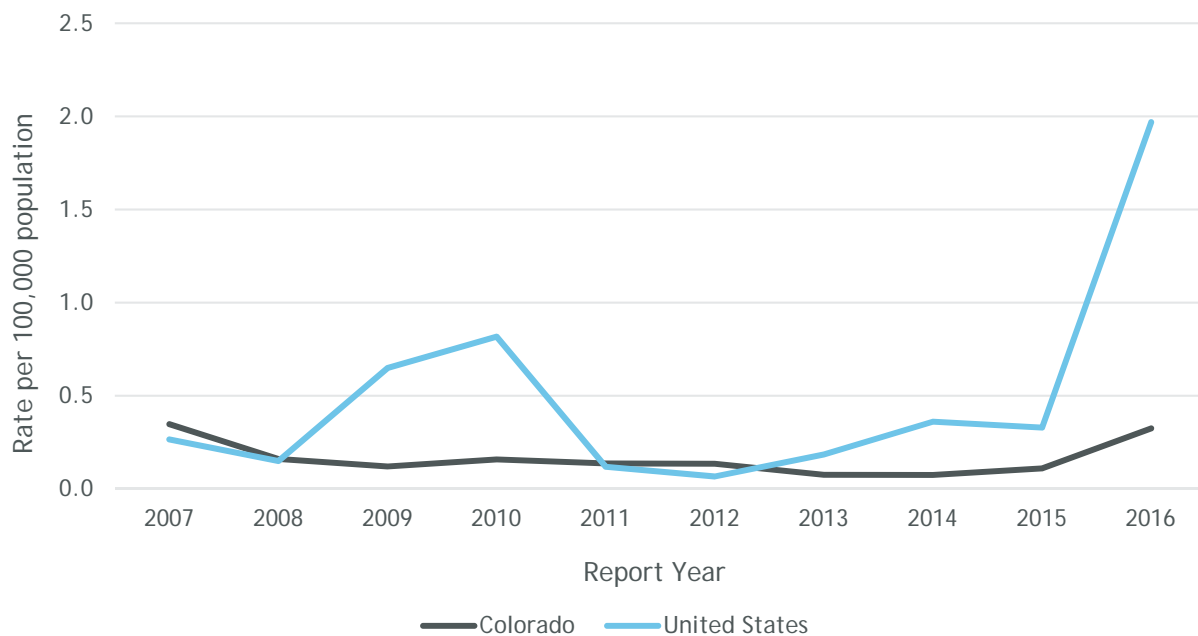
Results from several outbreak investigations showed that hospitalizations and overall complications are lower in people who were fully vaccinated compared with people who were unvaccinated. Severe complications of mumps are uncommon but occur more often in adults than children. Among all persons infected with mumps, reported rates of pancreatitis, deafness, meningitis, and encephalitis were less than 1%.

CDC's Advisory Committee on Immunization Practice recommends routine vaccination with the measles, mumps, and rubella (MMR) vaccine at age 12 through 15 months and a second dose at age 4 through 6 years. Adults with no evidence of immunity should get at least one dose of MMR vaccine.

People who attend college, travel internationally, or who work in healthcare settings should receive two doses of MMR vaccine⁹.

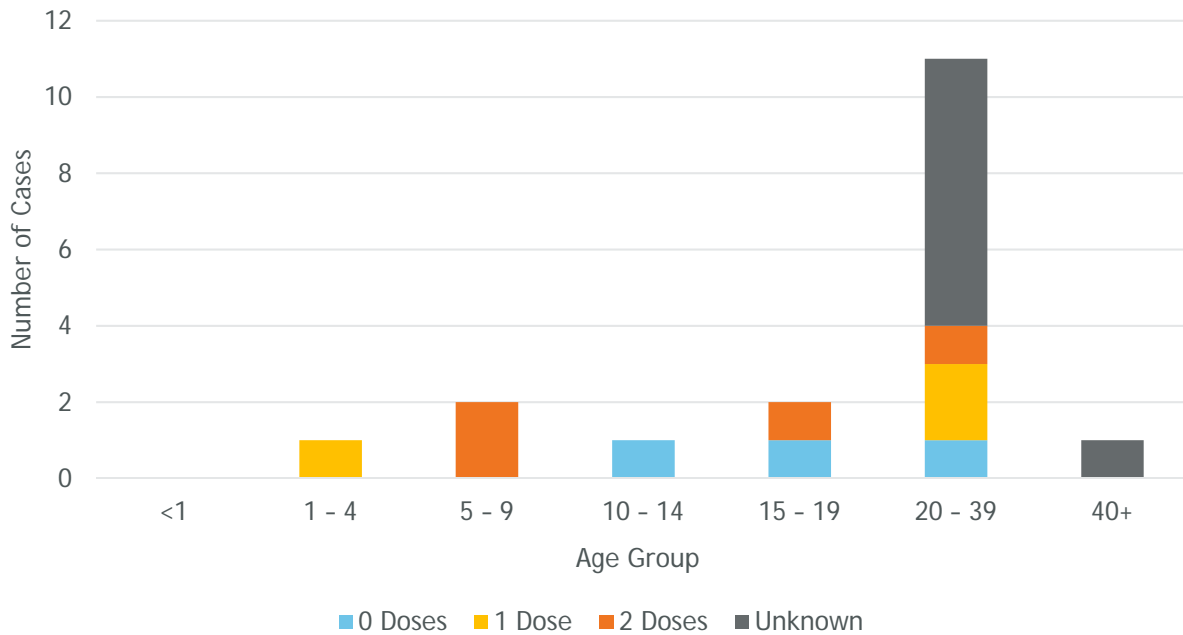
In 2016, 6,366 mumps cases were reported in the US, the highest number of cases since 2006. More than two-thirds of cases were outbreak-associated with outbreaks occurring in 32 states and most occurred in universities. Many of these cases had two doses of MMR vaccine. Because of these large outbreaks and outbreaks during 2015, researchers began to investigate the impact of a 3rd dose of MMR for outbreak control when cases occur in well-vaccinated populations.

Figure 8: Reported Mumps Cases and Incidence Rates, Colorado and United States, 2007 - 2016



⁹ CDC. Prevention of Measles, Rubella, Congenital Rubella Syndrome and Mumps, 2013: Summary Recommendations of the Advisory Committee on Immunization Practices (ACIP). 2013 Jun 14; 62 (RR04); 1-34.

Figure 9: Reported Cases of Mumps by Age Group and MMR Vaccination Status, Colorado, 2016



Pertussis (Whooping cough)

Pertussis, or “whooping cough”, is a respiratory disease caused by the bacterium *Bordetella pertussis* that is easily spread from person to person. The illness is typically characterized by a prolonged, paroxysmal cough (coughing fits) followed by a “whooping” sound.

Pertussis rarely causes severe complications in healthy, vaccinated people. However, infants are at greatest risk for pertussis-related complications and death. Pneumonia is the most common complication in all age groups; seizures and encephalopathy (brain swelling) are rare and generally occur only among very young infants. Death is infrequent and most likely to occur in unvaccinated infants, although deaths occasionally occur in older children and adults with serious underlying health conditions.

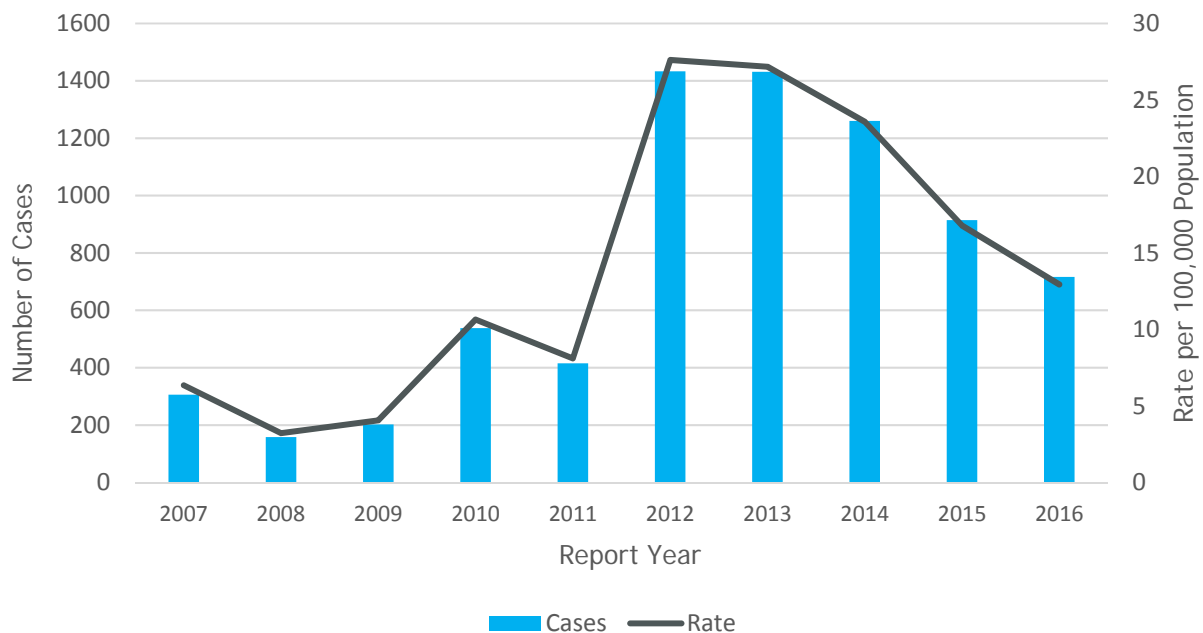
Laboratory surveillance to monitor changes in *B. pertussis* is important. Isolates of *B. pertussis* collected through enhanced surveillance are vital to understanding the evolution of *B. pertussis* and how those changes may impact the current pertussis vaccination program and other prevention strategies.

Starting in 2012, Colorado and the United States experienced epidemic levels of pertussis. While cases have decreased since 2012, levels remain high compared to the annual average number of cases in the 1980s and 1990s. Multiple factors have likely contributed to the increase including waning immunity from acellular pertussis vaccines; heightened provider and public awareness; improved testing; and possibly molecular changes within the pertussis bacterium. The incidence of pertussis remains highest among young infants.

Pertussis cases are classified as confirmed or probable. Confirmed cases have symptoms consistent with pertussis and test positive by PCR, culture or linked to someone who tested positive. Cases classified as probable have symptoms consistent with pertussis and either absent laboratory results or non-contributory laboratory results, such as serology.

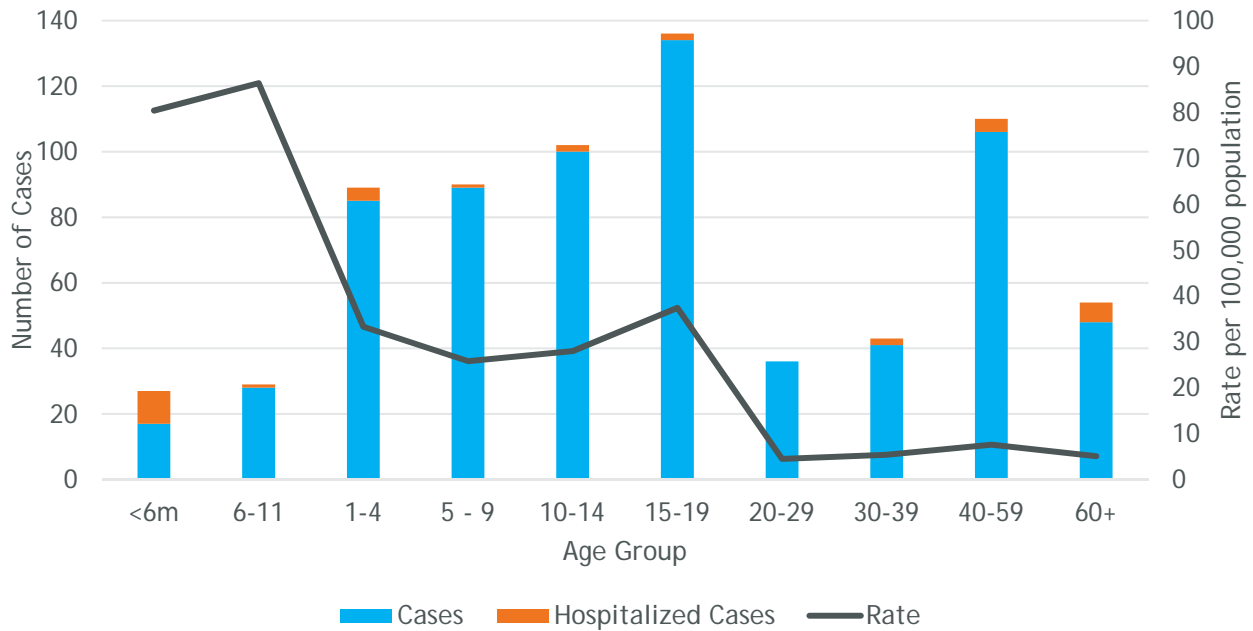
CDC’s Advisory Committee on Immunization Practice recommends routine vaccination with pertussis-containing vaccine, DTaP (diphtheria, tetanus, and acellular pertussis vaccination) at 2, 4, 6, and 15 through 18 months and 4 through 6 years, followed by a dose of Tdap at 11-12 years of age. Adults are recommended a Td booster every ten years. Pregnant women are recommended a single dose of Tdap during every pregnancy. For adults who have never received Tdap, a dose of Tdap can replace one of the 10-year Td booster doses.¹⁰

Figure 10: Reported Pertussis Cases and Incidence Rate, Colorado, 2007 - 2016



¹⁰ CDC. Prevention of Pertussis, Tetanus, and Diphtheria with Vaccines in the United States: Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2018 Apr 27; 67(2);1-44

Figure 11: Reported Pertussis Cases and Incidence Rate by Age Groups, Colorado, 2016



Note: Of the 716 cases reported in 2016, 470 were classified as confirmed and 246 were probable. The average number of days hospitalized in 2016 was 5.6 days with the median being 2 days.

Figure 12: Reported Pertussis Cases by Age Group and Number of Pertussis-Containing Vaccine Doses, Colorado, 2016

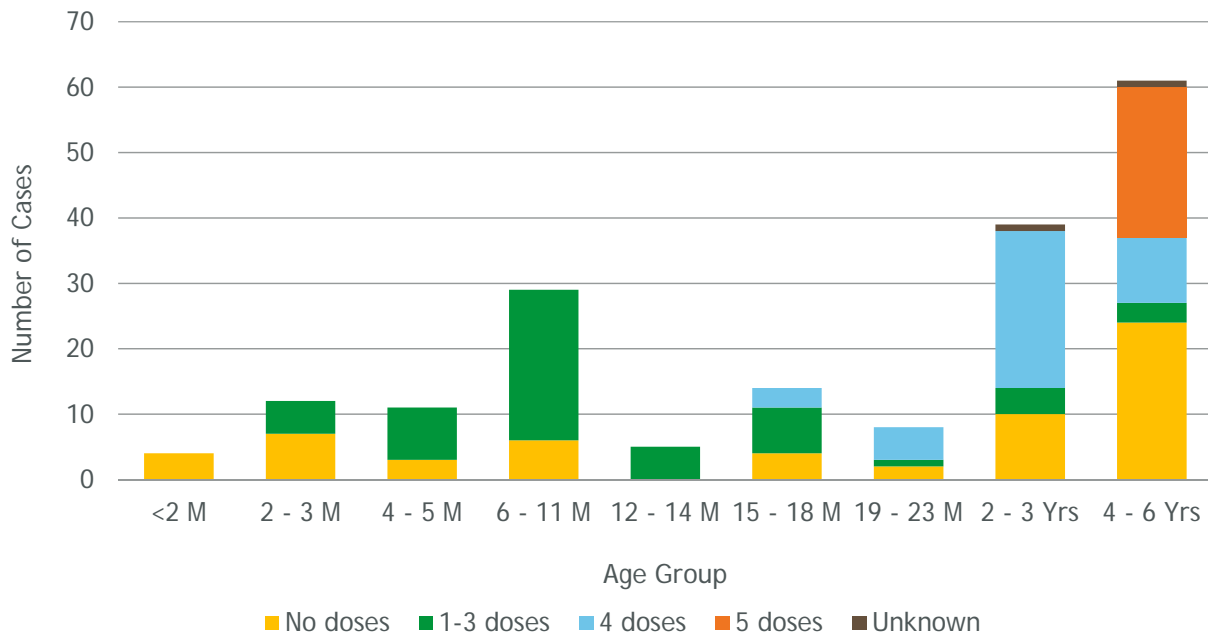
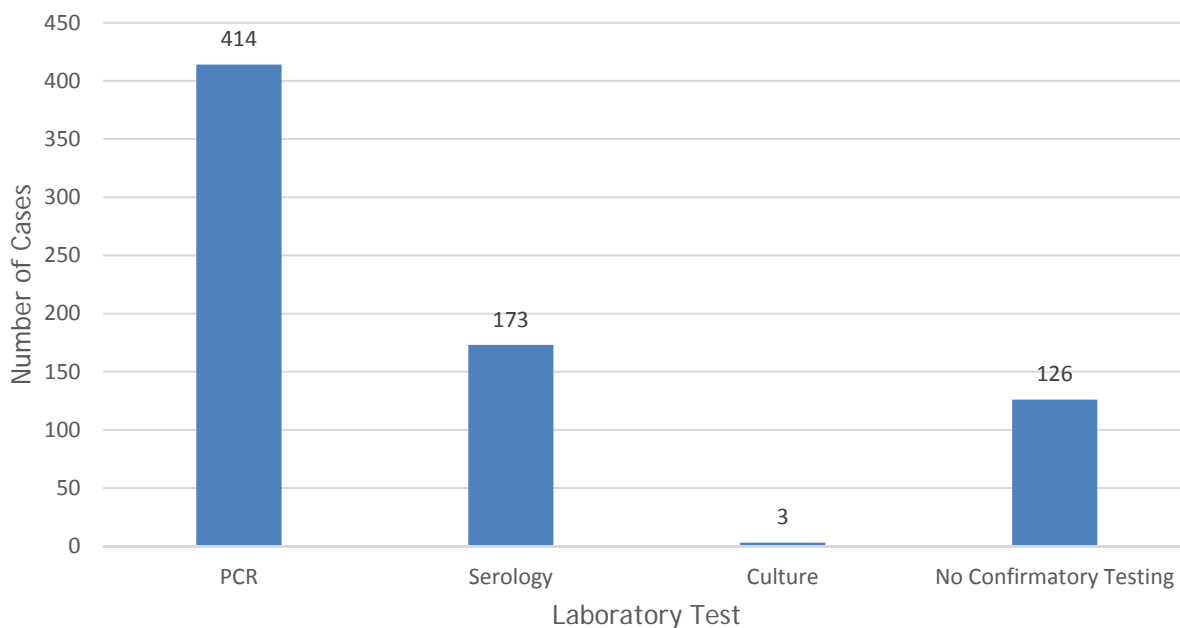


Figure 13: Reported Pertussis Cases by Laboratory Test, Colorado, 2016



Pneumococcal Disease, Invasive

Invasive pneumococcal disease (IPD) is an infection in the blood, spinal fluid, or other sterile body site with the bacteria, *Streptococcus pneumoniae*, or pneumococcus. Pneumococcus is the most common cause of bloodstream infections, pneumonia, meningitis, and middle ear infections in young children. Adults older than 65 years are also at increased risk, especially if they have certain chronic illnesses such as asthma, heart disease, or cancer. Two types of vaccines are available (PCV13 or Prevnar and PPSV23 or Pneumovax23) to prevent against the most common strains of pneumococcal disease.

Following the introduction of the pneumococcal conjugate vaccines in children in the United States (PCV7 in 2000 and PCV13 in 2010), dramatic declines in invasive pneumococcal disease among those less than 5 years old were reported nationwide. All children 2 through 59 months of age should be routinely vaccinated with PCV13 following the CDC's Advisory Committee on Immunization Practice guidelines. The primary series beginning in infancy consists of three doses routinely given at 2, 4, and 6 months of age. A fourth (booster) dose is recommended at 12-15 months of age.¹¹

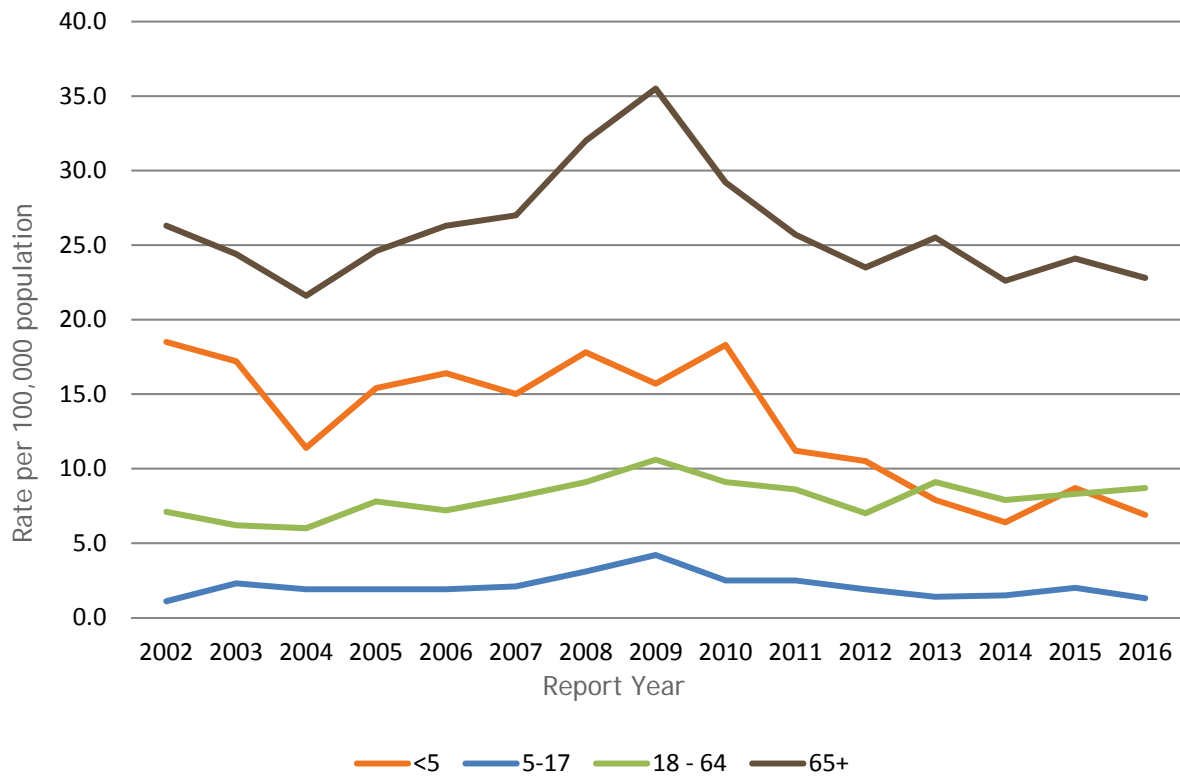
PCV13 was introduced in 2012 for use among adults 19 years or older with immunocompromising conditions and in 2014 for all adults 65 years or older. However, declines in invasive pneumococcal disease were seen as early as

¹¹ CDC. Epidemiology and Prevention of Vaccine-Preventable Disease. Hamborsky J, Kroger A, Wolfe S, eds. 13th ed. Washington D.C. Public Health Foundation, 2015.

2001 among adults because of the use of pneumococcal conjugate vaccines in children (herd protection). Adults 65 years old or older who have not previously received pneumococcal vaccine or whose previous vaccination history is unknown should receive a dose of PCV13. A dose of PPSV23 should be given 6-12 months after the dose of PCV13.¹²

The overall IPD incidence declined from 95 cases per 100,000 in 1998 to 9 cases per 100,000 in 2016; IPD caused by PCV13 serotypes declined from 88 cases per 100,000 in 1998 to 2 cases per 100,000 in 2016. Similar trends have been seen in Colorado among those less than 5, as shown in Figure 14.¹³

Figure 14: Reported Rates of Invasive Pneumococcal Disease by Age Group, Colorado, 2002 - 2016



¹² CDC. Epidemiology and Prevention of Vaccine-Preventable Disease. Hamboraksy J, Kroger A, Wolfe S, eds. 13th ed. Washington D.C. Public Health Foundation, 2015.

¹³ CDC. Pneumococcal Disease <https://www.cdc.gov/pneumococcal/surveillance.html>

Figure 15: Reported Cases, Rates, and Case Fatality of Invasive Pneumococcal Disease by Age Group, Colorado, 2016

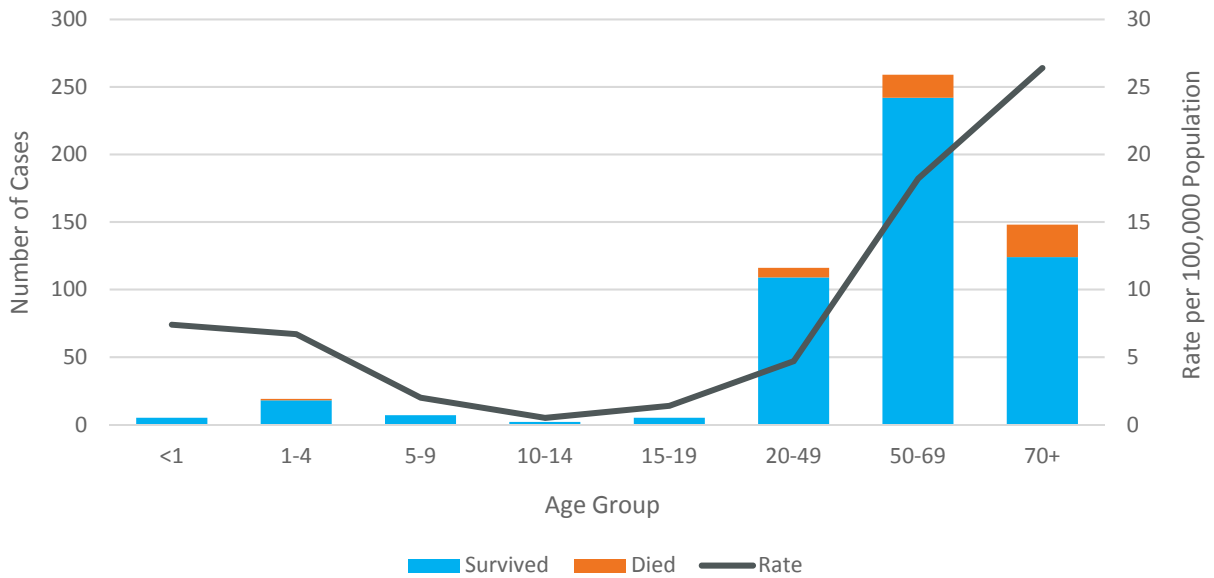
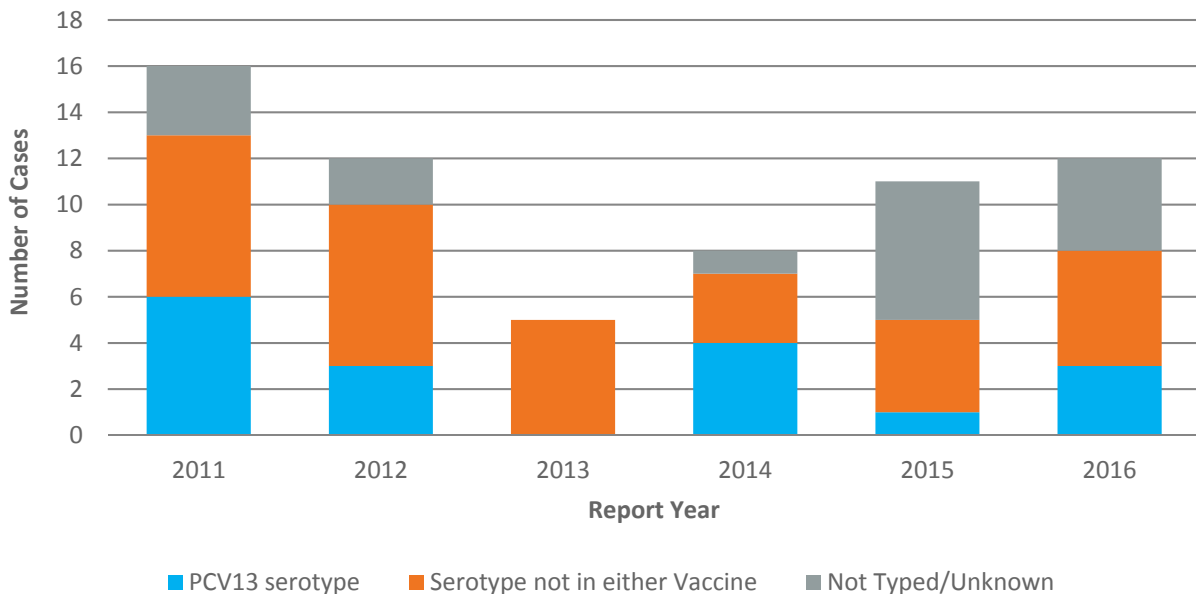


Figure 16: Reported Cases of Invasive Pneumococcal Disease Less than 5 Years of Age by Vaccine Serotype, Denver Metropolitan Area, 2011-2016



Note: Isolates from residents in the Denver Metro Area (Adams, Arapahoe, Denver, Douglas, and Jefferson County) with invasive pneumococcal disease are serotyped at CDC as part of the Emerging Infections Program (EIP). Serotypes included in PCV13 are 1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F, 23F.

Polio

No polio cases were reported in Colorado during 2016. In the United States, the last polio case caused by wild poliovirus was identified in 1979. In 1994, the World Health Organization certified the Western Hemisphere as free of wild poliovirus.

CDC's Advisory Committee on Immunization Practice recommends routine immunization with inactivated poliovirus vaccine (IPV) at ages 2, 4, 6 through 18 months, and 4 through 6 years.¹⁴

Rubella

No rubella cases were reported in Colorado during 2016. The last reported case of rubella in Colorado was in 2003.

CDC's Advisory Committee on Immunization Practice recommends routine vaccination with the measles, mumps, and rubella (MMR) vaccine at age 12 through 15 months and a second dose at age 4 through 6 years. Adults with no evidence of immunity should get at least one dose of MMR vaccine. People who attend college, travel internationally, or who work in healthcare settings should have two doses of MMR vaccine.¹⁵

Tetanus

During 2006-2016, there were three cases of tetanus reported in Colorado (one in 2012 and two in 2015). The 2012 case was an adult who received 5 doses of DTaP as a child and a Tdap in 2008. One of the 2015 cases had not received a tetanus vaccine in over 25 years and the vaccination status of the second 2015 case is unknown. All three cases recovered from the illness.

CDC's Advisory Committee on Immunization Practice recommends routine vaccination with tetanus toxoid-containing vaccine, DTaP (diphtheria, tetanus, and acellular pertussis vaccination) at 2, 4, 6, and 15 through 18 months and 4 through 6 years, followed by a dose of Tdap at 11-12 years of age. Pregnant women are recommended a single dose of Tdap during every pregnancy. Adults should receive a single dose of Td vaccine every 10 years. A dose of Tdap can replace one of the 10-year Td booster doses. Adults who have never received Tdap also are recommended to receive a booster dose of Tdap.¹⁶

¹⁴ CDC. Updated Recommendations of the Advisory Committee on Immunization Practices (ACIP) Regarding Routine Poliovirus Vaccination. 2009 Aug 7; 58 (30); 829-830.

¹⁵ CDC. Prevention of Measles, Rubella, Congenital Rubella Syndrome and Mumps, 2013: Summary Recommendations of the Advisory Committee on Immunization Practices (ACIP). 2013 Jun 14; 62 (RR04); 1-34.

¹⁶ CDC. Prevention of Pertussis, Tetanus, and Diphtheria with Vaccines in the United States: Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2018 Apr 27; 67(2);1-44

Varicella (chickenpox)

Chickenpox is caused by the varicella zoster virus (VZV), a virus belonging to the herpes virus group. Initial infection with VZV causes varicella (chickenpox). Like other herpes viruses, VZV has the ability to persist in the body as a latent infection. Shingles, also known as herpes zoster, results from the reactivation of the latent VZV infection. In Colorado, only cases of chickenpox are reported to CDPHE. Shingles is not reportable in Colorado.

Varicella (chickenpox) causes a blister-like rash, itching, tiredness, and fever. The rash appears first on the stomach, back and face and can spread over the entire body causing between 250 and 500 itchy blisters.

Chickenpox can be serious, especially in babies, adults, and people with weakened immune systems.

In 2005 and 2006, the Advisory Committee on Immunization Practices (ACIP) adopted new recommendations for the use of live, attenuated varicella vaccines for the prevention of varicella.¹⁷ In 2007, Colorado began requiring varicella vaccination for school. The varicella vaccination requirement was implemented in Colorado with a stepwise process beginning in 2007. Two doses of varicella vaccination was required in all incoming kindergarteners in 2007 and one dose in first to seventh grade. Then the following year, two doses were required in kindergarteners to first grade and one dose in second to eighth grade. This process would lead to eventually all grades being required to receive two doses of varicella vaccination by 2019. In 2016, two doses of varicella vaccination was required from kindergarteners to ninth grade.¹⁸

CDC's Advisory Committee on Immunization Practice recommends varicella vaccine for all children without contraindications at 12 through 15 months of age. The vaccine may be given to all children at this age regardless of prior history of varicella. A second dose should be administered at 4 through 6 years of age. A second dose of varicella vaccine is also recommended for persons older than 6 years of age who have received only one dose.¹⁹

¹⁷ CDC. Prevention of varicella: recommendations of the Advisory Committee on Immunization Practices [ACIP]. *MMWR* 2007 Jun 22;56(RR-4):1-40.

¹⁸ Colorado Board of Health (2007), 6 CCR 1009-2: 2006-01238 Rules of the Colorado Board of Health Pertaining to the Infant Immunization Program and the Immunization Of Students Attending School <https://www.sos.state.co.us/CCR/eDocketDetails.do?trackingNum=2006-01238>

¹⁹ CDC. *Epidemiology and Prevention of Vaccine-Preventable Disease*. Hamboroksy J, Kroger A, Wolfe S, eds. 13th ed. Washington D.C. Public Health Foundation, 2015.

Figure 17: Reported Varicella (Chickenpox) Cases and Incidence Rates, Colorado, 2007-2016

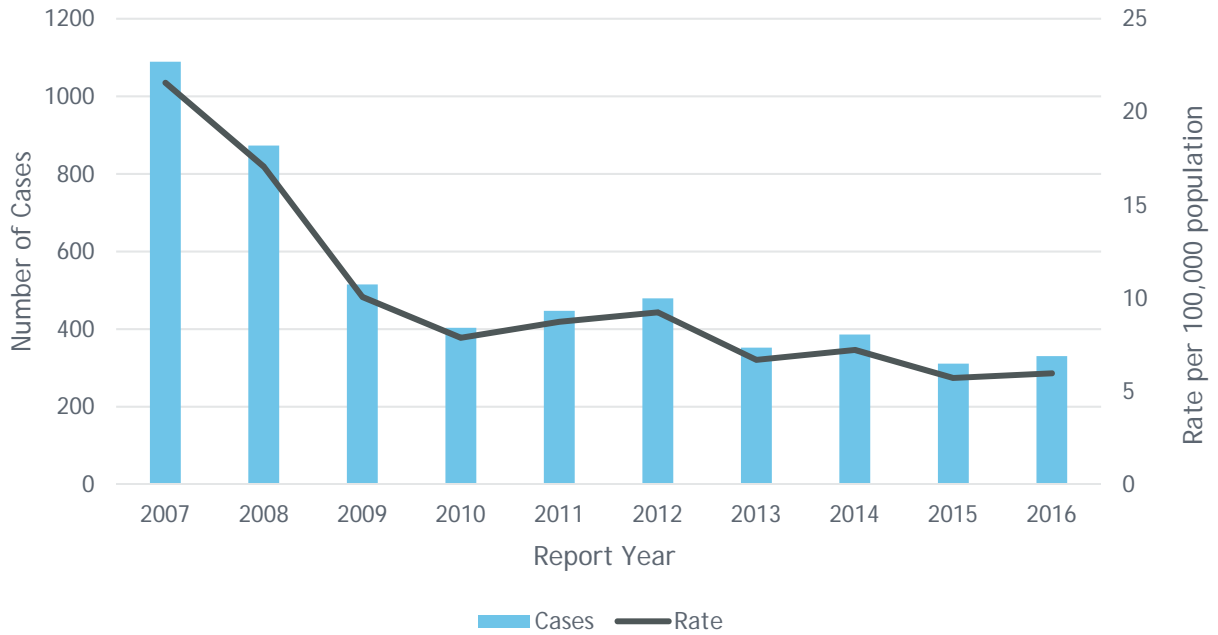


Figure 18: Reported Varicella (Chickenpox) Cases and Incidence Rate by Age and Hospitalization, Colorado, 2016

