Immunization and Communicable Disease

Health Objective for the Year 2010: Prevent disease, disability, and death from infectious diseases, including vaccine-preventable diseases.

Health Implications

Immunizations

Few measures in public health can compare with the benefits of vaccines. For each dollar spent on the measles, mumps, and rubella vaccine (MMR), $13.50 is saved. Polio vaccine yields $6.10 in savings for every dollar spent.[1] These same kinds of savings accrue for each vaccine that is part of the recommended immunizations for both children and adults. These cost savings include prevention of work loss by parents to take care of ill children, and prevention of lost earnings from disability and prevention of death. All the vaccines routinely recommended for children are highly cost saving. On average, more than 2,000 immunizations are given each month through the Lincoln–Lancaster County Health Department's immunization program, and the cost saving each month would amount to over $13,000.

The ravaging effects of preventable disease, primarily among our youth, have taught us that vaccines can play a powerful role in preventing the debilitating and, in some cases, fatal effects of infectious diseases. During one year in the 1960s, more than 20,000 infants were born with major malformations, including deafness, blindness, congenital heart disease, and mental retardation, because their mothers were infected with rubella virus during pregnancy. The organisms have not disappeared. They have receded into the background, due to the remarkable effect that vaccines have had in preventing them, but they will reemerge if vaccination coverage levels drop. The serious health burden of vaccine-preventable diseases (VPDs) is evident from the measles resurgence of 1989 to 1991, which resulted in at least 55,000 cases, over 11,000 hospitalizations, and more than 120 deaths. More than $100 million was spent on direct medical care costs.

Approximately 45,000 adults die each year from complications associated with pneumococcal disease and influenza. With the aging of our population, increasing numbers of adults will be at risk for these major causes of death and illness. Persons with high-risk conditions (e.g., heart disease, diabetes, chronic respiratory disease, and asthma) remain at increased risk, as do persons living in institutional settings. Vaccination is an effective strategy to reduce illness and deaths due to pneumococcal disease and influenza.

Vaccines protect more than the vaccinated individual; they protect society as well. When immunization

Table 1. Immunization and Communicable Disease Indicators

	Lancaster Recent	Lancaster Objective 2010	Nebraska Recent	Nebraska Objective 2010	National Recent	National Objective 2010[1]
Percent immunization coverage among children 19–35 months of age (public health clinics)	74.0[2]	90.0	72.0[2]	--	76.0[3]	90.0
Incidence of hepatitis C per 100,000 population	1.3[4]	1.0	0.3[5]	--	3.7[6]	1.0
Incidence of tuberculosis per 100,000 population	2.1[4]	1.0	1.9[5]	--	8.0[7]	1.0
Incidence of HIV-1 per 100,000 population	7.3[4]	5.0	4.6[5]	--	--	--
Incidence of hepatitis B per 100,000 population	2.1[4]	1.0	1.4[5]	--	22.9[6]	--
Percent of children enrolled in a fully functional population-based immunization registry (birth through age 5)	0[8]	50.0	--	--	--	--
Percent immunization coverage for children in licensed day care facilities	55.0[9]	95.0	55.0[9]	--	95.0[10]	95.0
Percent of adults 65 years of age and older reporting getting flu immunization	73.2[11]	90.0	64.0[12]	--	65.9[13]	90.0

levels in a community are high, the few who cannot be vaccinated, such as those too young for vaccination and those who have legitimate contraindications to immunization, are often indirectly protected because they are surrounded by vaccinated persons and do not get exposed to disease (herd immunity).

Communicable Diseases

Illness, disability, lost productivity, and death associated with infectious diseases can have a significant impact on individuals, families, and the community. Reporting of infectious disease is fundamental to preventing further spread of disease, determining common source outbreaks, identifying emerging disease, assuring appropriate medical therapy, and planning and evaluating disease prevention and control programs. Such information is basic for determining short-term and long-term trends and for establishing the magnitude of disease in the community. In an era of tight cost containment, accurate and consistent disease reporting is essential to facilitate the establishment of meaningful program priorities.

The ability to rapidly respond to a disease outbreak is the most important aspect of a good surveillance and reporting system. Without the ability to respond quickly and effectively, the capacity to limit disease spread within the community is compromised. The implementation of current technology into communicable disease programs will help facilitate the ability of local health departments to identify and respond quickly to disease outbreaks.

Current Status and Trends

Immunizations

In general, significant progress has been made in reducing indigenous cases of vaccine-preventable diseases (VPDs). Nationally, according to provisional 1997 data, zero cases of wild-virus polio, four cases of congenital rubella syndrome, five cases of diphtheria among people 25 years old and younger, and five cases of tetanus among people less than 25 years old were reported. Measles was reduced from a 1988 baseline of 3,058 cases to only 135, and rubella was reduced from 225 to 161. These VPDs have a Healthy People 2000 goal of zero cases. Mumps, with a Healthy People 2000 goal of 500 cases, was reduced from 4,866 to 612. Pertussis (whooping cough), with a Healthy People 2000 goal of 1,000 cases, has increased from 3,450 in 1988 to 6,568 cases in 1997.

Substantial progress has been made in implementing a strategy to eliminate hepatitis B virus (HBV) transmission in the United States. From 1991 (when routine infant hepatitis B vaccination was first recommended) to 1996, the proportion of 19-month-old to 35-month-old children who have received three doses of hepatitis B vaccine has increased from less than 10% to 82%. Implementation of programs for catch-up vaccination of all adolescents has also recently begun, and state law now requires adolescents to be vaccinated in order to enter school.

Achieving the Year 2000 Objective related to reduction in the incidence of bacterial meningitis was entirely due to introduction of Hib vaccine for infants. The vaccine was first licensed in 1990 for use in infants beginning at age two months. The Hib vaccine is highly effective in protecting individuals against Hib meningitis (the most common form of bacterial meningitis in children). In 1989, eight cases of Hib meningitis were reported in Lancaster County. Between 1990 and 1995, only one case was reported each year. The last case of Hib meningtitis in Lancaster County was reported in 1995.

Immunization coverage levels for children aged 19 to 35 months rose in 1998 to 74%. Recently immunization requirements for schools and daycare settings were expanded to include recently developed vaccines. In 1998 Lancaster County had 82% of its children at one year of age and 55% of its children at two years of age adequately immunized.

The financing of childhood immunizations has been significantly improved as a result of two major initiatives. The Vaccines for Children Program and the Child Health Insurance Program cover children on Medicaid, uninsured children, and American Indian and Alaska Native children. In addition, underinsured children who receive immunizations at federally qualified health centers and rural health clinics are covered. Because free vaccines are provided to needy children, the vaccine cost is not a barrier to receipt of immunizations. Also, the 317 Grant Program and state funds help provide free vaccines for children not covered by the other programs.

Immunization coverage levels among adults vary widely by risk group. Influenza and pneumococcal vaccines are covered by Medicare, thus supporting the feasibility of vaccinating greater numbers of older adults.

Communicable Diseases

A few decades ago experts predicted that the public health significance of infectious diseases would continue to decline in the United States, yet they remain a major source for morbidity and mortality in this country. In addition, we continue to detect new infectious agents and diseases, and diseases considered to be under control have reemerged in recent years. Compounding the problem of emerging infections, antimicrobial resistance is evolving rapidly in a variety of hospital- and community-acquired infections. These trends provide reminders of the importance and potential volatility of infectious diseases at the turn of the century.

The global context of infectious diseases must also be considered. Increases in international travel, importation of foods, improper human and veterinary use of antibiotics in the United States and abroad, and global environmental changes increase the potential for global epidemics of infectious diseases, including emerging and reemerging diseases as well as drug-resistant strains.

Because of their impact on society, infectious diseases require a coordinated strategy to understand, detect, control, and ultimately prevent them. This strategy covers four goal areas: surveillance and response, applied research, infrastructure and training, and prevention and control.

In Lancaster County, local outbreaks of Giardiasis, Shigellosis, E. coli O157:H7, and Pertussis are just some of the reminders that communicable diseases continue to impact our community. In strengthening the areas of surveillance and response, applied research, infrastructure and training, and prevention and control, we are assuring that our community remains capable of effectively preventing and, when necessary, quickly responding to communicable disease outbreaks.

Surveillance, the cornerstone of communicable disease control, is greatly dependent on the cooperation of many in the community. The community's health care providers, laboratories, hospitals, infection-control practitioners, and other professionals report communicable diseases in a timely manner because they understand not only the legal requirement but more important the public health impact. Lancaster County must continue to develop our local reporting system by taking advantage of current and future technologies that will increase the timeliness of reporting to the community's surveillance system.

Our community's population is ever changing, and the health needs of sections of our population present

special needs in the area of communicable diseases. Populations migrating from areas where diseases such as tuberculosis are common have increased the need for communicable disease program services. As immigration into the area continues to increase, the availability of initial health services to assess health status, including administering immunizations and TB testing is increasing in importance as a community need. Although the incidence of tuberculosis is low in Nebraska and Lancaster County, the need for preventive therapy, including "direct observation therapy," has increased.

Health Disparities

Although childhood immunization rates have been historically lower in minority populations, there has been a significant narrowing of the gap. The October 1997 issue of the *Morbidity and Mortality Weekly Report* documents the findings from the National Immunization Survey, and it shows substantial progress toward achieving 1996 Childhood Immunization Initiative coverage goals by racial and ethnic group. Despite this unprecedented progress, efforts to increase vaccination coverage need to be intensified, particularly for children living in poverty.

Rates for some infectious diseases are disproportionate in some minority communities. For example, HIV-1 cases in the African-American and Hispanic communities are at higher rates than their percentage of the population. Tuberculosis is another example of a disease that has higher rates in refugee populations from areas with high endemicity for TB.

Public Health Infrastructure

A fully functional vaccination registry includes the capability to automatically enroll all children at birth, give providers access to complete immunization history, recommend needed immunizations, recall children who are overdue for immunizations, and assess coverage at the practice and geographic level. Optimally, such registries should contain additional important functions, such as automation of the submission of adverse-event reports.

State and community immunization registries will be the cornerstone of our nation's immunization system by 2010. Registries facilitate the timely immunization of children by ensuring that the child's complete vaccination history is available to the health care provider before an office visit. The information that registries contain along with database management capabilities also facilitates several proven methods for increasing immunization coverage: reminder/recall systems and feedback of practice-based coverage levels to immunization providers for example. Registries also provide a simple means for assessment of immunization coverage at the geographic level and population level, thus facilitating efforts to reduce gaps in coverage among subgroups of persons.

Few immunization registries existed before 1992, and little data are available regarding the extent to which they have been implemented. However, a 1997 Center for Disease Control survey showed immunization registries were planned in all states, had been started in at least one public clinic in 44 states, and were active at all public clinic sites in 13 states (unpublished data, CDC).

Recommendations

- Maintain and improve immunization levels in Lincoln–Lancaster County by commiting to making immunizations accessible and available to all children. Promote immunization among populations in the community with low immunization rates by taking advantage of current knowledge and resources to reduce barriers to immunization services.
- Shift current surveillance methods from a paper system of reporting to electronic reporting to increase disease follow-up response time and the ability to prevent further disease spread.
- Provide an easily accessible program for making timely initial health assessments and referrals for individuals who immigrate from other countries to the local community.

Notes

Related discussion or indicators are located in the chapters on *Maternal and Child Health*, *Healthy Children*, *Safe Food*, and *Public Health Emergency Management*.

Table 1

-- Currently no data source.

1. U.S. Dept. of Health and Human Services, Office of Public Health and Science, *Healthy People 2010 Objectives: Draft for Public Comment*, September 1998.
2. Nebraska Health and Human Services System, *Immunization Program Report*, 1999.
3. Americas Children; Key National Indicators of Well-Being, 1999, CDC, 6 January, 2000,
4. Lincoln–Lancaster County Health Department, *Morbidity and Mortality Report*, 1998.
5. Nebraska Health and Human Services System, Public Health Assurance, Communicable Diseases Section, Sexually Transmitted Disease Program. 1998 data provided by program staff.
6. U.S. Dept. of Health and Human Services, *Healthy People 2000 Review 1997, National Health Promotion and Disease Prevention Objectives*. 1995 data from the National Notifiable Disease Surveillance System, Sentinel Countries Surveillance of Acute Viral Hepatitis, Viral Hepatitis Surveillance Program.
7. U.S. Dept. of Health and Human Services, Office of Public Health and Science, *Healthy People 2010 Objectives: Draft for Public Comment*, September 1998. 1996 data from the National TB Surveillance System.
8. There is currently no population-based immunization registry in Lancaster County.
9. Nebraska Health and Human Services System, *Immunization Program Report*, 1999.
10. U.S. Dept. of Health and Human Services, Office of Public Health and Science, *Healthy People 2010 Objectives: Draft for Public Comment*, September 1998. 1995–1996 data from Annual Survey by State Immunization Programs.
11. Lancaster–Lancaster County Health Department, Behavioral Risk Factor Survey, 1999.
12. Nebraska Health and Human Services System, *Behavioral Risk Factor Surveillance System Report,* 1995–96.
13. Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Adult and Community Health, Behavioral Risk Factor Surveillance System Online Prevalence Data, 1995–98. 1998 national BRFS data from tabulation query: <http://www2.cdc.gov/nccdphp/brfss/>

Narrative sources

1. National Immunization Program, Center for Disease Control.