

THE AVOIDABLE LOSS OF LIFE

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As a nation, we are moved to immediate action by the loss of a few hundred lives in a spectacular way, but the deaths of thousands of our fellow citizens from avoidable, but insidious causes, do not interest us in proportion to the loss involved or stimulate us to the necessary efforts of prevention.

The burning of a theater with the loss of several hundred lives is reported as a disaster and is followed by legislation making public buildings safe, but whooping cough, which destroys annually 10,000 persons and renders 190,000 ill, is frequently not listed as a notifiable infectious disease. We are horrified at the European conflict, but the combined loss of all the navies engaged is less than the number slain each year in this country by the typhoid bacillus. In a modern battle 100,000 men may be killed and wounded, but the tubercle bacillus slaughters 147,600 of our citizens yearly, and a million and a half remain infected, the greater number of whom will die of tuberculosis.

COMMUNICABLE DISEASE

Over 500,000 people die of communicable disease each year in the United States and over five millions are sick as a result of infection. Had such a loss of life and health been localized, a city the size of Cleveland would have been depopulated and every individual in two cities the size of Chicago would have been in need of medical attention.

The immediate death rate and illness of infectious diseases are scarcely more important than those of their complications and sequelae. Measles and whooping cough prepare the soil for tuberculosis; scarlet fever for renal diseases; rheumatic fever, tonsillitis, pneumonia and syphilis for cardiac failure; and, infectious disease, in general, and syphilis in particular, for vascular degeneration. The effect of sequelae are well illustrated in the recent studies of Dublin in connection with typhoid fever. He noted that the death rate among typhoid survivors for the three years following the attack was twice the expected mortality for an equal number of individuals of the same age, sex and color. Of those dying within three

years following recovery, tuberculosis caused 39 per cent of the deaths and heart disease 14.8 per cent. Dublin estimates that 8,000 deaths occur in the United States each year among persons who have had their vitality so impaired by typhoid fever that they succumb within the first or second year after recovery.

Twelve thousand persons die of measles in the United States annually, and ten thousand of whooping cough. Eighty-one per cent of the deaths due to measles and 95 per cent of those caused by whooping cough occur in children under 5 years of age. The failure of the mortality rates of measles and whooping cough to show a reduction during the last fifteen years is due to the fact that they are highly communicable in their early stage, when diagnosis is most difficult and to the attitude of the public, which regard their presence as to be expected and of little consequence to either the individual or to the community.

Scarlet fever causes the loss of nearly nine thousand lives, 82 per cent occurring before the tenth year of life. Scarlatina is difficult to control, as its cause is unknown and mild cases may occur which are almost impossible of detection, but which serve as a focus for further spread of the disease. It is certain, however, that many unnecessary cases of scarlet fever are due to lack of care of the attendants upon patients; the non-pasteurization of milk; the failure to give thorough disinfection; the absence of adequate medical inspection of schools; and to imperfect isolation and too short quarantine. The deaths due to the failure to use effectively the well-recognized methods of prevention could and should be avoided.

Diphtheria and croup are responsible for the death of 18,000 people annually; 88 per cent within the first decade of life. The fatal cases of croup are usually the work of diphtheria bacillus. The number of deaths due to diphtheria have almost uninterruptedly decreased during the last fifteen years and, at present, are less than one-half that of 1900. As striking as this decrease may be, the mortality is much too high for a disease of known etiology, of well-recognized epidemiology, and one for which we possess a specific preventive and curative therapy.

The mortality of diphtheria is almost entirely dependent upon the time of the administration of the antitoxin. If it is given in sufficient dose within the first twenty-four hours, practically all patients will recover; if withheld beyond the first day, the death rate increases with each hour. The delay in receiving antitoxin is usually due to the slowness of the patient to obtain medical attention and the waiting on the part of the physician to determine the nature of a suspicious sore throat clinically, rather than bacteriologically.

In 1913, there were about 18,000 deaths from typhoid fever and approximately 180,000 cases. Happily, this is a reduction of 50 per cent in twelve years, but the rate is still inexcusably high. Typhoid fever so impairs the vitality of the individual that his mortality is twice the expected death rate during the three years succeeding the attack and in this way, according to Dublin, is responsible indirectly for the loss of 8,000 lives annually.

Typhoid fever should be eliminated. Improvements in water supplies, scientific sewage disposal, the protection of milk, meat and vegetables from contamination, the anti-fly campaign, and, perhaps, the adoption of typhoid inoculation, have been largely instrumental in lowering the death rate from 35.9 per 100,000 population in 1909 to 17.9 in 1913.

The contact of a large number of individuals aids in the dissemination of typhoid fever, yet the death rates of our largest cities, which take precautions against the typhoid bacillus, are about one-third the rate of the entire registration area. While certain large cities have shown great progress in the reduction of typhoid fever, the sanitation of the rural section of the country is in its infancy and in many of the smaller towns and villages the insanitary privy and polluted well are menaces to the health of the community.

It is impossible to determine the extent of syphilis, a disease protean in its manifestations, variable in its intensity, chronic in its tendency, and hereditary in its scope. It may be conservatively estimated that there are at least a million and a half syphilitics in the United States. In 1913 syphilis was directly responsible for 7,200 deaths, for 6,900 due to paresis and 2,600 caused by locomotor ataxia. It attacks the vascu-

lar system with special severity and is a great factor in the mortality due to insufficiency of the aortic valves, aneurism, arterio-sclerosis, certain groups of cases of angina pectoris, and cerebral hemorrhage. Syphilis produces over 26 per cent of still births and holds an important place as a cause of death within the first year of life. Nearly 20 per cent of the first entrances to the institutions for the insane are due to this disease. There is an increased mortality rate among syphilitics of 70 per cent, which means a reduction of the average expectancy of life by five and a half years.

In the presence of the ravages of this scourge of the human race, the one thing that stands out most conspicuously is the ability to prevent it. The moralist would attack the problem of syphilis by clean living, the abolition of prostitution, by instruction of the youth in regard to the danger of venereal disease and would discourage the postponement of marriage. These measures would be the happiest, the most efficient and certainly the most desirable means of prevention, but, on account of the frailty of human nature and the strength of the sexual instinct, are most difficult of general application. The sanitarian would utilize the full force of ethics, but, in addition, would urge the establishment of hospitals for the early diagnosis and prompt treatment of syphilis, would educate the public in the means of prophylaxis, and would make it a criminal offense for one individual to knowingly transmit the disease to another.

Pneumonia destroys annually 132,400 lives, is the most prevalent and most fatal of all the acute communicable diseases. Its occurrence has shown considerable reduction during the last thirteen years, falling from 180.5 deaths per 100,000 population in 1900 to 132.4 in 1913.

It occurs as a primary disease; as a secondary to measles, scarlet fever, whooping cough, diphtheria, influenza, and typhoid; at both extremes of life—causing the death of young children and enabling elderly sufferers to easily exchange a life of invalidism for a peaceful grave.

Pneumonia is caused most frequently by the pneumococcus, but it also may be due to other organisms. It was commonly believed that pneumonia was an autogenic infection, for a

pneumococcus was to be found in the oral and respiratory passages of a large proportion of healthy individuals, and that the lowering of the vitality by exposure to cold, by inhalation of dust and fumes, alcoholism, injury to lung tissue, or senility so disturbed the balance between the virulence of the organism and the susceptibility of the individual as to present a favorable opportunity for development of the disease. This conception does not agree with recent observations, which seem to indicate that the disease is due to contact with patients or with healthy carriers.

The prevention of pneumonia requires isolation of the patient, disinfection of his expectoration, and the avoidance of all things which tend to lower the vitality of the individual or to favor the spread of the disease by carriers. The increased opportunity for infection in cities owing to crowding demands the allaying of dust, and adequate ventilation of theaters, schools, cars and public buildings. Occupations requiring excessive fatigue, exposure to unsuitable temperatures, and to dust or fumes should be under the supervision of a sanitarian and so modified as not only to add to the efficiency of the worker, but to afford him an opportunity to increase his resistance to disease. The occurrence of pneumonia may be reduced, individual susceptibility decreased, and the devitalizing influence of modern life successfully overcome by proper exercise, the abundance of fresh air at night, as well as during the day, sunlight, sensible clothing, sufficient and suitable food, cold baths, enough sleep, attention to oral hygiene and by the avoidance of exposure, excessive fatigue and alcohol.

Tuberculosis caused 147,000 deaths in 1913. The mortality rate of tuberculosis has markedly declined, falling from 326.2 per 100,000 population in 1880 to 147.6 in 1913. The decrease has been uninterrupted since 1904. There are approximately a million and a half individuals suffering from tuberculosis in the United States.

The medical profession and the public have more consistently endeavored to prevent tuberculosis than probably any communicable disease, but, in spite of their efforts, it is of the first importance among the causes of death and is still "The Great White Plague," the captain of the hosts of death.

Tuberculosis is the unfortunate result of the combination of the tubercle bacillus and a lowered vitality. The necropsy findings and the Von Pirquet cutaneous reaction show that few persons pass through life without being infected. The failure of more individuals to have symptoms of the disease is due to their resistance and the number of bacilli taken into the body at one time.

The prevention of tuberculosis begins at birth and is a two-fold problem—avoiding infection and increasing the resistance of the individual.

Infection may be avoided by providing sanatoria for segregation and treatment of the tuberculous, the protection of the milk supply by testing of the cattle or by pasteurization, anti-spitting regulations, proper disposal of the sputum, and education of the public. Early diagnosis is of the utmost importance, for the sooner the disease is discovered, the greater the chance for successful treatment and the earlier the opportunity for the protection of others. With proper education of the public, it will be practical to make a diagnosis of "a fertile soil for tuberculosis" before unmistakable symptoms are present and without causing the individual or his friends unnecessary distress. In a person underweight, "a little run down," a poor eater, "rather nervous" and easily fatigued, the stage is set for tuberculosis. In such an individual, the time for rest, better food, fresh air and change of environment has arrived. The moment for rescue is before the rapids are reached, not when the passage of the precipice is inevitable.

The increase of resistance to tuberculosis is economic and sociologic. Good food, fresh air, sanitary houses and places of occupation, sufficient sleep and the avoidance of overwork and overworry, the essentials of a normal existence, are obtainable for the well-to-do, but not for the poor. Tuberculosis is an ally of want and squalor, and is becoming more and more the disease of the overcrowded, the underfed, and the overworked. Until social and economic conditions make it possible for each individual to have enough sleep, abundance of clean, fresh air, sanitary housing, sufficient rest and proper food for growth and energy, society may expect to reap a harvest of tuberculosis.

INFANTILE DIARRHEA

There are 75,200 deaths, annually, due to diarrhea in children under 2 years of age, a mortality exceeding the sum of the death caused by measles, scarlet fever, whooping cough, diphtheria and typhoid fever by 6,000.

This loss of life is mainly preventable. It is due to summer heat, want of care, ignorant feeding, improper food and bad hygiene. Many of these deaths would be avoided if maternal feeding was more common. Holt has shown that the death rate of the artificially fed infant to the breast nourished is in the ratio of 32 to 1. Maternal feeding requires little effort or care; artificial feeding demands intelligence, judgment and the means for the purchase of the proper food. Artificial feeding *per se* is not to blame, but ignorant feeding, the giving of contaminated or improper food or the failure to modify the quality and quantity of clean wholesome food to the needs of each child.

Heat seems to bear a direct relation to the occurrence of "summer diarrhea." It affords a better opportunity for the growth of bacteria in the child's food and for an increase of the normal flora of the intestine. It may so influence normal digestion and metabolism as to lead to the formation of toxic substances which may cause diarrhea.

Enteritis may be largely prevented by maternal feeding. The distribution of clean milk and the instruction of the mother in its modification to meet the special needs of her child, will do much to reduce the incidence of diarrhea. Strict attention should be given to the cleanliness of the nursing bottles, nipples and to the hygiene of the baby. The clothing of the child should be determined by the temperature rather than by tradition. Congested living quarters should be avoided and the infant should be kept out of doors as much as possible. The months of July and August should be spent in the country; if this is not feasible, the child should have the full benefit of the parks.

THE DEGENERATIVE DISEASES

Deaths due to lesions of the heart, kidneys and blood vessels, the diseases of old age, are on the increase. They are becoming more frequent before fifty and many individuals are dying

prematurely, at an age when, as a result of training and experience, they should be most productive and of the greatest value to society.

In 1913 there were over three hundred thousand deaths due to diseases of the kidneys, heart, and blood vessels. 24.2 per cent of all the deaths due to Bright's disease and 21 per cent of those caused by organic heart trouble occurred in individuals under fifty years of age. Cerebral hemorrhage and arteriosclerosis have increased during the last ten years.

The strenuousness of modern life, the intemperance of food and drink, exposure, and the intoxications of occupation play a part in the production of renal, cardiac, and vascular degeneration. In many cases, however, we see the hand of syphilis, the sequel of rheumatic fever, tonsillitis, chorea, and of pneumonia, or the probable latent injuries of scarlet fever, diphtheria, typhoid, or malaria.

In the acute cases of kidney, heart, or vascular disease, the virulence of the invading organism, the reduction of the resistance of the individual, or both, so favor the spread of the infection that signs of disease are early apparent. In the chronic cases the injuries may be comparatively latent, the symptoms slight or absent, yet the organs may be so damaged that under the stress of modern life their period of activity may fall short ten or twenty years.

On the basis of the last statistics, there are 78,900 deaths due to cancer annually in the United States. The mortality rate has steadily increased from 63 per 100,000 population in 1900 to 78.9 in 1913. Do these figures represent an actual increase? Statisticians and notably Hoffman believe that the mortality rates "unconditionally confirm the conclusion that cancer is relatively on the increase throughout the civilized world and the increase is affecting practically all important organs and parts of the body." Physicians and surgeons are somewhat skeptical and are inclined to attribute the increase largely to better methods of diagnosis of internal cancer and to the lengthening of the average life which increases the number of individuals reaching the cancer age.

The two great predisposing causes of cancer are age and irritation. Cancer usually occurs after forty, but it may not

uncommonly appear earlier in life. Any source of irritation, be it mechanical as the effect of a jagged tooth on the cheek or tongue; actinic, as the action of the Roentgen or ultra-violet rays upon the skin; thermic, as the effect of a hot pipe stem upon the tongue or lip; or chemic, as the action of arsenic and aniline dyes upon the skin, predisposes to cancer.

The prevention of cancer depends upon the education of the public as to the dangers of chronic irritation, as to the importance of the early symptoms and the necessity of an early operation. It should be universally known that any lump in the breast or unusual bleeding from the uterus in a woman above thirty-five requires investigation to exclude cancer. Sores, warts, and swellings of the lips or tongue in an individual over forty should be brought immediately to the surgeon for diagnosis. Bleeding from the bowels of a person of similar age demands the exclusion of cancer. Warts or moles that begin to show signs of growth or soreness should be removed at once. Suspicious growths should be given expert microscopical examination. All the precautions used against external precancerous lesions should be taken to avoid and discover beginning internal cancer. The best way to make a curable cancer hopeless is to delay operation or to use plasters and salves.

ECONOMIC IMPORTANCE OF PREVENTABLE DISEASE

Society is demanding each year greater skill and increased efficiency of its members, a requirement that calls for a larger investment in the training of the individual and a condition that makes the economic loss due to preventable disease most appalling. So many factors contribute to this waste that it is practically impossible to state it in figures.

Nine-tenths of all children dying of measles, whooping cough, scarlet fever and diphtheria, and all those dying of diarrhea, or any disease, before the tenth year, represent a total loss, for economic values have been created and destroyed without giving return.

The toll of syphilis, typhoid fever, and tuberculosis, is heaviest during the period of greatest usefulness. The ravages of syphilis are large between thirty and forty-five, but greatest between forty-five and sixty. It shortens the expectancy of

life 5.5 years; it renders the individual inefficient during the most productive period of life; it fastens itself upon the posterity of its victim; increasing degeneracy, encouraging poverty and promoting public charges; it erects about 20 per cent of our insane asylums and taxes the nation for their maintenance. Typhoid fever causes 94 per cent of its mortality before the sixtieth year, over 48 per cent before the twenty-fifth year, and 29 per cent between the fifteenth and twenty-fifth year. Tuberculosis destroys 90 per cent of its victims before sixty; 30 per cent before twenty-five, and 19 per cent between the fifteenth and twenty-fifth year. Tuberculosis and typhoid fever not only cause over 90 per cent of their mortality before sixty, but they cause tens of thousands to seek public charity or to spend large sums to recover their health, when they should be producing. Nearly one-third of the deaths due to typhoid and one fifth of those caused by tuberculosis occur in the high-school-university period of life, the time representing the maximum investment of society in the preparing of the individual for usefulness.

Diseases of the heart, kidney and blood vessels are becoming more frequent, thus individuals are prematurely lost to society who by training and experience should be of the greatest value.

The great economic loss due to the deaths of individuals before they have become an earning power and of persons dying during the most productive period of life is relatively small as compared with the enormous loss caused by illness with its consequent loss of time of the wage earner, the inefficiency of the worker, the expenditures for medicine and attention and the absence or decrease of productiveness on the part of other individuals who must spend a part of their entire time in caring for the sick.

It is obvious that this large loss of life and health constitutes a serious curtailment of the productive efficiency of the nation and that a heavy economic burden results from the support of invalids, defectives and those deprived of their bread winners. As long as preventable diseases are present we are paying large premiums to keep them, for it would be much cheaper to prevent than to have them.

PROPHYLAXIS

Preventable disease is associated inseparably with poverty and ignorance, and any successful attempt at prevention must be an attack upon these twin brothers of human misery.

Poverty may be the great predisposing cause of disease or the result of it. Poverty by underfeeding, overworking, and poorly housing renders the individual more susceptible to disease; by overcrowding presents a favorable opportunity for the spread of infection. The English Royal Commission on Poverty states that 55-60 per cent of the poverty of Great Britain is due to sickness. The report of the Charity Organization of New York City shows about the same per cent for New York City.

The poverty-stricken individual is a fourfold menace to the nation—a poor progenitor, an inefficient producer, a potential source of disease, and frequently a malcontent. Society should realize that every individual who makes his best efforts and every child born to the nation must be guaranteed as their inalienable rights sufficient food for growth and energy, the necessary amount of sleep and rest, abundance of fresh air, sanitary quarters, and an opportunity for an education. A different attitude fails to promote the general welfare, procreates weaklings, invites disease and undermines the stability of the nation.

Ignorance can be removed only by education, and if the intelligent individuals of every community who realize the serious importance of disease to the nation are to be interested and increased in numbers until they will demand preventive machinery commensurate with scientific knowledge and the enactment of laws founded upon the present development of preventive medicine, public education must be pushed with greater vigor.

Much has been accomplished by popular literature, lectures, and demonstrations, more will be done by them in the future, but the importance of preventable disease upon the social and economic conditions of the nation demands more than an occasional public lecture, pamphlets at infrequent intervals or casual demonstrations. Instruction in the methods of pre-

venting disease should be an essential part of our system of education and no individual should have completed his education without the knowledge of how communicable diseases are spread and prevented; the dangers of and the methods of avoiding industrial disease; how to care for an infant, and a practical understanding of sanitation and hygiene. A system of education that requires large sums of money to teach individuals English and science and does not instruct them how to protect themselves from preventable death and illness fails to insure its investment and may be criticised as incomplete.

Each county should have a full-time health officer and community nurses to meet the needs of the population. Their duties should be threefold; the control of disease, the education of the public, and as expert consultants for the citizens of the county upon matters of hygiene and sanitation.

With such a force it would be possible to make a sanitary survey of each industrial plant, place of amusement, summer resort and residence. Such a survey would reach a large number of persons who are not likely to hear public lectures or to read popular literature. A visit and a tactful conference of the health officer and property owner have not only a sanitary and educational value, but they create a sympathetic understanding between the citizen and the sanitarian, a condition essential to the practical progress of sanitary science.

Every large industrial plant should carefully supervise the physical condition of its employees, for the health of the workman determines his daily efficiency and the period of his productivity. Periodic physical examination of all employees would detect disease in its incipency; would contribute largely to community health, and would make it possible to adapt the work to the physical condition of the worker. There would be an economic gain to the employer by the reduction of the number of accidents to workmen, material and machinery; in protection against unjust claims for compensation; in the increased efficiency of the worker, and in the decreased loss of time from preventable sickness.

The prevention of disease is the function of science and society. Science must provide the way; society must use the means and bear the cost. The acceptance by society of Jen-

ner's demonstration of the advantage of vaccination ended the devastation of smallpox; with the practical application of the discoveries of Laveran and Ross, malaria ceased to be the scourge of mankind; the use of the knowledge of Reed, Carroll and Lazear made the Panama Canal a possibility and closed our ports to yellow fever; our understanding of the life history of the Koch vibrio has kept Asiatic cholera beyond our shores, and a scientific attack upon plague has prevented its spread and practically driven it from the country.

The knowledge of tuberculosis is as complete as that of plague; the epidemiology of typhoid fever and cholera are practically identical; the understanding of syphilis is as clear as that of malaria, and the information concerning diphtheria as definite as that of yellow fever. The way for the great reduction or elimination of preventable disease is known; the need is for society to educate its members, use the methods, and bear the cost.
