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# Dog and Cat Bites

## *by John R. August, B Vet Med, MS**

A 35-year-old male veterinarian was bitten by a healthy 2-year-old male Chow Chow while trimming its nails. Wounds on the right wrist and hand were cleansed with povidone-iodine solution and a sterile bandage was applied. Twelve hours later, the man complained of increasing discomfort at the bite site. Twenty-four hours after the injury, he was taken to an emergency room because of malaise, chills, and localized pain.

On physical examination, oral temperature was 38.3 C; blood pressure was 116/80 mm of Hg; pulse rate was 85 beats/min; and respiratory rate was 18 breaths/min. Puncture wounds were observed on the anterior and posterior aspects of the right hand and wrist, which were swollen and erythematous. A serosanguinous exudate drained from the wounds.

Because constitutional signs were evident and the wounds were infected, the veterinarian was admitted to the hospital and was referred to a hand surgeon. A CBC revealed leukocytosis, but bacteria were not observed in neutrophils in Wright-stained blood smears or in gram-stained buffy coat smears. Stained smears of wound exudates had many gram-negative rods. Bacterial culture of the exudates yielded a profuse growth of *Pasteurella multocida, Fusobacterium* sp, and *Bacteroides* sp.

Pencillin was administered IV. The bite wounds were irrigated, debrided of devitalized tissues, and covered with gauze impregnated with an antibacterial agent. The affected hand was wrapped in a bulky mitten dressing and was elevated. Five days

*Continued to page 2*

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*Continued from page 1*

later, the patient's discomfort had ceased. Erythema and swelling at the bite sites had receded markedly, and no exudation was evident. The margins of the larger puncture wounds on the wrists were debrided and sutured, and the dressing was reapplied. Antimicrobial treatment was changed to oral administration of amoxicillin with clavulanic acid. The veterinarian was discharged from the hospital on day 6 and recovered without complications.

The patient directed the following questions to his attending surgeon*:

*Q: How many people are bitten by dogs and cats each year?*

A: Health authorities report that more than 1 million people are bitten by dogs each year[1]; however, it is estimated that only half of all bites are reported.[2] In spite of the fact that most dog bite wounds are trivial and most victims do not seek medical attention,[3] bite wounds account for about 1% of all emergency room admissions and cost approximately $30 million in annual health care.[4]

Surveys of schoolchildren have shown that the frequency of dog bites may be much higher than indicated by reports from health authorities.[5] Fifty-five percent of boys and 39 percent of girls, from 4 to 18 years old, reported being bitten during their lifetimes. Seventeen percent of children reported receiving medical attention for dog bites during their lifetimes. The investigators concluded that being bitten by a dog is a rather common occurrence in children between the ages of 7 and 12 years, and that the event is greatly underestimated by official bite statistics. In a survey of veterinarians from Minnesota and Wisconsin, 92.3% of respondents reported being bitten by dogs, and 81% reported being bitten by cats.[6]

*Q: Are any groups at risk for being bitten by dogs or cats?*

A: One half to two thirds of dog bite victims are less than 20 years old, with many victims being less than 10 years old. Injuries may be more severe in the latter group.[7] Men and boys are bitten more often than women and girls, as the former group is more likely to own dogs as pets and to come into close contact with unleashed free-roaming dogs.[2]

Dog bites occur more commonly in the warmer months when there is a greater opportunity for outdoor contact between human beings and pets. The incidence begins to increase in March, and peaks between June and August. Most dog bites occur in the afternoon and evening, with the peak between 3 PM and 7 PM.[2] Recreational activities such as jogging or cycling that are pursued during these times tend to provoke dogs to attack.

*Q: Which dogs bite people?*

A: About half of all bites are from dogs owned by neighbors.[5] Pets of the victim's family or pets of friends often are involved.[8] Most bites are from large or medium-sized dogs that are being kept for protection in urban areas.[2] Overall, dogs inflict 80 to 90% of the animal bites that require medical attention.[9]

*Q: On which part of the body do most victims get bitten?*

A: Most victims are bitten on their arms and hands.[3,4,10] The right arm is most often bitten, as many victims attempt to protect themselves with this limb.[2] Bites from family dogs are more prevalent on the arm and back, compared with bites from stray dogs and dogs of unknown background that are most likely to be inflicted on the leg.[11] About 65% of facial bites are in children less than 10 years of age.[2]

*Q: Which bacteria cause most bite wound infections?*

A: Aerobic flora of the skin of the victim and aerobic and anaerobic oral flora of the biting animal are all capable of inducing infection[7,9] with the oral flora being more important pathogenically.[12] Most infected bite wounds contain several species of aerobic and anaerobic bacteria that interact synergistically to make elimination more difficult. There is a larger mean number (5.4) of bacterial isolates from infected human bites than from infected animal bites (2.8).[9]

More than 64 species of bacteria may be found in the mouths of dogs.[13] The normal oral flora of dogs includes *P multocida, Staphylococcus aureus, S epidermidis, S saprophyticus, Streptococcus* sp, *Neisseria* sp, *Moraxella* sp, *Escherichia coli, Enterobacter aerogenes, Pseudomonas flourescens, Acinetobacter calcoaceticus, Corynebacterium* sp, *Actinomyces* sp, *Bacillus* sp, *Caryophanon* sp, *Mycoplasma* sp, and the alphanumeric strains IIj, EF-4, M-5, and DF-2.[8,14,15] The oral flora of cats is similar.[8]

The species of bacteria isolated from clinically noninfected and infected animal bite wounds are similar.[3,12] In one study, aerobic bacteria alone were isolated from 24% of animal bite wounds, anaerobic bacteria alone from 10%, and mixed isolates from 66%.[9] In another study, aerobic bacteria were isolated from 74% of all animal bite wounds, and anaerobic bacteria were isolated from 41% of wounds.[3] The most common aerobic isolate was α-hemolytic *Streptococcus* sp. *Bacteroides* sp and *Fusobacterium* sp were the most common anaerobic isolates.

Infections with *S aureus* often develop as a sequela to self-debridement.[1] Seventy-seven percent of veterinarians reported that they treated themselves after being injured in some manner during their work: 19.7% reported that they sutured their own wounds, and 67.5% reported that they prescribed antimicrobial agents for themselves.[6]

*Q: What role does* P multocida *play in animal bite wounds?*

A: *Pasteurella multocida* is a nonmotile, pleomorphic, gram-negative coccobacillus.[16,17] The organism may be responsible for up to 50 and 90% of infections resulting from dog bite wounds and cat bite wounds, respectively,[18] and is the most common isolate from victims hospitalized with infected bites.[8] Recently, it has been proposed that the species *Pasteurella* includes the following: (1) *P canis,* which is found in the oral cavity of dogs and often is isolated from persons with infected dog bites; (2) *P. dagmatis,* which may be isolated from the oral cavity of dogs and cats and may cause local and systemic infections in people bitten by animals; (3) *P stomatis,* which

**The following questions and answers posed to a physician are offered to* JAVMA *readers for their own information, but are not intended as a source of information from which a veterinarian would offer advice on human medical matters.*

may be isolated from the respiratory tracts of dogs and cats; and (4) *P multocida,* which may be isolated from a variety of mammalian species.[19]

*Pasteurella* spp were isolated from the tonsillar crypts of 92 and 99% of dogs and cats, respectively.[20] *Pasteurella canis* was isolated from 20 and 27% of dogs and cats, respectively. The risks of wound infection with *P multocida* are estimated to be 10 times higher after cat bites than after dog bites.[21] Cat bite wounds usually are composed of small deep puncture wounds that are difficult to irrigate and debride. In addition, the *Pasteurella* sp isolated from cats, compared with that isolated from dogs, appear to be more pathogenic to mice, and this characteristic may result in more aggressive wound infections in people bitten by cats.[20]

Most human infections with *P multocida* result from direct inoculation of the organism into a bite wound. In 29% of people with bone and joint *P multocida infections,* there was no history of scratches or bites, yet there was a record of exposure to animals; in 17%, there was no history of exposure to animals.[17]

*Pasteurella multocida* may cause a rapidly developing cellulitis characterized by erythema, pain, and swelling, which often develops within 2 days of injury.[10,22] A serosanguinous or gray malodorous exudate may develop. The organism may be responsible for low-grade chronic cellulitis and delayed wound healing after bite wounds.[22] Human respiratory tract infections may result from colonization with *P multocida* acquired from the nasopharyngeal flora of animals.[16]

Complications of bite wounds infected with *P multocida* include tenosynovitis, septic arthritis, osteomyelitis, abcesses, and fatal sepsis.[17,23] Chronic complications of *P multocida* infections are more likely to develop in people with underlying diseases or defective defense mechanisms. Septic arthritis usually affects joints that were previously diseased. Bacteremia is more likely to develop in people taking corticosteroids or who suffer from alcoholic liver disease. Bronchopneumonia caused by *P multocida* usually develops in people with other underlying respiratory diseases.[17]

*Q: Which bite wounds become infected?*

A: Wound infection most likely develops:

- When the victim is more than 50 years old.[22]
- When puncture wounds preclude thorough cleansing.[22]
- When the bites are on the hands. Infection occurred in 28% of hand wounds, compared with 4% of bites on the face.[9]
- When there is a delay of more than 24 hours in seeking treatment.[9,22]
- When inadequate attention is paid to careful irrigation and debridement during initial wound management.[22]

*Q: From which bite wounds should specimens be taken for bacteriologic culturing?*

A: Presently, it is considered unnecessary to obtain specimens from wounds with no clinical signs of infection[1,7,13,22,24,25]; however, specimens should be obtained in the following instances:

- When bite wounds are accompanied by overt signs of local infection.
- When bite wounds are undergoing rapid deterioration.
- When bite wounds are accompanied by constitutional signs.
- When bite wounds do not respond to empirical antimicrobial treatment.
- When immunocompromised people are bitten.[26]

Gram-stained smears from noninfected wounds may provide inexpensive and timely information about the presence of potential pathogens,[13] and may be used to help select initial antimicrobial treatment while cultures are pending.[7]

*Q: What are the general principles of bite wound management?*

A: Fortunately, about half of all bite wounds are trivial; however, at least 10% require suturing, and 1 to 2% of bite victims must be hospitalized.[9]

Wounds should first be examined for signs of infection, even though these signs are rarely visible within 8 hours of injury.[3] The injured area should be evaluated for evidence of integrity of vascular tissues and motor and neurologic function.[1] The wound should be explored carefully for signs of damage to tendons, fascia, joint capsules; cartilage, and bone. When infection is evident, the physician may trace the extent of cellulitis on the skin with a marking pen to monitor response to treatment. In deteriorating wounds, cellulitis usually spreads proximally.[1] Regional lymph nodes should be evaluated for evidence of lymphadenopathy or lymphangitis.

Emergency room physicians are aware that puncture wounds are deceptive and are often more extensive than recognized on initial examination.[1] Radiographs may be obtained when deep puncture wounds are close to bone or joints. These radiographs may be used as baseline data in case osteomyelitis or septic arthritis develop.[4]

Many dog bites cause crushing injuries and avulsion of tissues rather than puncture wounds or lacerations.[13] Dogs' jaws may exert a pressure of 200 to 450 lbs psi during a bite.[27] The injured area may be swollen and painful and may contain much devitalized tissue, predisposing to infection.[1]

The management of bite wounds depends on[4]:

- Where the wound is located.
- Whether the victim is examined before or after 8 hours have elapsed from the time of injury.
- Whether the wound is clean or infected.
- What pathogens are involved, and what antimicrobial agents are effective against them.

Physicians agree that all bite wounds require meticulous cleansing, high-pressure irrigation, and careful debridement.[28] Povidone-iodine solution is preferred for initial wound cleansing. The solution does not contain detergents found in some other preparations that may induce pain, may delay wound healing, and may further damage delicate, exposed subcutaneous tissues. The wounds may be cleansed gently with fine mesh sponges[28]; vigorous scrubbing may devitalize tissue and delay healing.[7]

The rabies immunization history of the biting animal and the rabies and tetanus immunization histories

*Continued to page 4*

*Continued from page 3*

of the victim are determined.[1,7,29]

*Q: Why is wound irrigation so important?*

A: Irrigation decreases the number of potentially pathogenic bacteria that were inoculated during the bite. In one study, infection developed in 69% of wounds that were not irrigated, compared with an infection rate of 12% in wounds that were irrigated thoroughly.[22] Irrigation is especially important in hand wounds, where the depth of wound, presence of vital structures, and tightness of the skin prevent adequate wound debridement.[13]

After the wounds have been cleansed with povidone-iodine solution, they are irrigated under pressure with normal saline (0.9% NaCl) solution, using an 18-gauge blunted needle on a 35 ml syringe.[28] Up to a liter of saline solution may be used at a pressure of 50 to 70 psi.[7]

*Q: Why is wound debridement so important?*

A: Removal of devitalized tissue and skin tags appears to decrease the risk of infection in bite wounds. In one study, infection developed in 17% of wounds that had not been debrided, compared with an infection rate of 7.1% in debrided wounds.[22] In addition, debridement allows easier surgical repair and results in a smaller scar at the site of injury.[13] Although debridement of tear wounds is generally accepted, the need to debride puncture wounds remains controversial.[1]

*Q: Which bite wounds should be sutured?*

A: Opinions differ on this question. In the past, it was considered unwise to close any dog bite wound; however, more physicians now are performing primary closure after meticulous surgical wound cleansing.[13]

The decision to perform primary wound closure depends on[7]:

- Whether the wound will close satisfactorily on its own.
- The risk of infection in that bite wound.
- Whether there are cosmetic considerations.

Fresh noninfected wounds may be sutured after wound cleansing, irrigation, and debridement. After initial wound management, small infected wounds may be allowed to heal by secondary intention if they are in cosmetically unimportant areas. Larger wounds may be closed by primary intention after infection has resolved.[28]

Deep puncture wounds caused by cat bites usually are not sutured because of the high prevalence of subsequent infections.[28]

*Q: Which animal bite wound victims require referral to a specialist or hospitalization?*

A: Emergency room physicians may determine that certain patients with bite wounds should be referred to a surgeon for further evaluation or should be hospitalized. These may include.[28]

- People with hand bites, except those bites that are superficial and fresh.
- People with extensive infection in the bite site.
- People with bites in which there is damage to tendon, cartilage, bone, and joint capsule.
- People with disfigurement or tissue loss requiring cosmetic surgery.
- People, especially those with hand injuries, who are predicted to comply poorly with the emergency room physician's recommendations.
- Young children with head injuries from bites inflicted by large dogs.[21] The severity of injury may be underestimated based on examination of the scalp wounds.

*Q: Which bite victims should receive antimicrobials?*

A: Antimicrobial treatment has been recommended for the following groups of bite victims[28]:

- People bitten by cats.
- People who seek treatment 8 hours or more after being bitten by a dog.
- People whose bite wounds were sutured and who are being evaluated for potential delayed wound closure.
- People with bite wounds on the hands.
- People with deep puncture wounds that were not amenable to thorough irrigation and debridement.
- People who are diabetic or who are immunocompromised.
- People with facial bites.[9]

*Q: Should antimicrobial treatment be prescribed for people with noninfected bite wounds?*

A: This question, more than any other issue, remains a controversial subject in animal bite wound management. Many authors use the term prophylactic antimicrobial treatment in this situation, insinuating that treatment may prevent infection later. Others state that this definition is incorrect in that treatment is not being started before the bite wound is received.[7] Many bite wounds that are not accompanied by signs of infection are contaminated by bacteria that are potentially pathogenic.

Several investigators have reported that antimicrobial treatment does not decrease the prevalence of infection in dog bit victims with clinically noninfected wounds who were treated with proper wound cleansing.[22,25,30,31] Prophylactic administration of antimicrobials may not be indicated in these people as long as thorough wound care is achieved. As noted previously, this observation does not apply to people who are at risk for developing infection, for victims of cat bites, or for bites on the hands and face.

Some physicians recommended antimicrobial treatment for clinically noninfected dog bites, noting that these wounds may be contaminated with aerobic and anaerobic bacteria that may be capable of causing infection. In addition, it may be difficult to predict which wounds are likely to become clinically infected.[1] Other physicians prescribe antimicrobial

treatment for all dog bite victims, except those who seek medical attention 24 hours or more after injury and who have no signs of infection.[3]

Further studies are needed to resolve the question of whether antimicrobial treatment is indicated in clinically noninfected dog bite wounds. Presently, the preferred antimicrobials for prophylactic treatment are a combination of a pencillin and a penicillinase-resistant penicillin, or amoxicillin with clavulanic acid.[18]

*Q: Which antimicrobial agents are most commonly used for infected bite wounds?*

A: There is no single antimicrobial agent that is effective against all of the aerobic and anaerobic bacteria that may be inoculated into bite wounds.[23] *Pasteurella multocida* usually is resistant to the penicillinase-resistant penicillins, yet is sensitive to penicillin.[9] Cephalosporins administered orally do not reach blood concentrations high enough to eradicate *P multocida* infections reliably.[17] *Staphylococcus aureus* usually is resistant to penicillin.[9]

For people with infected bite wounds, penicillin is recommended as the initial choice for parenteral treatment.[3] If gram-stained smears from wound exudates indicate there may be coinfection with *S aureus,* a penicillinase-resistant penicillin may be added. A combination of ticarcillin with clavulanic acid has been recommended for initial parenteral treatment. Ultimately, antimicrobial agents are chosen based on the results of bacterial culture and antimicrobial susceptibility, and on observation of response to treatment.[8]

Bite wound victims treated as outpatients may be advised to return for reevaluation after 48 hours, by which time, signs of infection may have arisen. At this time, treatment may be modified based on the results of bacterial culture and susceptibility, and sutures may be removed if signs of infection are evident.[28] Patients who have suffered deep cat bites are evaluated carefully to allow early detection of complications such as osteomyelitis.[17]

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# *Recommendations of the Immunization Practices Advisory Committee of the U.S. Public Health Service*

# Measles Prevention: Supplementary Statement

## Introduction

Since measles vaccine was introduced in the United States in 1963, the reported incidence of measles has decreased 99%, and indigenous measles transmission has been eliminated from most of the country. However, the goal to eliminate measles by October 1982 has not been met. Between 1981 and 1987, a low of 1497 (1983) to a high of 6282 (1986) cases were reported annually.[1]

Two major types of outbreaks have occurred recently in the United States: those among unvaccinated preschool-aged children, including children younger than the recommended age for routine vaccination (i.e., 15 months), and those among vaccinated school-aged children.[2] Large outbreaks among unvaccinated preschool-aged children have occurred in several inner-city areas. In these outbreaks, up to 88% of cases in vaccine-eligible children 16 months to 4 years of age were unvaccinated; as many as 40% of all cases occurred in children <16 months of age. Surveys of immunization levels in areas where these outbreaks occurred indicate that only 49%–65% of 2-year-olds had received measles vaccine.[3]

Many outbreaks have occurred among school-aged children in schools with vaccination levels above 98%. These outbreaks have occurred in all parts of the country. Attack rates in individual schools have been low (1%–5%), and the calculated vaccine efficacy has been high. Primary vaccine failures (i.e., the approximately 2%–10% of vaccinees who fail to seroconvert after measles vaccination) have played a substantial role in transmission. In many of these outbreaks, children vaccinated at 12–14 months of age have had higher attack rates than those vaccinated at older ages.[4]

In a few outbreaks[5,6], persons vaccinated in the more distant past, independent of age at vaccination, have been at increased risk for disease. However, no conclusive data indicate that waning vaccine-induced immunity itself has been a major problem.

## Evaluation of the Current Measles Elimination Strategy

The current measles elimination strategy calls for administration of one dose of measles vaccine at 15 months of age.[7] A documented history of vaccination at or after 12 months of age, however, is considered appropriate vaccination. High immunization levels, along with careful surveillance and aggressive outbreak control, are the three essential elements of this strategy. The Immunization Practices Advisory Committee (ACIP) has periodically reviewed the current strategy and progress toward measles elimination.[7] At a recent meeting, the ACIP again reviewed the epidemiology of measles in the United States as well as recommendations, made by a group of consultants convened by CDC in February 1988, for modification of the measles elimination strategy.

To increase vaccine coverage among preschool-aged children in inner-city areas, the ACIP considered it essential that research be conducted to determine ways to increase vaccine delivery. A variety of additions and/or changes in the current strategy were considered, including a routine two-dose measles vaccination schedule and a one-time mass revaccination for school-aged children. Two new strategies were recommended and are described below (Table 1).

## New Recommendations

***Changes in vaccination schedule in areas with recurrent measles transmission among preschool-aged children.***

To improve immunity levels in high-risk children <15 months of age, the ACIP recommends that a routine two-dose vaccination schedule for preschoolers be implemented in areas with recurrent measles transmission (i.e., counties with more than five reported cases among preschool-aged children during each of the last 5 years). If recurrent measles transmission is occurring in defined parts of a county, local officials may elect to implement the routine two-dose schedule selectively in those parts. Health authorities in other urban areas that have experienced recent outbreaks among unvaccinated preschool-aged children may also consider implementing this policy. The first dose of measles vaccine should be administered at age 9 months or at the first health-care contact thereafter. Infants vaccinated before their first birthday should receive a second dose at or about 15 months of age. Single-antigen (monovalent) measles vaccine should be used for infants <1 year of age, and measles, mumps, and rubella vaccine (MMR), for persons vaccinated on or after the first birthday. Although some data suggest that children who do not respond to the first dose administered at a

**TABLE 1. New recommendations for measles vaccination**

**Areas with recurrent measles transmission***

Two-does schedule

| | |
|---|---|
| First dose: | Monovalent measles vaccine at 9 months of age or first visit thereafter |
| Second dose: | MMR at 15 months of age |

If a routine two-does schedule is impractical, then MMR should be given routinely at 12 months of age.

**Outbreaks in schools**

Revaccinate all persons who received their most recent vaccination before 1980. If this is impractical, then children vaccinated before 15 months of age should be revaccinated.

*County reporting more than five cases of measles among preschool-aged children during each of the previous 5 years.

young age may have an altered immune response when revaccinated at an older age,[8] there are not data to suggest that such children are not protected from measles.[9]

If resource constraints do not permit a routine two-dose schedule, an acceptable alternative is to lower the age for routine vaccination to 12 months in those areas using one dose of MMR. If children also need diphtheria and tetanus toxoids and pertussis vaccine (DTP) and oral polio vaccine (OPV), these vaccines can be administered simultaneously with measles vaccine or MMR.

***Changes in outbreak-control strategies for school-based outbreaks***

Because of the prominent role that persons with primary vaccine failure are playing in measles transmission, the ACIP recommends the institution of some form of revaccination in outbreaks that occur in junior or sen-

ior high schools, colleges, universities, or other secondary institutions. In an outbreak, the ACIP recommends that, in affected schools as well as unaffected schools at risk of measles transmission from students in affected schools, all students and their siblings who received their most recent dose of measles vaccine before 1980 should be revaccinated. This date was selected for several reasons: 1) this strategy will capture almost all students vaccinated between 12 and 14 months of age, a group known to be at increased risk of primary vaccine failure, since the recommended age for routine vaccination was changed from 12 to 15 months in 1976; 2) it may be easier to identify students by year of vaccination than by age at vaccination; and 3) in some outbreak investigations, students vaccinated before 1978–1980 have been found to be at increased risk for measles. This is not felt to be due to waning immunity but rather to a higher rate of primary vaccine failure in persons vaccinated before that time. This higher rate may be due to different reasons, including less than optimal vaccine storage and handling or to the greater lability of the measles vaccine manufactured before a new stabilizer was used in 1979. While the exact date has not been determined, 1980 is a conservative cutoff. If all students vaccinated before 1980 cannot be revaccinated, then persons vaccinated before 15 months of age should be targeted.

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## Have an Idea for the *Bulletin?*

*The editor welcomes any reports of cases, outbreaks, or public health problems of interest to the* Bulletin*'s readers. Such accounts and any other comments or suggestions regarding the* Bulletin *should be addressed to: Editor,* Epidemiology Bulletin, *Office of Epidemiology, Room 700, 109 Governor Street, Richmond, Virginia 23219.*

# Announcement

Virginia Department of Health
Spring Continuing Medical Education Conference

May 3–5, 1989

Sheraton-Charlottesville
Charlottesville, Virginia

Call Patti Shaff for info at (804) 786-3165

**Cases of selected notifiable diseases, Virginia, for the period February 1 through february 28, 1989.**

| Disease | State | | | | | Regions | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total to Date | | Mean 5 Year To Date | This Month | | | | |
| | This Month | Last Month | 1988 | 1989 | | N.W. | N. | S.W. | C. | E. |
| Measles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mumps | 3 | 16 | 0 | 19 | 3 | 0 | 3 | 0 | 0 | 0 |
| Pertussis | 1 | 1 | 0 | 2 | 7 | 0 | 0 | 1 | 0 | 0 |
| Rubella | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Meningitis—Aseptic | 18 | 16 | 11 | 34 | 26 | 0 | 4 | 4 | 6 | 4 |
| *Bacterial | 32 | 14 | 25 | 46 | 41 | 3 | 8 | 5 | 4 | 12 |
| Hepatitis A (Infectious) | 17 | 6 | 10 | 23 | 27 | 1 | 0 | 5 | 8 | 3 |
| B (Serum) | 35 | 23 | 31 | 58 | 70 | 3 | 2 | 10 | 6 | 14 |
| Non-A, Non-B | 9 | 1 | 5 | 10 | 10 | 0 | 1 | 0 | 3 | 5 |
| Salmonellosis | 55 | 81 | 163 | 136 | 142 | 12 | 12 | 11 | 11 | 9 |
| Shigellosis | 57 | 47 | 72 | 104 | 35 | 10 | 4 | 0 | 33 | 10 |
| Campylobacter Infections | 18 | 51 | 61 | 69 | 57 | 5 | 4 | 4 | 2 | 3 |
| Tuberculosis | 25 | 29 | 63 | 54 | 46 | 0 | 8 | 2 | 5 | 10 |
| Syphilis (Primary & Secondary) | 43 | 46 | 64 | 89 | 63 | 3 | 6 | 3 | 14 | 17 |
| Gonorrhea | 1175 | 1260 | 2218 | 2435 | 2777 | — | — | — | — | — |
| Rocky Mountain Spotted Fever | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rabies in Animals | 25 | 17 | 35 | 42 | 34 | 5 | 7 | 3 | 5 | 5 |
| Meningococcal Infections | 4 | 4 | 10 | 8 | 11 | 0 | 0 | 1 | 2 | 1 |
| Influenza | 385 | 317 | 1605 | 702 | 1032 | 66 | 92 | 78 | 119 | 30 |
| Toxic Shock Syndrome | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Reye Syndrome | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Legionellosis | 0 | 1 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 0 |
| Kawasaki's Disease | 2 | 0 | 1 | 2 | 5 | 0 | 0 | 0 | 2 | 0 |
| Acquired Immunodeficiency Syndrome | 34 | 30 | 66 | 64 | — | 1 | 20 | 1 | 7 | 5 |

**Counties Reporting Animal Rabies:** Botetourt 1 skunk; Buckingham 1 raccoon; Chesapeake 1 raccoon; Chesterfield 2 raccoons; Dinwiddie 1 raccoon; Gloucester 1 raccoon; Henrico 1 raccoon; Highland 1 cow; James City 1 raccoon, 1 skunk; Loudoun 1 cat, 3 raccoons, 1 skunk; Orange 1 raccoon; Prince William 1 cat, 1 raccoon; Rappahannock 1 cow; Russell 1 skunk; Shenandoah 1 skunk; Warren 1 raccoon; Washington 1 skunk; York 1 raccoon.

**Occupational Illnesses:** Asbestosis 2; Byssinosis 1; Carpal Tunnel Syndrome 26; Loss of Hearing 5; Coal Workers' Pneumoconiosis 9; Repetitive Trauma Disorder 4; Silicosis 1.

*other than meningococcal

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