

the very best results were being secured; then out went the man. Politics interfered, and the work has to be done all over again at some future time.

SURGEON-GENERAL STERNBERG, Washington, D. C., agreed with Dr. Hurty that a professional sanitarian might be a more suitable member of the health board than a physician who is not a sanitarian, but it seems to him that the professional sanitarians we need are men who have a medical education in the first instance, and added to that the necessary training to make them sanitarians. He thinks a great many physicians and health officers in this country appreciate the fact that a trained body of medical men who are specialists in sanitary work is needed. At the present time there is no regular system of training, and no place to go and pursue such a course of study. There is some prospect in Washington of being able to present such a course to those young medical men who desire to be sanitarians; the course will last for two years and lead up to the degree of Doctor of Public Health. The program has been made out by the president and trustees of Columbian University, which is soon to be called the George Washington University. The faculty has been selected. Dr. Sternberg is to be the dean, and among other members of the faculty are Dr. Wylie of the Agricultural Department, Dr. Salmon, and Dr. Stiles, who is an expert in everything relating to animal parasites. Dr. Wyman is to give lectures on quarantine administration, and Dr. Woodward on municipal sanitation. Dr. Sternberg is to have the general subject of hygiene. One or two distinguished lawyers and one justice of the supreme court, who is connected with the Columbian Law School, will give instruction with reference to sanitary laws, and the limitations placed by the constitution on legislation. They expect to have a competent sanitary engineer. The trustees have approved the plan, and there is only one thing at the present time that prevents them announcing that they are ready to receive students, and that is the lack of money. The trustees have decided that such a department shall be established as soon as \$250,000 can be secured as an endowment or a guarantee fund of \$50,000 to carry on the work of the department for a period of five years. If any wealthy gentleman will come forward with the guarantee fund they will be prepared to start the Department of Public Health. Dr. Sternberg believes if it could be fairly started that in the course of a few years they could begin to turn out thoroughly trained sanitarians. They will admit to the course non-graduates in medicine in order that they may take advantage of the instruction, but they can not receive a degree. The time will come when public sentiment in this country will demand that there shall be on every board of health at least one trained sanitary expert to whom all questions can be referred, who will conduct the laboratory work, etc.

DR. G. T. SWARTS, Providence, R. I., suggested that the trustees interview brothers Rockefeller and Carnegie.

DR. SENECA EGBERT, Philadelphia, believes the time will come when just such a school as this will be demanded; and when it begins to turn out its graduates we will then have sanitary districts, each with its proper sanitary officer. This plan is now in vogue in England. The United Kingdom is subdivided into sanitary districts, and in each of the sanitary districts there must be a sanitary officer, who is usually a graduate of just such a school and with such a degree as Dr. Sternberg has described. Dr. Egbert said if we can make the dairymen understand that by improving the conditions of their dairies and making them more sanitary and more nearly normal they are going to help themselves economically, we will reflexly help ourselves and our people, because as the dairy improves so will the quality of the milk improve. We must impress on the dairyman the necessity of putting his cattle in the best hygienic condition possible. Dr. Egbert believes that much of our tubercular infection comes from the milk and food we consume. He believes that the usual way of infection is through the alimentary tract into the lacteals, thence up through the thoracic duct to where it enters the subclavian vein. The chyle is poured di-

rectly into the subclavian vein just before the blood goes into the vena cava and heart, and from there right into the lungs. The material that goes into the body by way of the thoracic duct must go directly to the lungs, and the first place where it meets any marked obstruction to its progress is in the capillaries of the lungs. Everywhere else it has a comparatively large lumen to pass through.

DR. H. M. BRACKEN, Minneapolis, said that he does not think the Jews are any more careful in excluding tuberculous meat than are the gentiles. He knows of instances where tubercular cattle were killed under inspection, and the Jewish butchers were ready to take meat of a lower grade than the regular butchers. So far as he can judge, their inspection of meat does not amount to much when it comes to the question of tuberculosis.

DR. GARDINER SWARTS, Providence, R. I., said that there has been a good deal of dispute of late whether animals can infect the human being with tuberculosis, although the trend of opinion is confirmatory.

DR. R. C. NEWTON said that, so far as he could ascertain on the eastern seaboard, the percentage of infected cattle was 30 per cent. Whether this is so or not over the entire country, we have no accurate knowledge. Buyers of fancy cattle and men who are trying to get high-class herds have had such an experience that they are beginning to think the disease almost universal. Thirty per cent. among eastern cattle is, perhaps, a low average. New Jersey has just passed a good law, which requires that every health inspector shall be examined as to his fitness and be licensed. The present inspector in Montclair is a graduate of the Massachusetts Institute of Technology. Those men are educated along the lines of chemistry and bacteriology better than the average physician. An epidemic of typhoid fever which occurred in Montclair in 1894 resulted in giving the health board more power than perhaps any other health board in the state. They have regularly employed an expert inspector since then. He has an analysis made of the milk delivered by every dealer every month, and that analysis is posted on the wall in the office of the board of health and any one can go in there and find out whether he is getting milk with 30,000, 40,000 or more bacteria to the c.c. or not. The more careful dairymen are getting all the business. Public opinion must be elevated considerably above its present status in order that the health boards may have proper authority to issue licenses to all dairies and to revoke the license of any dairy not properly administered. It is a matter of common report that the Jew is remarkably exempt from tuberculosis, and many observers have asserted that the careful inspection of their meat is at least one cause of this. It has been stated on good authority that out of 10,000 Jews in New York City one will find only 79 cases of tuberculosis, while among 10,000 Irish in the same place one will find 660; among the Swedes, 500, and among the Americans over 200. If we knew the reason for this we would be able to do something definite towards solving the great problem of the predisposing cause or causes of human tuberculosis. Dr. Bracken thinks hygienic laws and general habits have a great deal to do with it, but he does not think the meat has anything to do with it.

## IS PNEUMONIA INCREASING?\*

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The generally accepted view that the pneumonia mortality has risen rapidly in late years rests on no other evidence than the apparent mortality rates and ratios. If the rates and ratios are in general delusive, and if with respect to pneumonia they are shown to be fallacious, it does not follow that we must diminish our

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respect for pneumonia as a cause of death, but that we must more accurately determine its important relations.

I shall use the ratios almost exclusively in this study, because the disturbing factors of mortality ratios are more easily ascertained than those of the death rates, and the ratios are less influenced by the vagaries and inconsistencies of registration.

The apparent rise of pneumonia dates from the beginning of mortality registration in this country, and has over and over again been the subject of remark. In 1889 the registration report of Massachusetts comments on the apparent rise of pneumonia mortality above the age of 60, but no remark is made on the statement that the ages below 15 had suffered 36.12 per cent of the pneumonia mortality during the previous 20 years. Its apparent rise since 1890 has, however, brought pneumonia prominently into view, and this period (since 1890) has been most discussed. In a study of the mortality reports of the United States

tion of the population in American cities altered very materially.

A glance at the charts (1 and 2) showing the curves of population and of pneumonia mortality, distributed by quinquennial age periods, will bring into view the first correction which must be applied to mortality ratios.<sup>1</sup> Unfortunately the distribution of urban population in 1880 is not shown, but the general age distribution of population in that year shows that cities had a considerably larger proportion of children in 1880 than in 1900. The 45.5 per cent mortality of 1900 fell on 30.3 per cent of the population. If, as seems probable, the 48 per cent mortality of 1800 fell on 35 per cent. of the population, then 48 per cent. in 1880 was really a lighter load than 45.5 per cent. in 1900. Here we find the true relations diametrically different from those which were at first apparent. Not a city in this country probably, and certainly not one of those cities where the apparent rise of pneumonia has excited most comment, can apply this fundamental test to its mortality statistics.

Next we must try the ratios by what we know, or think we know, about the causes of death.

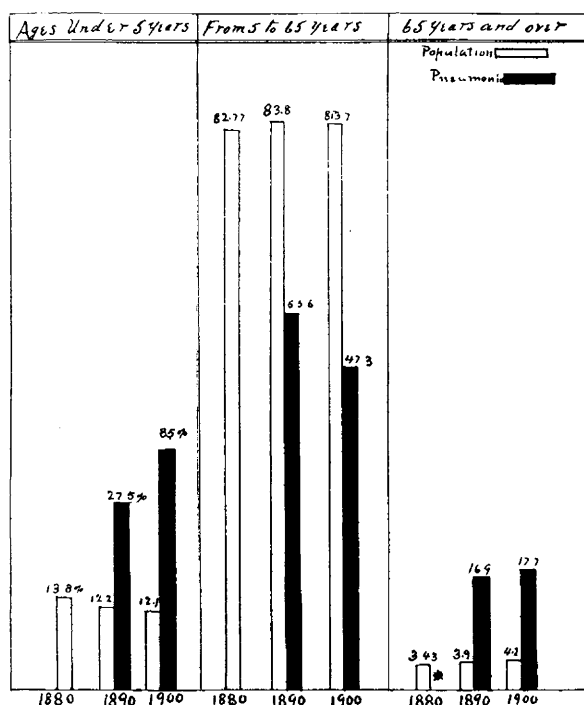


Chart 1.—United States census figures for 1880, 1890 and 1900. Population percentage in 3 age periods. Pneumonia mortality percentage in 3 age periods. \*Pneumonia for 1880 unknown.

Census for 1890 and 1900 Klebs pointed out the interesting fact that the pneumonia mortality between the ages of 15 and 60 diminished from 1890 to 1900, while the periods of childhood and old age carried an increased burden of mortality. It also appears from the census statistics that the whole burden of the alleged increase fell on cities. Taking the study back to 1880 one finds the same distinctions, but I believe it has not before been remarked that the distinctions of age and of urban mortality were more marked in 1880 than in 1890. In 1890 37.7 per cent. of the pneumonia mortality of cities fell under the age of 15; in 1900, 45.5 per cent. fell on the same period of life; but in 1880 the children bore 48 per cent. of the pneumonia mortality. If these figures contained the whole truth of the matter we should believe that pneumonia under 15 had decreased in cities since 1880. But it happened that between 1880 and 1900 the age distribu-



Chart 2.—United States Census, 1880, 1890, 1900. Percentages of urban population in 3 age periods. Percentages of urban pneumonia mortality in 3 age periods. Urban population for 1880 unknown.

The apparent ratios of death from pneumonia to deaths from all causes since 1850, as displayed in the United States reports, are as follows:

		Increase.	Per cent.
1850	37.55 per 1,000 deaths		
1860	68.74 per 1,000 deaths	31.19 points	83.00
1870	81.28 per 1,000 deaths	12.54 points	18.24
1880	83.80 per 1,000 deaths	2.02 points	2.5
1890	87.37 per 1,000 deaths	4.07 points	4.8
1900	106.1 per 1,000 deaths*	18.73 points	21.46

\*Known causes.

Note that the twelfth census states for the first time the ratio of pneumonia to known causes. The previous ratios included unknown causes and need corrections which the reports appear to furnish, though unfortunately we can not rely upon their accuracy.

<sup>1</sup>The original charts (1 and 2), showing quinquennial age curves, could not be satisfactorily reproduced. The charts here substituted, showing but three age periods, illustrate the argument less forcibly. The same remark applies to Chart 12.

The deaths from unknown causes are said to have varied from 1850 to 1900 as follows:

1850.....	13.69	per cent. of the total mortality
1860.....	11.1	per cent. of the total mortality
1870.....	3.5	per cent. of the total mortality
1880.....	4.9	per cent. of the total mortality
1890.....	3.916	per cent. of the total mortality
1900.....	3.904	per cent. of the total mortality

Correcting our apparent ratios for pneumonia, we shall have: (Chart 3.)

		Increase.	Per cent.
1850 ....	43.50 per 1,000 deaths		
1860 ....	77.33 per 1,000 deaths	33.83 points	75.4
1870 ....	84.23 per 1,000 deaths	6.90 points	9.0
1880 ....	84.44 per 1,000 deaths	.21 points	.25
1890 ....	90.06 per 1,000 deaths	5.62 points	6.6
1900 ....	106.1 per 1,000 deaths	16.04 points	17.8

Meanwhile our views have altered as to what are unknown causes. In 1850 a death from "fever" was a known cause. So were deaths from "wasting," "worms," "teething," "rage," "fright," "grief," "congestion of the heart," "paralysis of the lungs," "swal-

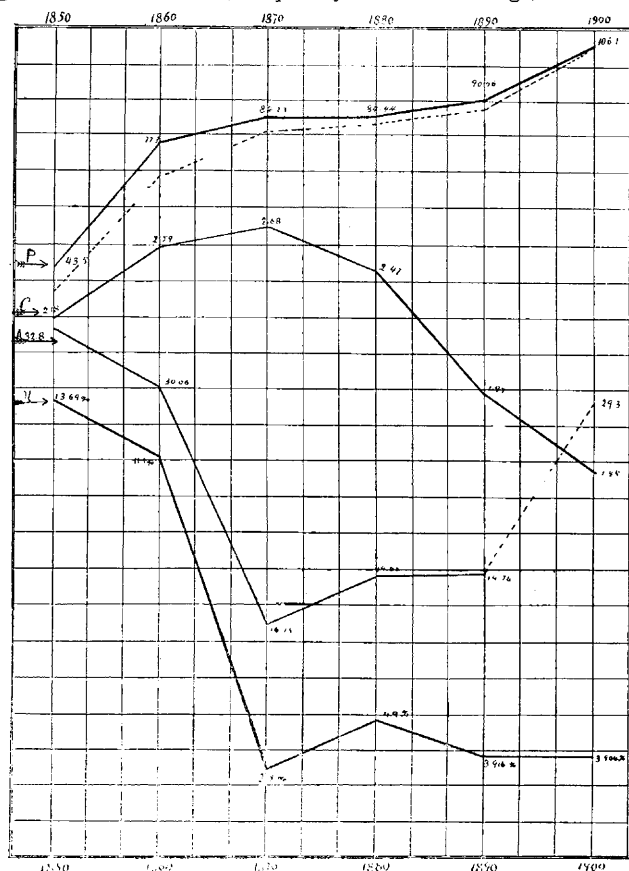


Chart 3.—United States census reports, showing the relation of pneumonia to unknown and indefinite causes of death. P, pneumonia; C, convulsions; A, old age; U, unknown causes.

lowed a penny when a boy," and other absurdities, traceable in the statistics down to the later nineties.

In 1900 the unknown class includes debility, wasting, heart failure, infantile atrophy, marasmus, inanition (above the age of three months), laparotomy, paracentesis, phlegmasia, pneumatosis, polydipsia, polyuria, surgical shock, strangulation, stricture, suppuration, tympanitis, typhomania, rupture of viscera, and 27 sorts of fever, all of which in 1870 were considered definite enough to be classified among known causes.

The percentage of unknown causes for the year of 1850, if brought into accord with modern ideas, would be much more than 13.7 per cent. of all the certificates examined, and the percentages for intervening years would be materially increased, thus further diminishing

the differences in our pneumonia ratios. The published pneumonia rates for the various localities of this country are all uncorrected for unknown causes, and there is no means of ascertaining what the error is on this account, but certainly a descending scale beginning with a percentage of 13.7 in 1850 and ending with 3 in 1900, would not fully correct the ratio of pneumonia to known causes of death.

The state of Connecticut publishes a percentage table of unknown causes, though the ratios are not corrected by it. In 1878 the percentage of returns giving unknown causes of death was higher than that of the census for 1870, and this fact supports the view that the census percentages are very much too small. In 1878 Connecticut was a registration state, collecting her mortality data day by day at the time and place of death; while the United States Census Reports depend on the returns of a very few registration states and cities, supplemented, or confused as the case may be, by the

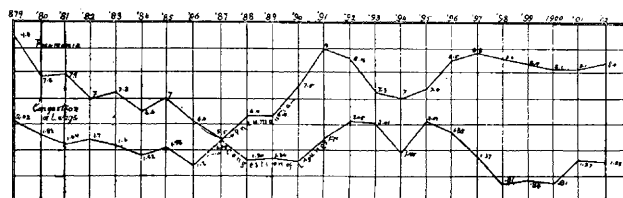


Chart 4.—District of Columbia, showing the symmetrical relations of pneumonia and congestion of the lungs with the striking effect of influenza's advent in 1890.

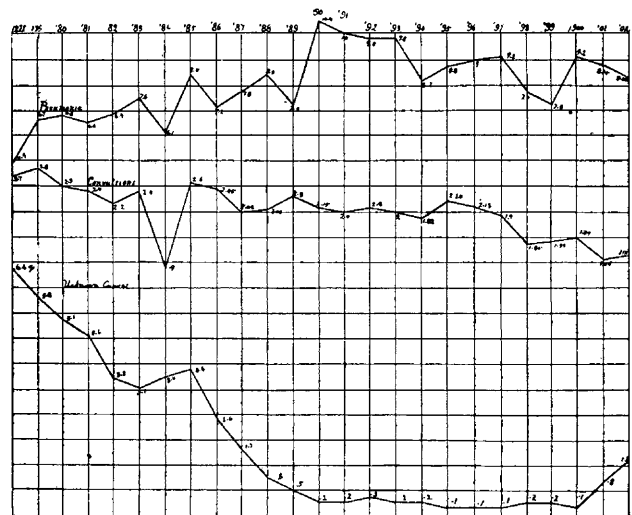


Chart 5.—Connecticut. Showing history of unknown causes. Illustrating the confusion between convulsions and pneumonia. Tendency to diverge in parallel motion. Relation of influenza suddenly appearing in 1890. Unknown causes are included in these ratios.

reports of unskilled lay enumerators making inquiry in May concerning all the deaths of a preceding twelve months.

The Connecticut percentage for unknown causes falls year by year from 6.6 per cent. in 1878 to two-tenths of 1 per cent. in 1890. It does not rise above three-tenths of 1 per cent. until 1901, when the international classification came into use, sending the ratio of ill-defined causes up in two years to 1.3 per cent. Fancy what would happen to the pneumonia ratios of Connecticut if they were subjected to a plus correction beginning at 1.3 per cent. in 1902 and augmented backward to 37.7 per cent. in 1880 (Chart 5).

No statement of unknown or ill-defined causes can be found in Chicago reports. In New York city reports since 1901 one can find the vague causes of death, and they amount to 4 per cent. of the total mortality. Baltimore has been employing the international classification since 1898, but the deaths classed as of indefinite causation are but six-tenths of 1 per cent. The Philadelphia registrar is cleverest of all (Chicago always excepted), for he only finds one certificate in two or three thousand too difficult for his skill at classification. The returns of Maryland, outside of Baltimore, are examined by a medical man, and so large a proportion as 6 per cent. of them are found incapable of classification and unfit for inclusion in the nosologic ratios.

Boston is silent about indefinite causes of death until 1902, when the international classification went into use, and the indefinite causes of death are found to be about 4 per cent. The Massachusetts registration reports give us a clue to the probable history of vague causes in Boston. The indefinite causes of death shot up in a remarkable way in 1868, when vague returns for deaths of infants were taken out of the infantile class and passed into the unclassified account for all ages. The percentage of unknown causes shot up from 1.9 per cent. to 5.4 per cent. of the total

per thousand deaths from known causes, reducing the apparent rise of 22 points to a rise of less than 8 points in 20 years.

Statistical compartment No. 179 is not the only waste basket in our nosologic classification. Each class of diseases has a special receptacle for the certificates which appear to belong to a definite class of diseases but not to a definite nosologic title.

Old age furnishes a statistical history somewhat suggestive, though less interesting than that of undefined causes. The ratios of old age to the so-called known causes of death are, according to the census reports, as follows: (Chart 3.)

		Increase or Decrease.	Per cent.
1850	.... 32.8 per 1,000 deaths		
1860	.... 30.6 per 1,000 deaths	—2.2 points	—6.7
1870	.... 16.75 per 1,000 deaths	—13.85 points	—45.9
1880	.... 19.61 per 1,000 deaths	+2.86 points	+17.00
1890	.... 19.74 per 1,000 deaths	+13 points	+66
1900	.... 29.3 per 1,000 deaths	+9.56 points	+48.4

If old age were a cause of death, its ratio to total mortality should have steadily and very materially risen in 50 years, for the proportion of population above the age of 65 has risen. We find, however, that the mortality ascribed to this cause fell for twenty years, and in the next 30 years rose slightly. The apparent rise of mortality since 1890 can not, however, be explained

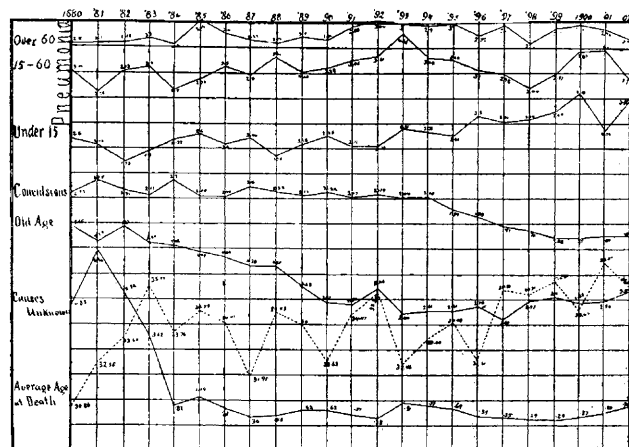


Chart 6.—Rhode Island. Showing an indefinite cause of death, "old age," declining while the average age at death increases and the pneumonia mortality above 60 does not rise. Under 15 years pneumonia rises while convulsions decline. These ratios are to total mortality, including unknown causes.

mortality, and from this point it fell to 1.17 per cent. in 1889. If the 4 per cent. correction for unknown causes in Boston in 1902 be multiplied backward to 24.8 per cent. in 1882, what will then be the relation of the ratios of any definite cause of death? If the experience of Massachusetts and Connecticut indicates so large a source of error in undefined causes, how can the error be less in Chicago or New York?

Moreover, the age distribution of the unknown and ill-defined causes of death shows that this correction applies but slightly to the middle period of life, 40 per cent. of it falling on ages under 5 years, and a small excess again on ages over 60. These corrections would undoubtedly moderate the remarkable angularity of the published pneumonia curves, and might even cause its apparent general rise to disappear.

The Massachusetts correction applied to the census figures would change the pneumonia ratio for 1880 from 83.30 per 1,000 deaths from all causes to 98.54

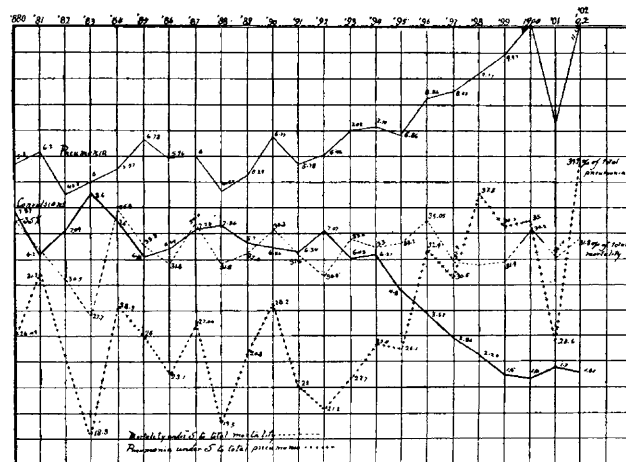


Chart 7.—Rhode Island. Showing apparent rise of pneumonia under 5, with coincident decline of convulsions and increasing ratio of pneumonia under 5 to total pneumonia. The decline of infantile mortality in general is also shown. Ratios are to total mortality under 5 and include unknown causes.

on the view that a larger proportion of deaths were returned under this vague title. The experience of all registration states is contradicted by the figures for these wide apart years, for everywhere old age is diminishing as an alleged cause of death, though everywhere old age as a phase of human life is increasing. The deaths of the aged are nowadays far more definitely explained than 20 years ago. Of those lost to the indefinite account many have gone into the accounts of cancer and of kidney diseases, but some have gone into the pneumonia account. The apparent rise of pneumonia in the aged is fully accounted for by the increased population at advanced ages, added to the improved certification resulting from better diagnosis.

In the class of respiratory diseases there is a vague title which undoubtedly conceals part of the pneumonia mortality. It is "congestion of the lungs," a title signifying as much in vital statistics as it does in medical

diagnosis, and no more. The District of Columbia<sup>1</sup> reports show the progress of this statistical item for many years. Observe chart 4, which shows pneumonia and congestion of the lungs diverging steadily year by year in parallel motion. Its responsiveness to the pneumonia curve shows that congestion of the lungs, in the District of Columbia at least, is not an empty title, although it has been unloading into the pneumonia column for years.

Certain obscure or ill-defined diseases bear relations to infantile mortality quite analogous to those borne by old age to the mortality above 60, and by unknown causes to the total mortality. One of these statistical titles has a close relation to the pneumonias of children, namely, "convulsions." Statistics of mortality from convulsions are available from 1850 to the present time. (Chart 3.) Their history in the United States Census is as follows:

	Per 1,000 deaths from all causes.	Per 1,000 deaths from known causes.
1850 .....	18.8	21.8
1860 .....	23.04	25.9
1870 .....	25.9	26.8
1880 .....	23.6	24.7
1890 .....	18.9	19.7
1900 .....	.....	15.5

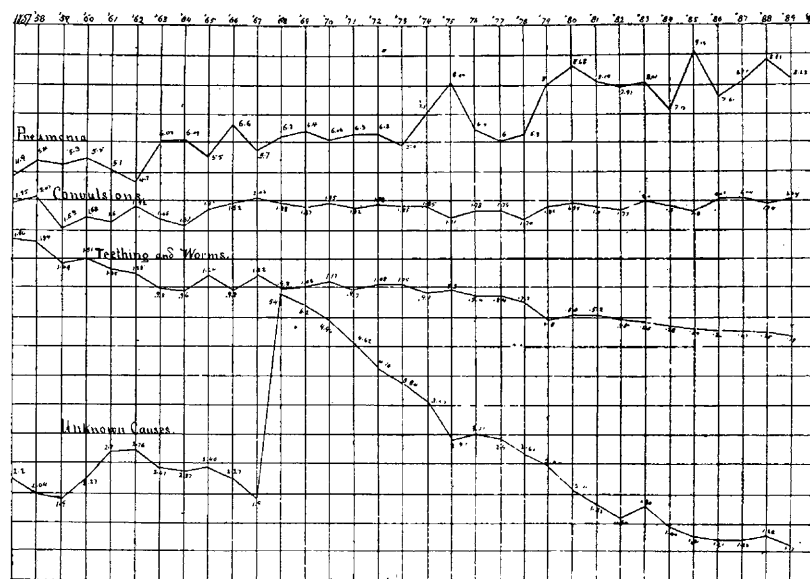


Chart 8.—Massachusetts, 1857 to 1890. Showing progress of the pneumonia ratios for all ages in relation with the progress of "unknown" causes and with two indefinite causes.

For the last decade, while pneumonia has been rising from 90.06 to 106.1, convulsions have fallen from 19.7 to 15.5 per 1,000 deaths from known causes. In the same period the death rate, for convulsions, per 100,000 population, has fallen from 56.2 to 33.1. The ratio of convulsions per 1,000 deaths from known causes at known ages has dropped from 33.5 to 20.4.

1. The apparent pneumonia history of the District of Columbia has attracted much attention as the "exception." The crude statistics indicate a decline of pneumonia. The age distribution of the population of Washington is very different from that of any other city in the country. In this respect it resembles none of the states adjacent. The population of Washington is deficient below the age of 20 and above the age of 60 years. It lacks precisely the elements of population which are said to have suffered the increased incidence of pneumonia. The average age at death has steadily increased, but it is doubtful if the average age of the living has materially altered in Washington in the past 20 years. If the statistics of Washington could be studied for pneumonia under the age of 5 years, it should and probably would appear that the returned mortality for pneumonia has increased, but the tables do not yield the necessary data, though Washington prints better statistics of mortality than any other large city in the country.

The relations of convulsions to quinquennial periods under 15 are as follows: In each 1,000 deaths under the age of 5 years there were charged to convulsions in 1890, 67.05; in 1900, 59.5. In each 1,000 deaths between 5 and 10 years, 15.44 in 1890, and in 1900, 11.3 were charged to convulsions. In each 1,000 deaths between 10 and 15 years of age there were charged to convulsions in 1890, 8.45; in 1900, 5.3. This is a remarkably consistent statistical exhibit of the progress of the mortality records toward definiteness.

Convulsions in children mask pneumonia more than any other cause of death, and one can safely say that a major part of the diminishing mortality from convulsions has, through improving diagnosis, been transferred to the pneumonia account, though from the statistical point of view this means no more than a step or two toward definiteness. At the present time every textbook warns one not to be misled by convulsions into overlooking pneumonia, and the importance of convulsions in the symptomatology of pneumonia is strongly emphasized. The diagnosis of pneumonia in children is indeed a very modern refinement of medicine, and dates from the comparatively recent inclusion of pediatrics among the essential subjects of college training.

One can not derive from the published statistics of large cities the relations of convulsions to pneumonia, but it seems quite significant that the weekly bulletin of Chicago has recently commented on the 40 per cent. decline of mortality from nervous diseases in the present decade, as compared with the decade preceding. The great part of that gain is a 60 per cent. reduction of the mortality from convulsions. It will be safe to say that 95 per cent. of the deaths charged to convulsions in Chicago fall on the period of life below 5 years, and that no more than 15 per cent. of these cases were in any proper sense diseases of the nervous system. A majority, at least, of these cases were pneumonia, and undoubtedly the pneumonia account has fattened on the alleged decline of nervous diseases.

The relations of pneumonia to convulsions are shown on several of the accompanying charts, and here, as in the case of congestion of the lungs, one observes a tendency to rise and fall together, particularly in the earlier part of the history. They diverge, however, the convulsions line pursuing a general downward course as pneumonia tends to rise.

For the state of Rhode Island I have been able to separate the pneumonia ratios by age periods, charting separately the pneumonia ratios for ages under 15 (Chart 6), from 15 to 60, and above 60. This brings out the relation of convulsions to infantile pneumonia rather better, although the statement is not quite fair to that relation. The relations of pneumonia under 15 to convulsions would be better stated as ratios to the mortality from known causes under 15 than to the mortality at all ages. The published figures would not yield these ratios, but Dr. Swarts has kindly furnished me figures which yield a still more striking illustration, namely, the relations of pneumonia and convulsions under 5 years to the total mortality under 5 years, the relations of pneumonia under 5 to pneumonia at all ages, and of the mortality under 5 to total mortality;

all for the period of time covered by the preceding chart (Chart 7).

The chart for Massachusetts contains, besides convulsions and unknown causes, the mortality ratios for "teething" and "worms." In 1897 only 1.3 deaths in "worms" are given definite consideration in the mortality statistics of Massachusetts down to the year 1900, when these items were lost by the adoption of the international classification. The relations of "teething" and "worms" to present-day mortality may very well be ignored, but their relations to our vital bookkeeping in the past may not be ignored. In 1857, 18.6 deaths in every 1,000 deaths at all ages, were attributed to "teething" and worms." In 1897 only 1.3 deaths in 1,000 are found under these heads. Different and more definite relations of infantile pneumonia are shown in Chart 9 from the experience of Massachusetts between 1889 and 1902.

A single registration office that I know of keeps separate account of the diseases of the brain and nervous system of children. My friend, Henry Mitchell, of New Jersey, furnishes this statistical account for comparison with the pneumonia account. The graphic

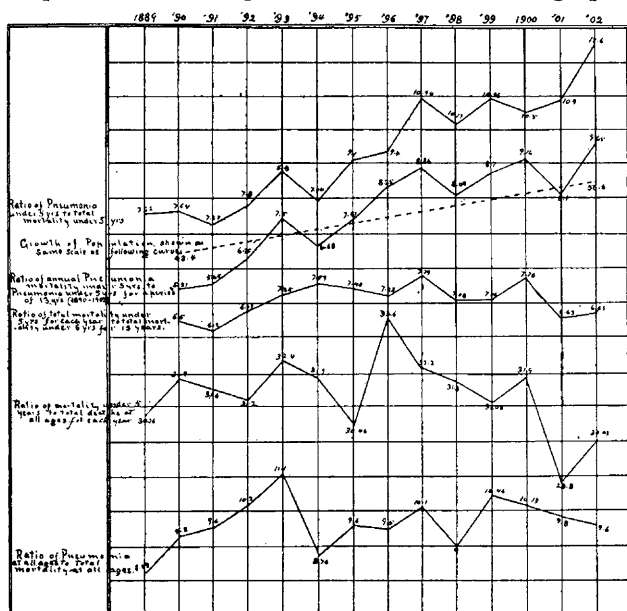


Chart 9.—Massachusetts, 1889 to 1902. Showing apparent rise of pneumonia under 5, increasing independently of the proportionate general mortality for that age period; showing the ratio of pneumonia for each year to pneumonia for 13 years, in the age period under 5, increasing but slightly in excess of growth of population.

statement is quite a remarkable one, showing the two curves separating in parallel motion so uniformly as to leave no doubt, in my mind at least, that the pneumonia account is fattening on the decline of its too responsive companion. Let me remind you again of the diagnosis of pneumonia in children. Its symptoms may include convulsions, stiff neck, opisthotonos, Kernig's sign, and the tache cérébrale, the cardinal signs, till recently, of meningitis. (Chart 10.)

For the state of Michigan I have been able to chart the ratio of pneumonia under 5 to the mortality from specified causes under 5, and to show the progress of convulsions and of unknown causes in the same relations. The relations of all these curves to the proportion of total mortality borne by children under 5 is also shown. A particular point of interest in this chart is the extremely irregular curve of unknown causes. Of course the unknown causes pursued in reality no such

eccentric course. Rather does it indicate that Michigan registrars were like the rest of us, long in acquiring the Socratic merit of knowing that they did not know. From 1884 to 1889 a large number of obscure causes of death in infancy appear to have been restored to the classified nomenclature. If the plan of compilation used in 1883 had continued in use to 1889, the ratios would have traveled as high as they do in the nineties until 1897, when a much more stringent exclusion of vague causes was practiced, sending up a ratio that otherwise would have fallen. (Chart 11.)

In this state, too, the advent of influenza in 1890 had a remarkable effect on both pneumonia and convulsions. Both the ratios fall a long way in obedience to the strong impression made by the grip on the medical mind and probably also on the registration office. This precipitate decline marks the period when the physicians and registration officers of Michigan came very near calling a spade a spade, though they have, in common with physicians and registrars elsewhere, been hiding influenza in the pneumonia account ever since that year.

One must regret that the mortality statistics of the large cities can not be studied from the published reports. It is a reproach that the mortality of these cities is not at least put into condition for study before publication. The fact that crude statements are published without any mention of their elements, is of itself sufficient ground for refusing them credit. For New York it may be said that it is difficult to find collateral evidence of the delusiveness of her pneumonia statistics. Chicago, however, does not confine her remarka-

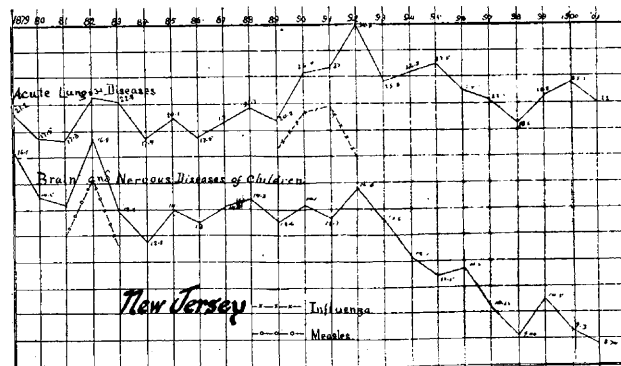


Chart 10.—New Jersey. Showing the mortality account of brain and nervous diseases of children unloading into the mortality account of acute lung diseases. The chart at 1892 suggests marked alteration either in the death certification or statistical treatment of influenza.

ble statements concerning mortality to the subject of pneumonia. Some of Chicago's detached utterances are difficult to reconcile. For instance, when we are told that from November, 1903, to May, 1904, there were 3,568 deaths from pneumonia, one may ask whereabouts on the population the mortality fell?

Above the age of 65, Chicago has but 2.46 per cent. of her population. The large American cities (including Chicago) have 3.07 per cent. of their population above 65. The Chicago figures for pneumonia impose a mortality 30 per cent. excessive on a population 20 per cent. short. One can not compound mortality at this rate.

At ages between 5 and 65 pneumonia is declining, and Chicago should derive a profit from this fact, for she has 86.3 per cent. of her people in this period, against the 85.93 per cent. in other large American cities. The excessive mortality can not fall on this period.



Chicago has below the age of 5 years, 11.24 per cent. of population, against 11 per cent. in this period in other large American cities. This part of the population, according to urban experience in recent years, must carry approximately 46.4 per cent. of the pneumonia mortality.

According to a recent bulletin the present proportion of deaths under the age of 5 is 21.8 per cent. of the total mortality, about 4 points less than it has been in years. The pneumonia mortality of Chicago is said to be 22.32 per cent. of the total mortality. The use of exactly these figures would result in an absurdity so gross that I hesitate to utilize it. Let us assume as Chicago's proportionate mortality what she says is her average, 26 per cent., and we shall have the statement that 26 per cent. of all deaths include not less than 37 per cent., and perhaps as much as 46 per cent. of the deaths from that cause which itself causes 22.32 per cent. of the total mortality. The arithmetical result of this sad disarrangement is that of every 1,000 deaths in Chicago under the age of 5 years, between 318 and 471 must have died of pneumonia.

There is no conceivable way of adjusting 3,568 deaths from pneumonia to the roll of the living or the dead in

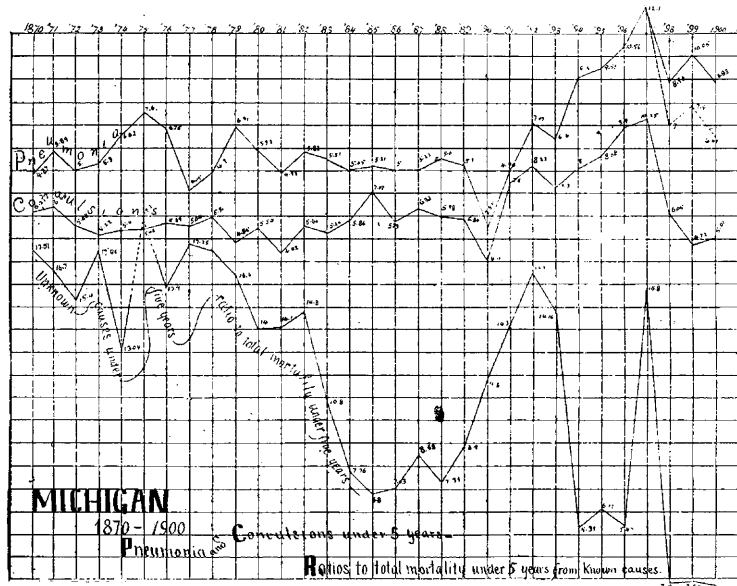


Chart 11.—Michigan. Illustrating the confusion of pneumonia with convulsions, especially in the years 1871, 1878, 1881, 1882, 1883, 1888, 1889, 1890, independent of the fluctuations of unknown causes—in the years 1891, 1892, 1893, 1897, 1898 the same confusion exaggerated by the fluctuation of unknown causes. At the year 1890 the chart derives its peculiar character from the reference of many deaths under 5 to influenza—convulsions and pneumonia, both falling, notwithstanding a large rise in the unknown causes. Unknown causes are excluded from the ratios.

Chicago without producing as absurd relations as these. Instead of 21.8 per cent., 31.8 per cent. of total mortality for the period of life under 5 years is the lowest figure possibly consistent at the same time with human experience and with Chicago's reported pneumonia mortality. On the other hand, if 21.8 per cent. is approximately the proportionate mortality of Chicago for the age period under 5 years, the pneumonia mortality must be counted down from 3,568 to 2,880 before it reaches the limits of credibility.

The bulletin says again that the present season is the most favorable in the history of the city so far as childhood is concerned. Great gratification is expressed at the "phenomenal infrequency of the contagious dis-

eases." Since the first of the year there are said to have been but 9 deaths from measles, against 190 in a like period last year, but 91 deaths from scarlet fever against 167 in a like period last year, but 8 deaths from whooping-cough against 186 in a like period last year. Now Chicago is on earth. It is situated in one of the United States, is inhabited, and its people have the characteristics of the human race, except that they can suffer a phenomenal rise of pneumonia, associated with a more phenomenal fall of measles, scarlet fever and whooping-cough. In this respect the history of Chicago in 1904 is unique in the experience of Illinois, of the United States, of the world, and of Chicago.

These representations of the history of indefinite causes in general exhibit the progress of medical diagnosis and of registration in the general direction of definiteness. They show that improvement in medical diagnosis has a far more serious effect on the signifi-

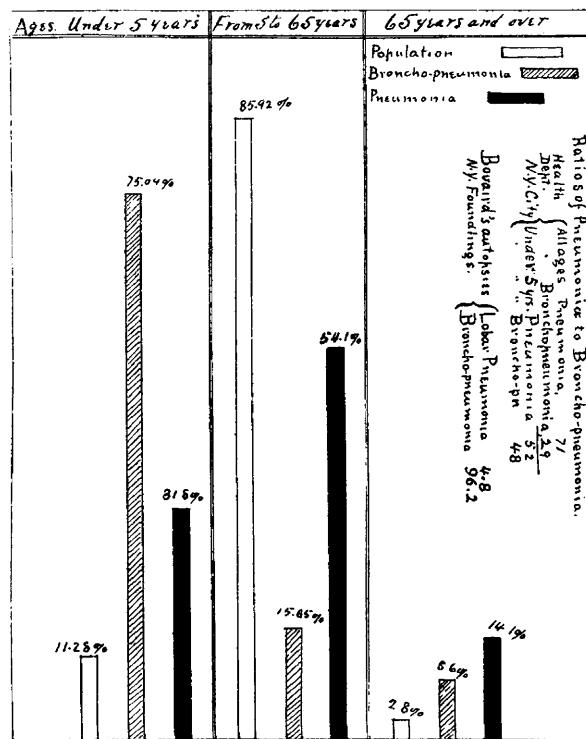


Chart 12.—New York City, 1901. Percentages of population in 3 age periods. Percentages of pneumonia mortality in 3 age periods. Percentages of broncho-pneumonia in 3 age periods.

cance of the figures than is generally admitted. In the history of the very indefinite and unknown causes one sees so large an error as to vitiate the statistics for practically all the definite diseases, which are said to be rising. In the infantile mortality especially, one sees a number of vague causes of death gradually disappearing from the tables, while most of the definite affections are at the same time declining. There is but one possible explanation of the declining mortality charged to such vague statistical accounts as teething, worms, convulsions, brain and nervous diseases of children, and that explanation is that deaths long ago attributed in large numbers to these causes are now receiving at the hands of physicians more definite nosologic reference.

Certain important diseases of infancy are declining, and their decline can be accounted for. A single rising account has appeared in the history of infantile mortality, and the conclusion is to me irresistible, that the one

rising account has profited by the decline of the indefinite causes of infantile mortality.

If such corrections as I have suggested be applied to the statistics, we shall, perhaps, not seriously diminish the importance of pneumonia as a cause of infantile mortality at the present time. So far, indeed, the argument simply brings the past and unsuspected importance of pneumonia into view, and at that point we should have to stop if pneumonia were a definite cause of death. But the term pneumonia is not, either in the tables or in its medical use, a definite statement of a cause of death. In medical parlance pneumonia has grown less definite in the course of time. In statistics the term is less definite than in medicine, although it preserved the appearance of definiteness until the adoption of the international classification, when the comparatively modern compounded word, bronchopneumonia, received a separate index.

In the United States census for 1900, although the international classification is used, one finds under the head of pneumonia no differential statement such as this classification provides for. For the local registration offices in general, one may say that differential statements can rarely be found in the published records where the international classification is not used, while in the offices employing this classification differential statements are obtainable only for the past three or four years.

All the statistical sources utilized in this study give differential statements for a total of 13,608 deaths, of which 9,263 were returned under the head of pneumonia, and 4,340 under the heads of bronchopneumonia and pleuro pneumonia.

The published reports for New York furnish hardly any and those of Chicago no means whatever of determining the probable line of cleavage between the two sorts of pneumonia, but if the per cent. derivable from the figures given hold good for these cities, 32 per cent. will be cut off the returned mortality for the past four years. One can not say, however, that the 32 per cent. error which is fairly chargeable against the records for the years 1900-1902 would hold good for any equal antecedent period. The information yielded by the New York City report for 1901 is shown in Chart 12.

The statistics for Boston throw a curious light on this point. The pneumonias were differentiated in that city in the published reports before 1900, but they were distributed in such a way as to make it appear that lobar pneumonia has been decreasing, while bronchopneumonia has been increasing. The bronchopneumonia for 1896 was 15 per cent. of the whole pneumonia account, in 1897, 17 per cent., and in 1899, 22 per cent. Since 1900, 46.7 per cent. of the pneumonia account of Boston is made up of deaths returned as caused by bronchopneumonia.

One might say that it is right to add bronchopneumonia to pneumonia now, the figures should be recovered and added to the pneumonia of the past. But the rise of bronchopneumonia does not mean in medicine and it should not mean in statistics anything added to pneumonia. Traced backward, bronchopneumonia will be found to disappear, the greater part of it at least, in the bronchitis account.

The correction for certificates returned under the head of bronchopneumonia is a discount applied to the pneumonia ratios at a rate beginning with at least 32 per cent. in 1902, and diminishing year by year to zero at about the year 1880.

This would still leave a considerable though indeterminate amount of bronchopneumonia in the figures for recent years. The terms pneumonia and bronchopneumonia, although convertible terms in statistics, are not convertible terms in medical use. No physician ever writes "bronchopneumonia" on a death certificate when he means lobar pneumonia, but many physicians write simply "pneumonia" when they have recognized the cause of death as bronchopneumonia. Bovaird's recent figures for 500 autopsies at the New York Foundling Asylum gave 95.2 per cent. of bronchopneumonia to 4.8 per cent. of lobar pneumonia. Fancy the curves on these charts cut to fit this ratio, and one can see the end of the pneumonia sensation. If the bronchopneumonia could, however, be eliminated or distinguished, the pneumonias remaining would still lack a definite significance.

In the manual which presumably governs the practice of officers using the international classification the instructions as to what returns are to be included under each of the two heads are interesting. Pneumonia includes deaths certified as due to acute, alcoholic, apical, croupous, infectious, bilious, typhoid, diplococcus, lobar and vesicular pneumonia, lung fever, inflammation of the lung or chest, peripneumonia, pneumopericarditis, pneumopleurisy, splenopneumonia. The title does not include death certified as due to bacillary pneumonia, caseous, catarrhal or interstitial pneumonia.

Bronchopneumonia includes catarrhal pneumonia, aspiration pneumonia and deglutition pneumonia. The bronchopneumonia of the census does not include the returns of capillary bronchitis. Capillary bronchitis is counted in the census office and in several local registration offices as bronchitis! One has no means of ascertaining what practice was followed previous to 1900, but it is certain that the practice differed from this. Practically everywhere the total pneumonia account includes all the death certificates in which the word pneumonia was used without reference to an antecedent disease of equal or greater statistical importance. In the District of Columbia the pleurisy account carries the pleuropneumonia mortality. The hypostatic, traumatic, surgical, septic, terminal and ether pneumonias are included in the pneumonia account whenever the death certificate fails to mention an antecedent condition having recognized importance as a cause of death.

The age distribution of bronchopneumonia is interesting. A very large part of it—75 per cent.—falls on ages under 15, but no part of life appears to be exempt from it; 25 per cent. is far too much to charge to ages above 15. I have charted the pneumonia and bronchopneumonias separately for New York by ages. Enormous as the disparity appears below the ages of 5 years, the actual contrast is greater. (Chart 12.) If the bronchopneumonias between 15 and 50 were all charged to tuberculosis, the bronchopneumonia statistics would be better and the tuberculosis statistics no worse. Above the age of 60 the use of the term bronchopneumonia does not express antemortem diagnosis.

Our study has gradually narrowed down to the question of pneumonia under 15, and in this period to the one-ninth or so of population under 5 years. Here we find that something like 90 per cent. of the recorded pneumonias have extremely various etiologic relations, and have no right whatever to consideration under a single nosologic head. Outside of mortality statistics, such thing as a primary bronchopneumonia is but



rarely recognized. In a great majority of instances the essential cause of bronchopneumonia can be determined clinically, and should be recorded on the certificate. Possibly since 1890 the diagnosis of respiratory affections in childhood has been in a single respect more difficult. Since the advent of influenza many bronchopneumonias are perhaps not referred to their etiologic factor so easily as are the bronchopneumonias of measles, whooping cough, scarlet fever, diphtheria, etc. Bronchopneumonia is a secondary or complicating condition, and whenever the primary causative factor is known a death from bronchopneumonia should receive appropriate statistical reference. When the certificate fails to designate the proper statistical reference, the record should at least be disposed of in such a way as not to obscure the relations of an agent of death as definite and important as lobar pneumonia.

There is no proof that lobar pneumonia has grown more prevalent or more fatal at any period of life. There is no considerable evidence of an increase at any period of life save that under 5 years, and here pneumonia has simply come into view and demands some consideration. Pneumonia is not the "Captain of the Men of Death." The claims of six destroyers stand between pneumonia and the distinction of leadership.

#### CONCLUSIONS.

1. The returned mortality of the United States for ages between 15 and 60 during the past twenty years shows a diminishing mortality from the class of respiratory diseases commonly returned as pneumonia. Of the pneumonias occurring in this age period a large majority are true lobar pneumonia. Fifty-eight and a half per cent. of the population of the United States, and 66.5 per cent. of the population of cities are between the ages of 15 and 60. The incidence of lobar pneumonia on a major part of the population is therefore diminishing.

2. The return mortality of the United States, for ages above 60, indicate that the mortality from the class of respiratory diseases commonly returned as pneumonia has increased from 21.9 per cent. to 22.6 per cent. in ten years, the population at the same age in the same period having increased from 6.2 to 6.6 per cent.

The urban mortality for the same age has grown in ten years from 16.1 to 19.5, and has been accompanied by an increase of population in that age period laterally from 5.23 to 5.27 per cent. Several pathologic conditions added to the group of pneumonias, and not provided for in statistics, are included in the returned mortality of pneumonia for ages above 60. For 6 per cent. of our total population lobar pneumonia may have increased in the past ten years, though satisfactory evidence of an increase has not been offered.

3. The return mortality of the United States for ages under 15 (about one-third of the total population) shows an apparent rise of mortality for the group of respiratory diseases commonly classed as pneumonia. The acute respiratory diseases of children were in former years commonly mistaken for affections of the nervous system. Year by year for thirty years increasing numbers of deaths formerly found in the indefinite accounts, and in the class of nervous diseases, have been transferred to the class of respiratory diseases and especially to the pneumonia account.

Of the mortality recorded as due to pneumonia under the age of 15 years, not more than 10 per cent. is due to lobar pneumonia. A small though considerable

incidence of lobar pneumonia in children under the age of 5 has come into view of late years, but there is no evidence that lobar pneumonia has increased in this age period. The remaining 90 per cent. of the recorded mortality ascribed to pneumonia includes the conglomerate group of bronchopneumonias, nearly all of which are secondary or complicating causes of death, and should be referred in the mortality tables to the primary causes of death.

4. Since 1890 a new cause of infantile mortality has come into view, an acute respiratory infection, attacking infants of 2 years old and under, commonly returned under the diagnosis of pneumonia, sometimes returned as due to a disease of the nervous system, and probably due to influenza.

5. The mortality registration of American cities is in general very poor. The crude rates and ratios offered by certain cities as evidence of a rising pneumonia mortality are inconsistent with the mortality statements concerning other causes of death, and with the characteristics of the populations concerned. They represent a perversion of statistics which must eventually bring discredit on American mortality registration.

#### DISCUSSION.

DR. BENJAMIN LEE, Philadelphia, said that we all remember the criticism of the individual who divided lies into three classes—lies, confounded lies and statistics. Dr. Lee does not second that particular definition of statistics. At the same time he could not help thinking that we were discussing two propositions supposed to be founded on statistics, both of which have been accepted as definite and fixed, and neither of which, to his knowledge, has ever been definitely proved. It seems to him that we might expect 75,000,000 people to consume more alcohol than 10,000,000, but, taking our people as we find them, he does not think that any one can prove that at the present time intoxication is a vice of this country to the extent that it was 100 years ago. At that time a man was hardly considered a gentleman who did not go to bed drunk, while at the present time it is the exception for a respectable man to go to bed drunk. We may be increasing in the use of certain forms of alcohol, but those are the forms which are the least pernicious. The man who drinks a pint of beer does not drink as much alcohol as the man who drinks a glass of sherry, and very much less than the man who drinks an ounce of whisky. It does not seem to him that our present diseases are more due to the use of alcohol now than they were fifty years ago. There are many factors to be considered when we come to make up our minds as to statistical data and results in medicine. One of the most important factors is the question of diagnosis, and following that is the question of nomenclature. Both of these, in the period during which more or less accurate statistics have been kept, have made wonderful changes. Our advances in diagnosis have been very remarkable, and Dr. Fulton has pointed out that an immense number of diseases are now properly reported as pneumonia which formerly were not so reported. Comparatively few physicians now report infantile bronchitis and catarrh. Most of these cases are probably now reported as pneumonia.

DR. CRESSY L. WILBUR, Lansing, Mich., regrets that it is so extremely difficult to go back over the records of any state, or the United States, and obtain thoroughly reliable data as to the age distribution of any particular disease. He said that, in regard to the variations in the distribution of unknown causes in Michigan, perhaps Dr. Baker can throw some light on the matter, as the early records were compiled under Dr. Baker's personal supervision. Not only the methods of compilation change, but the men change who make the compilations. Dr. Baker, in the early compilation of the Michigan statistics, formed a book of practice, which served as a guide to the work. The statistics at that time were compiled according to the classification of Dr. Farr. During Dr. Wilbur's first experience in compilation he used this classification, but

he had no guide to its practical employment. He simply used his best judgment. At the Montreal meeting of the American Public Health Association, in 1894, he suggested a new classification. At that time there was no hint or promise of an international agreement. As soon as there was a prospect of a successful international classification, beginning with the Bertillon system in 1898, he began to use it. This system was revised in 1900, the revision going into effect in 1901, since which time he has adhered strictly to the "international classification," as it is now called. That makes four systems that have been used in Michigan, besides one system which was employed by three different compilers, varying in methods to some extent. This shows the necessity of having a proper guide in this matter if our statistics are to be used for comparisons even in the same state, and the international classification, if strictly followed, should give more satisfactory results than those shown by the diagram. The United States Census reports for the year 1900 were for the census year 1899-1900. The international classification was not used for that compilation, so that the results shown in the last line should compare with those for the preceding censuses. The International Commission of Paris in 1900 did not seem to give this question of the proper compilation of pneumonia very much consideration. A distinction was made between bronchopneumonia and "pneumonia," the latter supposed to correspond closely to croupous pneumonia; but, unfortunately, among the deaths reported from "pneumonia" are included many deaths from bronchopneumonia or catarrhal pneumonia, and the statistics are thereby vitiated. Dr. Tatham of the English Registrar General's Office recently introduced a new classification, and now makes four divisions of pneumonia. Epidemic pneumonia is placed among the infectious diseases. Bronchopneumonia or catarrhal pneumonia and acute lobar or croupous pneumonia are stated separately. In the fourth class appears "pneumonia," unqualified, with indications that it is an indefinite term, not to be chosen if possible to specify more definitely. Dr. Wilbur stated that the statistics of pneumonia are also confused by the fact that many deaths from "pneumonia" occur as the terminations of chronic diseases and are merely terminal infections or complications. When pneumonia is the result of whooping cough, measles, or any of those diseases, it should be charged to the primary cause.

DR. J. N. HURRY, Indianapolis, said that, attracted to this subject by constant reference of the bulletin of the Chicago Board of Health, he commenced to study the matter very closely in Indiana and tabulated and compared the pneumonia periods, as he called them, namely, November, December, January, February and March of each of the four last years. He found that during the last period there were fewer deaths than the average of the entire four years, and so, evidently according to our statistics, while there was no increase in the total deaths from pneumonia, still, when they compared the results by the different ages, they found an increase in those under 5 years of age. There were more pneumonia deaths during the last period than the average for the four years. During the first period, November and December, 1899, and January, February and March, 1900, there were quite as many deaths from pneumonia in Indiana as during the same periods in 1903 and 1904. The weather of the last period was very bad, being very raw, cold and wet. The humidity was high. In the first period there were quite as many pneumonia deaths, but the weather was comparatively mild, so he concluded that the weather was not causing an increase, if there was an increase, which did not appear by these comparisons. In one particular the two periods were alike in having the same number of deaths from pneumonia and in this, that measles, influenza and whooping cough prevailed extraordinarily in both those periods, and in the lower periods they did not prevail, but Dr. Hurty could not find any similarity in the weather to account for it.

DR. HENRY B. BAKER, Lansing, Mich., stated that from his standpoint the method of study is fundamentally wrong. He does not think we know from that method of study whether pneumonia is increasing or decreasing. It is not a satisfactory

method to determine this question by means of the ratio of deaths from pneumonia to the deaths from all causes, because the deaths from the other causes are changing. Dr. Fulton or someone should take these figures and give us the relation of the deaths from pneumonia at certain ages to the population at those same ages. We are indebted to Dr. Fulton for calling attention to the influence of these other questions on the subject, but it is too early to apply these corrections which he seeks to apply. We haven't anything to apply them to to the best advantage.

DR. BENJAMIN LEE, Philadelphia, believes that a board of health without a proper system of registration of vital statistics is a truncated animal, and he is simply longing for the time when Pennsylvania will take as firm a stand as any other state. There are one or two points in regard to this question of pneumonia which have not been touched on. One is the influence of the presence in this country for the past ten years of the grip germ. Unquestionably a great many of the cases reported as pneumonia take that special form. The other point is the greater prevalence of pneumonia in cities as compared with the rural districts. Dr. Lee believes that street dust is a great factor in producing the disease, and whether that street dust contains the pneumococci or whether it contains some other poison is in each case an open question. He believes that long periods of dry weather, during which the atmosphere becomes filled with dust, are more frequently a source of danger than rainy weather. A most interesting experiment was tried in the city of New York many years ago. They were laying out a large park and had set out a great number of elm trees, and during the first two years all those trees died. When they came to take up the trees to find out the cause of death they found that all the roots of the trees were dyed blue, and on investigation they discovered that the dye material was Prussian blue, produced by the reaction of iron, potash and nitrogenous material in the street dirt, which had been used as a fertilizer. Dr. Lee has never followed up the question as to what effect the breathing of dust laden with Prussian blue would have, but he can conceive that it would have a very unpleasant action on the mucous membrane of the air passages. He does not believe that the question of street dust is at all ended when we talk only about the bacilli. He believes that there are other impurities and poisons in the street dust which may affect the pulmonary tissues disastrously.

DR. G. T. SWARTS, Providence, R. I., stated that the changes in nomenclature have been so rapid within the last four or five years that it would be difficult to compare the results with previous years. One could hardly believe the conditions existed as they are reported, and with the intent of learning something of those conditions since last February he has written to every physician who has reported the cause of death as pneumonia as to whether there was any known exposure to another case. That was for the purpose of determining if boards of health could profit by requiring isolation. At the present time it would seem that the amount of known exposure is very slight indeed. In answer to his inquiries he noticed that sometimes a physician would correct his diagnosis and state that the attack of pneumonia followed influenza. That would lead us to go back to what we call the primal cause of pneumonia, and whether the pneumococcus was present or some other organism as in measles or scarlet fever, and which has produced the inflammation of the lungs which simulates pneumonia. Until we can educate physicians to make an exact diagnosis and be more particular as to what we, as registrars, desire from them our statistics will still be in a chaotic state. When we attempt to draw conclusions we are very apt to be led astray unless we know the physician. The physicians of the state of Rhode Island are taking up this subject with interest, especially as they have been pestered for the last few years with questions from the registrar as to what they mean or do not mean to give as the cause of death.

DR. JOHN S. FULTON said that this subject, like many others of the sort, is in a state of confusion. To show that was one of the purposes of the paper. The argument which he made is for the most part destructive, but is none the less a necessary

argument. The registration offices in this country do not furnish the data necessary to a satisfactory study of the subject. Accurate numerical statements concerning the elements of population and concerning the distribution of mortality are lacking. The heterogeneousness of some of the mortality accounts has not been sufficiently considered by many students of the subject, and some registration offices have published misleading and alarming statements based on very insufficient data. The influence of improving diagnosis has not been accorded its due importance and the history of indefinite causes of death has not been taken into account. To his mind one of the most interesting phases of mortality registration is its progress toward definiteness. As medical knowledge improves the indefinite account loses by the medical reference of a certain number of deaths to their true cause. At the same time the indefinite account gains by the statistical reference of deaths medically returned under very vague or obsolete nosological heads. The weight of movement is toward definiteness but some of our growing accounts have not become definite, and one or two, though having very definite appearing titles, such as pneumonia, have actually become less definite. The progressive unloading of the "unknown" account, of "teething" and "worms," "old age," "convulsions," etc., into other accounts gives as a general result an exaggerated view of rising accounts and a disguise of falling accounts, but no one dare say, without careful examination, how any particular account has been affected. The pneumonia account has received substantial accretions from certain more indefinite accounts, but the term pneumonia has not meanwhile grown more definite, but less so. No one is prepared to tell us exactly what the pneumonia account includes, but in the period of life below 5 years 85 per cent. of the pneumonia mortality consists of the secondary bronchopneumonias, having a variety of etiologic relations. In the present state of knowledge it matters little that the pneumococcus is more or less loosely related to many of these cases, for the relations of pneumococcus even to the massive pneumonias, which physicians have in mind when speaking of pneumonia, are not yet satisfactorily affirmed. A consideration of the figures seems to Dr. Fulton to suggest rather strongly that about 1889 a new factor entered into the pneumonia mortality of young children. This new factor may not have been the freshly imported strain of influenzal virus, but it certainly was not a new strain of pneumococcus. The relation of influenza to infant mortality has not been regarded as very important, but he suspects that the apparent pneumonia mortality would be very much reduced by successful prophylaxis of influenza, and that profits therefrom would be realized most amply by that part of the population under 5 years of age.

### THE MANAGEMENT OF HERNIA IN INFANCY AND CHILDHOOD, WITH RESULTS OF OPERATIVE TREATMENT.\*

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The fact that at least one-third of all the cases of hernia occur in children under the age of 14 is sufficient evidence of the importance of this subject.

Most cases of hernia in infancy and childhood are regarded as congenital, but this is a term that has given rise to much confusion. By congenital hernia we do not mean a hernia that existed at birth, but a hernia due to the failure on the part of Nature to close the process of peritoneum that has followed the testis in its descent into the scrotum. If the hernial sac is found at operation to communicate with the tunica vaginalis of the testis, we speak of it as congenital her-

nia. If, however, the pouch of peritoneum has become closed off just above the testis, but still leaving an open funicular process extending through the canal, or even into the scrotum, we still have a condition quite as favorable for the development of a hernia as in the former typical congenital variety. This latter variety, strictly speaking, would be a congenital hernia, although there is no way of differentiating it, anatomically, from an acquired hernia.

It is probable that the great majority of herniæ in children under the age of 5 or 6 years belong to these two varieties, and owe their existence to a congenital or preformed hernial sac. An analysis of our own series of operations for hernia in children shows that in more than half of the cases there is no communication between the hernial sac and the tunica vaginalis. Given the existence of a congenital or pre-formed sac, the immediate or exciting cause may be anything that greatly increases the intra-abdominal pressure, e. g., crying, coughing, straining at stool, constriction of the abdominal cavity by too tight bands.

The main question under consideration in the present paper is how to treat a hernia after it has developed, and the first point to decide is: Shall the treatment be mechanical or operative?

We believe that truss treatment should always be the method of choice in children under the age of 4 years, although not a few surgeons, both here and abroad, are now advocating operation as the primary method of treatment in infants. While I believe it a good general rule not to operate until the age of 4 years has been reached, there are certain important exceptions:

1. If there is a history of strangulation that has become reduced by taxis, I believe that an operation is indicated, no matter how young the child.

2. In cases in which, despite carefully directed truss treatment, the hernia has become irreducible, or reducible with difficulty, I think early operation should be advised.

3. In cases in which the rupture can not be controlled by a truss and, as a consequence, is gradually increasing in size.

4. In all cases of femoral hernia, the reason for prompt operation in this class being that a cure by persistent truss treatment is practically unknown at any age.

5. Immediate operation is indicated in all cases of hernia associated with reducible hydrocele or fluid in the hernial sac, inasmuch as it is impossible to control the rupture by means of a truss, and there is, hence, nothing to be gained by waiting.

#### RESULTS OF MECHANICAL TREATMENT IN CHILDREN.

Roughly speaking, I believe that herniæ in infants and children under the age of 4 years can be cured by carefully directed truss treatment in about two-thirds of the cases, although it is probable that, in after years, a considerable percentage will relapse.

Beyond the age of 4 years, in a fair proportion of the cases, a cure can be effected by means of a truss, provided the truss is properly fitted in the first place, and the child is regularly seen by a surgeon for a period of not less than two years.

#### METHOD OF MECHANICAL TREATMENT.

There are several kinds of trusses, all of which are of nearly equal value in the treatment of hernia in children. Personally, I consider the "opposite-side" or "cross-body" truss (Knight truss, Fig. 1) the best. It consists

\* Read in the Section on Diseases of Children of the American Medical Association, at the Fifty-fifth Annual Session, June, 1904.