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Immunization of Health-Care Workers:

Recommendations of the Advisory Committee on Immunization Practices (ACIP) and the Hospital Infection Control Practices Advisory Committee (HICPAC)

Summary

The following article includes excerpts from the MMWR report with the above title (1997:46[No. RR-18]:1-42). This report summarizes recommendations of the Advisory Committee on Immunization Practices (ACIP) concerning the use of certain immunizing agents in health-care workers (HCWs) in the United States. It was prepared in consultation with the Hospital Infection Control Practices Advisory Committee (HICPAC) and is consistent with current HICPAC guidelines for infection control in health-care personnel. This report reflects current ACIP recommendations at the time of publication. ACIP statements on individual vaccines and disease updates should be consulted for more details regarding the epidemiology of the diseases, immunization schedules, vaccine doses, and the safety and efficacy of the vaccines. If you would like a copy of the entire MMWR article, you may call the Office of Epidemiology at 804/786-6261 or visit the Centers for Disease Control and Prevention web site http://www.cdc.gov.

Introduction

Because of their contact with patients or infective material from patients, many health-care workers (HCWs) (e.g., physicians, nurses, emergency medical personnel, dental professionals and students, medical and nursing students, laboratory technicians, hospital volunteers, and administrative staff) are at risk for exposure to and possible transmission of vaccine-preventable diseases. Maintenance of immunity is therefore an essential part of prevention and infection control programs for HCWs. Optimal use of immunizing agents safeguards the health of workers and protects patients from becoming infected through exposure to infected workers.

Any medical facility or health department that provides direct patient care is encouraged to formulate a comprehensive immunization policy for all HCWs. The American Hospital Association has endorsed the concept of immunization programs for both hospital personnel and patients. The following recommendations concerning vaccines of importance to HCWs should be considered during policy development.

Recommendations

Recommendations for administration of vaccines and other immunobiologic agents to HCWs are organized in three broad disease categories:

- those for which active immunization is strongly recommended because of special risks for HCWs (i.e., hepatitis B, influenza, measles, mumps, rubella, and varicella);
- those for which active and/or passive immunization of HCWs may be indicated in certain circumstances (i.e., tuberculosis, hepatitis A, meningococcal disease, typhoid fever, and vaccinia) or in the future (i.e., pertussis); and
- those for which immunization of all or many adults is recommended (i.e., tetanus, diphtheria, and pneumococcal disease).

In This Issue:

Immunization Is Strongly Recommended

ACIP strongly recommends that all HCWs be vaccinated against (or have documented immunity to) hepatitis B, influenza, measles, mumps, rubella, and varicella (Table 1).

Hepatitis B

Any HCW who performs tasks involving contact with blood, blood-contaminated body fluids, other body fluids, or sharps should be vaccinated. Hepatitis B vaccine should always be administered by the intramuscular route in the deltoid muscle with a needle 1-1.5 inches long.

Among health-care professionals, risks for percutaneous and permucosal exposures to blood vary during the training and working career of each person but are often highest during the professional training period. Therefore, vaccination should be completed during training in schools of medicine, dentistry, nursing, laboratory technology, and other allied health professions, before trainees have contact with blood. In addition, the OSHA Federal Standard requires employers to offer hepatitis B vaccine free of charge to employees who are occupationally exposed to blood or other potentially infectious materials. Prevaccination serologic screening for previous infection is not indicated for persons being vaccinated because of occupational risk unless the hospital or health-care organization considers screening cost-effective.

Needlestick or other percutaneous exposures of unvaccinated persons should lead to initiation of the hepatitis B vaccine series. Postexposure prophylaxis should be considered for any percutaneous, ocular, or mucous membrane exposure to blood in the workplace and is determined by the HBsAg status of the source

Table 1. Immunizing agents and immunization schedules strongly recommended for health-care workers (HCWs)

Generic name	Primary schedule and booster(s)	Indications	Major precautions and contraindications	Special considerations
Hepatitis B (HB) recombinant vaccine	Two doses IM 4 weeks apart; third dose 5 months after second; booster doses not necessary.	**Preexposure:** HCWs at risk for exposure to blood or body fluids. **Postexposure:** See Table 2	Previous anaphylactic reaction to common baker's yeast is a contraindication to vaccination.	The vaccine produces neither therapeutic nor adverse effects on HBV-infected persons. On the basis of limited data, no risk of adverse effects to developing fetuses is apparent. Pregnancy should *not* be considered a contraindication to vaccination of women.
Influenza vaccine (inactivated whole-virus and split-virus vaccines)	Annual vaccination with current vaccine. Administered IM.	HCWs who have contact with patients at high risk for influenza or its complications; HCWs who work in chronic care facilities; HCWs with high-risk medical conditions or who are aged ≥65 years; HCWs who will be in the second or third trimester of pregnancy during the influenza season.	History of anaphylactic hypersensitivity to egg ingestion.	No evidence exists of risk to mother or fetus when the vaccine is administered to a pregnant woman with an underlying high-risk condition.
Measles live-virus vaccine	One dose SC; second dose at least 1 month later.	HCWs born during or after 1957 who do not have documentation of having received 2 doses of live vaccine on or after the first birthday **or** a history of physician-diagnosed measles **or** serologic evidence of immunity. Vaccination should be considered for all HCWs who lack proof of immunity, including those born before 1957.	Pregnancy; immunocompromised persons,§ including HIV-infected persons who have evidence of severe immunosuppression; anaphylaxis after gelatin ingestion or administration of neomycin; recent administration of immune globulin.	MMR is the vaccine of choice if recipients are likely to be susceptible to rubella and/or mumps as well as to measles. Persons vaccinated during 1963-1967 with a killed measles vaccine alone, killed vaccine followed by live vaccine, or with a vaccine of unknown type should be revaccinated with 2 doses of live measles virus vaccine.
Mumps live-virus vaccine	One dose SC; no booster.	HCWs believed to be susceptible can be vaccinated. Adults born before 1957 can be considered immune.	Pregnancy; immunocompromised persons;§ history of anaphylactic reaction after gelatin ingestion or administration of neomycin.	MMR is the vaccine of choice if recipients are likely to be susceptible to measles and rubella as well as to mumps.
Rubella live-virus vaccine	One dose SC; no booster.	Indicated for HCWs, both men and women, who do not have documentation of having received live vaccine on or after their first birthday **or** laboratory evidence of immunity. Adults born before 1957, **except women who can become pregnant,** can be considered immune.	Pregnancy; immunocompromised persons;§ history of anaphylactic reaction after administration of neomycin.	If a pregnant woman is vaccinated or if a woman becomes pregnant within 3 months after vaccination, she should be counseled about the theoretical basis for concern for the fetus. The risk for rubella vaccine-associated malformations under these circumstances is negligible and MMR vaccination during pregnancy should not ordinarily be a reason to terminate pregnancy. MMR is the vaccine of choice if recipients are likely to be susceptible to measles or mumps, as well as to rubella.
Varicella zoster live-virus vaccine	Two 0.5 mL doses SC 4-8 weeks apart if ≥13 years of age.	Indicated for HCWs who do not have either a reliable history of varicella or serologic evidence of immunity particularly those who have close contact with persons at high risk for serious complications from varicella.	Pregnancy, immunocompromised persons,§ history of anaphylactic reaction following receipt of neomycin or gelatin. Avoid salicylate use for 6 weeks after vaccination.	Vaccine is available from the manufacturer under a research protocol for special use for certain patients with acute lymphocytic leukemia in remission. Because 71%-93% of persons without a history of varicella are immune, serologic testing before vaccination is likely to be cost-effective.
Varicella zoster immune globulin (VZIG)	Persons <50 kg: 125 µ/10 kg IM; persons ≥50 kg: 625 µ.‡	Persons known or likely to be susceptible (particularly those at high risk for complications, e.g., pregnant women) who have close and prolonged exposure to a contact case or to an infectious hospital staff worker or patient.		Serologic testing may help in assessing whether to administer VZIG. If use of VZIG prevents varicella disease, patient should be vaccinated subsequently.

§Persons immunocompromised because of immune deficiency diseases, HIV infection, leukemia, lymphoma or generalized malignancy or immunosuppressed as a result of therapy with corticosteroids, alkylating drugs, antimetabolites, or radiation.
‡Some experts recommend 125 µ/10 kg regardless of total body weight.
Abbreviations: IM = intramuscular;SC = subcutaneous; MMR = measles, mumps, rubella vaccine.

and the vaccination and vaccine-response status of the exposed person (Table 2).

If the source of exposure is HBsAg-positive and the exposed person is unvaccinated, HBIG also should be administered as soon as possible after exposure (preferably within 24 hours) and the vaccine series started. The effectiveness of HBIG when administered >7 days after percutaneous or permucosal exposures is unknown. If the exposed person had an adequate antibody response (≥10 mlU/mL) documented after vaccination, no testing or treatment is needed, although administration of a booster dose of vaccine can be considered.

One to 2 months after completion of the 3-dose vaccination series, HCWs who have contact with patients or blood and are at ongoing risk for injuries with sharp instruments or needlesticks should be tested for antibody to hepatitis B surface antigen (anti-HBs). Persons who do not respond to the primary vaccine series should complete a second three-dose vaccine series or be evaluated to determine if they are HBsAg-positive. Revaccinated persons should be retested at the completion of the second vaccine series. Persons who prove to be HBsAg-positive should be counseled accordingly. Primary non-responders to vaccination who are HBsAg-negative should be considered susceptible to HBV infection and should be counseled regarding precautions to prevent HBV infection and the need to obtain HBIG prophylaxis for any known or probable parenteral exposure to HBsAg-positive blood (Table 2). Booster doses of hepatitis B vaccine are not considered necessary, and periodic serologic testing to monitor antibody concentrations after completion of the vaccine series is not recommended.

Table 2. Recommended postexposure prophylaxis for percutaneous or permucosal exposure to hepatitis B (HB) virus, United States

Vaccination and antibody response status of exposed person	Treatment when source is		
	HBsAG* positive	HBsAG negative	Source not tested or status unknown
Unvaccinated	HBIG† x 1; initiate HB vaccine series	Initiate HB vaccine series	Initiate HB vaccine series
Previously vaccinated:			
Known responder‡	No treatment	No treatment	No treatment
Known non-responder‡	HBIG x 2 or HBIG x 1 and initiate revaccination	No treatment	If known high-risk source, treat as if source were HBsAG positive
Antibody response unknown	Test exposed person for anti-HBs** 1. If adequate,‡ no treatment 2. If inadequate,‡ HBIG x 1 and vaccine booster	No treatment	Test exposed person for anti-HBs 1. If adequate,‡ no treatment 2. If inadequate,‡ initiate revaccination

*Hepatitis B surface antigen.
†Hepatitis B immune globulin; dose 0.06 mL/kg intramuscularly as soon as possible after exposure. A second dose of HBIG should be administered one month later if HB vaccine series has not been started.
‡Responder is defined as a person with adequate levels of serum antibody to hepatitis B surface antigen (i.e., anti-HBs ≥ 10 mlU/mL); inadequate response to vaccination defined as serum anti-HBs < 10 mlU/mL.
**Antibody to hepatitis B surface antigen.

Influenza

To reduce staff illnesses and absenteeism during the influenza season and to reduce the spread of influenza to and from workers and patients, the following HCWs should be vaccinated in the fall of each year:

- Persons who attend patients at high risk for complications of influenza (whether the care is provided at home or in a health-care facility);
- Persons aged ≥65 years;
- Persons with certain chronic medical conditions (e.g., persons who have chronic disorders of the cardiovascular or pulmonary systems; persons who required medical follow-up or hospitalization within the preceding year because of chronic metabolic disease [including diabetes], renal dysfunction, hemoglobinopathies, or immunosuppression [including HIV infection]);
- Pregnant women who will be in the second or third trimester of pregnancy during influenza season.

Measles, Mumps, and Rubella

Persons who work within medical facilities should be immune to measles and rubella. Immunity to mumps is highly desirable for all HCWs. Because any HCW who is susceptible can, if exposed, contract and transmit measles or rubella, all medical institutions should ensure that those who work within their facilities are immune to measles and rubella. Likewise, HCWs have a responsibility to avoid causing harm to patients by preventing transmission of these diseases.

Persons born in 1957 or later can be considered immune to measles, mumps, or rubella only if they have documentation of a) physician-diagnosed measles or mumps disease; or b) laboratory evidence of measles, mumps, or rubella immunity (persons who have an "indeterminate" level of immunity upon testing should be considered nonimmune); or c) appropriate vaccination against measles, mumps, and rubella (i.e., administration on or after the first birthday of two doses of live measles vaccine separated by ≥28 days, at least one dose of live mumps vaccine, and at least one dose of live rubella vaccine).

Although birth before 1957 generally is considered acceptable evidence of measles and rubella immunity, health-care facilities should consider recommending a dose of measles-mumps-rubella (MMR) vaccine to unvaccinated workers born before 1957 who are in either of the following categories: a) those who do not have a history of measles disease or laboratory evidence of measles immunity, and b) those who lack laboratory evidence of rubella immunity. Rubella vaccination or laboratory evidence of rubella immunity is particularly important for female HCWs born before 1957 who can become pregnant.

Serologic screening need not be done before vaccinating against measles and rubella unless the health-care facility considers it cost-effective. Serologic testing is not necessary for persons who have documentation of appropriate vaccination or other acceptable evidence of immunity to measles and rubella. Serologic testing before vaccination is appropriate only if tested persons identified as nonimmune are subsequently vaccinated in a timely manner, and should **not** be done if the return and timely vaccination of those screened cannot be ensured. Likewise, during outbreaks of measles, rubella, or mumps, serologic screening before vaccination is not recommended because rapid vaccination is necessary to halt disease transmission.

MMR trivalent vaccine is the vaccine of choice. If the recipient has acceptable evidence of immunity to one or more of the components, monovalent or bivalent vaccines may be used. MMR or its component vaccines should not be administered to women known to be pregnant. For theoretical reasons, a risk to the fetus

from administration of live virus vaccines cannot be excluded. Therefore, women should be counseled to avoid pregnancy for 30 days after administration of monovalent measles or mumps vaccines and for 3 months after administration of MMR or other rubella- containing vaccines. Routine precautions for vaccinating postpubertal women with MMR or its component vaccines include a) asking if they are or may be pregnant, b) not vaccinating those who say they are or may be pregnant, and c) vaccinating those who state that they are not pregnant after the potential risk to the fetus is explained. If a pregnant woman is vaccinated or if a woman becomes pregnant within 3 months after vaccination, she should be counseled about the theoretical basis of concern for the fetus, but MMR vaccination during pregnancy should not ordinarily be a reason to consider termination of pregnancy. Rubella-susceptible women from whom vaccine is withheld because they state they are or may be pregnant should be counseled about the potential risk for congenital rubella syndrome and the importance of being vaccinated as soon as they are no longer pregnant. Measles vaccine is not recommended for HIV-infected persons with evidence of severe immunosuppression.

Varicella

All HCWs should ensure that they are immune to varicella. Varicella immunization is particularly recommended for susceptible HCWs who have close contact with persons at high risk for serious complications, including a) premature infants born to susceptible mothers, b) infants who are born at <28 weeks of gestation or who weigh ≤1,000 g at birth (regardless of maternal immune status), c) pregnant women, and d) immunocompromised persons.

Serologic screening for varicella immunity before vaccinating those with a negative or uncertain history of varicella is generally cost-effective. Routine postvaccination testing of HCWs for antibodies to varicella is not recommended because ≥90% of vaccinees are seropositive after the second dose of vaccine.

Hospitals should develop guidelines for management of vaccinated HCWs who are exposed to natural varicella. Seroconversion after varicella vaccination does not always result in full protection against disease. Therefore, the following measures should be considered for HCWs who are exposed to natural varicella: a) serologic testing for varicella antibody immediately after exposure; b) retesting 5-6 days later to determine if an anamnestic response is present; and c) possible furlough or reassignment of personnel who do not have detectable varicella antibody. Whether postexposure vaccination protects adults is not known.

Hospitals also should develop guidelines for managing HCWs after varicella vaccination because of the risk for transmission of vaccine virus. Institutions may wish to consider precautions for personnel in whom a rash develops after vaccination and for other vaccinated HCWs who will have contact with susceptible persons at high risk for serious complications.

Other Diseases for Which Immunoprophylaxis Is or May Be Indicated

ACIP does not recommend routine immunization of HCWs against tuberculosis (TB), hepatitis A, pertussis, meningococcal disease, typhoid fever, or vaccinia. However, immunoprophylaxis for these diseases may be indicated for HCWs in certain circumstances.

Tuberculosis and BCG Vaccination of Health-Care Workers in High-Risk Settings

BCG vaccination of HCWs should be considered on an individual basis in health-care settings where all of the following conditions are met:

- a high percentage of TB patients are infected with *M. tuberculosis* strains that are resistant to both isoniazid and rifampin; and
- transmission of such drug-resistant *M. tuberculosis* strains to HCWs is likely; and,
- comprehensive TB infection-control precautions have been implemented and have not been successful.

Vaccination with BCG should not be required for employment or for assignment in specific work areas.

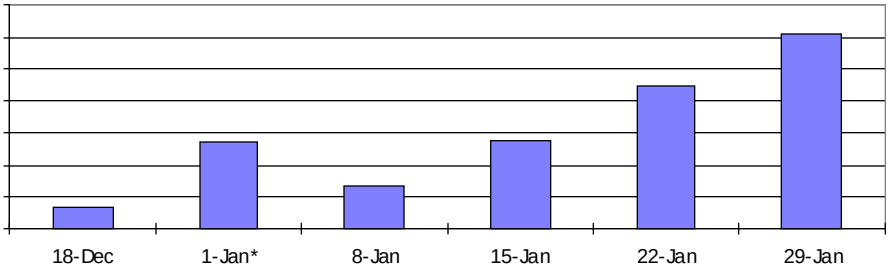
BCG is not recommended for use in HIV-infected persons or persons who are otherwise immunocompromised. In health-care settings where there is a high risk for transmission of *M. tuberculosis* strains resistant to both isoniazid and rifampin, employees and volunteers who are infected with HIV or are otherwise immunocompromised should be fully informed about the risk for acquiring TB infection and disease and the even greater risk for development of active TB disease associated with immunosuppression.

HCWs considered for BCG vaccination should be counseled regarding the risks and benefits of both BCG vaccination and preventive therapy. They should be informed about the variable findings of research regarding the efficacy of BCG vaccination, the interference of BCG vaccination with diagnosis of newly acquired *M. tuberculosis* infection, and the possible serious complications of BCG vaccine in immunocompromised persons, especially those infected with HIV. They also should be informed about the lack of data regarding the efficacy of preventive therapy for *M. tuberculosis* infections caused by strains resistant to isoniazid and rifampin and the risks for drug toxicity associated with multidrug preventive-therapy regimens. If requested by the employee, employers should offer (but not compel) a work assignment in which an immunocompromised HCW would have the lowest possible risk for infection with *M. tuberculosis.* Managers of health-care facilities should develop written policies to limit activities that might result in exposure of immunocompromised employees to persons with active cases of TB.

BCG vaccination is not recommended for HCWs in low-risk settings. In most areas of the United States, most *M. tuberculosis* isolates (approximately 90%) are fully susceptible to isoniazid or rifampin or both, and the risk for TB transmission in health-care facili-

Flu Corner

Influenza activity in Virginia was characterized as regional from January 1-14, and widespread from January 15-29, 1998. Laboratory-confirmed cases of influenza type A have been reported from the north, northwest and southwest health planning regions. The graph below represents the trend in influenza-like illness cases reported by sentinel physicians throughout the state.



**Two week combined period.*

ties is very low if adequate infection control practices are maintained.

Hepatitis A

Routine preexposure hepatitis A vaccination of HCWs and routine immune globulin (IG) prophylaxis for hospital personnel providing care to patients with hepatitis A are not indicated. Rather, sound hygienic practices should be emphasized. Staff education should emphasize precautions regarding direct contact with potentially infective materials (e.g., hand washing).

In documented outbreaks of hepatitis A, administration of IG to persons who have close contact with infected patients (e.g., HCWs, other patients) is recommended. A single intramuscular dose (0.02 mL per kg) of IG is recommended as soon as possible and ≤2 weeks after exposure. The usefulness of hepatitis A vaccine in controlling outbreaks in health-care settings has not been investigated.

Meningococcal Disease

Routine vaccination of civilians, including HCWs, is not recommended. HCWs who have intensive contact with oropharyngeal secretions of infected patients, and who do not use proper precautions, should receive antimicrobial prophylaxis with rifampin (or sulfonamides, if the organisms isolated are sulfonamide-sensitive). Ciprofloxacin and ceftriaxone are reasonable alternative drugs; ceftriaxone can be administered to pregnant women. *Editor's Note: Chemoprophylaxis is generally limited to medical personnel who performed unprotected mouth-to-mouth resuscitation or who suctioned the patient before antibiotic therapy had begun. Routine prophylaxis of HCWs is not indicated.*

Pertussis

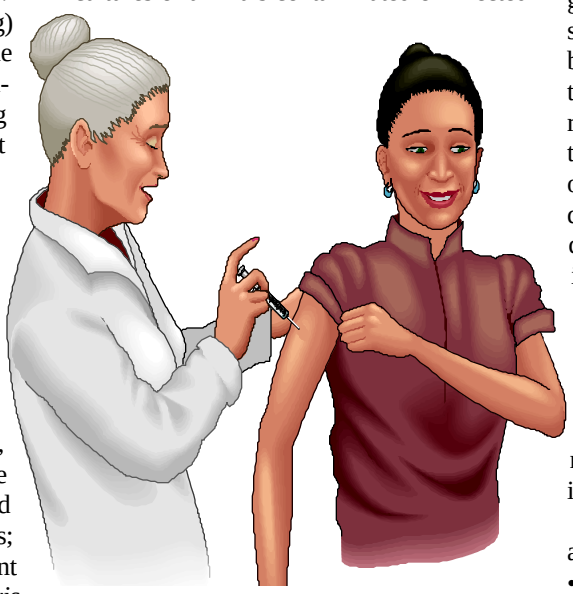
Pertussis vaccines (whole-cell and acellular) are licensed for use only among children aged 6 weeks through 6 years. If acellular pertussis vaccines are licensed for use in adults in the future, booster doses of adult formulations may be recommended to prevent the occurrence and spread of the disease in HCWs.

Typhoid

Workers in microbiology laboratories who frequently work with *S. typhi* should be vaccinated with any one of the three typhoid vaccines distributed in the United States: oral live-attenuated Ty21a vaccine (one enteric-coated capsule taken on alternate days to a total of four capsules), the parenteral heat-phenol inactivated vaccine (two 0.5 mL subcutaneous doses, separated by ≥4 weeks), or the capsular polysaccharide parenteral vaccine (one 0.5 mL intramuscular dose). Under conditions of continued or repeated exposure to *S. typhi*, booster doses are required to maintain immunity, every 5 years if the oral vaccine is used, every 3 years if the heat-phenol inactivated parenteral vaccine is used, and every 2 years if the capsular polysaccharide vaccine is used. Live-attenuated Ty21a vaccine should not be used among immunocompromised persons, including those infected with HIV.

Vaccinia

Vaccinia vaccine is recommended only for the few persons who work with orthopoxviruses (e.g., laboratory workers who directly handle cultures or animals contaminated or infected with vaccinia, recombinant vaccinia viruses, or other orthopoxviruses that replicate readily in humans [e.g., monkeypox, cowpox, and others]). Other HCWs (e.g., physicians and nurses) whose contact with these viruses is limited to contaminated materials (e.g., dressings) and who adhere to appropriate infection control measures are at lower risk for accidental infection than laboratory workers, but may be considered for vaccination. When indicated, vaccinia vaccine should be administered every 10 years. Vaccinia vaccine should not be administered to immunocompromised persons (including persons infected with HIV), persons who have eczema or a history of eczema, or to pregnant women.



Other Vaccine-Preventable Diseases

Health-care workers are not at substantially increased risk than the general adult population for acquiring diphtheria, pneumococcal disease, or tetanus. Therefore, they should seek these immunizations from their primary care provider, according to ACIP recommendations.

Immunization of Immunocompromised HCWs

ACIP has published recommendations for immunization of immunocompromised persons. Specific recommendations for use of vaccines depend upon the type of immunocompromising condition.

Killed or inactivated vaccines do not represent a danger to immunocompromised HCWs and generally should be administered as recommended for workers who are not immunocompromised. Additional vaccines, particularly bacterial polysaccharide vaccines (i.e., *Haemophilus influenzae* type b [Hib] vaccine, pneumococcal vaccine, and meningococcal vaccine), are recommended for persons whose immune function is compromised by anatomic or functional asplenia and certain other conditions. Frequently, the immune response of immunocompromised persons to these vaccine antigens is not as good as that of nonimmunocompromised persons; higher doses or more frequent boosters may be required. Even with these modifications, the immune response may be suboptimal.

Specific recommendations for vaccination of HIV-infected persons have been developed. In general, live virus or live bacterial vaccines should not be administered to HIV-infected persons. However, asymptomatic HCWs need not be tested for HIV infection before administering live virus vaccines.

The following recommendations apply to all HCWs infected with HIV:

- MMR vaccine is recommended for all asymptomatic HIV-infected HCWs who do not have evidence of severe immunosuppression. Administration of MMR to HIV-infected HCWs who are symptomatic, but who do not have evidence of severe immunosuppression, should be considered. Measles vaccine is not recommended for HIV-infected persons with evidence of severe immunosuppression.
- Enhanced inactivated poliovirus vaccine (IPV) is the **only** poliovirus vaccine recommended for HIV-infected persons. Live oral poliovirus vaccine (OPV) **should not** be administered to immunocompromised persons.
- Influenza and pneumococcal vaccines are indicated for all HIV-infected persons (influenza vaccination for persons aged ≥6 months and pneumococcal vaccination for persons aged ≥2 years).

Cases of Selected Notifiable Diseases Reported in Virginia*

Disease	Total Cases Reported, December 1997						Total Cases Reported Statewide, January through December		
	State	Regions					This Year	Last Year	5 Yr Avg
		NW	N	SW	C	E			
AIDS	132	5	26	31	22	48	1177	1212	1248
Campylobacteriosis	68	15	22	14	11	6	644	790	725
Giardiasis	50	3	14	12	9	12	465	405	360
Gonorrhea	795	39	86	101	273	296	8731	9292	12087
Hepatitis A	34	3	17	5	5	4	246	218	194
Hepatitis B	14	2	4	2	2	4	131	163	155
Hepatitis NANB	0	0	0	0	0	0	24	17	33
HIV Infection	122	5	22	12	20	63	998	980	1245
Influenza	2	0	0	2	0	0	460	841	959
Legionellosis	5	2	0	1	0	2	31	54	28
Lyme Disease	3	0	0	0	2	1	64	57	92
Measles	0	0	0	0	0	0	1	3	5
Meningitis, Aseptic	31	4	10	4	1	12	262	234	401
Meningitis, Bacterial†	16	5	4	4	0	3	96	77	104
Meningococcal Infections	2	0	0	1	0	1	60	67	63
Mumps	3	1	2	0	0	0	21	19	39
Pertussis	6	1	1	0	0	4	58	108	54
Rabies in Animals	53	15	23	6	4	5	690	612	450
Rocky Mountain Spotted Fever	1	0	0	1	0	0	23	54	30
Rubella	0	0	0	0	0	0	1	2	0
Salmonellosis	132	39	23	16	22	32	1120	1229	1147
Shigellosis	14	4	9	0	0	1	416	746	569
Syphilis, Early‡	35	2	1	4	15	13	616	798	1194
Tuberculosis	43	4	14	3	9	13	348	349	399

Localities Reporting Animal Rabies This Month: Accomack 2 raccoons; Albemarle 1 fox; Arlington 1 raccoon; Bedford 1 raccoon, 2 skunks; Buckingham 1 skunk; Caroline 1 fox; Charlotte 1 skunk; Culpeper 1 cat, 1 skunk; Fairfax 1 bat, 1 fox, 9 raccoons, 3 skunks; Fauquier 1 raccoon; Frederick 1 raccoon; Grayson 1 skunk; Hanover 1 skunk; Loudoun 1 cat, 3 raccoons, 2 skunks; Lynchburg 1 raccoon; Newport News 1 raccoon; Northampton 1 raccoon; Orange 1 raccoon; Page 1 skunk; Patrick 1 raccoon; Prince William 1 raccoon, 1 skunk; Richmond City 1 raccoon; Rockbridge 1 fox, 1 skunk; Rockingham 1 skunk; Spotsylvania 1 fox, 1 raccoon; Stafford 1 raccoon, 1 skunk; Virginia Beach 1 raccoon.
Occupational Illnesses: Asbestosis 21; Carpal Tunnel Syndrome 47; DeQuervain's Syndrome 2; Hearing Loss 14; Lead Poisoning 6; Pneumoconiosis 11.
*Data for 1997 are provisional. †Other than meningococcal. ‡Includes primary, secondary, and early latent.

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