

Infectious Diseases Under Control Now Better Than Ever

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Over the past century, mortality rates in the US have steadily declined and the life expectancy at birth for the average American has increased from 47 to nearly 78 years.

Much of these historic improvements in health can be attributed to dramatic reductions in mortality resulting from infectious diseases in the first half of the twentieth century, with most of that decline, in turn, due to public health actions and other “upstream” efforts.

Currently, the leading causes of death in both Nevada and the US are heart disease, cancer, lung disease, and stroke – chronic, slowly developing diseases typically resulting in death as we get older.

In contrast, the principal killers during the early decades of the twentieth century were infectious diseases such as pneumonia, tuberculosis, diarrhea and enteritis, and diphtheria. Together, these diseases were responsible for one third of all deaths in 1900 and levied their toll on young and old alike, in some cases striking healthy children and adults one day and leaving them dead the next.

It is difficult to underscore the death and havoc, not to mention terror, wrought by infectious disease less than a century ago.

In his recent bestseller, *The Great Influenza*, John Barry chronicles one of the most devastating infectious disease epidemics in human history – the influenza pandemic of 1918. He notes that “influenza killed more people in a year than the Black Death of the Middle Ages killed in a century; it killed more people in twenty-four weeks than AIDS has killed in twenty-four years.”

While the annual death toll in the US from influenza these days is not trivial – an estimated 36,000 Americans die from the flu in a “non-epidemic” year – the 1918 pandemic killed nearly 700,000 Americans out of a population one-third our present size.

Conventional wisdom holds that the dramatic reductions in infectious disease mortality, past and present, have been largely a product of medical advances and treatments.

Medical interventions and comparatively “downstream” efforts – such as the use of penicillin and antibodies in the 1940s and immunization campaigns introduced by mid-century – have

certainly contributed to the *eradication* of many of the killers of the early twentieth century (most notably, small pox and polio).

However, most of the decline in infectious disease mortality was a product of upstream developments by municipalities and the newly emerging local health departments, including the introduction of chlorination and clean water technologies, improved waste-disposal systems, and improvements in housing after the turn of the century.

For example, deaths associated with tuberculosis in the US declined steadily for a century – long before physicians were able to effectively treat or prevent the disease. In 1900, the death rate from TB was over 200 per 100,000 US residents. By the time an effective antibiotic therapy, Streptomycin, was introduced in the 1940s, the death rate was less than 50 per 100,000.

Likewise, precipitous declines in death due to pneumonia, whooping cough, measles, scarlet fever, tetanus, and other infectious diseases had taken place long before the availability of antitoxins or effective therapies or even mass vaccination campaigns occurred.

It is crucial to stress that most of the now vaccine-preventable diseases mentioned in this column are presently at all-time lows or have been effectively eradicated altogether (or, relegated to the developing world which is a topic for another day) as a result of mass immunization campaigns and widespread access to antimicrobial drugs.

This state of affairs represents the successful marriage of biomedical science and public health actions and is a major public health accomplishment in its own right.

The control of infectious disease and the longevity currently enjoyed by Americans today are rooted in the public health campaigns of yesteryear – upstream endeavors that triumphed over considerable public uncertainty, fear and resistance.

If there is a downside to these achievements, it is the invitation to complacency given the considerable effectiveness of upstream infectious disease control efforts.

The looming threat of a worldwide flu pandemic, HIV/AIDS, severe acute respiratory syndrome (SARS), and antibiotic-resistant “staph” bacteria are but a few reminders that as microbes and society evolve, new infectious diseases will emerge requiring the perpetual vigilance of the public health community.

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