EPIDEMIOLOGY BULLETIN

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Postexposure Prophylaxis of Hepatitis B

*The following statement supplements and updates certain sections of two previous statements on hepatitis B virus prophylaxis (*Epidemiology Bulletin *1981; 81: No. 8, and* Epidemiology Bulletin *1982; 82: No. 6). Those statements should be consulted regarding pre-exposure use of hepatitis B vaccine and prophylaxis of hepatitis A.*

Introduction

Prophylactic treatment to prevent hepatitis B (HB) infection after exposure to hepatitis B virus (HBV) should be considered in several situations: perinatal exposure of an infant born to a hepatitis B surface antigen (HBsAg)-positive mother, accidental percutaneous or permucosal exposure to HBsAg-positive blood, or sexual exposure to an HBsAg-positive person. In each of these settings, the risk of HB infection is known to be high and justifies preventive measures. Previous recommendations for postexposure prophylaxis have relied on passive immunization with specific hepatitis B immune globulin (HBIG) (*1*). However, the recent demonstration of high efficacy of HB vaccine combined with HBIG in preventing chronic HB infection in infants of HBsAg-positive mothers requires the revision of recommendations for postexposure prophylaxis (*3*) (Table 1).

Passive immunization with HBIG alone has been partially effective in preventing clinical HB in studies of medical personnel after needlestick accidents (*4*) and sexual exposure to partners with acute HB (*5*). In addition, HBIG prophylaxis has been shown to significantly reduce the percentage of infants who become chronic HBV carriers after perinatal exposure to HBsAg-positive mothers (*6*). For perinatal and needlestick exposures, however, HBIG alone is only about 75% effective even when given very soon after exposure, may provide only temporary protection, and is costly (over $150 per adult dose).

With the development of HB vaccine, the possibility arose that HB vaccine, alone or in combination with HBIG, might be useful for postexposure prophylaxis. Studies have shown that response to HB vaccine is not impaired by concurrent administration of HBIG and that the combination of HB vaccine and one dose of HBIG produces immediate and sustained high levels of protective antibody to the hepatitis B surface antigen (anti-HBs) (*7*). A recent study examining the efficacy of HB vaccine combined with a single dose of HBIG in preventing perinatal transmission from HBsAg carrier mothers who were also positive for hepatitis B "e" antigen (HBeAg) showed this combination to be highly effective in preventing the HBV carrier state in infants and significantly more effective than multiple doses of HBIG alone (*3*).

Perinatal Transmission

Transmission from mother to infant during birth is one of the most effi-

Continued to page 2

Table 1. Hepatitis B Virus Postexposure Recommendations

	HBIG		Vaccine	
Exposure	**Dose**	**Recommended timing**	**Dose**	**Recommended timing**
Perinatal	0.5 ml IM	Within 12 hrs of birth	0.5 ml (10 µg) IM	Within 7 days*; repeat at 1 & 6 mos
Percutaneous	0.06 ml/kg IM or 5 ml for adults	Single dose within 24 hrs	1.0 ml (20 µg) IM†	Within 7 days*; repeat at 1 & 6 mos
		or§		
	0.06 ml/kg IM or 5 ml for adults	Within 24 hours; repeat at 1 mo	—	—
Sexual	0.06 ml/kg IM or 5 ml for adults	Within 14 days of sexual contact	¶	—

**The first dose can be given the same time as the HBIG dose but at a separate site.*

†For persons under 10 years of age, use 0.5 ml (10 µg).

§For those who choose not to receive HB vaccine.

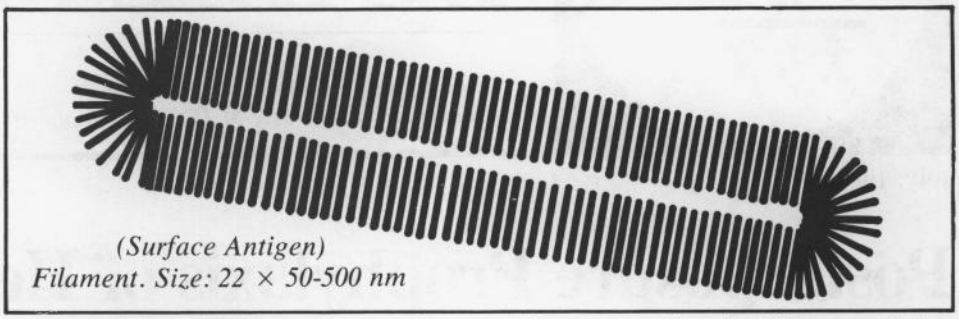
¶Vaccine is recommended for homosexually active males and for regular sexual contacts of chronic HBV carriers.

Continued from page 1

cient modes of HBV transmission. If the mother is positive for both HBsAg and HBeAg, about 80%-90% of infants will become infected. Although infection is rarely symptomatic in the acute phase, approximately 90% of these infected infants will become chronic HBV carriers. It has been estimated that 25% of these chronic carriers may die of cirrhosis or primary hepatocellular carcinoma (*3*). In addition, such persons are infectious, and female carriers may subsequently perpetuate the cycle of perinatal transmission. If the HBsAg-positive carrier mother is HBeAg-negative or if anti-HBe is present, transmission occurs in less than 25% and 12% of cases, respectively. Such transmission rarely leads to chronic HBV carriage; however, severe acute disease, including fatal fulminant hepatitis in the neonate, has been reported (*8,9*). Even if perinatal infection does not occur, the infant may be at risk of subsequent infection from other family contacts. For these reasons, prophylaxis of infants from all HBsAg-positive mothers is recommended, regardless of the mother's HBeAg or anti-HBe status.

The primary goal of postexposure prophylaxis for exposed infants is prevention of HBV carrier state. In addition, there is a need to prevent the rare occurrence of severe clinical hepatitis in some of these infants. Administration of 0.5 ml HBIG to an infant of an HBsAg, HBeAg-positive mother soon after birth and repeated at 3 months and 6 months reduces the probability of chronic infection from about 90% to about 25% (efficacy about 75%). The concurrent use of HB vaccine and various combinations of HBIG increases the efficacy to close to 90%. Since approximately 5% of perinatal infection may occur in utero, it appears likely that no form of postnatal prophylaxis will be 100% effective in this circumstance.

Concurrent HBIG and vaccine administration does not appear to interfere with vaccine efficacy. HB vaccine has been shown to be equally immunogenic in neonates, whether given in 10-µg or 20-µg doses. The use of HB vaccine in combination with HBIG in the perinatal setting has the advantages of increasing efficacy, eliminating the need for the second and third doses of HBIG, and providing long-term immunity to those who are not infected during the perinatal period.



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Maternal Screening

Since efficacy of this regimen depends on administering HBIG on the day of birth, it is vital that HBsAg-positive mothers be identified before delivery. Mothers belonging to groups known to be at high risk of HB infection (Table 2) should be tested routinely for HBsAg during a prenatal visit. If a mother belonging to a high-risk group has not been screened prenatally, HBsAg screening should be done at the time of delivery or as soon as possible thereafter.

Management of HBsAg-Positive Mothers and Their Newborns

The appropriate obstetric and pediatric staff should be notified directly of HBsAg-positive mothers, so the staff may take appropriate precautions to protect themselves and other patients from infectious material, blood, and secretions, and so the neonate may receive therapy without delay after birth.

Recent studies in Taiwan and the United States have confirmed the efficacy of the following regimen (Table 3). Other schedules have also been effective (*3,10,11*). The major consideration for all these regimens is the need to give HBIG as soon as possible after the infant has physiologically stabilized after delivery.

HBIG (0.5 ml) should be administered intramuscularly (IM) after physiologic stabilization of the infant and preferably within 12 hours of birth. HBIG efficacy decreases markedly if treatment is delayed beyond 48 hours. HB vaccine should be administered IM in three doses of 0.5 ml of vaccine (10 µg) each. The first dose should be given within 7 days of birth and may be given concurrently with HBIG but at a separate site. The second and third doses should be given 1 month and 6 months, respectively, after the first (Table 1). HBsAg testing at 6 months may be done for counseling purposes, since HBsAg-positivity at 6 months indicates a therapeutic failure, and the third vaccine dose need not be given if HBsAg-positivity is found. If a mother's HBsAg-positive status is not discovered until after delivery, prophylaxis should still be administered if a venous (not cord) blood sample from the infant is HBsAg-negative. Testing for HBsAg and anti-HBs is recommended at 12-15 months to monitor the final success or failure of therapy. If HBsAg is found, it is likely the child is a chronic carrier. If HBsAg is not detectible, and anti-HBs is present, the child has been protected. Since maternal antibody to the core antigen (anti-HBc) may persist for more than 1 year, testing for anti-HBc may be difficult to interpret

Continued to page 3

Table 2. Women for Whom Prenatal HBsAg Screening is Recommended

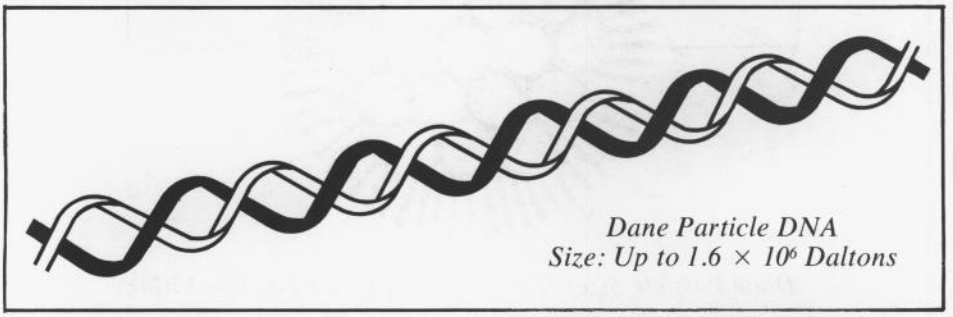
1. Women of Asian, Pacific Island, or Alaskan Eskimo descent, whether immigrant or U.S.-born.
2. Women born in Haiti or Sub-Saharan Africa.

And Women With Histories of:

3. Acute or chronic liver disease.
4. Work or treatment in a hemodialysis unit.
5. Work or residence in an institution for the mentally retarded.
6. Rejection as a blood donor.
7. Blood transfusion on repeated occasions.
8. Frequent occupational exposure to blood in medico-dental settings.
9. Household contact with an HBV carrier or hemodialysis patient.
10. Multiple episodes of venereal disease.
11. Percutaneous use of illicit drugs.

Continued from page 2

during this period. HB vaccine is an inactivated product, and it is presumed that it will not interfere with other simultaneously administered childhood vaccines (*12*). HBIG administered at birth should not interfere with oral polio and diphtheria-tetanus-pertussis vaccines administered at about 2 months of age (Table 3).



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Size: Up to 1.6 × 10^6 Daltons

Acute Exposure to Blood Containing HBsAg

There are no prospective studies directly testing the efficacy of a combination of HBIG and HB vaccine in preventing clinical HB following percutaneous or mucous-membrane exposure to HBV. However, since health-care workers at risk to such accidents are candidates for HB vaccine and since combined HBIG plus vaccine is more effective than HBIG alone in perinatal exposures, it is reasonable to recommend both HB vaccine and HBIG after such exposure. This combination will provide prolonged immunity to subsequent exposures and may also increase efficacy in preventing HB in such postexposure situations. In addition, because the second dose of HBIG is not considered necessary if the vaccine is used, the cost of combination treatment is usually less than that of two HBIG doses alone. If exposure to blood occurs in situations where the HBsAg status of the blood is unknown, refer to "Immune Globulins for Protection against Viral Hepatitis" (*1*). If HBsAg testing reveals the source of the blood to be positive, the following treatment schedule should be instituted as soon as possible.

For percutaneous (needlestick), ocular, or mucous-membrane exposure to blood known to contain HBsAg and for human bites from HBsAg carriers that penetrate the skin, a single dose of HBIG (0.06 ml/kg or 5.0 ml for adults) should be given as soon as possible after exposure and within 24 hours if possible. HB vaccine 1 ml (20 µg) should be given IM at a separate site as soon as possible, but within 7 days of exposure, with the second and third doses given 1 month and 6 months, respectively, after the first (Table 1). If HBIG is unavailable, immunoglobulin (IG [formerly ISG or "gamma globulin"]) may be given in an equivalent dosage (0.06 ml/kg or 5.0 ml for adults). If an individual has received at least two doses of HB vaccine before an accidental exposure, no treatment is necessary if serologic tests show adequate levels (> 10 S/N by RIA) of anti-HBs. For persons who choose not to receive HB vaccine, the previously recommended two-dose HBIG regimen may be used (*1*).

HBIG for Sexual Contacts of Persons With Acute HBV Infection

Sexual contacts of persons with acute HB infection are at increased risk of acquiring HB infection. Two published studies have assessed the value of postexposure prophylaxis for regular sexual contacts of persons with acute HB infection. One showed that HBIG was significantly more effective than IG that contained no measureable anti-HBs in preventing both HB infection and clinical illness

Continued to page 4

Virginia Hospital Infection Control Week

In recognition of the contributions of Virginia infection control practitioners in coordinating infection control programs in health care facilities, and "directing medical, nursing and support staff toward the goal of controlling and preventing infection" and also recognizing that "curing and preventing infection are vital to effective and progressive medical care in our Commonwealth", Governor Charles S. Robb has declared the week of October 1-7, 1984 as Infection Control Week in Virginia.

On October 5, the Association for Practitioners in Infection Control Virginia will hold its tenth Annual Educational Conference at the Hyatt Hotel in Richmond. The one-day conference will include the following presentations:

"Hepatitis" presented by Robert L. Carithers, M.D., Associate Professor of Medicine, Medical Director of the MCV Transplant Program.

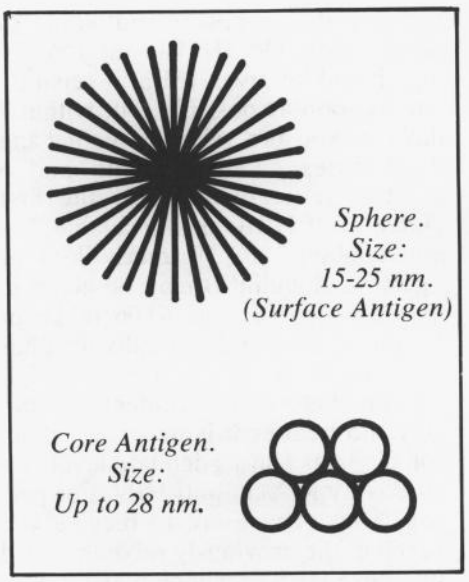
"Infection Control in the Trauma Patient" presented by Ellis S. Caplan, M.D., Chief, Infectious Diseases, Maryland Institute of Emergency Medical Services Systems.

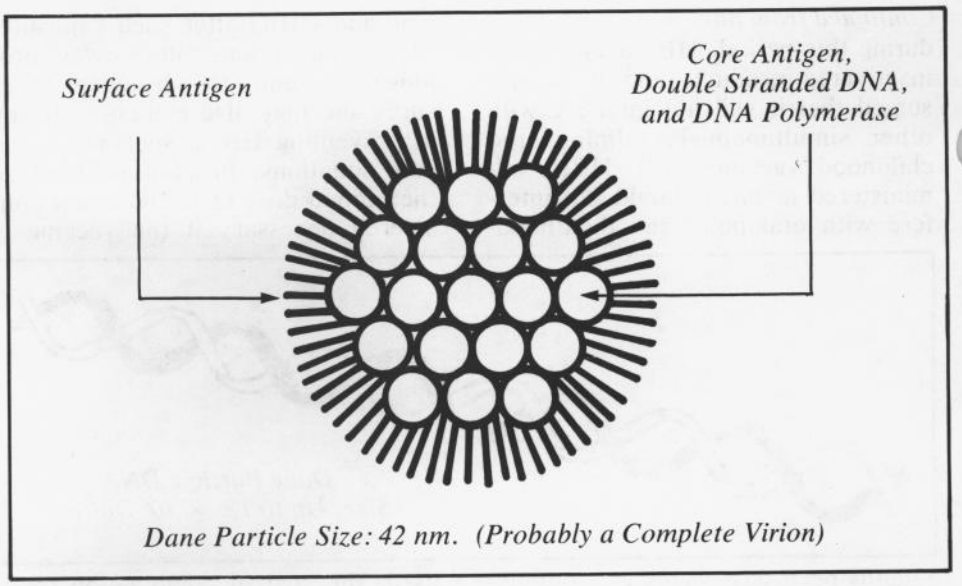
"New Infections" presented by Gerald L. Mandell, M.D., Professor of Medicine, Head, Division of Infectious Diseases, UVA School of Medicine.

For additional information and registration contact Constance D. Jones, R.N., 8530 Chester Forest Lane, Richmond, VA 23237 (Phone Number 804-541-7418).

New Epidemiologist

On July 30, Scott F. Wetterhall, M.D., joined the Division of Epidemiology as a two-year assignee from the Centers for Disease Control's Epidemic Intelligence Service (EIS). Dr. Wetterhall completed his undergraduate studies at Columbia University and received his M.D. degree from Tufts University School of Medicine. Dr. Wetterhall, who is Board Certified in Internal Medicine, served as Assistant Director of Critical Care at St. Claire's Hospital in Schenectady, New York before coming to Virginia.





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(*5*). The second study, however, showed comparable disease rates in persons receiving HBIG and IG containing the increased levels of anti-HBs found in currently available lots (*13*). Because data are limited, the period after sexual exposure during which HBIG is effective is unknown, but extrapolation from other settings makes it unlikely that this period would exceed 14 days. The value of HB vaccine alone in this setting is unknown. However, since about 90% of persons with acute HB infections become HBsAg-negative within 15 weeks of diagnosis, the potential for repeated exposure is usually self-limited. HB vaccine is not routinely recommended for such exposures.

Prescreening sexual partners for susceptibility before HBIG treatment is recommended if it does not delay HBIG administration beyond 14 days after last exposure. In one study, 27% of regular sexual partners (heterosexual) were positive for HBsAg or anti-HBs at the time they presented for evaluation (*5*). Among homosexually active males, over 50% have markers indicating prior infection, and 5%-6% are HBsAg positive (*2*). Testing for anti-HBc is the most efficient prescreening test to use in this population group.

A single dose of HBIG (0.06 ml/kg or 5 ml for adults) is recommended for susceptible individuals who have had sexual contact with an HBsAg-positive persons if HBIG can be given within 14 days of the last sexual contact, and for persons who will continue to have sexual contact with an individual with acute HB before loss of HBsAg in that individual (Table 1). In exposures between heterosexuals, a second HBIG dose should be given if the index patient remains HBsAg-positive 3 months after detection. If the index patient is a known HBV carrier or remains HBsAg-positive for 6 months, HB vaccine should be offered to regular sexual contacts. For exposures among homosexual men, the HB vaccine series should be initiated at the time HBIG is given following a sexual exposure, since HB vaccine is recommended for all susceptible homosexual men (*2*). Additional doses of HBIG are unnecessary if vaccine is given. Because current lots of IG contain anti-HBs, it remains an important alternative to HBIG when HBIG is unavailable.

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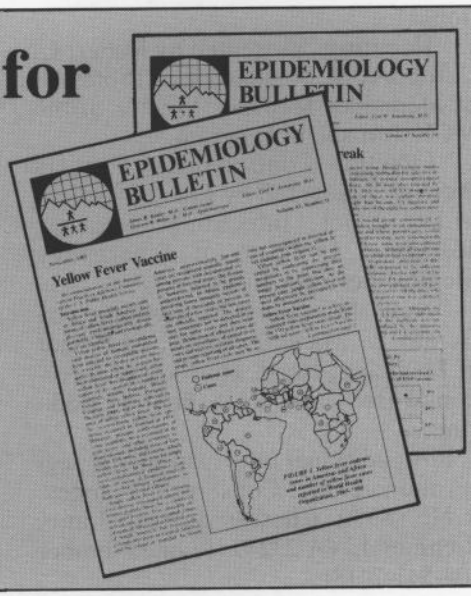
Continued to page 5

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 Health Protection and Environmental Management, Room 700, 109 Governor Street, Richmond, Virginia 23219.*



Foodborne Campylobacter Outbreak

During June several cases of diarrheal illness caused by *Campylobacter jejuni* were linked to a single restaurant meal in a Virginia resort city. Investigation of the first reported cases has led to identification of several different parties of diners involved. The Division of Epidemiology is interested in finding other individuals who visited the city of Virginia Beach during Memorial Day weekend and experienced diarrheal illness due to *Campylobactor* with two (2) weeks after a seafood restaurant meal. Reports of such illness should be forwarded (mail or phone) to the Regional Epidemiologist, Eastern Regional Office, State Health Department, Suite 203, 5700 Thurston Avenue, Virginia Beach, Virginia 23455 (804-460-5314).

Symposium on Hospital Infection Control

The Tenth Annual Symposium for Clinicians on Hospital Infection Control will be held November 15-16, 1984 at the Boar's Head Inn in Charlottesville. Among the topics to be presented are "Cytomegalovirus-Risk to Employees and Patients", "Evolutionary History of Diseases Transmitted from Animals to Man", "DRG's—Implications for Infection Control", "Human T Cell Leukemia Virus—Implications for Infection Control in the Hospital", and a special presentation on "Australia Antigen and the Discovery of the Hepatitis B Vaccine" to be given by Baruch S. Blumberg, M.D., Ph.D., recipient of the 1976 Nobel Prize in Physiology or Medicine for discoveries concerning new mechanisms of the origin and dissemination of infectious diseases.

For registration or additional information contact Stella King, Hospital Epidemiology Secretary, Box 473, University of Virginia Medical Center, Charlottesville, VA 22908 (Phone number 804-924-2777 or 924-2143).

Continued from page 4

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Reprinted from MMWR 1984;33:285-90.

Table 3. Routine pediatric vaccination schedule and HBV prophylaxis for infants of HBsAg-positive mothers

Age (months)	Hepatitis B prevention schedule	HBV marker screening	Routine pediatric schedule
Birth	HBIG* HB vaccine†		
1	HB vaccine		
2			DPT§, Polio
4			DPT, Polio
6	HB vaccine	HBsAg test¶ **	DPT
12-15		HBsAg** & anti-HBs†† test	
15			MMR§§
18			DPT, Polio

**Hepatitis B immune globulin 0.5 ml IM within 12 hours of birth.*
†HB vaccine 0.5 ml IM within 7 days of birth.
§Diphtheria-tetanus-pertussis.
¶Optional. If positive, indicates infection, and a third HB vaccine dose need not be given.
***HBsAg-positive indicates therapeutic failure.*
††Anti-HBs-positive indicates therapeutic success.
§§Measles-mumps-rubella.

Month: July; 1984

Disease	State				Mean 5 Year To Date	Regions				
	This Month	Last Month	Total to Date 1984	1983		This Month N.W.	N.	S.W.	C.	E.
Measles	1	0	3	23	118	1	0	0	0	0
Mumps	3	4	15	25	59	1	0	1	0	1
Pertussis	3	2	12	44	16	2	0	1	0	0
Rubella	0	0	0	1	50	0	0	0	0	0
Meningitis—Aseptic	28	16	90	86	70	9	9	4	5	1
**Bacterial	19	22	157	164	125	5	1	4	5	4
Hepatitis A (Infectious)	7	9	62	76	125	1	2	1	0	3
B (Serum)	41	47	288	331	285	5	13	9	9	5
Non-A, Non-B	3	7	58	50	*33	0	1	2	0	0
Salmonellosis	169	129	651	692	678	22	38	32	39	38
Shigellosis	13	11	132	86	278	5	3	0	0	5
Campylobacter Infections	75	67	320	281	*132	18	23	4	9	21
Tuberculosis	23	46	246	265	—	—	—	—	—	—
Syphilis (Primary & Secondary)	23	39	240	339	343	0	4	1	9	9
Gonorrhea	1518	1911	11,133	11,403	12,071	—	—	—	—	—
Rocky Mountain Spotted Fever	10	12	25	36	46	1	1	2	4	2
Rabies in Animals	11	12	140	439	163	4	6	1	0	0
Meningococcal Infections	2	7	43	56	53	0	0	0	0	2
Influenza	1	6	1095	885	1429	0	0	1	0	0
Toxic Shock Syndrome	1	0	6	5	5	0	1	0	0	0
Reyes Syndrome	0	1	5	5	11	0	0	0	0	0
Legionellosis	3	5	15	16	9	0	0	1	0	2
Kawasaki's Disease	1	2	9	31	15	0	0	0	0	1
Other:	—	—	—	—	—	—	—	—	—	—

Counties Reporting Animal Rabies: Clarke 1 raccoon; Madison 1 skunk; Orange 2 raccoon; Fairfax 1 raccoon, 1 fox; Loudoun 3 raccoons; Prince William 1 raccoon; Washington 1 skunk.

Occupational Illnesses: Occupational hearing loss 8; occupational dermatoses 1; occupational pneumoconiosis 32; Carpal tunnel syndrome 12; Asbestosis 4; mesothelioma 1.

*4 year mean
**other than meningococcal

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