

22. IMMUNIZATION AND INFECTIOUS DISEASES

Goal

Prevent disease, disability, and death from infectious diseases, including vaccine-preventable diseases.

Terminology

Emerging infectious diseases: Diseases of infectious origin whose incidence in humans has increased within the past two decades or threatens to increase in the near future. Recognition of an emerging disease can occur because the disease is present in the population for the first time, the disease has been detected for the first time, or links between an infectious agent and a chronic disease or syndrome have been identified only recently, or the disease or infectious agent is increasing.

Influenza high-risk populations: (1) Persons older than 65 years; and (2) persons with chronic underlying disorders of the cardiovascular, pulmonary, or renal systems, as well as those with metabolic diseases (including diabetes mellitus), severe anemia, and compromised immune function.

Inappropriate rabies postexposure prophylaxis: Any actions that are contrary to current recommendations described by the Centers for Disease Control and Prevention (CDC) (1991. Rabies prevention-United States, 1991. *MMWR* 40:RR-3, pp.1-19).

Overview

The 1990's saw significant progress in infectious disease control in Kentucky, but important challenges remain to be met. Tuberculosis incidence fell from above the national rate to 30 percent below the national rate. However, a multi-year rural outbreak of multi-drug resistant TB was not yet finally terminated, and a new outbreak of an unusually highly communicable strain developed in contiguous areas of Kentucky and Tennessee. A major measles outbreak in 1991-1992 was followed by 6 measles-free years; then measles reappeared in 1999. *Haemophilus influenzae* type b (Hib) meningitis nearly disappeared, but surfaced sporadically in unvaccinated children. Several pertussis outbreaks occurred, partly in communities that do not routinely accept immunization. Hepatitis A and B incidence fell. The surveillance system was modified in 1997 to focus on hepatitis B infections in young children and pregnant women. In 1998, a law was passed requiring prenatal testing for hepatitis B.

An Epidemiology “Rapid Response” team composed of state and local staff has facilitated investigation of outbreaks. Courses to train new members have been conducted in most of the years, and experiences and new developments are shared in annual team conferences.

Immunization coverage among two-year-olds has been measured since 1995 by the National Immunization Survey. Although the results for Kentucky have shown around 80 percent to be up to date, which is slightly above the national average, no significant improvement has been made since 1995. Surveys within Kentucky’s health centers by a fairly similar methodology showed major improvement from 1990 forward, reaching levels over 90 percent. The computerized immunization tracking and recall system available to the health centers is believed responsible for much of the advance. Lack of such a system to serve the private sector is hypothesized to be responsible for lower coverage rates than in the health departments. Currently the Jefferson County Health Department and the University of Louisville are piloting development of a more state-of-the-art tracking system which could serve all sectors.

Adult immunization has not received major federal or state funding support, but modest increases in coverage with influenza and pneumococcal vaccines have been made. Late in the decade, planning began for how the state might respond to a new influenza pandemic.

A newly recognized problem in infectious disease control is that of emerging antibiotic resistance brought about largely by misuse and overuse of antibiotics. Although this problem has been the focus of studies and teaching efforts, there is no indication so far that it is coming under control. However, authority to require surveillance of this situation in hospitals was obtained by regulation in 1997. In 1999, updated recommendations were prepared by the Department for Public Health, with the assistance of infection control staff from hospitals, and issued as “Guidelines for the Prevention and Management of Multidrug-resistant Organisms.”

Progress Toward Year 2000 Objectives

- 20.1 Called for zero incidences of diphtheria, tetanus, polio (wild virus type), measles, rubella, congenital rubella syndrome, and mumps, and no more than ten cases of pertussis.

The only confirmed diphtheria in the 1990’s was an imported case in 1992. Tetanus had a case each in 1990 and in 1991. There may have been a rubella case in 1993 (records are unclear) but no congenital rubella syndrome. Cases of mumps were 4 in 1992, 3 in 1997, and 1 in 1998. The annual pertussis count has ranged from 0 to 142, averaging 49 and showing no tendency to decline. Thus it appears unlikely that this objective can be fully met by the year 2000.

- 20.2 To reduce by 15 percent reduction in the January-through April pneumonia and influenza deaths among people aged 65 and older, a rate of 271 per 100,000 population based on a corrected calculation of the baseline.

The rate for January-April 1997 was 315 per 100,000. The preliminary number of cases in January-April 1998 was 6 percent higher than in 1997, but 1998 population estimates are not yet available for rate calculation. However, the Mid-Decade Review noted annual fluctuations and recommended using a three-year average, so it remains to be seen whether this objective will be met, although it seems unlikely.

- 20.3 To reduce viral hepatitis incidence per 100,000 population to 1.9, 7.9 and 0.8 respectively for hepatitis A, hepatitis B and non-A, non-B hepatitis.

The preliminary 1998 incidence of hepatitis A was 0.7 per 100,000, and for hepatitis B was 1.2 per 100,000. Surveillance has changed to hepatitis C instead of non-A, non-B, and its result was 0.6 per 100,000. Non-A, non-B hepatitis, if measured, would probably have the same result. This objective has been met.

- 20.4 To reduce tuberculosis incidence of no more than 6.0 cases per 100,000 people.

The 1998 incidence of 4.6 per 100,000 surpasses this target. Special population targets were 25 per 100,000 at age 65 and older, and 1 per 100,000 under age 15. The 1998 results are 17.2 and 0.9, respectively, for these age groups, so the targets have been met.

- 20.5 To reduce *Haemophilus influenzae* type b (Hib) meningitis to no more than 1.8 cases per 100,000 people.

The rate has been less than 0.5 cases per 100,000 people since 1992, so the objective has been met.

- 20.6 Increase immunization levels as follows:

- Basic immunization series among children under age two: at least 90 percent.
- Age appropriate immunization levels among day care children: at least 90 percent.
- Full compliance with immunization laws by 95 percent of students in grades kindergarten through 12.
- Annual influenza immunization of at least 75 percent of persons ages 65 and older.

The National Immunization Survey rate for Kentucky for 4 DTP, 3 polio, and 1 MMR among children aged 19 to 35 months began at 80 percent in 1994 and was only 81 percent in the year ending June 30, 1998. It appears unlikely this objective will be reached. For day care in 1998-99, 90 percent of the children aged 19 months or older had 4 DTaP, 3 polio, and 1 MMR. However, this has fluctuated from year to year, so it is not certain that the objective will be met in 2000. It also covers only the vaccines which were required when the objective

was set. Subsequently, Hib vaccination became required. The percentage having a Hib dose after age 12 months as well as the others is 89 percent. At kindergarten entrance in 1997, 95.4 percent were in compliance, despite the recent addition of a second dose measles requirement. The law is now a public health one instead of a school one, and the hepatitis B series is required for kindergarten entrants beginning in 1998. The 1998-99 survey, due to technical problems, does not measure compliance adequately. Compliance is required at all grade levels, but only monitored routinely at kindergarten and sixth grade entry. The sixth grade survey also has technical problems, so it can only measure compliance with the second dose measles requirement rather than full compliance. The 1998-99 result was 94.2 percent, possibly due to problems with the survey, as it had been above 95 percent for the previous 6 years. Flu shots in the preceding 12 months were reported by 61 percent of surveyed persons age 65 and over in 1997, compared to 49 percent in 1992. The target of 75 percent seems unlikely to be met by 2000.

- 20.7 To reduce animal rabies cases to no more than 66 per year.

The number has remained below 66 since 1990 and was 29 in 1997. In the year 2000, this objective is likely to be met.

- 20.8 To reduce the need for post-exposure rabies prophylaxis by 50 percent.

The baseline was the number of 1ml doses of rabies vaccine shipped to Kentucky in FY88 by the then sole manufacturer. By 1994 this had declined 21 percent. For subsequent years, this number is no longer available. However, the number of rabies vaccine post-exposure doses in health centers declined 48 percent from 445 in CY1994 to 229 in FY1998. This is suggestive of the objective being met, but the measurement is not very reliable.

- 20.9 To increase to at least 90 percent the proportion of local health departments that have programs to serve persons at high risk for tuberculosis infection and disease.

This was achieved by 1995, when 97 percent had such programs.

- 20.10 To increase to 85 percent the proportion of people with tuberculosis infection who have completed courses of preventive therapy.

This is unlikely to be achieved; the most recent result, from January-June 1998, was 60.9 percent, lower than the baseline.

2010 Objectives

- 22.1. Reduce indigenous cases of vaccine-preventable disease.**

<u>Disease</u>	<u>1998</u>	<u>2010 Target</u>
Congenital rubella syndrome	0	0
Diphtheria (people <35 years)	0	0
<i>Haemophilus influenzae</i> type b invasive disease (Includes unknown serotype)	7	0
Hepatitis B (people <18 years)	4	0
Measles	0	0
Mumps	1	0
Pertussis (children <7 years)	50	146
Polio (wild-type virus)	0	0
Rubella	0	0
Tetanus (people <35 years)	0	0
Varicella	NA	5,840

Target Setting Method: Use same rates as in national targets (but modify age cut- off for hepatitis B due to when universal infant hepatitis B immunization was introduced in Kentucky).

Data Source: Kentucky Reportable Disease System.

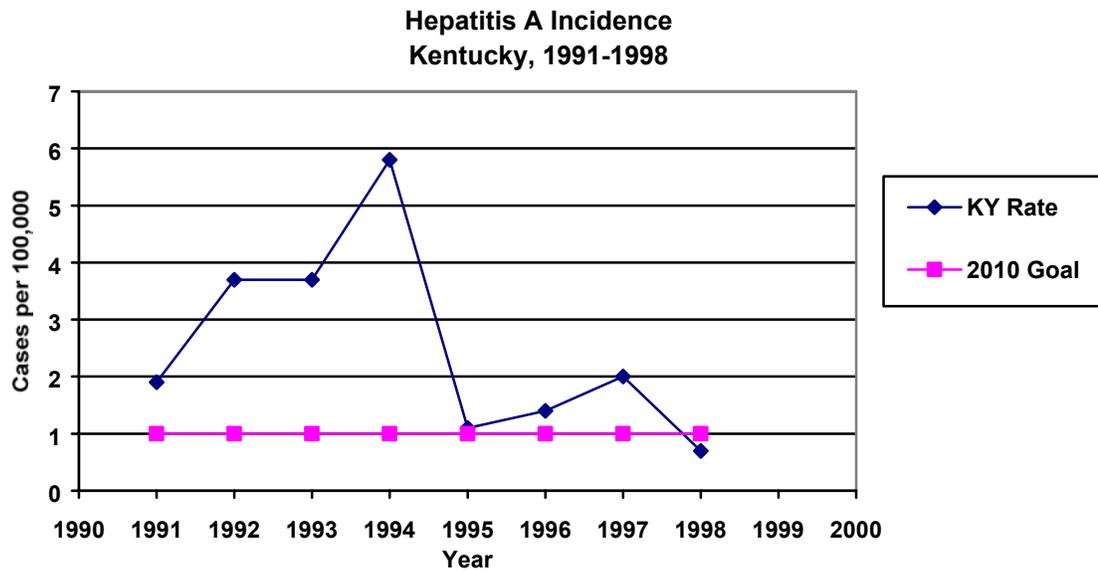
Implementation Strategy:

- Continue to enforce all existing laws and regulations concerning immunization.
- Promptly investigate suspected cases of vaccine-preventable diseases, vaccinate or give prophylaxis to contacts, and restrict activities of infected persons to eliminate exposures.
- Extend immunization information system to be available to all immunization providers statewide.

22.2. Reduce hepatitis A cases to an incidence of no more than 1.0 cases per 100,000.

Target Setting Method: Judgment of what might be achievable. This is a 50 percent reduction from Kentucky's 1997 rate of 2.0 per 100,000, which is less than 10 percent of the national rate. The preliminary 1998 rate of 0.7 is unusually low. The proposed target is just over 7 percent of the national target.

Data Source: Kentucky Reportable Disease System.



Implementation Strategy:

- Promptly investigate suspected cases and administer immune globulin to appropriate contacts.
- Promote hepatitis A vaccination for illegal drug users, men who have sex with men, persons traveling to HAV-endemic counties, persons with occupational risk (as defined by the Centers for Disease Control and Prevention), and persons with chronic liver disease.
- Use hepatitis A vaccine for outbreak control in cases of outbreaks of types for which vaccine has been shown effective.

22.3. Reduce to no more than 6 chronic hepatitis B virus infections in infants (perinatal infections).

Target Setting Method: Same rate as for *Healthy People 2010* target.

Data Sources: Kentucky Reportable Disease System; Perinatal hepatitis B Tracking System.

Implementation Strategy:

- Continue legal requirements to screen pregnant women and report those infected.
- Continue perinatal tracking system, including reminders for appropriate immunization and testing of infants of infected mothers.
- Continue promotion of adolescent hepatitis B immunization for those not immunized earlier in life.

22.4. Reduce to zero cases per 100,000 hepatitis B rates in persons less than 18 years of age (except perinatal infections). (Baseline: 0.4 cases per 100,000 population in 1998.)

Target Setting Method: Same as national target except that cut-off age reflects timing of initiation in Kentucky of universal infant hepatitis B immunization.

Data Source: Kentucky Reportable Disease System.

Implementation Strategy:

- Continue legal requirement for children born October 1, 1992, or later.
- Continue promotion of adolescent hepatitis B immunization for those not immunized earlier in life.
- Conduct epidemiologic investigation of suspected clusters of cases and/or infections.

22.5. Reduce hepatitis B cases per 100,000 in the following age groups:

<u>Age Group</u>	<u>1998</u>	<u>2010 Target</u>
25-39 years	3.1	3.0
≥40 years	6.0	1.0

Target Setting Method: Since the starting levels in Kentucky are much lower than national rates, it is probable that only a 50 percent reduction is achievable (rather than the 75 percent targeted nationally).

Data Source: Kentucky Reportable Disease System.

Implementation Strategy:

- Promotion of immunization of selected high-risk groups (as determined by the Centers for Disease Control and Prevention).
- Epidemiologic investigations of suspected clusters of cases and/or infections.

22.6. Limit newly acquired hepatitis C cases to an incidence of no more than 1 case for 100,000 people. (Baseline: 23 cases per 100,000 population in 1998.)

Target Setting Method: Same as *Healthy People 2010*.

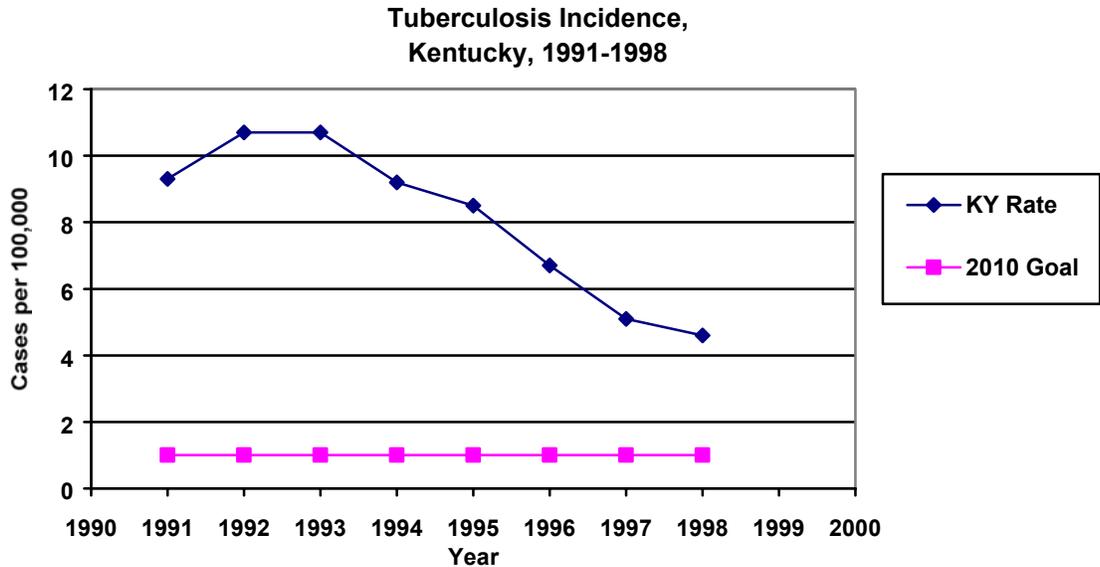
Data Source: Kentucky Reportable Disease System.

Implementation Strategy:

- Education of the public on how to decrease risk factors.

- Epidemiologic investigation of suspected clusters of cases and/or infections.

22.7. Reduce tuberculosis to an incidence of no more than 1.0 per 100,000.



Target Setting Method: Same as *Healthy People 2010*.

Data Source: Kentucky Reportable Disease System.

Implementation Strategy:

- Monitor and emphasize appropriateness of anti-tuberculosis drug regimens.
- Maximize use of directly observed therapy.
- Monitor and emphasize completion of preventive therapy and maximize use of directly observed preventive therapy.
- Conduct prompt and thorough epidemiologic investigation of outbreaks.
- Focus screening on groups of high-risk persons.

22.8. Limit the incidence of invasive pneumococcal infections to 49 per 100,000 persons less than 5 years of age and to 53 per 100,000 persons aged 65 and older.

Target Setting Method: Same as *Healthy People 2010*.

Data Source: Kentucky Hospital Discharge database.

Implementation Strategy:

- Promote acceptance among high-risk group of current pneumococcal vaccine.

- Promote and support universal use in infancy when a safe and effective pneumococcal conjugate vaccine becomes available.

22.9. Limit hospitalization caused by peptic ulcer disease to 57 per 100,000 population.

Target Setting Method: Same as *Healthy People 2010*.

Data Source: Kentucky Hospital Discharge database.

Implementation Strategy:

- Educate health care providers and consumers concerning the possibility of cure of ulcers using appropriate antibiotics.

22.10 Achieve immunization coverage of at least 90 percent among children 19-35 months of age for the following:

- 4 DTaP, 3 polio, 1 MMR, 3 Hib, 3 hepatitis B
- 1 dose of varicella vaccine.

Target Setting Method: Same as *Healthy People 2010*.

Data Source: National Immunization Survey.

Implementation Strategy:

- Continue enforcing all existing laws and regulations concerning immunization.
- Introduce a regulation requiring varicella immunization.
- Extend immunization information system to be available to all immunization providers statewide and promote its use for reminder and recall.

22.11. Achieve immunization coverage of 95 percent for children in licensed day care facilities and children in kindergarten for the following:

- Diphtheria-tetanus-pertussis (4 doses, at least 1 on or after age 4).
- Measles, mumps, rubella (2 doses for kindergarten, 1 dose for children over 16 months of age in day care).
- *Haemophilus influenzae* type b (if under 5 years of age).
- Hepatitis b (3 doses)
- Varicella
- Polio (3 doses)

Target Setting Method: Same as *Healthy People 2010* plus more clarification on number of doses and age.

Data Source: Survey by State Immunization Program.

Implementation Strategy: Same as for Objective 22.10.

22.12. Increase to the following targets the rate of immunization coverage among the following adult groups.

<u>Group and Vaccine</u>	<u>2010 Target</u>
Noninstitutionalized adults 65 years of age or older	
Influenza vaccine	75%
Pneumococcal vaccine	70%
Institutionalized adults in long-term care or nursing homes	
Influenza vaccine	90%
Pneumococcal vaccine	90%

Target Setting Method: Judgment of what might be achievable.

Data Sources: Behavioral Risk Factor Surveillance Survey (BRFSS) for noninstitutionalized adults; Special surveys for long-term care and nursing homes.

Implementation Strategy:

- Educate health care providers and consumers concerning adult immunization.
- If voluntary implementation in long-term care and nursing homes does not appear likely to achieve the target, consider introduction of a regulation.

22.13. Increase to at least 75 percent the proportion of all tuberculosis patients who complete curative therapy within 12 months.

Target Setting Method: Judgment of what might be achievable.

Data Source: National TB Surveillance System.

Implementation Strategy:

- Monitor and emphasize appropriateness of anti-tuberculosis drug regimens.
- Maximize use of directly observed therapy.

22.14. Increase to at least 75 percent the proportion of contacts, including other high-risk persons with tuberculosis infection (as defined by the Centers for Disease Control and Prevention), who complete courses of preventive therapy.

Target Setting Method: Judgment of what might be achievable.

Data Source: Preventive therapy reports from TB coordinators.

Implementation Strategy:

- Monitor and emphasize completion of preventive therapy.
- Maximize use of directly observed preventive therapy.

22.15. (Developmental). **Decrease to 50 the number of inappropriate rabies postexposure prophylaxis, as defined by current Advisory Committee on Immunization Practices (ACIP) guidelines.**

Target-setting method: An approximated 50 percent decline from the current level.

Potential Data Source: Ad hoc survey.

Implementation Strategy: Education of health care providers on rabies prophylaxis.

22.16. (Developmental) **Increase to 50 percent the number of immunization providers who have systematically measured the immunization coverage levels in their practice population.**

Target Setting Method: Judgment of what might be achievable.

Potential Data Source: Ad hoc surveys.

Implementation Strategy:

- Continue to require at least annual coverage assessments of public immunization providers.
- Encourage private providers to have assessments and offer assistance in the process.

22.17. (Developmental) **Increase to 90 percent the number of children enrolled in a fully functional population-based immunization registry (birth through age 5).**

Target Setting Method: Judgment of what might be achievable.

Potential Data Source: Keeping count of participants by age in comparison with population estimates.

Implementation Strategy:

- Extend immunization information system to be available to all immunization providers statewide.
- Emphasize benefits to providers of the system such as easily available information on prior immunizations and automatic printing of immunization certificates.

22.18. Reduce to zero the number of cases of vaccine-associated paralytic polio.

Target Setting Method: Same as *Healthy People 2010* target.

Data Source: Kentucky Reportable Disease System.

Implementation Strategy:

- Discontinue use of oral polio vaccine as soon as recommended by the Centers for Disease Control and Prevention.
- Educate private providers to do the same.

22.19. Reduce to 48 hours the time it takes for a laboratory to confirm and report 75 percent of the number of new tuberculosis cases who have not started drugs at the time of specimen collection.

Target Setting Method: Same as *Healthy People 2010* target (with more precise definition of denominator).

Data Source: State Public Health Laboratory records; Ad hoc survey of other laboratories.

Implementation Strategy:

- Routine use by state public health laboratory of best available and affordable state-of-the-art tests.
- Encourage other laboratories either to use such tests or to use the state public health laboratory.

References

- Recommendations of the Advisory Committee on Immunization Practices (ACIP) (issued on various dates by the Centers for Disease Control and Prevention).
- 1997 Red Book: Report of the Committee on Infectious Diseases, 24th edition, American Academy of Pediatrics.

Contributors

- Clarkson Palmer, MD, MPH, Consultant to the Division of Epidemiology and Health Planning, Department for Public Health, Chapter Coordinator
- Michael Auslander, DVM. MSPH, Assistant Director, Division of Epidemiology and Health Planning, Department for Public Health
- Janet Black, Lake Cumberland District Health Department
- Norma Carlin, Division of Laboratory Services, Department for Public Health
- Sandra Gambescia, Immunization Section, Division of Epidemiology and Health Planning, Department for Public Health
- Linda Jackson, Tuberculosis Section, Division of Epidemiology and Health Planning, Department for Public Health
- Grace Maguire, MD, Department of Pediatrics, University of Kentucky Medical School
- Diane Young, Division of Laboratory Services, Department for Public Health