Infectious Disease Epidemiology

Theory and Practice

— 2005 —

Kenrad E. Nelson, MD
Professor
Departments of Epidemiology, International Health, and Medicine
Johns Hopkins Medical Institutions
Johns Hopkins University
Baltimore, Maryland

Carolyn Masters Williams, PhD, MPH
Epidemiology Branch, Basic Science Program
Division of AIDS
National Institute of Allergy and Infectious Diseases
Bethesda, Maryland

Neil M.H. Graham, MBBS, MD, MPH
Director
HIV Programs
Glaxo Wellcome, Inc.
Research Triangle Park, North Carolina

JONES AND BARTLETT PUBLISHERS
Sudbury, Massachusetts
BOSTON TORONTO LONDON SINGAPORE

Table 2–10 Death Rates for Common Infectious Diseases in the United States in 1900, 1935, and 1970

Infectious Disease	*Mortality Rate per 100,000 Population*		
	1900	*1935*	*1970*
Influenza and pneumonia	202.2	103.9	30.9
Tuberculosis	194.4	55.1	2.6
Gastroenteritis	142.7	14.1	1.3
Diphtheria	40.3	3.1	0.0
Typhoid fever	31.3	2.7	0.0
Measles	13.3	3.1	0.0
Dysentery	12.0	1.9	0.0
Whooping cough	12.0	3.7	0.0
Scarlet fever (including streptococcal sore throat)	9.6	2.1	0.0
Meningococcal infections	6.8	2.1	0.3

Source: Reprinted from National Office of Vital Statistics, USPHS and Centers for Disease Control and Prevention.

stantially; however, this has been offset by increasing mortality for lung cancer and other diseases. Clearly, the decline in mortality from infectious diseases during the twentieth century stands as a tribute to the advances in public health and safer lifestyles, compared with that in previous centuries.

What caused these remarkable reductions in the mortality from the common infectious diseases? One might surmise that the development of modern microbiology with the understanding the discipline provided about the pathogenesis of specific infections led to the development of vaccines and effective antibiotics to prevent or treat infections. However, for most of these infections, the evidence suggests a more complex scenario. The decline in the annual death rates for tuberculosis in England and Wales antedated the identification of the tuberculosis bacillus; however, the slope of the declining mortality increased after 1948, with the availability of streptomycin, isoniazide, and other chemotherapeutic agents (Figure 2–8). Similarly, death rates from scarlet fever, diphtheria, and whooping cough (pertussis) in children under age 15 in England and Wales began to decline well before these organisms were identified in the laboratory, and the availability of effective antibiotics had a small effect on the overall mortality decline (Figure 2–9).[57] Also, dramatic declines in the death rates from measles and pertussis were seen among children in England and Wales decades prior to the identification of these organisms and the availability of vaccines or antibiotics to treat infected persons. What, then, can account for these declines in mortality? Recent experience with some of these diseases in poor and often malnourished children from developing countries in Africa has shown that some of these diseases still have high mortality in certain populations. For example, measles, which is rarely fatal when it occurs in children in the United States, is still associated with a 15–20% mortality in infants and children in Sub-Saharan Africa. Hypotheses to explain this difference have included poorer nutritional status, earlier ages at exposure, other concomitant infections, higher infectious dose, and greater crowding during epidemic spread among infants in Africa.[58,59] All of these factors may play a role but it is difficult to evaluate their independent contribution. Clearly, the complex changes that have occurred in soci-