Published monthly by the
VIRGINIA DEPARTMENT OF HEALTH
Office of Epidemiology
P.O. Box 2448
Richmond, Virginia 23218
http://www.vdh.virginia.gov
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VIRGINIA
EPIDEMIOLOGY BULLETIN

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Volume 107, No.7

Summary of Notifiable Diseases, Virginia, 2006 – Part II

Toxic Substance-Related Illnesses, Vaccine-Preventable Infections, and Zoonotic Diseases

Introduction

Each year the Virginia Department of Health (VDH) publishes a comprehensive report entitled *Reportable Disease Surveillance in Virginia* (available at www.vdh.virginia.gov/Epidemiology/Surveillance/SurveillanceData/index.htm). Issue 6 of the 2007 *Virginia Epidemiology Bulletin* (VEB) previewed key findings from a preliminary analysis of disease surveillance data related to enteric, respiratory, and sexually transmitted infections (including HIV/AIDS) in Virginia for 2006. This issue (Issue 7) of the VEB provides a preview of key findings from a preliminary analysis of disease surveillance data in Virginia for 2006 for reportable toxic substance-related illnesses, vaccine-preventable infections, and zoonotic diseases.

Data Sources

As outlined in Issue 6, reports of known or suspected notifiable conditions, including outbreaks, are primarily made by physicians, laboratories, infection control practitioners, and administrators of long-term care facilities, childcare centers, camps, and schools. Reports are received by local health departments for appropriate action (e.g., further investigation, interventions, etc.), and forwarded to the Office of Epidemiology for centralized data analysis. This includes assessing the available laboratory test results and/or clinical diagnostic criteria to determine if they meet case classifications developed by the Centers for Disease Control and Prevention (CDC).

Data are presented as numbers of cases for the reporting year. Where comparisons are of interest, incidence rates are calculated. Denominators for incidence rates used 2005 U.S. Census data (www.census.gov/popest/counties/asrh/CC-EST2005-alldata.html). Table 1 shows reported cases for selected conditions in Virginia by Health Planning Region in 2006. For a table of reported cases of selected conditions in Virginia over time (1997-2006) please see Issue 6 of the VEB. As in Issue 6, graphs of the number of cases over time show the five-year average (mean) for 2001-2005 as a dashed line. This provides a 'baseline' for comparison with the number of cases seen in 2006.

2006 HIGHLIGHTS FOR SELECTED DISEASES

Toxic Substance-Related Illnesses

__Lead, Childhood Elevated Blood Levels__

There were 515 newly reported cases of childhood (less than 16 years of age)

Table 1. Number of Reported Cases of Selected Diseases and Rate per 100,000 Population by Health Planning Region, Virginia, 2006

	Total	Northwest Region		Northern Region		Southwest Region		Central Region		Eastern Region	
Population	**7,567,465**	**1,153,146**		**2,03,872**		**1,314,119**		**1,286,635**		**1,789,693**	
		No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
AIDS	589	44	3.8	247	12.2	27	2.1	134	10.4	137	7.7
Amebiasis	45	7	0.6	18	0.9	14	1.1	2	0.2	4	0.2
Arboviral infection (EEE, LAC, SLE, WNV)	5	0	0.0	5	0.2	0	0.0	0	0.0	0	0.0
Campylobacteriosis	669	118	10.2	191	9.4	133	10.1	88	6.8	139	7.8
Chickenpox (Varicella)	1,959	357	31.0	590	29.2	449	34.2	219	17.0	344	19.2
Chlamydia trachomatis infection	24,081	2,777	240.8	3,226	159.4	2,876	218.9	5,419	421.2	9,783	546.6
Cryptosporidiosis	71	20	1.7	11	0.5	25	1.9	4	0.3	11	0.6
Escherichia coli infection, shiga toxin-producing	168	50	4.3	52	2.6	25	1.9	12	0.9	29	1.6
Giardiasis	514	114	9.9	189	9.3	57	4.3	72	5.6	82	4.6
Gonorrhea	6,474	422	36.6	444	21.9	975	74.2	1,926	149.7	2,707	151.3
Haemophilius influenzae infection, invasive	69	11	1.0	9	0.4	20	1.5	18	1.4	11	0.6
Hepatitis A	64	12	1.0	38	1.9	3	0.2	6	0.5	5	0.3
Hepatitis B, acute	78	3	0.3	12	0.6	17	1.3	19	1.5	27	1.5
Hepatitis C, acute	9	1	0.1	1	0.0	2	0.2	4	0.3	1	0.1
HIV infection	914	54	4.7	273	13.5	61	4.6	249	19.4	277	15.5
Influenza	16,107	1,668	144.6	3,797	187.6	3,679	280.0	3,911	304.0	3,052	170.5
Kawasaki syndrome	6	2	0.2	1	0.0	3	0.2	0	0.0	0	0.0
Lead, elevated blood levels in children 0-15 yrs	515	66	27.7	80	17.3	105	43.3	166	61.7	98	24.3
Legionellosis	68	13	1.1	11	0.5	18	1.4	10	0.8	16	0.9
Listeriosis	20	2	0.2	6	0.3	5	0.4	3	0.2	4	0.2
Lyme disease	357	49	4.2	255	12.6	17	1.3	7	0.5	29	1.6
Malaria	55	4	0.3	34	1.7	6	0.5	5	0.4	6	0.3
Meningococcal infection	22	4	0.3	7	0.3	3	0.2	3	0.2	5	0.3
Mumps	117	56	4.9	23	1.1	8	0.6	20	1.6	10	0.6
Pertussis	221	41	3.6	91	4.5	24	1.8	19	1.5	46	2.6
Rocky Mountain spotted fever	114	11	1.0	18	0.9	28	2.1	28	2.2	29	1.6
Salmonellosis	1,089	185	16.0	312	15.4	155	11.8	218	16.9	219	12.2
Shigellosis	120	13	1.1	62	3.1	20	1.5	14	1.1	11	0.6
Streptococcal disease, Group A, invasive	132	31	2.7	27	1.3	26	2.0	17	1.3	31	1.7
Streptococcus pneumoniae, invasive (0-4 yrs)	50	8	11.1	14	8.8	6	8.4	8	9.7	14	11.0
Syphilis, early	351	18	1.6	94	4.6	21	1.6	60	4.7	158	8.8
Tuberculosis	332	28	2.4	198	9.8	10	0.8	40	3.1	56	3.1
Typhoid fever	20	1	0.1	14	0.7	0	0.0	5	0.4		0.0
Vibrio spp.infection	32	1	0.1	7	0.3	2	0.2	2	0.2	20	1.1

Figure 1. Lead, Elevated Blood Levels in Children: Ten-Year Trend, Virginia, 1997-2006

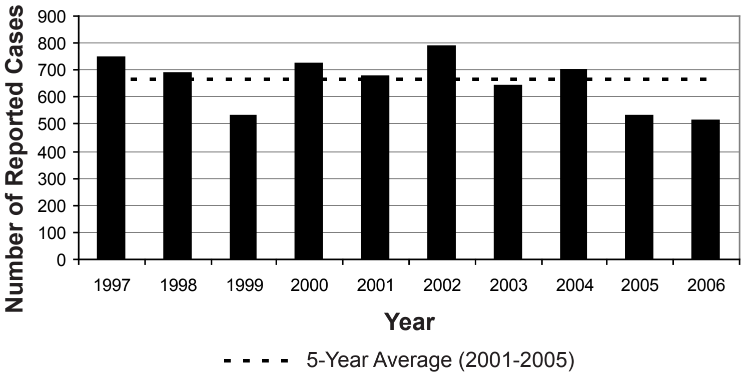


Figure 2. Lead, Elevated Blood Levels in Children: Reported Cases by Age, Virginia, 2006

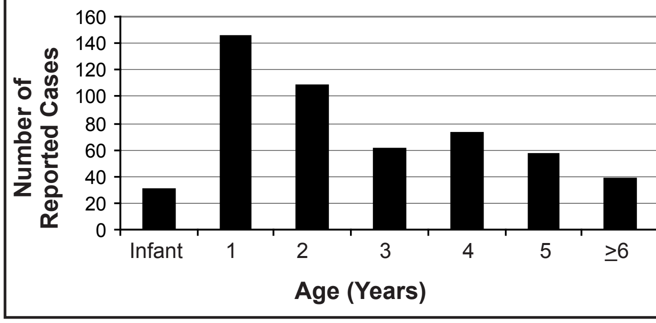
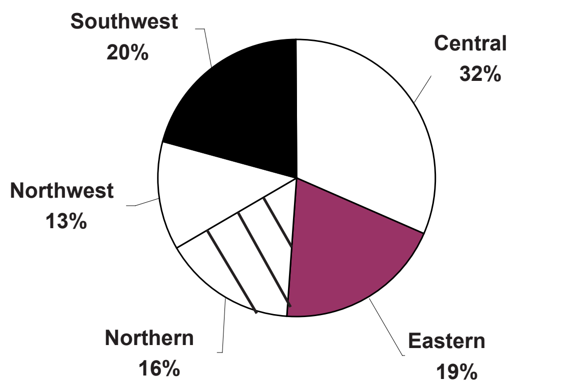


Figure 3. Lead, Elevated Blood Levels in Children, Proportion by Health Planning Region, Virginia, 2006



elevated blood lead levels in Virginia in 2006. This is a slight (3%) decrease from the 529 cases reported in 2005, but is 23% lower than the five-year average of 669 cases per year. Overall, the ten-year trend of childhood elevated blood lead cases has been relatively stable (Figure 1); the observed decrease in cases for 2005 and 2006 is partially attributable to better reporting of follow-up test results by healthcare professionals.

In 2006, the mean blood lead level of reported cases was 14.8 µg/dL, with 68% of all cases in the 10-14 µg/dL range. Fifty-five percent of reported cases were male. The mean age of reported cases in 2006 was three years of age; however, the largest number of cases occurred in children one year of age (Figure 2). For reports where race was recorded, blacks accounted for 59% of cases.

In 2006, the Central Health Planning Region, particularly the City of Richmond, reported the highest number of new cases (32%) (Figure 3), representing an incidence of 62/100,000. The next highest rate was in the Southwest Health Planning Region, with 20% of new cases and an incidence of 43/100,000. The relatively large incidence of elevated blood lead levels detected in children in the Central Health Planning Region was due to a combination of active screening of children and the high prevalence of older housing where lead paint is present. However, while lead paint is still the most common source of lead exposure in children, other sources can include some ethnic candies, traditional Hispanic, Indian, and Middle Eastern folk remedies, and ceramics purchased or brought from foreign countries.

The continued role of healthcare professionals and parents is acknowledged for improving the identification of children at risk for lead exposure. In addition, continued monitoring of children, and detailed and accurate reporting are essential to develop interventions to protect children.

Toxic Substance-Related Illnesses (Adult)

In 2006, there were 414 reported cases of adult toxic substance-related illnesses. This is a significant increase from the 321 cases reported in 2005, largely due to the exposure of 108 individuals to carbon monoxide gas during their stay in a college dormitory in Salem, VA while on a church retreat. If the carbon monoxide exposures are removed from the total, the number of reported cases in 2006 drops to 306, which is comparable to the number of reported cases in 2005.

Exposure to lead was the leading cause of adult toxic substance-related illness in 2006, and accounted for 139 (34%) of the reported cases. Pneumoconiosis among coal workers has continued to remain high in recent years (117 in 2006, compared with four in 2003, 115 in 2004, and 109 in 2005). This is due to increased and more accurate reporting from worker's compensation claims and death certificates. The next most common reported toxic substance exposure was to carbon monoxide gas (108, as noted above). Asbestosis decreased in 2006 by 23% (from 43 cases in 2005 to 33 in 2006) as a result of increased awareness of the harmful effects of asbestos combined with very restrictive legislation governing its removal or abatement. Other toxic exposures reported in 2006 included: mesothelioma (seven cases), mercury exposure (four cases), non-specific pneumoconiosis (two cases), cadmium exposure (two cases), and methemoglobinemia (one case). A first in Virginia was the report of a fatality due to farmer's lung, caused by the inhalation of large amounts of mold spores during farming practices involving hay.

The average age of adults affected by toxic substances, where age was reported, during 2006 was 51 years. The most frequent industry reported was coal mining (27%), followed by automotive battery manufacturing (12%). Improving public and healthcare professional recognition and reporting of exposures due to heavy metals, pesticides, and industrial types of dusts and gases remain important for reducing illness from these toxins.

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

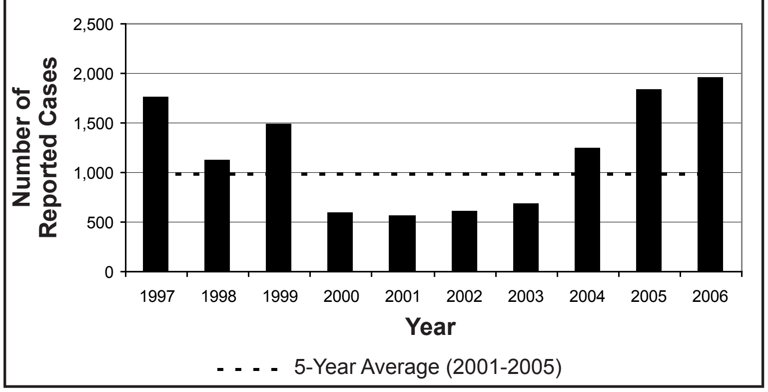


Figure 5. Chickenpox: Rate by Age Group, Virginia, 2006

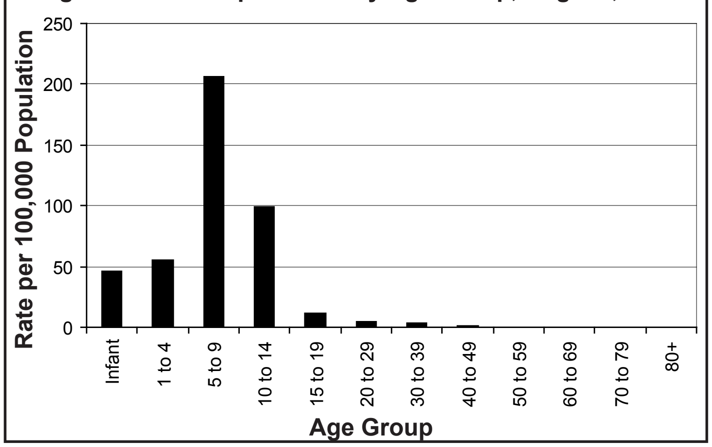


Figure 6. Chickenpox: Month of Event, Virginia, 2006

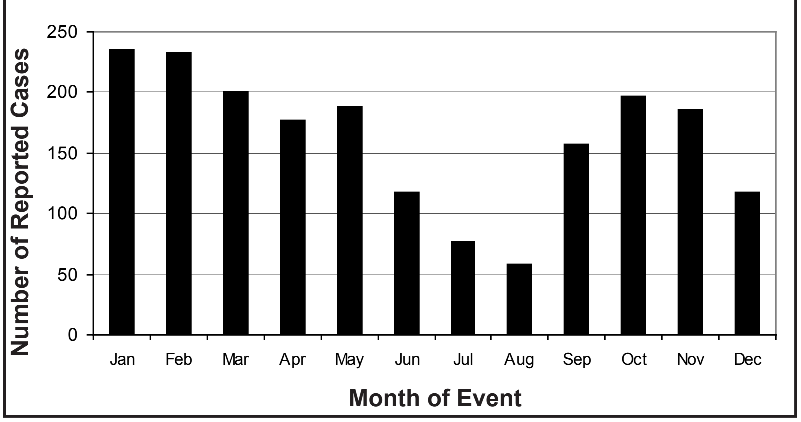
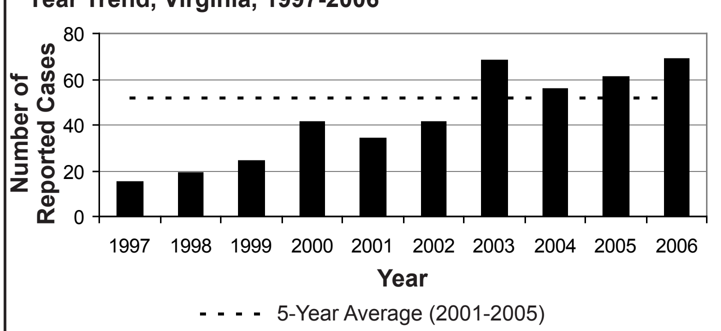


Figure 7. *Haemophilus influenzae* Infection, Invasive: Ten-Year Trend, Virginia, 1997-2006



Vaccine-Preventable Infections

Chickenpox (Varicella)

Varicella vaccine has been available in the U.S. since 1995 and vaccination is required in Virginia for school entry for all children born on or after January 1, 1997. Studies suggest that a steady decline in reported varicella cases has resulted from the increased use of varicella vaccine.[1] However, the 1,959 cases of chickenpox reported in Virginia in 2006 (a 7% increase from 2005) continued the trend of increasing incidence and represented a 99% increase over the five-year average of 985 cases/year (Figure 4). This increase is attributed primarily to better morbidity reporting from healthcare professionals and schools.

One percent of the cases (n=20) were noted to require hospitalization. Among reported cases, whites had the highest rates (23/100,000), followed by Asians (19/100,000), and blacks (10/100,000). The highest risk was in children 5-9 years of age (206/100,000) compared with other age groups (e.g., 54/100,000 for children less than five years of age; 99/100,000 for children 10-14 years of age) (Figure 5).

In 2006, the pattern of cases by month appeared to parallel that of schools being open, with cases decreasing during the summer months and then rising rapidly in September (Figure 6). This pattern is suggestive of the importance of close contact among children in maintaining the chain of infections. However, it may also be related to the impact that school nurses have on the detection and reporting of cases.

Sixty-four outbreaks (all but three among school-aged children) with an average size of 10 cases per outbreak were investigated by local health departments in 2006. Despite high one-dose vaccination coverage and the success of the vaccination program in reducing varicella morbidity and mortality, outbreaks of varicella have continued to occur, especially in elementary schools. This mirrors the nationwide trend and has led to new recommendations for the two-dose varicella vaccination schedule.

Of note, although breakthrough infections have continued to occur in vaccinated individuals, on average the illness in vaccinated individuals is much milder (e.g., fewer skin lesions, low or no fever, and a shorter duration of illness). For example, Virginia data show an average duration of illness of five days in vaccinated individuals compared with eight days when vaccination status is negative or not provided.

Haemophilus influenzae **Infection, Invasive**

Prior to the introduction of an effective vaccine, *Haemophilus influenzae* type b (Hib) was the leading cause of bacterial meningitis and other invasive bacterial diseases among children less than five years of age. With the availability of a highly effective vaccine, Hib has become a rare cause of invasive disease in children in Virginia. In 2006, the annual number of reported cases of invasive infections due to all types of *H. influenzae* increased to 69 cases (compared with 61 cases reported in 2005). This was approximately 33% higher than the five-year average of 48 cases/year (Figure 7), and suggests an increasing trend. The role of replacement strains (i.e., other, non-vaccine covered, strains) may be an important factor in this trend.

In 2006, cases occurred throughout the year, but a substantial proportion were reported during the spring (Figure 8). Only three (4%) of the 69 cases reported in 2006 were less than five years of age, and none of the cases were identified as being type b. Risk was highest in older age groups (50 years of age and older)—this is most likely due to an increased prevalence of predisposing health conditions as well as to waning immunity from past exposures with age (Figure 9).

Of note, isolates from 45 (65%) reported cases were not submitted for serotyping or the serotype was not reported. VDH requests that clinicians assist in public health efforts related to vaccine-preventable diseases by encouraging laboratories to submit invasive *H. influenzae* specimens to the Division of Consolidated Laboratory Services (DCLS) for typing.

Figure 8. *H. influenzae* Infection, Invasive: Month of Event, Virginia, 2006

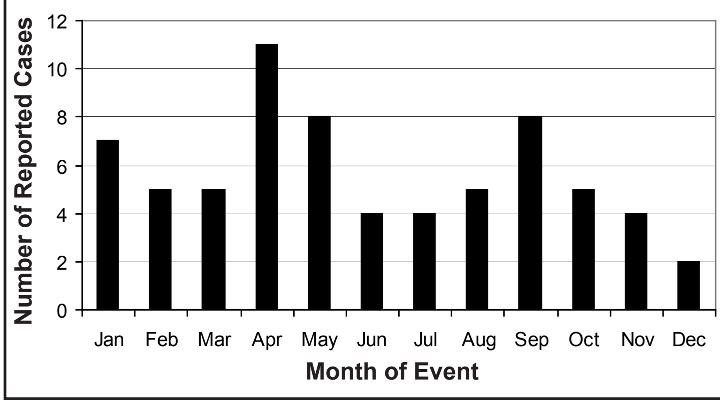
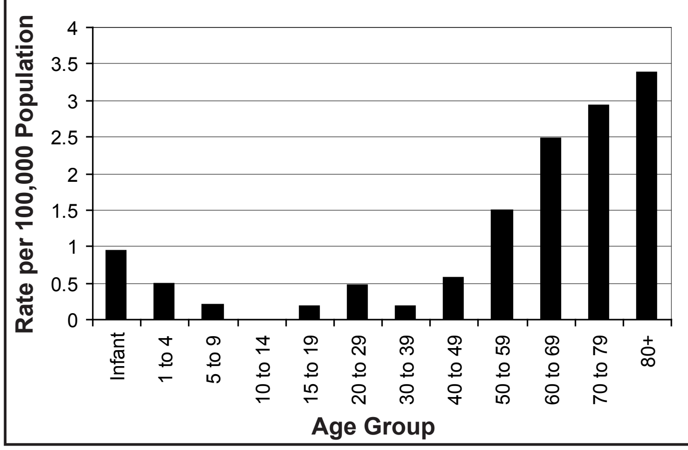


Figure 9. *H. influenzae* Infection, Invasive: Rate by Age Group, Virginia, 2006



Hepatitis A

Data from 2006 showed a continued decline in the annual number of reported cases of hepatitis A in Virginia. The 64 cases reported in 2006 represented a 31% decrease from the number of cases reported in 2005. This was also 55% below the five-year average of 141 cases/year (Figure 10). Seventy-eight percent of cases occurred in the Northern and Northwest Health Planning Regions (incidence: 2/100,000, compared to <1/100,000 for the rest of the state) (Figure 11). For cases where race was recorded, Asian individuals had a substantially higher incidence (3/100,000) compared with all other races (combined

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

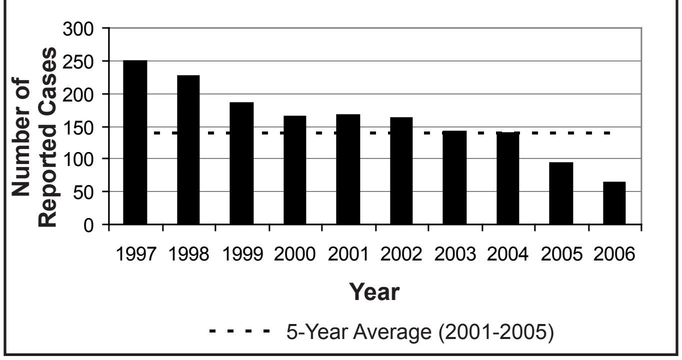
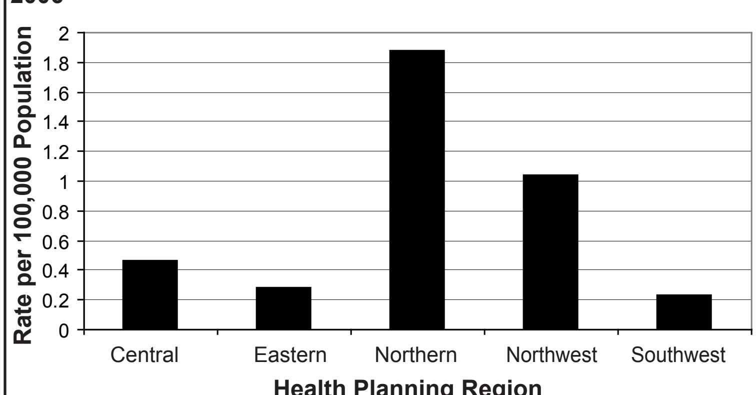


Figure 11. Hepatitis A: Rate by Health Planning Region, Virginia, 2006



incidence: <1/100,000). Twenty-nine percent (17 cases) were reported to have required hospitalization. In 2006, children 5-9 years of age had the highest risk of infection (Figure 12).

Specific causes for the decline in hepatitis A in Virginia are not known but may be a result of the cyclical nature of hepatitis A epidemics in the United States, combined with the impact of immunization.[2] In addition, as a result of the problem of hepatitis A IgM false positive test results, case classification changed in 2005 so that only reported cases with symptoms were counted. Therefore, to ensure accurate classification VDH encourages all clinicians to report signs and symptoms consistent with hepatitis A infection when reporting cases. Finally, it is expected that the 2006 Advisory Committee on Immunization Practices (ACIP) recommendations for routine hepatitis A vaccination of all children will lead to further reductions in the incidence of this illness.[3]

Figure 12. Hepatitis A: Rate by Age Group, Virginia, 2006

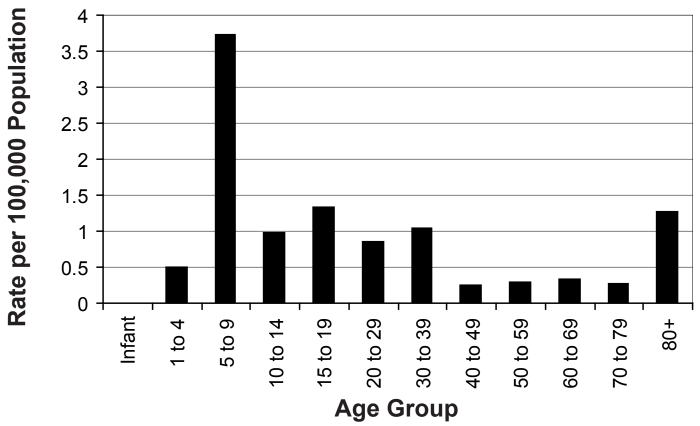


Figure 13. Hepatitis B, Acute: Ten-Year Trend, Virginia, 1997-2006

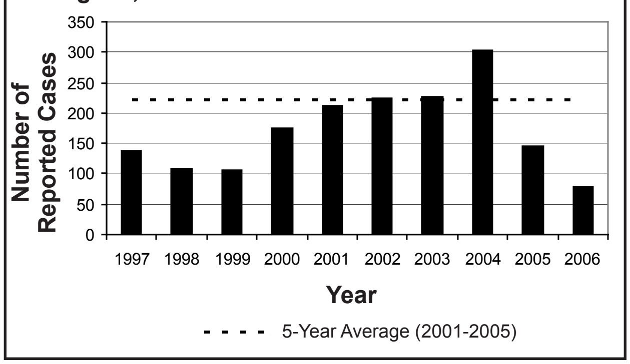


Figure 14. Hepatitis B, Acute: Rate by Age Group, Virginia, 2006

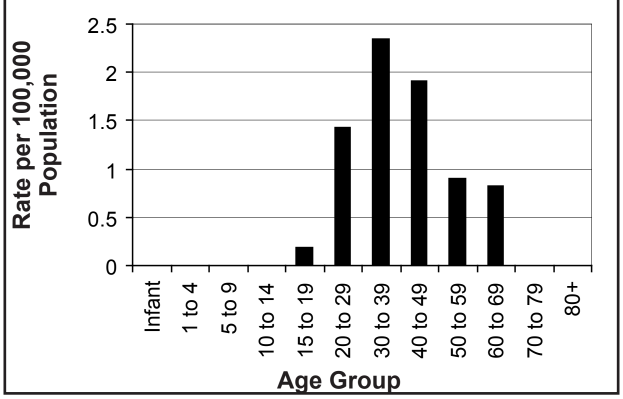
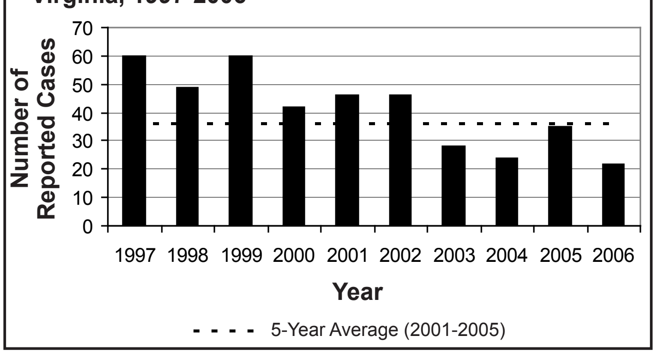


Figure 15. Meningococcal Infection: Ten-Year Trend, Virginia, 1997-2006



Hepatitis B, Acute

In 2006, the 78 reported cases of acute hepatitis B were 52% lower than the number of cases reported in 2005, and were significantly (65%) lower than the five-year average (Figure 13). This represents a reversal in the increasing trend of reported cases since IgM antibody to hepatitis B core antigen (IgM anti-HBc) became a reportable condition by directors of laboratories in 1999. The cause of the decrease is unknown. Of the cases for which data were provided, 46% (32 cases) required hospitalization. In addition, for cases for which race was recorded, blacks had an incidence of 2/100,000, compared to <1/100,000 for other races. Future levels should decrease as the cohort of individuals (especially children) vaccinated against hepatitis B increases; however, this may take years as most cases (99%) of acute hepatitis B in Virginia are reported among individuals 20 years of age and older (Figure 14). This is consistent with the major modes of transmission (e.g., intravenous drug use).

Measles

No cases of measles have been reported in Virginia since 2001, demonstrating the continued effectiveness of the vaccine and the benefit of efforts that have been made to protect children in Virginia.

Meningococcal Infection

Reported cases of meningococcal infection have generally been declining. In 2006, the 22 reported cases represented a decrease of 37% from the 35 cases reported in 2005 (Figure 15). This was substantially lower (by 39%) than the five-year average of 36 cases/year. Two deaths from meningococcal infection were reported in 2006. The risk of infection does not appear to vary substantially by health planning region (incidence: <1/100,000 in each region). Risk was highest in young children, especially infants (Figure 16). Seventy-three percent of cases in 2006 occurred in females. Of the 59% (13 of 22) of isolates for which serogrouping was performed, 54% were vaccine preventable (A, C, or Y).

Persons living in crowded environments, such as campus dormitories, are at least three times more likely to contract the meningococcal bacteria, compared to the general public.[4] The overall decline in cases in Virginia may be partly attributed to the 2001 Virginia law requiring that students enrolling in any four-year Virginia public college or university for the first time must be immunized against meningococcal disease. The recommendation for routine vaccination of adolescents (11-18 years of age) with tetravalent meningococcal polysaccharide-protein conjugate vaccine [MCV4 (Menactra®, Sanofi Pasteur)] may

Figure 16. Meningococcal Infection, Invasive: Rate by Age Group, Virginia, 2006

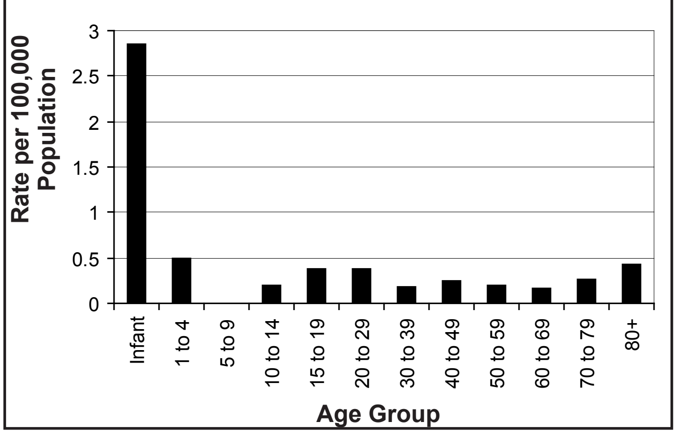


Figure 17. Mumps: Ten-Year Trend, Virginia, 1997-2006

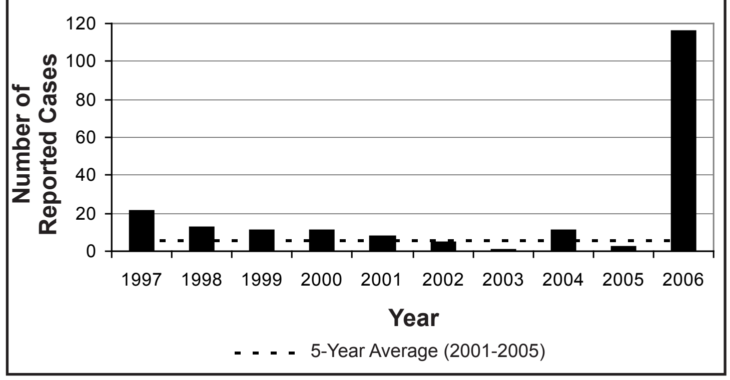


Figure 18. Mumps: Rate by Health Planning Region, Virginia, 2006

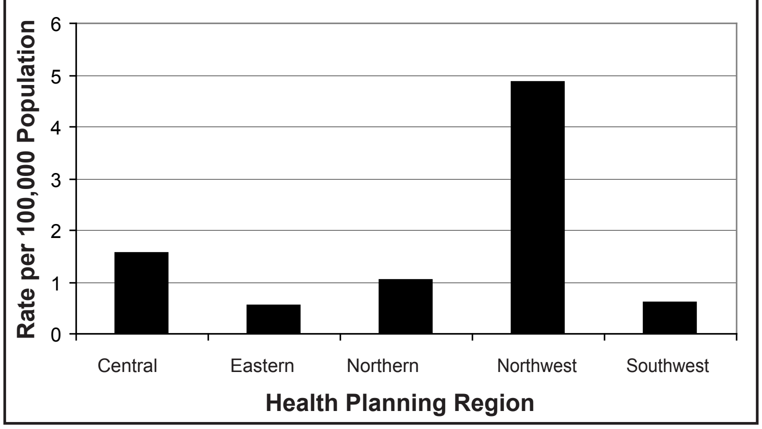


Figure 19. Mumps: Rate by Age Group, Virginia, 2006

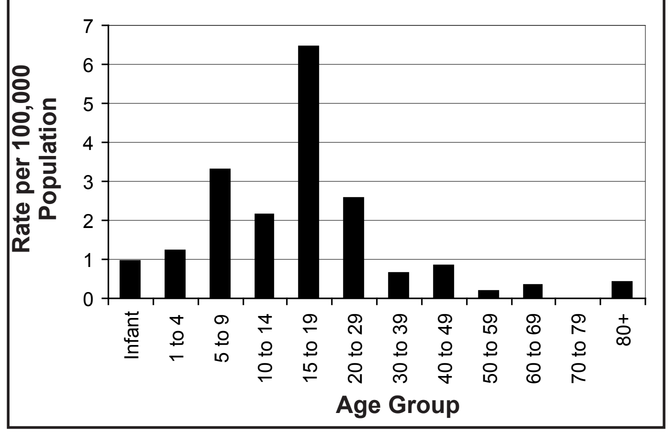


Figure 20. Mumps: Month of Event, Virginia, 2006

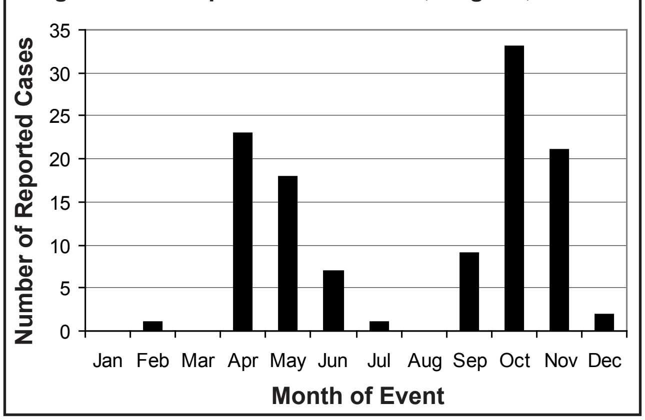
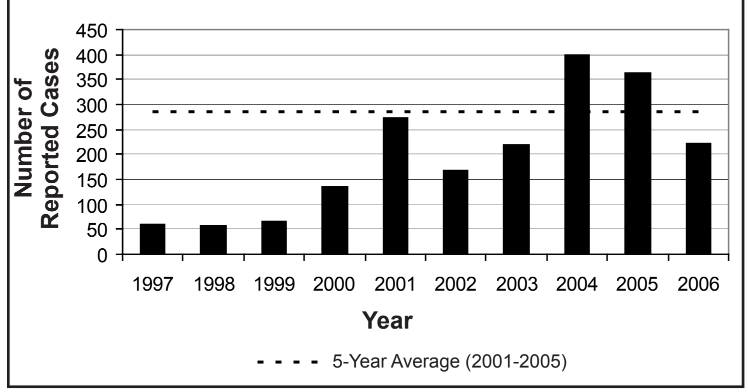


Figure 21. Pertussis: Ten-Year Trend, Virgnia, 1997-2006



help to further reduce the incidence of this serious disease.

Mumps

The 116 reported cases of mumps in 2006 were a dramatic increase (57-fold) compared to 2005 (Figure 17). Although cases were reported in all health planning regions of the state, 49% of cases occurred in the Northwest Health Planning Region (incidence: 5/100,000) (Figure 18). In addition, for cases where race was recorded, while the majority of cases (70 of 90) were white, Asian individuals had an incidence of 3/100,000, compared to <1/100,000 for all other races combined. Of reported cases, 61% were female. A substantial proportion (58/116, or 50%) of cases occurred in individuals 15-24 years of age (Figure 19) consistent with the observed foci of the outbreaks in Virginia (i.e., college campuses); spring and fall were the seasons of highest mumps activity (Figure 20). The ease with which diseases such as mumps can be imported and spread among communities highlights the need for maintaining effective surveillance programs, ongoing evaluation of vaccination strategies, and high immunization rates.

Pertussis

The number of pertussis cases reported has increased in recent years in Virginia despite high levels of vaccination coverage in children. However, in 2006 the 221 reported cases (including two outbreaks) represented a 39%

decrease from the 363 cases reported in 2005 (Figure 21). Risk was strongly age-associated, with the highest risk in infants (32/100,000 compared to 3/100,000 for all other ages combined) (Figure 22); thirty-two cases (15%) occurred in children less than six months of age, who are too young to be adequately immunized. Unlike in 2005, when reported cases peaked in the fall/winter, there did not appear to be a seasonal pattern to pertussis cases in 2006. Of the cases where data were provided, 14% (30 cases) required hospitalization.

Generally, increases in reported pertussis cases typically occur in waves, with peak numbers appearing every 3-4 years. The decrease in cases from the high in 2004 may be the start of a downward trend. However, recent cycles have not dipped to historic lows, indicating an overall increasing trend in the number of cases. Although not known for certain, this trend may be a result of: increased recognition of the disease in adolescents and adults by clinicians; increased susceptibility among adolescents and adults due to waning immunity following vaccination (until recently, no booster vaccine has been available for persons over seven years of age); and increased availability of more sensitive laboratory testing. The recent Food and Drug Administration approval of pertussis booster vaccines for older age groups (e.g., GlaxoSmithKline's Boostrix®, indicated for persons 10-18 years of age; Sanofi Pasteur's Adacel™, indicated for persons 11-64 years of age) may help to further reduce the incidence of this disease in the future.

Figure 22. Pertussis: Rate by Age Group, Virginia, 2006

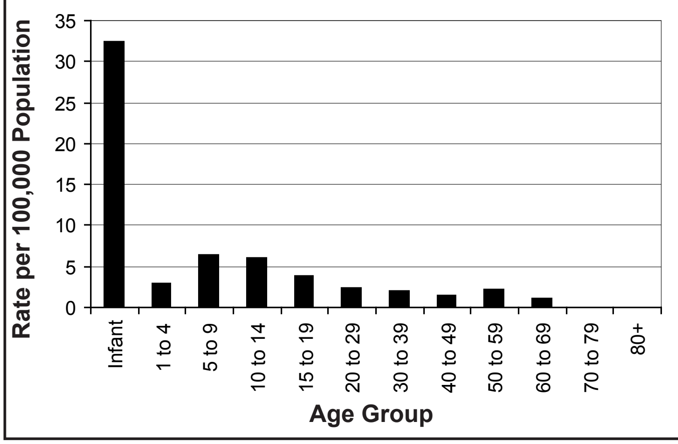
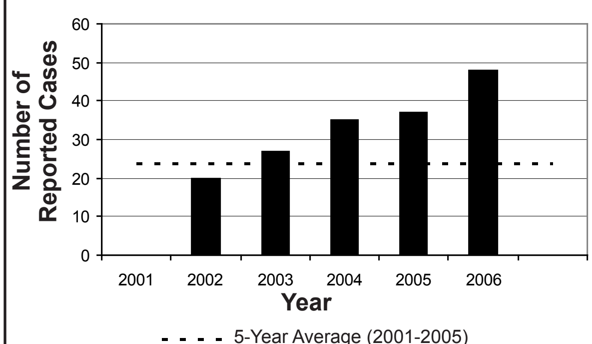


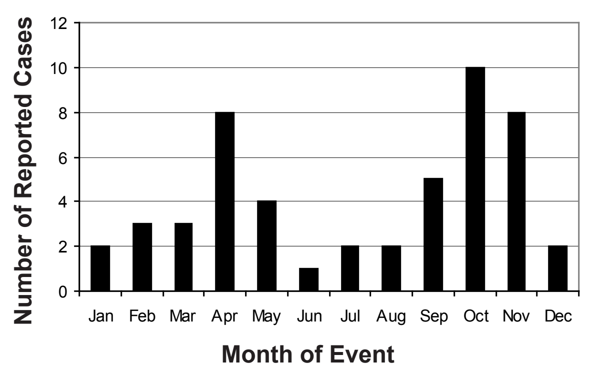
Figure 23. Invasive *Streptococcus pneumoniae* Infection*: Six-Year Trend, Virginia, 2001-2006^



* Children less than 5 years of age

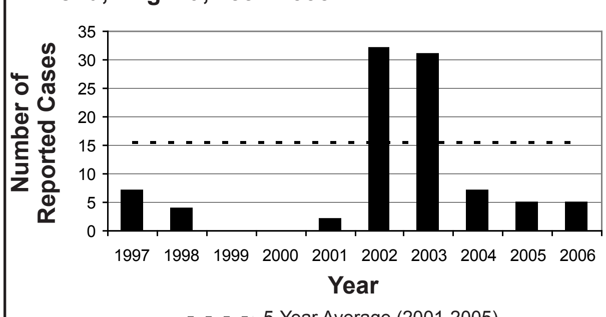
^ Condition made reportable in 2001

Figure 24. Invasive *Streptococcus pneumoniae* Infection*: Month of Event, Virginia, 2006



*Children less than 5 years of age

Figure 25. Human Arboviral Infection: Ten-Year Trend, Virginia, 1997-2006



Streptococcus pneumoniae, Invasive, Children <5 Years of Age

The number of reported cases of invasive *Streptococcus pneumoniae* infections have been increasing in recent years, with the 48 cases reported in 2006 representing a 30% increase from 2005 (Figure 23). Risk was strongly age-related, with an incidence among infants of 17/100,000, compared to 7/100,000 for children 1-4 years of age. Onset of cases appears to have a biphasic seasonal pattern (peaks in April and October) (Figure 24). In addition, in 2006, 71% of reported cases were male.

Zoonotic Infections

Arboviral Infection (Human)

Five human cases of arboviral infection were reported in Virginia in 2006 compared to five cases in 2005. All five cases in 2006 were due to West Nile Virus (WNV) (Figure 25), compared to one case of WNV in 2005. It is important to note that a large proportion (approximately 80%) of persons infected with WNV are asymptomatic or have only mild symptoms, and so the disease is rarely diagnosed.

The cause of the significant decrease in reported WNV cases in 2004-2006 could be attributable to one or more factors, including: the impact of weather on virus replication and vector mosquito populations; public education about the dangers of mosquito bites and more citizens using personal protection measures; and possibly fewer viremic wild birds to infect mosquitoes due to an increased proportion of birds that were resistant to the virus from prior exposure. The resurgence of WNV cases in 2006 may have been due to exceptionally hot weather that summer.

Although no human cases of LaCrosse (LAC) virus infection were reported in Virginia in 2006, the apparent geographic expansion of the LaCrosse endemic region from the southwestern parts of the state north and eastwards in recent years remains a concern. Healthcare professionals in regions that have not generally had LaCrosse encephalitis should therefore be aware of the condition.

Figure 26. Lyme Disease: Ten-Year Trend, Virginia, 1997-2006

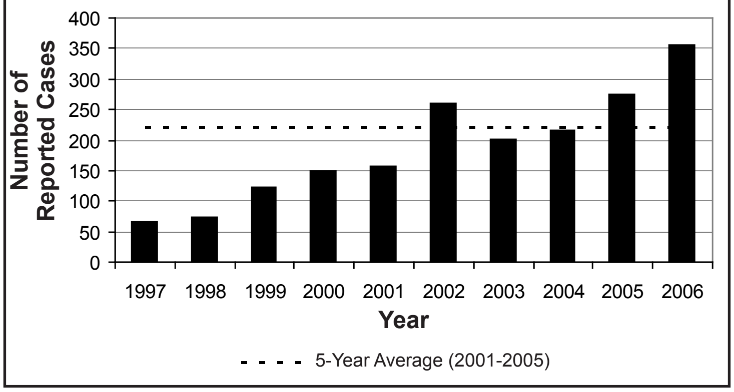


Figure 27. Lyme Disease and RMSF: Month of Event, Virginia, 2006

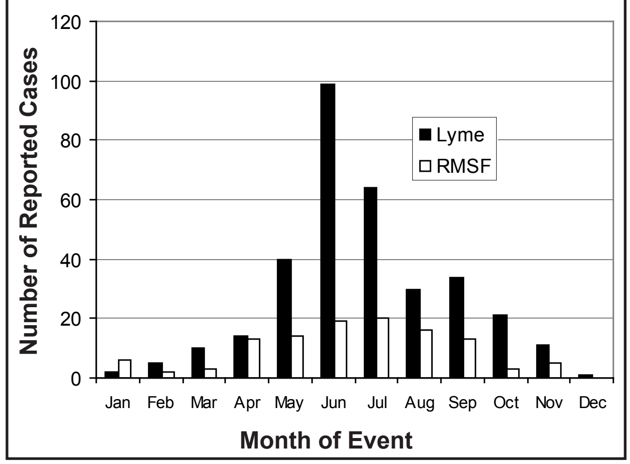


Figure 28. Lyme Disease: Rate by Health Planning Region, Virginia, 2006

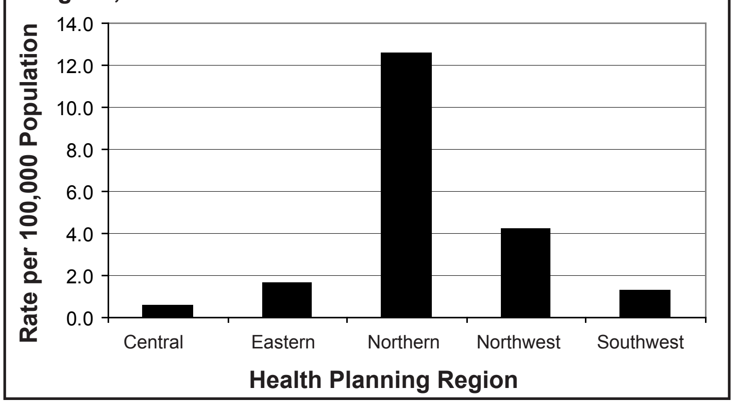
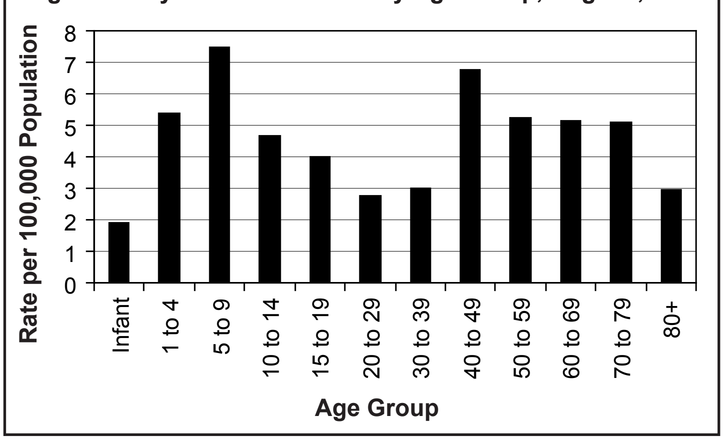


Figure 29. Lyme Disease: Rate by Age Group, Virginia, 2006



Lyme Disease

Since becoming a notifiable disease, Lyme disease is the most frequently reported tickborne illness in Virginia, and levels of reported cases have continued to increase. The 357 cases reported in 2006 represented a 30% increase above the 274 cases reported in 2005 and were 61% higher than the five-year average (Figure 26). Although cases were reported in every month of the year in 2006, Lyme disease showed a seasonal pattern, with the majority of cases (61%) reported during the months of May-July (Figure 27). The seasonality of Lyme disease is strongly related to the period when nymphal black-legged ticks, the primary vectors of Lyme disease, are active (i.e., from mid-April through mid-July). Cases were reported from all regions of the state; however, the incidence of Lyme disease in the Northern Health Planning Region was 13/100,000 population—this was almost seven times the level of all of the other health planning regions combined (Figure 28).

For cases for which race was recorded, white individuals had an incidence of 4/100,000, compared to 1/100,000 for other races. Racial differences may be in part related to easier detection of the erythema migrans (EM) lesion in individuals with lighter skin pigmentation, as well as to differences in healthcare access and to exposure to tick habitats.[5] There was no substantial gender difference in the number of reported cases. There was a bimodal risk by age group (rates were highest in children 5-9 years of age at over 7/100,000, with a second peak of almost 7/100,000 in adults 40-49 years of age) (Figure 29). This bimodal age group risk for Lyme disease has been observed in other regions of the U.S.

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 sub-urbanization of some parts of Virginia may enhance the environment for white tailed deer and white-footed mice which play roles in tick reproduction and transmission of the Lyme disease agent, and also brings more persons into contact with the tick vector.

Malaria

The 55 cases of malaria reported in 2006 represented a 25% increase from 2005 and were 9% above the five-year average. Newly identified cases in Virginia almost always occur among U.S. residents with recent travel to malaria-endemic countries, or among foreign residents immigrating to or visiting the U.S. No domestically acquired case of malaria was reported to VDH in 2006, although transmission of malaria in Virginia remains possible: three Virginia residents were confirmed to have acquired malaria domestically during 2002. In addition, for cases where race was recorded, blacks had an incidence of 2/100,000, compared to <1/100,000 for whites.

Figure 30. Rabies in Animals: Ten-Year Trend, Virginia, 1997-2006

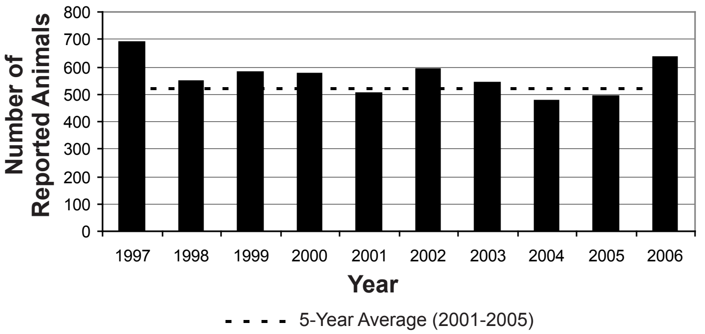


Figure 31. Distribution of Rabies in Animals, Virginia, 2006

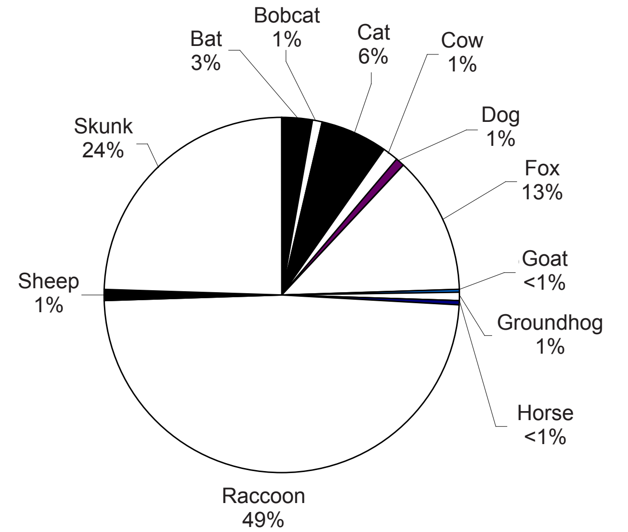


Figure 32. Rocky Mountain Spotted Fever: Ten-Year Trend, Virginia, 1997-2006

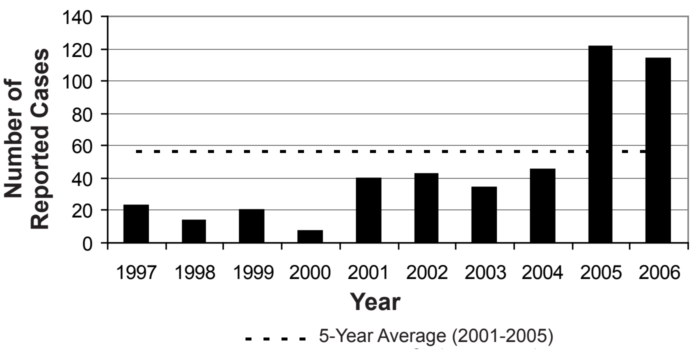


Figure 33: Rocky Mountain Spotted Fever: Rate by Age Group, Virginia, 2006

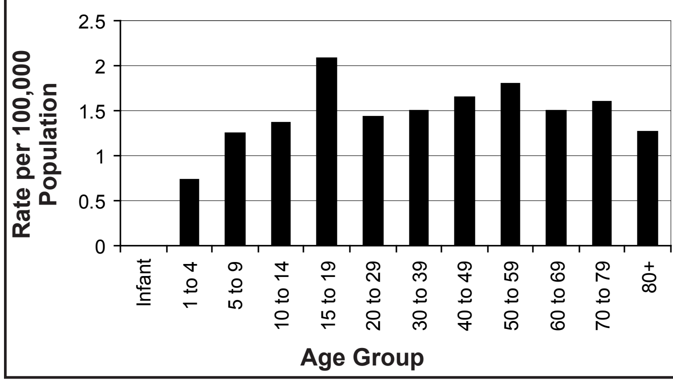
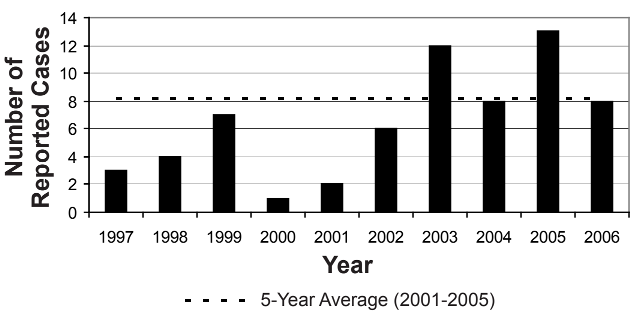


Figure 34. Ehrlichiosis: Ten-Year Trend, Virginia, 1997-2006



Rabies

The 637 rabid animals reported in 2006 were a substantial (29%) increase over the number reported in 2005, and were substantially (22%) higher than the five-year average of 521 cases/year (Figure 30). As in 2005, rabid raccoons accounted for the largest proportion (49%) of all rabid animals; other frequently reported rabid animals included skunks (24%) and foxes (13%) (Figure 31). The number of rabid animals tends to cycle, probably due to changes in wildlife populations (especially raccoons) and the proportion of animals that is susceptible in those populations.

Overall, 14,357 animal bites to humans were reported to health departments in 2006; healthcare professionals reported providing post-exposure prophylaxis (either the full series or the two injections given to exposed individuals who had previous rabies vaccinations) to 1,074 individuals; this is a substantial increase from the 789 courses provided in 2005. No human cases of rabies were reported in 2006. The last known human death from rabies in Virginia occurred in 2004 from a raccoon rabies virus variant; however, how the person became infected remains unknown.

Tickborne Rickettsial Diseases

Rocky Mountain spotted fever (RMSF) is a relatively uncommon tickborne rickettsial disease in Virginia. However, in 2006 there were 114 cases of RMSF reported to local health departments. While this represented a 6% decrease from the 121 cases reported in 2005, the 2006 activity was 101% higher than the five-year average of 57 cases/year (Figure 32). As with Lyme disease, another arthropod-borne disease, RMSF showed a strong seasonal pattern, with most cases (83%) reported from April-September (Figure 27). A bimodal age distribution, with incidence highest in persons 15-19 years of age, and 40-59 years of age, was seen in 2006 (Figure 33); this is characteristic for RMSF.

Ehrlichiosis is very rarely reported in Virginia (five-year average: eight cases/year). Although reported cases of ehrlichiosis have also been increasing in recent years, the eight cases reported in 2006 represent a 39% decrease from the peak of 13 cases in 2005 (the largest number ever reported in one year in Virginia) (Figure 34).

The cause of the increased reports of tickborne rickettsial diseases is likely due to increased efforts by local health departments to more fully investigate reported cases and describe these conditions in Virginia, as well as to increased exposure of individuals to tick habitats as new housing developments expand into rural areas.

Other Conditions of Public Health Importance

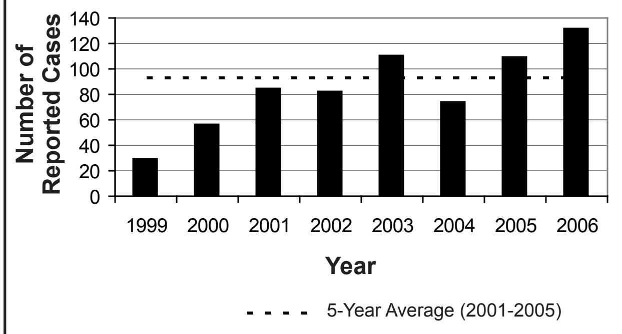
Creutzfeldt-Jakob Disease (CJD)

In 2006, a case of Creutzfeldt-Jakob Disease (CJD) in an individual less than 55 years of age was reported. Sporadic CJD occurs in Virginia; the age criteria is intended to screen for potential cases of new variant CJD (nvCJD). On further investigation, this individual was found to have new variant CJD. Epidemiologic investigation suggested that it was extremely unlikely that this individual acquired the infection in the U.S. However, this counted as only the third case of nvCJD ever diagnosed in the U.S. A high index of suspicion and early testing is important for diagnosing CJD, since arranging for brain biopsy or autopsy to confirm the diagnosis may be important for families and healthcare professionals.

Invasive GAS

Group A streptococcal (GAS) infection can range from mild illness (e.g., sore throat, fever, or skin infections) to severe illness (e.g., invasive infection of soft tissue, bacteremia, or toxic shock syndrome). Public health follow-up on cases of invasive disease may require significant resources to identify and prevent infection in at-risk contacts. In Virginia, in 2006, the 132 reported cases represented an increase of 20% from 2005, and were a 43% increase over the five-year average (Figure 35). Onset of invasive GAS infections appears to be highest in spring (March-May) (Figure 36). There is a bimodal age-related risk, with a moderate risk in children 0-4 years of age (3/100,000) and individuals 60 years of age and older (4/100,000), but a relatively small risk (1/100,000) for the intervening age groups (Figure 37).

Figure 35. Streptococcal Disease, Group A, Invasive: Eight-Year Trend, Virginia, 1999-2006*



*Condition made reportable in 1999

Figure 36. Streptococcal Disease, Group A, Invasive: Month of Event, Virginia, 2006

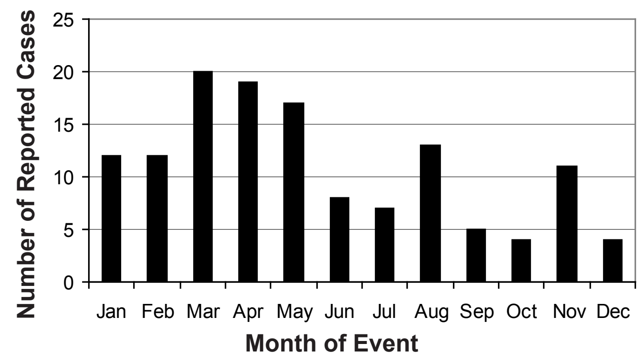
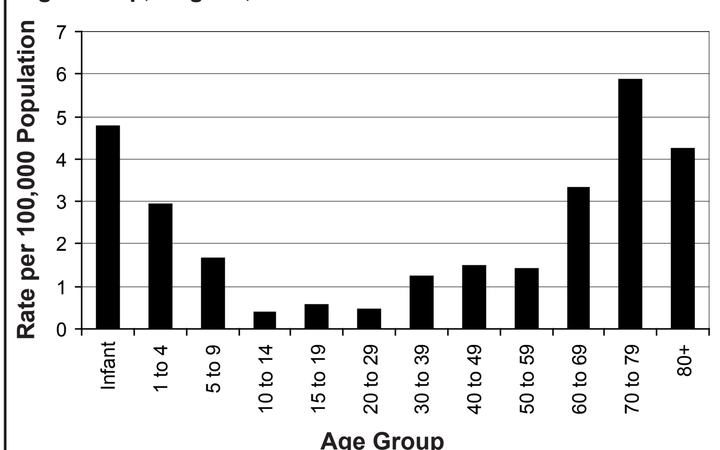


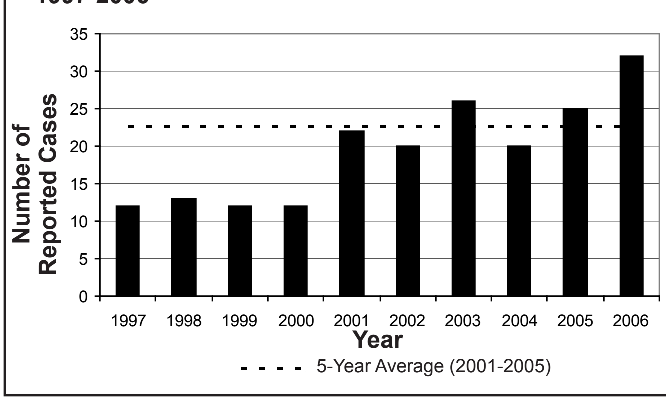
Figure 37. Streptococcal Disease, Group A, Invasive: Rate by Age Group, Virginia, 2006



Vibrio spp. Infections

Vibrio spp. (including *V. parahemolyticus* and *V. vulnificus*) can cause gastroenteritis, as well as infect open wounds and cause septicemia. Cases in Virginia have increased steadily in recent years, in part due to better recognition and reporting. In 2006, the 32 reported cases of *Vibrio* spp. infections represented a 28% increase from 2005, and a 42% increase over the five-year average (Figure 38).

Figure 38. *Vibrio* Infection: Ten-Year Trend, Virginia, 1997-2006



Summary

This report summarizes the disease surveillance statistics for key reportable toxic substance-related illnesses, vaccine-preventable infections, and zoonotic conditions in Virginia during the 2006 calendar year. Conditions with a significant increase in the number of cases, or that continued to be significantly elevated, included chickenpox (varicella), mumps, invasive *Streptococcus pneumoniae*, West Nile virus infection, Lyme disease, invasive Group A streptococcal infection, Rocky Mountain spotted fever, and *Vibrio* spp. infections. Although Hib infections remain low, *H. influenzae* infections continue to occur. On the positive side, reported cases of elevated childhood blood lead levels, hepatitis A, hepatitis B, meningococcal infection, pertussis, and LaCrosse virus infection declined in 2006. No cases

Cases of Selected Notifiable Diseases Reported in Virginia*

	Total Cases Reported, June 2007						Total Cases Reported Statewide, January - June		
		Regions							
Disease	State	NW	N	SW	C	E	This Year	Last Year	5 Yr Avg
AIDS	51	1	22	1	11	16	309	250	347
Campylobacteriosis	53	11	20	12	5	5	217	208	237
Chickenpox	121	16	16	7	8	74	820	997	453
***E. coli*, Shiga toxin-producing**	9	1	3	0	1	4	55	49	24
Giardiasis	21	5	2	9	3	2	192	191	170
Gonorrhea	497	24	17	42	227	187	3,024	3,247	4,196
Group A Strep, Invasive	9	0	1	4	3	1	82	80	59
Hepatitis, Viral									
A	9	0	4	0	3	2	46	24	40
B, acute	1	0	0	0	1	0	68	21	75
C, acute	1	0	0	0	1	0	3	3	4
HIV Infection	108	2	21	2	34	49	397	442	418
Lead in Children†	42	10	5	6	13	8	230	268	282
Legionellosis	6	2	1	1	1	1	14	21	13
Lyme Disease	77	11	60	2	2	2	219	40	32
Measles	0	0	0	0	0	0	0	0	0
Meningococcal Infection	1	0	0	0	1	0	10	13	16
Pertussis	4	1	0	1	0	2	45	100	89
Rabies in Animals	78	20	14	23	6	15	362	301	271
Rocky Mountain Spotted Fever	18	4	2	5	4	3	35	19	8
Rubella	0	0	0	0	0	0	0	0	0
Salmonellosis	69	14	24	6	11	14	342	292	341
Shigellosis	11	1	3	0	0	7	40	27	154
Syphilis, Early§	33	1	12	1	8	11	183	147	109
Tuberculosis	16	0	5	6	2	3	98	130	118

Localities Reporting Animal Rabies This Month: Accomack 1 fox, 3 raccoons; Albemarle 1 raccoon; Alexandria 1 bat, 1 raccoon; Amelia 1 cat; Amherst 1 fox, 3 raccoons; Augusta 1 fox; Bath 1 raccoon; Bedford 1 raccoon; Campbell 1 fox, 1 raccoon; Caroline 1 fox; Carroll 2 raccoons; Charlotte 1 raccoon; Chesterfield 1 cat; Culpeper 2 raccoons; Fairfax 3 bats, 1 fox, 4 raccoons; Fauquier 1 bat, 1 raccoon; Floyd 1 fox; Fluvanna 1 cat; Franklin 1 fox; Gloucester 1 raccoon; Greene 1 dog; Hanover 1 cat; Henrico 1 fox; James City 1 fox, 1 raccoon; Loudoun 1 fox, 2 raccoons; Louisa 1 cat; Lynchburg 1 raccoon; Mathews 1 raccoon; Mecklenburg 1 skunk; Nelson 1 cat, 1 raccoon; Newport News 2 raccoons; Norfolk 1 raccoon; Patrick 1 fox, 2 raccoons, 1 skunk; Pittsylvania 1 raccoon, 1 skunk; Prince William 1 fox; Richmond 1 fox; Roanoke 1 fox, 2 raccoons; Rockbridge 2 foxes; Russell 1 raccoon; Shenandoah 1 fox, 1 raccoon; Stafford 1 raccoon; Virginia Beach 1 cat, 2 raccoons; Warren 1 cat, 1 raccoon; Wythe 1 beaver.

Toxic Substance-related Illnesses: Adult Lead Exposure 13; Arsenic Exposure 1; Asbestosis 1; Mercury Exposure 1; Pneumoconiosis 4.
*Data for 2007 are provisional. †Elevated blood lead levels $\geq 10\mu g/dL$. §Includes primary, secondary, and early latent.

of measles were reported in 2006. Of note, a single case of new variant CJD was diagnosed in Virginia.

Limitations in the data include under-detection of cases who do not seek healthcare (e.g., due to asymptomatic infections, mild illness, or barriers to access), misdiagnosis of cases, a low incentive for diagnostic testing for some conditions, and the accuracy and completeness of case reporting to local health departments.

Finally, only some key reportable conditions are included in this report. Selected enteric, respiratory, and sexually transmitted infections were reviewed in Issue 6 (2007) of the VEB. For additional information about disease surveillance in Virginia, and updated information on reportable conditions, visit the VDH Office of Epidemiology web site (www.vdh.virginia.gov/epidemiology/). For more information on ways to improve the reporting process for your practice or facility, please contact your local health department.

References:
[1]MMWR. 2004. 52(37): 884-5.
[2]Samandari T, Bell BP, Armstrong GL. 2005. Vaccine. 22(31-32): 4342-50.
[3]MMWR. 2006;55(RR-7):1-25.
[4]MMWR. 2000. 49(RR07): 11-20.
[5]Fix AD, Peña CA, Strickland GT. 2000. American Journal of Epidemiology. 152(8): 756-759.

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