

Communicable Diseases and Public Health

GLOSSARY

AIDS

Acquired Immune Deficiency Syndrome. A person is considered to have AIDS if, in addition to HIV infection, s/he has one or more of 29 opportunistic infections or a CD4 cell count (a measure of cells important to the immune system) of 200 or fewer per cubic centimeter of blood.

Antibiotic

A medicine that fights bacteria.

Antiviral

A medicine capable of destroying or weakening a virus.

Bacteria

Tiny, one-celled organisms present throughout the environment; some cause disease.

Communicable disease

A disease that can be transmitted from one person or animal to another.

Epidemic

The occurrence of disease within a geographic area or population that exceeds that normally expected.

HIV

Human immunodeficiency virus, a retrovirus that causes the body's immune system to deteriorate.

Immunization

The process by which a person or animal becomes protected against a disease; also called vaccination or inoculation.

BACKGROUND

The term “public health” may refer to (1) the well-being of the population as it pertains to health and disease or (2) the broad system of policies, resources, practices, and programs intended to protect, maintain, and improve the health of the population. Both focus on the health of the population as a whole with an emphasis on preventing illness and attention to the range of factors (physical, behavioral, social, economic) that contribute to poor health in the population.

Evolution of the Public Health System

The public health system in the United States began in the early to mid-1800s in response to epidemics of such infectious diseases as cholera, diphtheria, smallpox, and typhoid. Local health agencies were created to carry out activities (including quarantine, isolation, and vaccination) to control communicable disease. In the late 1800s, state governments created state health boards and agencies, recognizing that environmental and communicable disease threats are not confined by local boundaries.

Communicable Disease Reporting

Infectious diseases still are one of the most common causes of suffering and death, and they impose a significant financial burden on society. Some diseases have been controlled—or eliminated—through prevention, antibiotics, and vaccines. But new diseases constantly appear, and some known diseases are reappearing in forms that resist existing drugs.

In Michigan, physicians, clinical laboratories, primary and secondary schools, child-care centers, and camps are required to report to the local health department the occurrence or suspected occurrence of any disease, condition, or infection identified in the Michigan Communicable Disease Rules. Reportable conditions include AIDS and HIV infection, chlamydia, diphtheria, gonorrhea, hepatitis, measles, meningococcal disease, meningitis, syphilis, and tuberculosis. Michigan health care professionals and laboratories also may report any condition, disease, or infection they believe may threaten public health. The following data on selected communicable diseases in Michigan are from the Michigan Department of Community Health (MDCH) unless otherwise specified.

Vaccine-Preventable Diseases

Many diseases that once were common now are controlled by vaccine. Smallpox was eliminated worldwide in 1977 and vaccination against it no longer is recommended. Poliomyelitis has been eliminated in the western hemisphere, and measles in the United States is at a record low; the organisms that cause these diseases have not disappeared, however, and they will reemerge if vaccination rates drop.

The federal Centers for Disease Control and Prevention (CDC) Advisory Committee on Immunization Practices (ACIP) recommends that all children born in the United

States be vaccinated against diphtheria, tetanus, pertussis, measles, mumps, poliomyelitis, rubella, *Haemophilus influenzae* type b, hepatitis B, varicella (hereafter, chickenpox), and pneumococcal disease. The 2001 National Immunization Survey indicates that 70 percent of Michigan's two-year-olds were fully immunized—this is down from 77 percent in 2000. Recommended immunizations for adults aged 65 years and older include a one-time immunization against pneumococcal disease (including pneumonia), a yearly “flu shot,” and a tetanus-diphtheria vaccine every 10 years.

In Michigan in 2001, there were only about 6,600 reported cases of chickenpox and, for the first time, none of measles.

Meningitis

For reporting purposes, meningitis is grouped into three categories.

- Meningococcal disease includes meningococcal meningitis (inflammation of the membranes surrounding the brain and spinal cord) and meningococemia (infection in the bloodstream).
- Bacterial meningitis pertains to types of bacterial meningitis *other* than meningococcal disease.
- Viral meningitis is the most common form of meningitis, but it is the least severe and usually resolves itself.

In Michigan from 1996 through 2001, the average number of reported cases of meningococcal disease and other types of bacterial meningitis were 67 and 203 cases, respectively. Reported cases in the third category, viral meningitis, appear to increase in three-year cycles: There were 1,561 cases in 1998 and 2,542 cases in 2001.

The bacteria and viruses that cause meningitis are spread by direct contact with nose and throat secretions, usually through kissing, coughing, sneezing, and sharing drinks, cigarettes, and food. Children aged under four years and adolescents and young adults aged 15–24 are at higher risk than others for meningococcal disease. A vaccine is available that can prevent some but not all cases. In 1999 the ACIP recommended that (1) college freshman and their parents be given information about meningococcal disease and the benefits of vaccination, and (2) vaccinations be provided or made easily available to freshmen who wish to reduce their risk of disease.

Early diagnosis and treatment of meningococcal disease and other forms of bacterial meningitis are very important. Antibiotics have decreased mortality rates from 60 percent in the 1930s to 10–13 percent today, but people who recover may suffer permanent hearing loss, kidney failure, or brain injury.

Tuberculosis

Tuberculosis (TB) is a communicable disease spread through airborne respiratory secretions (droplets), usually from a cough or sneeze. The bacteria may stay in the human body for many years before causing active disease, and people who are infected but not yet sick may take medicine so that they never develop it. People who have the disease may be treated and cured, but if TB patients do not take the medicine as prescribed, the bacteria may become resistant to the medication. Sometimes the bacteria become resistant to more than one drug (multi-drug resistant TB).

At higher risk than others are people aged over 65, those with weakened immune systems (e.g., the homeless, alcoholics, substance abusers, people with HIV/AIDS) and those born in countries that have high TB prevalence.

Infectious disease

A disease caused by an infectious agent; many are communicable.

Meningitis

Inflammation of the brain and spinal cord that can result in permanent brain damage and death.

Opportunistic infection

A serious and unusual disease (e.g., rare type of cancer or pneumonia) that is virtually absent among people with a healthy immune system.

Outbreak

Sudden appearance of a disease in a specific geographic area or population.

Pandemic

An epidemic occurring over a very large area.

Sexually transmitted disease

A disease caused by any one of more than 25 infectious organisms transmitted primarily through sexual activity.

Tuberculosis (TB) disease

An illness in which TB bacteria multiply and attack any part of the body but usually the lungs; TB is spread through the air.

Vaccine

A product that produces immunity to a specific disease.

Virus

A tiny organism that multiplies within cells and causes disease; viruses are not affected by antibiotics, the drugs used to kill bacteria.

Measures to prevent the spread of TB include limited use of a vaccine in certain high-risk populations and testing/treating people in regular contact with an infected person. Early detection and treatment of infection reduces TB transmission to others.

National TB rates declined steadily from 1953 until 1985, when cases began to increase following a sharp cut in TB control resources in the 1970s and the spread of HIV/AIDS in the 1980s. Rates began to decline again after control activities were strengthened in 1992. TB continues to grow globally, with 8 million new cases a year; it causes 2 million deaths annually.

In Michigan the number of active TB cases has been almost level since 1990; 331 cases were reported in 2001—a case rate of 3.3 per 100,000 population. Michigan's case rate for TB consistently is lower than the national rate.

Sexually Transmitted Diseases

Sexually transmitted diseases (STDs) are common in the United States. Women generally suffer more serious STD complications than men, including pelvic inflammatory disease, ectopic pregnancy, infertility, chronic pelvic pain, and cervical cancer from the human papilloma virus. Blacks and Hispanics have higher rates of STD than do whites. STD disproportionately affects adolescents and young adults. In Michigan (2001 data),

- reported cases of chlamydia (30,499) are the highest since reporting began, in 1993;
- reported cases of gonorrhea (17,121) have been declining gradually; and
- reported cases of infectious syphilis (428) are up, reflecting an outbreak in the Detroit area.

Several biological, social, and behavioral factors contribute to the rapid spread of STDs, including

- the presence of only mild or no symptoms, resulting in failure to seek treatment and unknowing transmission to others;
- the stigma associated with STDs and the general reluctance of Americans to discuss sexual behavior;
- the poverty and marginalization of people in high-risk behavior groups (e.g., sex workers, adolescents, prisoners, migrant workers), which reduce their access to health care services; and
- alcohol and drug abuse, which may involve the exchange of sex for drugs, anonymous sex partners, de-

creased motivation and ability to use protection, and lack of interest in medical treatment.

Early STD detection and treatment is essential, and behavior-change counseling is important to prevent recurrence and spreading it to others.

Hepatitis

Hepatitis A, B, and C are the most common types of hepatitis, a viral liver disease. Vaccines are available to prevent hepatitis A and B but not C.

- Disease caused by the hepatitis A virus (HAV) can make people very sick but usually resolves within six months.
- Disease caused by the hepatitis B virus (HBV) is more serious and can cause lifelong infection, cirrhosis of the liver, liver cancer, liver failure, and death. It is spread from person to person through blood or other body fluids and also may be spread from an infected pregnant woman to her fetus. (It is very important that pregnant women be tested for HBV so that if necessary, a baby may be immunized at birth.)
- Disease caused by the hepatitis C virus (HCV) is as serious as that caused by HBV. Hepatitis C usually is transmitted through large or repeated exposures to blood—for example, through needle sharing among drug users. Consistent data are lacking regarding the extent to which sexual activity contributes to HCV transmission. Hepatitis C was discovered in 1989 and is called the “silent epidemic” because it has received little public attention. The number of documented cases is but a fraction of the total number of individuals believed to be infected. As many as 4 million Americans and 200,000 Michiganders may be infected, and the majority of them are unaware of it and the risks it poses to their health. Not only is it important to identify HCV-infected persons so that they may be treated, but, from a public health standpoint, it is critical to counsel them on ways to prevent further transmission.

The 2001 hepatitis data for Michigan are as follows: HAV, 327 cases; HBV, 618 (up from the average of 457/year in the previous five years), and HCV, 4,451 (up dramatically from 339 in 1996).

HIV/AIDS

Since reporting on Acquired Immune Deficiency Syndrome (AIDS) began, in 1981, almost half a million Americans and nearly 22 million people worldwide have died of the disease. In the United States, the number of new infections continues at about 40,000 a year, and the

estimated number of people living with HIV/AIDS has increased to between 800,000 and 900,000. Racial and ethnic minority groups are disproportionately affected by HIV/AIDS and now comprise the majority of new human immunodeficiency virus (HIV) infections, people living with AIDS, and AIDS deaths nationally and in Michigan. An estimated half of all new infections nationally are among people aged under 25.

HIV is *communicable* (capable of being transmitted) and *chronic* (of long duration or slow progression). It is spread through exchange of body fluids (blood, semen, vaginal secretions, and breast milk), most commonly by sexual contact (vaginal, anal, or oral) and sharing dirty needles during intravenous drug use. Babies born to untreated HIV-positive women may be infected (perinatal transmission), but the incidence is greatly reduced when pregnant women adhere to specific therapies. Transmission from HIV-positive blood transfusions is virtually nonexistent in the United States today due to blood screening.

As of January 1, 2002, just under 10,500 people were *reported* to be living with HIV/AIDS in Michigan, but the *estimated* number is 15,500. The number of new HIV-infection diagnoses is about 825 a year, down from about 1,100 cases annually in 1995–97. Perinatal HIV transmission in Michigan dropped from 19 percent in 1993 to 3 percent in 2000, and this is credited to the state's quick adoption of U.S. Public Health Service guidelines for maternal and neonatal Zidovudine use.

HIV deteriorates the body's immune system. Most people with HIV look and feel healthy for years but can transmit the virus to others. Previously, most developed AIDS, the most serious form and final stage of HIV infection, but treatment advances that slow the progression of the disease mean that more people are remaining free of AIDS longer (but the effect's duration is unknown, and as yet there is no cure for HIV or AIDS). The most widely used treatment for HIV/AIDS is highly active antiretroviral therapy (HAART)—combinations of antiretroviral drugs. These therapies cost \$1,000 to \$1,500 a month and require a rigorous regimen and high patient adherence (15–20 tablets daily with periods of fasting). Low-income patients without adequate health insurance have access to drug therapy through AIDS drug-assistance programs that are funded federally and administered by the state.

Currently, avoiding certain behavior (or, put another way, engaging in safe behavior) is the only way to prevent new HIV infection. HIV-prevention programs attempt to elicit safe behavior or reduction of risk; examples of programs include education and information, abstinence programs, counseling for risk reduction, needle-exchange programs,

peer training, HIV testing (because counseling accompanies it), support groups, and media campaigns. No vaccines to prevent HIV infection currently are approved for use; progress is being made, but an effective vaccine is still years away.

DISCUSSION

Generally, there is widespread public support for community-oriented activities to prevent disease and promote health. But opinion differs on how much funding should be allocated, which problems should receive highest priority, and what strategies and activities should be implemented. Conflict between individual rights and the public interest, humanitarian and economic considerations, religious and secular views, and global and local concerns complicate policy decisions related to controlling and preventing many communicable diseases.

Investing in Public Health

In 1988 the Institute of Medicine Committee for the Study of the Future of Public Health warned that “public health in the United States has been taken for granted, many public health issues have become inappropriately politicized, and public health responsibilities have become so fragmented that deliberate action is often difficult if not impossible.” Today, public health professionals and advocates reiterate these concerns and assert that investment in the public health system results in lower health care costs in the long run.

Currently, economic decline has prompted state and federal budget reductions, affecting monies available to support public health efforts. But even in good economic times, state expenditures for public health have dropped: In roughly 10 years, public health spending has fallen from 2.29 percent of the Michigan budget to 2.02 percent in FY 2001–02. State and local government officials, health care providers, consumers, insurers, and employers worry about the state's commitment to the health of Michigan residents.

Funding for HIV/AIDS

In Michigan, FY 2001–02 budget cuts resulted in a 3 percent reduction in funding for HIV/AIDS services and a \$600,000 cut from the \$3 million originally set aside for HIV/AIDS testing and counseling.

AIDS activists say that flat or decreased funding is inadequate for prevention; the continuing number of new infections indicates that current prevention efforts are not able to reach everyone in need. They also point out that level funding for care and support programs does not meet

the growing need for services as more people live longer with HIV/AIDS.

Conversely, the watchdog group, Citizens Against Government Waste, maintains that federally funded HIV/AIDS programs are an “epidemic of waste, fraud, abuse and mismanagement” and duplication of funding. They propose that funding be redistributed to areas where it would be more effective, such as vaccine research, international efforts, and drug subsidies. AIDS activists and human rights supporters caution that there continues to be a need for a comprehensive response to HIV and AIDS that includes prevention, care, treatment, and research.

Cost Control

Recent Michigan legislative action and policy shifts intended to contain health care expenditures have fueled debate over the allocation of resources and effectiveness of efforts. Two examples are P.A. 209 of 2000 and the Michigan Pharmaceutical Initiative.

Public Act 209 eliminated the requirement for premarital counseling of couples applying for a marriage license and requires instead that they be given written educational materials on prenatal care and on the transmission/prevention of venereal disease and HIV infection. Opponents of this change argue that required counseling was an opportunity to encourage risk-reduction behavior and provide information on HIV and STD for many who otherwise would not get the information, and they suggest that most individuals will not read written materials. Supporters of the law contend that requiring counseling was an ineffective use of prevention resources and placed an unnecessary burden on the marriage-licensing system.

The legislature directed the MDCH to develop the Michigan Pharmaceutical Initiative, a state-approved formulary (drug list) from which prescriptions paid for by state-sponsored medical programs must be selected. Opponents fear that only the least expensive drugs will be on the list, and, depending on the patient, may not be as effective as others or may have more serious side effects. AIDS advocacy groups point out that treatment with combinations of antiretroviral medications is very complex, and a drug formulary may restrict the flexibility to make the adjustments patients need. The plan’s supporters contend that it will help the state to control rising drug costs, and patients will be able to obtain prior authorization if an unlisted drug is medically necessary.

Meningitis: The Power of Public Attention

The level of public concern about a particular health problem often drives health policy and legislation. While deaths from meningococcal disease are many fewer than

from some other communicable diseases (AIDS, hepatitis C), the sudden death of an apparently healthy, young adult due to meningitis captures public attention, raises fears, and stimulates a call for a response.

Public Act 163 of 2001 requires the MDCH to promote dissemination of certain information about meningococcal disease (and other vaccine-preventable diseases) to Michigan high schools and colleges. Supporters point out that the legislation implements some of the ACIP’s recommendations. Some argue that the new law does not go far enough, contending that all entering freshmen who live in dormitories or residential halls should be vaccinated. Yet the infection rate—even though it is higher than that of the general population—still is less than half the threshold that the CDC recommends for initiating a meningococcal vaccination campaign.

Meanwhile, complacency regarding the HIV/AIDS epidemic and lack of awareness about the spread of hepatitis C frustrate public health officials and advocates who see a need for stronger action on these issues.

Immunizations: Maintaining Public Health Gains

Many of the advances against public health problems are taken for granted, such as safe water and protection against former epidemic diseases, but public health officials warn that continuing vigilance is needed to preserve the gains that have been won. The national increase in TB during the mid-1980s is attributed in part to reduced TB control activities. Measles outbreaks—for which effective vaccination is available—continue to occur in populations where the immunization level is low.

Michigan law requires children to be inoculated before or upon school entry against polio, measles, mumps, rubella, hepatitis B, diphtheria, tetanus, pertussis, and, beginning with the 2002–03 school year, chickenpox. In addition, children entering sixth grade or enrolling in a school for the first time must present documentation that they have received, are receiving, or object to certain immunizations. Schools must report student immunization status to public health officials.

As a result of a supply shortage in the United States for some childhood vaccines, the 2002 ACIP guidelines recommend deferring some doses of tetanus, diphtheria, pertussis, and pneumonia vaccines until the supplies have been restored. The CDC indicates that the shortages may lead to increased illness and are a cause for concern but not panic. Health providers are frustrated because they see their attempts to increase immunization levels being undermined, and they fear that parents will not return to get their children immunized when the vaccines are avail-

able. Some providers call for developing backup systems to guarantee adequate supplies in the future, particularly when there is only one manufacturer of a vaccine. They point out that money spent on vaccinations saves much more in health care costs.

Sometimes concerns are raised about adverse effects from vaccines. Some health professionals fear that these concerns may threaten the gains made in immunization levels. They point out that while no vaccine is entirely free from side effects, vaccines are held to a higher standard of safety than other medicines, and numerous studies demonstrate their safety and effectiveness.

Preventing STD, HIV, and Hepatitis C

Because STDs, HIV, and hepatitis C are transmitted through sexual contact and/or injecting drug use, prevention strategies are controversial.

Sexual Abstinence versus Safer Sex

Some people advocate abstinence-only education while others promote both abstinence-based education and safer-sex education (e.g., effective condom use). As evidence of the success of abstinence-only education, Michigan Abstinence Partnership (MAP) supporters point to Michigan's significant drop in its teen pregnancy rate since the MAP began, in 1993.

Supporters of safer-sex education argue that Michigan's declining teen pregnancy rate could be due to factors other than MAP; they contend that it is a fact that many teens engage in sex and, to prevent pregnancy as well as STDs and HIV, they should be educated about how to protect themselves. Supporters of abstinence-only education fear that teaching students how to engage in safer sex promotes sexual activity; opponents point to evidence that after being educated about condom use, youths do increase condom use but not their sexual activity.

Supporters of abstinence-only education point out condoms are not 100 percent effective (due to improper use, breakage, and slippage) in preventing HIV and STDs and claim that promoting condom use is misleading if not dangerous. Supporters of safer-sex education respond that condoms do prevent transmission when used correctly, and people who are sexually active should be taught to use all the means available to protect themselves. They point to the gonorrhea decline as evidence that safer-sex education programs are effective.

Syringe and Needle Exchange

Since intravenous drug users make up a sizable proportion of HIV/AIDS and hepatitis C populations, prevention among this group is vitally important in slowing transmis-

sion of HIV and HCV. Syringe/needle-exchange programs are proven successful in reducing the risky behavior (sharing dirty needles and syringes) among intravenous drug users, but such programs rarely are supported with public funding because the risky behavior involves illegal drug use. The two programs operating in Michigan are supported by private funding. In support of public funding, advocates point to the programs' success. Opponents argue that the programs, by providing drug paraphernalia, are at the very least evincing a benign view of illegal and destructive behavior if not actually promoting it.

Individual Privacy and Disease Surveillance

All states require that AIDS cases be reported to public health authorities, but only some—including Michigan—require HIV cases to be reported as well. Some health authorities and others call for national HIV reporting (using names or codes), but others, and many people living with HIV/AIDS, fear that this could erode confidentiality rights. Proponents of wider reporting argue that not having a full HIV-surveillance system deprives health authorities of reliable information about the incidence, prevalence, and trends in HIV infection, types of behavior that increase transmission risk, or trends in specific subpopulations (e.g., minorities, women). Because of the stigma associated with HIV/AIDS, opponents fear that stricter monitoring and reporting could increase the risk of discrimination in housing, insurance, and employment as well as invade personal privacy. Opponents also worry that increased monitoring and reporting will deter people from being tested, which could result in more transmission, delayed treatment, and higher costs. The same arguments apply to reporting of other communicable diseases such as STDs and hepatitis C.

Global Health

State and local policymakers addressing communicable disease issues must deal with increasing complexity because of the permeable nature of local, state, and international borders. In an age of rapid transit and increasing mobility worldwide, a communicable disease outbreak in one country can quickly become a local threat in another.

See also Emergency Preparedness and Response; Substance Abuse.

FOR ADDITIONAL INFORMATION

AIDS Education Global Information System (AEGIS)
www.aegis.com
 [one of the largest Web HIV/AIDS information sources]

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