Lecture.

THE ALLEGED INCREASE OF CANCER IN MASSACHUSETTS.¹

THE SHATTUCK LECTURE.

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MR. PRESIDENT AND FELLOWS OF THE MASSACHUSETTS SOCIETY: During the past few years attention has been called to the apparent rapid increase of the death rate from cancer, and prophecies of an alarming nature have been made for the future, based on this assumption. With a view to determine what may be the underlying cause of this, the statistics of the disease in this State have been studied, and a comparison made with those of other states and foreign countries; and it is to the results of this that I have the honor to invite your attention this evening.

At the risk of repeating what may perhaps be known to many of you, I will begin by briefly describing the way in which statistics are usually compared and explain a few of the common terms.

The standard by which the mortality of one year or place is compared with another is termed the death rate. By this is meant the number of persons who have died during a year out of a given number who were alive at the beginning. The number usually selected is 1,000, and the rate is easily obtained by dividing the total number of deaths for the whole year by the number of the population alive in the middle of it and pointing off the proper number of decimals. Thus, for example, if it is stated that the death rate of a given year or place is 19, it is meant that 19 out of every 1,000 persons, without regard to age or sex, alive at the beginning, died during the year.

The rate for any disease may be obtained in the same way by using the number of its deaths instead of the total number from all causes.

Another standard for a separate disease can be obtained by using the proportion of deaths from it during a year to the total number from all causes. This will be called the death ratio, and is best expressed in per cent.

It will be evident at once that the results obtained in these ways are very crude and inaccurate, if the age and sex are not taken into account. For example, the death rate of cholera infantum, a disease restricted to early childhood, would be very misleading if based upon the entire population of all ages.

So for cancer—99% of the cases of which occur after twenty-five years—it is useless to take into account the population or deaths before that age in estimating the yearly rate and ratio. Then, too, the female sex is generally regarded as more subject to this malady, so that the sexes also should be considered separately.

Unfortunately, in the published statistics of most states and countries these fundamental de-

tails are not given, and nothing beyond the crude death rate can be obtained.

In our own State the value of vital statistics was early recognized, and there are quite accurate reports going back to the year 1847, and covering very fully the particulars for the State as a whole. But when it comes to the arbitrary divisions called counties, simply the total number of deaths are recorded, and for towns they are altogether silent in regard to an important disease like cancer, although an entire column of space running through many pages is allotted to the record of those killed in battle or executed, with perhaps the necessity of a single entry for the year.

But, unsatisfactory and incomplete as they are in many respects, there is yet much that can be gleaned from them, which it is to be hoped will repay your consideration and criticism.

First, let us look at the death rate for cancer, from 1850 to 1895 by quinquennia calculated from the average deaths of five years, so arranged as to bring the decimal year in the middle, and thus coincide with the year in which the census is actually taken.

In order that the difference may be in whole numbers instead of decimals, the rate is made to apply to 1,000,000 persons, instead of 1,000. Further, two rates are given, one for persons of all ages, the other for those over thirty years of age, and are as follows:

DEATH RATE FOR CANCER FOR ONE MILLION PERSONS.

Year.	All Ages.	Over 30 Years.	Year.	All Ages.	Over 30 Years.
1850.....	153.....	375	1875.....	374.....	890
1855.....	193.....	480	1880.....	505.....	1,165
1860.....	257.....	625	1885.....	560.....	1,205
1865.....	290.....	650	1890.....	605.....	1,300
1870.....	348.....	815	1895.....	670.....	1,495

If a comparison is made between the figures of 1850 and 1895, it is found that the latter are four and one-third times greater for the crude and four times greater for the death rate "over thirty years."

Taking the latter figure as the more accurate, it can hastily be said that the death rate has doubled twice in the last fifty years. Assuming the increase to go on at this rate for the next hundred years, doubling every twenty-five, it would give a death rate of 3,000 in 1920; 6,000 in 1945; 12,000 in 1970; and 24,000 in 1995. A death rate more than equal to that of all diseases at the present day. In two centuries the figures would be 590,000 for each million, or, in other words, every second person over thirty would die of cancer during the year; and in another quarter of a century the race over thirty years would be practically extinct.

But it will be well to look back once more before we leap so rashly into the future. In the first place, it is certain that the progression is geometrical—for at its worst it may only be arithmetical.

The difference between the rate over thirty years for 1850 and 1895 is found to be 1,120,

¹ Delivered before the Massachusetts Medical Society, June 11, 1901.

which, if divided equally among the ten quinquennia, would give 112 for each.

If the increase is geometrical, it would be expected that the rate for the first half should be below this average, and for the last above it.

PLATE 1.

The following are the actual differences for each five-year period:

1850 to 1855	106
1855 to 1860	145
1860 to 1865	25
1865 to 1870	165
1870 to 1875	75—Average 112
1875 to 1880	275
1880 to 1885	130
1885 to 1890	95
1890 to 1895	105

Great irregularity is the marked feature of this table, some of the figures of the first half being higher than those of the second half, and the increase of the last five years of the series corresponds almost exactly with that of the first. From this there is certainly much more proof of arithmetical than geometrical progression; and if, with this, the horoscope is again cast, it will be found that the rate for 1920 will be 2,060; for 1945, 2,620; for 1970, 3,280; and for 1995, 3,840 instead of 24,000.

Even this number, small by comparison with the other, is high enough, and I must ask you to look still further and see if a redeeming clause can be found for it anywhere.

In estimating the general death rate the failure to properly return or record the deaths is about the only source of error which has to be taken into account. But in the study of single diseases the errors in diagnosis and the proper classification of these death certificates also have to be considered. From this the possibility is at once

suggested, that the increase which has been shown above may be entirely due to more accurate diagnosis and more careful registration.

The question, then, is to find what is the real death rate or ratio for cancer, and how closely it corresponds with that obtained from the vital statistics. Where, then, are there cases which will prove this? And the answer is, in the great hospitals, where the diagnosis has been verified by post-mortem examination. Those in our midst are too small and the autopsies too infrequent to furnish very reliable information, so we must turn to foreign countries for it, and in the reports of the k. k. Allgemeiner Krankenhaus, in Vienna, it can be found. There the records of the autopsies have been carefully kept and classified for a series of years.

The cases have been collected by Nothnagel for the years 1870–1881, and 1882–1893, with 1875 and 1885 for the middle point, and for the single year 1865.

The figures and percentages are as follows:

	Autopsies.	Cancer Cases.	Death Ratio.
1865	1,512	122	8.02%
1870–81	20,480	1,460	7.15%
1882–93	20,358	2,124	10.90%

They have also been obtained from the reports of the Charité Hospital in Berlin for eleven years:

	Autopsies.	Cancer Cases.	Death Ratio.
1875–1885	8,968	569	6.35%

PLATE 2.

If now these are added to those of Vienna, the following is the result:

BERLIN AND VIENNA.			
	Autopsies.	Cancer Cases.	Death Ratio.
1870–1892	49,806	4,153	8.3%

In these large hospitals, although the age is not given, the greater number of patients are adults, and so the ratios are fairly comparable with those for "over thirty years."

From this it is clear that the average death ratio for cancer, based upon carefully performed autop-

practitioner throughout the State, that the difference is not greater.

To the same conclusion have come Newsholme and King,² from their study of the statistics of Great Britain, which show a similar rate of increase to ours, and from a comparison of the figures of an insurance company and of the Frankfort Hospital.

Here this part of the subject may be left, and I will ask you to look back for a moment to see if any of the irregularities of increase, which have doubtless been noticed, are capable of explanation.

The following table gives the death rate of males and females over thirty years for the same period of fifty years, as has been done before for persons.

MASSACHUSETTS.—DEATH RATE FOR ONE MILLION LIVING OVER THIRTY YEARS.

MALES AND FEMALES. 1850-1895.

Year.	Males.	Females.	Year.	Males.	Females.
1850.....	290	445	1875.....	565	1,200
1855.....	342	598	1880.....	795	1,500
1860.....	413	822	1885.....	835	1,685
1865.....	408	868	1890.....	900	1,800
1870.....	532	1,070	1895.....	997	1,965

The first marked irregularity is between 1860 and 1865, where the death rate for males is lower than that for the preceding year. This can well be attributed to the draft the Civil War made upon the male population. But it is surprising that the rate for the females should have also been affected by this cause, yet it appears there is nothing like

PLATE 3.

sies, was nearly 2% higher thirty years ago than it is today in Massachusetts, according to the recorded clinical diagnosis. So that until the death ratio, "over thirty years," reaches more than 8%, and then begins to show a decided increase, it is not justifiable to speak of it as due to anything except better diagnosis and more careful registration and classification.

What more careful diagnosis can do is shown from the statistics of the New York Mutual Life Insurance Company, where great care is exercised in verifying the cause of death. The data taken from their published figures is restricted to the ratio for the ages of fifty to seventy years, and is compared with that for Massachusetts in the following table:

RATIO OF CANCER DEATHS TO TOTAL DEATHS.

	Males (50 to 70 years).	5-year averages.
	Massachusetts.	Mutual Life Insurance Co.
1880	5.15	5.74
1881		
1885	4.75	
1886		5.65
1890	6.10	
1891		5.61
1895	6.25	
1896		6.84

This shows that the returns are about $\frac{1}{2}\%$ higher when made with more care and accuracy. It speaks well, however, for the ability of the average

PLATE 4.

the increase between 1860 and 1866 that there was for the five years preceding or following. It can, however, be explained by the absence of the

² Proc. Roy. Soc., vol. liv.

surgeons in the field, and the faulty registration due to the unsettled state of the community. The effect of the war on the male population is still apparent for the next ten years, since a large proportion of them had perished in the field before

PLATE 5.

arriving at the "cancer age." On the other hand, the females resume their increase with the advent of more skilful attendance and settled conditions.

Between 1875 and 1880 is the largest single gain, and since then it has been gradual, but on a higher level. This era, however, is marked by general introduction of aseptic surgery; and, with the hope held out by it, cases have been attacked and brought to light which before had found their resting place in vital statistics, under the head of hemorrhage, marasmus, heart failure, old age and the like. And yet, for all this improvement, as has been shown above, the limits of accurate diagnosis have not been reached.

So far, in considering the rate and ratio, all ages have been taken together; but interesting relations are brought out when they are further separated into decades. But as these periods of time pass gradually into each other, the figures can be plotted into a curve to show the gradations between them. If the rates for cancer are expressed on the same scale as is used for the general death rate, namely, 1,000, there will be found such little variation that the line, representing the increase from the earlier to the later years, will be almost a straight one. If, furthermore, it is desired to compare the lines for different years, one with another, the space between them will be so small that they will often apparently coincide. In order to appreciate these differences the lines

will have to be magnified, which is easily accomplished by estimating the rate on the basis of 1,000,000 living at each decade instead of 1,000.

If this is done, it will be found that the rate rises slowly from 30 to 45 or 50, rapidly to 70, and much less thence to the end of life. The curves for the males and females have a general similarity. The latter starts higher and increases more rapidly up to 70, beyond which time it is much less than for the males, so that at the end of life the rates are very close. (Plate 1.)

If now two widely separated years, 1865 and 1895, are compared, the proportion of increase of the two sexes for each decade can be found. At first glance it seems as if the highest must be in the later years of life for females, as the lines tend to go apart and assume the form of a cornucopia. But if the rate of increase is calculated, assuming the earlier year as one, it will be found that the highest rate is really for the males between fifty and sixty years of age, and the lowest is for them also between eighty and one hundred.

Another interesting comparison is to find in what decade the female death rate is proportionately the greater when compared to the males. It proves to be between 30 and 40, and then descends quite rapidly to the last decade, where it practically coincides.

In the same way, if it is desired to use the death ratios, their numbers can be plotted in a

PLATE 6.

curve and compared by decades. They emphasize more clearly than the rate curves the high mortality of females during the period from forty-five to fifty-five years of age. The curve of the males follows at a lower level, with its highest

point at sixty-five years, while the females' is at a decade earlier. (Plate 2.)

Both the curves of the death rate and ratio can be shown together, and make what may be well termed a "graphic picture." It seems as if each

PLATE 7.

disease has its own characteristic one. This is strikingly shown if those for apoplexy and paralysis, pneumonia and cancer, are placed side by side. In the first, the ratio starts above the rate, ascends in almost a straight line to eighty years, and drops off decidedly in the last decade. The rate swings away from the ratio from forty-five years to sixty-five years, then rapidly rises to cross it and ends very high. (Plate 3.)

The ratio for pneumonia starts much above the rate, reaches its highest point at forty-five years and falls somewhat with an undulating curve to the end of life. The rate curve is at first a slowly, and finally a rapidly rising one to the end, cutting the ratio at about the same point as the first. (Plate 4.)

The ratio for cancer starts moderately above the rate and rapidly reaches its summit between fifty and sixty years, to fall lower than its starting point at the end. The rate curve, much more nearly approximating a straight line, rises gradually, and crossing the ratio ends at a much lower level than either of the others. (Plate 5.)

Of course the picture will differ a little from those shown, according to the relative space allotted to each per cent. of the ratio and 500 of the rate, which in those to be shown after this will be made more equal. It will be seen from them that, go where we will, to the other states of this country or abroad, this graphic picture of

cancer will be similar in its general outlines, although some of its details may vary.

I will now pass rapidly in review these graphic pictures of other states and countries, showing wherein they differ from that of our own, first stating that in some only persons are available, while in others both males and females are given.

The comparisons are all made with Massachusetts for the year 1895, the rate and ratio of which are as follows:

MASSACHUSETTS.—DEATH RATE FOR CANCER FOR ONE MILLION LIVING AT EACH DECADE.

	MALES.	FEMALES.	PERSONS.			
	1895.					
	30-40	40-50	50-60	60-70	70-80	80-100
Males.						
Rate	153	449	1,302	2,852	3,862	5,025
Ratio	1.53	3.37	5.78	6.65	4.42	2.64

(Plate 6.)

Females.						
Rate	447	1,460	2,897	4,004	5,076	4,952
Ratio	4.7	11.9	1.5	11.1	6.87	2.85

(Plate 7.)

Persons.						
Rate	300	955	2,099	3,428	4,469	3,340
Ratio	3.1	7.55	10.37	8.87	5.65	2.77

(Plate 8.)

MAINE.—PERSONS ONLY AVAILABLE.

	30-40	40-50	50-60	60-70	70-80	80-100
Rate	282	790	1,575	2,770	4,275	4,080
Ratio	3.6	8.44	10.07	8.95	6.37	2.8

PLATE 8.

In comparing the ratio, it is found to start a little higher, but its summit is not as high as Massachusetts. The rate curve is also a little lower, and the drop at the end a little more marked:

NEW HAMPSHIRE.—MALES AND FEMALES.

Males.	30-40	40-50	50-60	60-70	70-80	80-100
Rate	75	298	570	2,041	3,990	4,125
Ratio	1.1	3.18	3.60	6.12	5.26	2.7
Females.						
Rate	466	1,280	2,205	2,925	4,160	3,975
Ratio	6.15	12.25	14.08	9.76	6.12	2.85
Persons.						
Rate	265	797	1,435	2,480	4,025	4,075
Ratio	3.34	8.22	9.05	7.9	5.7	2.76

PLATE 9.

Males.—The ratio gives a very irregular curve, owing to a singular depression at the decade of fifty to sixty, which is also shown in the rate curve. They are both decidedly below Massachusetts.

Females.—The ratio is very close both in form and height to Massachusetts, and the rate parallels it at a lower level.

VERMONT.—PERSONS ONLY.

	30-40	40-50	50-60	60-70	70-80	80-100
Rate	200	680	1,300	2,190	3,360	3,460
Ratio	2.75	7.64	8.88	7.66	5.50	2.61

Both curves are somewhat lower, but follow the same general outline as that for Massachusetts.

RHODE ISLAND.—MALES. FEMALES. PERSONS.

Males.	30-40	40-50	50-60	60-70	70-80	80-100
Rate	107	366	1,025	2,240	2,825	4,675
Ratio	1.06	2.70	4.3	5.17	3.92	2.70
Females.						
Rate	532	1,453	2,390	3,720	5,160	5,450
Ratio	5.43	11.20	12.45	9.25	6.75	3.14
Persons.						
Rate	323	922	1,760	3,020	4,320	2,652
Ratio	3.27	6.92	8.20	7.30	5.37	2.96

The males are very much lower in both curves until the last two decades. The lines of both are very regular, perhaps fairer than for Massachusetts.

The females are also lower but similar, and the lines are regular.

CONNECTICUT.—PERSONS ONLY.

Persons.	30-40	40-50	50-60	60-70	70-80	80-100
Rate	243	875	1,635	2,618	3,230	3,860
Ratio	2.70	7.45	8.30	6.20	4.35	2.51

Both curves lower and rather irregular.

NEW ENGLAND STATES.—PERSONS ONLY.

Persons.	30-40	40-50	50-60	60-70	70-80	80-100
Rate	282	705	1,835	3,010	4,115	4,360
Ratio	3.08	6.10	9.80	8.37	5.52	2.72

(Plate 9.)³

Two quite fair curves, following almost exactly those for Massachusetts, at a little lower level. As in every composite picture the strongest feature predominates, so in this the type is essentially that of Massachusetts, but lowered a little in height from the poorer diagnosis and registration of her sister states.

MICHIGAN.—MALES. FEMALES. PERSONS.

Males.	30-40	40-50	50-60	60-70	70-80	80-100
Rate	192	410	1,285	2,600	4,325	5,530
Ratio	3.78	5.26	9.1	8.6	5.68	2.77
Females.						
Rate	381	1,000	2,340	3,425	5,000	7,560
Ratio	5.70	13.5	17.60	12.4	6.8	3.88
Persons.						
Rate	271	736	1,801	3,050	4,632	6,495
Ratio	4.81	9.06	13.05	10.55	6.17	3.30

PLATE 10.

Michigan has but one year of vital statistics which are of value, namely, 1898, and therefore the curves are based on data from a single year. While the general death rate and ratio is very

³ The x and o in this and the following plates show the ratio and rate for Massachusetts at each decade.

low, the number of cancer deaths is actually quite high, causing an extremely high ratio.

The males practically coincide with Massachusetts until sixty years, when they pass beyond and continue so for the rest of life. The rate curve is lower for females, while the ratio is higher except for the last period of eighty to one hundred. A

PLATE 11.

possible explanation of this high rate may be found in a large number of foreigners in the population, if it is true that they are more subject to cancer than native born Americans, as Lyon⁴ thinks has been proved by a study of the statistics of Buffalo. This is borne out by the fact that the proportion of cases of cancer of the stomach and liver is higher in Michigan than Massachusetts (namely, 1.85 to 1.68), from which form of the disease he also claims Germans show a high mortality.

These are the only states which have records in sufficient detail to compare with our own. For New York and New Jersey only the crude death rates can be obtained, which are 6 for New York, 5.12 for New Jersey against 6.70 for Massachusetts for 10,000 living.

Turning now to foreign countries, there are two of which the statistics are complete and accessible; these are England and Austria.

England has been very thoroughly worked up in the Report of the Registrar General and by Newsholme and King, so that I will not trouble you with the details of increase. The latest average date, however, that can be obtained is the year 1885, with which ours of 1895 is compared.

⁴Lyon, Irving Philip, M.D., Cancer Distribution and Statistics in Buffalo. American Journal Medical Science, vol. cxxi, p. 629.

ENGLAND AND WALES.—MALES. FEMALES. PERSONS.

Males.	25-35	35-45	45-55	55-65	65-75	75-100
Rate	79	297	998	2,299	3,742	3,914
Ratio	1.02	2.40	5.05	6.60	5.32	2.31
(Plate 10.)						
Females.	25-35	35-45	45-55	55-65	65-75	75-100
Rate	172	852	2,042	3,368	4,506	4,578
Ratio	2.32	8.07	13.55	11.85	7.53	3.07
(Plate 11.)						
Persons.	25-35	35-45	45-55	55-65	65-75	75-100
Rate	128	584	1,545	2,868	4,160	4,295
Ratio	1.70	5.12	9.05	9.13	6.42	2.38

Males.—The rate is very close in general, except at the last period, when Massachusetts rises considerably higher.

The ratios are also very close, but the highest point in the English curve is sixty years, five years earlier than for Massachusetts.

Females.—The rates coincide quite closely and are in general similar, although the English is the fairer.

The ratio is lower than Massachusetts but in general on the same lines; but this may be due to the fact that their returns are given for forty-five to fifty instead of fifty to sixty.

This points rather to the fact that the English physicians, as a class, are about ten years ahead of us in diagnosis, and that the registration is also more accurate.

PLATE 12.

AUSTRIA.—MALES. FEMALES. PERSONS.

Males.	30-40	40-50	50-60	60-70	70-100
Rate	171	690	2,065	3,740	3,995
Ratio	1.94	4.90	8.20	7.42	3.33
(Plate 12.)					
Females.	30-40	40-50	50-60	60-70	70-100
Rate	346	1,075	2,260	3,520	3,980
Ratio	3.38	8.97	10.46	7.60	3.24
(Plate 13.)					
Persons.	30-40	40-50	50-60	60-70	70-100
Rate	219	888	2,205	3,620	3,990
Ratio	2.70	6.78	9.19	7.52	3.29

The rate for males is distinctly higher than Massachusetts, except in the last period, which covers from seventy to one hundred instead of from eighty to one hundred years.

The ratio is higher throughout, its summit being a decade earlier, however.

The rate for females is very much lower than Massachusetts and coincides closely with its own male curve.

The ratio is also much lower and appears higher than the rate when compared with the males. This is the only country, so far, where the males are so close to the females both in rate and ratio. The curves are both very easy.

If the death rates of England, Austria and Massachusetts are placed side by side, the fact of the high rate of males compared to females is to be especially noticed, and that Massachusetts has both the highest crude death rate and that over

PLATE 13.

thirty years. In decennial comparisons, it is markedly in excess of Austria, while the intermediate portion of England brings her into the proper place in the curve, as has been seen above.

Finally, let us return again to our own country and see what is the difference between the New England States, and, if any is shown, whether the geographical relationship offers any explanation for it. When this is done a single figure has to be used, and on the whole the most accurate comparison is based on the death rate or ratio over thirty years. It has been found that no essential difference results whichever is chosen, and, therefore, to avoid confusion, only one, the ratio, has been employed. If arranged on this basis the

states would appear in 1895 in the following order.

States.	Death Ratio over 30 Years.
1. Connecticut	5.50
2. Vermont	5.60
3. Rhode Island	5.88
4. New Hampshire	5.95
5. Massachusetts	6.53
6. Maine	6.75

They fall readily into two groups, one between 5.50 and 6, the other between 6.50 and 6.75. Neither group has any geographical relationship between them. When it is further remembered in reality how small the actual difference is, 1.25% between extremes, the assumption is warranted that it can be explained entirely upon statistical grounds without any local cause. Especially as the statistics of the two highest states are regarded as the most accurate of all.

For comparing the different counties of our own State, the total number of deaths over thirty years could be obtained, but the deaths from cancer were given without respect to age or sex. For the State as a whole, however, the number of cancer deaths over thirty had been found to be 96.50 for each hundred cancer deaths of all ages. This figure was used to correct the returns for each county, and thus a close approximation to the true number of cancer deaths over thirty could be calculated. With these two factors, then, the ratio for each of the counties was worked out for the years 1870 and 1895, as follows:

COUNTIES ARRANGED ACCORDING TO RATIO OVER THIRTY YEARS.

	1895	1870	Rate of Increase.
1. Plymouth	5.12	3.41	1.47
2. Hampshire	5.83	4.12	1.45
3. Barnstable	6.08	5.26	1.14
4. Worcester	6.19	4.06	1.54
5. Bristol	6.34	3.76	1.68
6. Norfolk	6.42	3.98	1.61
7. Berkshire	6.51	3.57	1.83
8. Franklin	6.67	4.44	1.50
9. Middlesex	6.72	4.31	1.56
10. Suffolk	6.75	3.98	1.70
11. Hampden	6.85	3.25	2.11
12. Essex	7.28	3.83	1.90
13. Dukes and Nantucket	8.16	4.37	1.84
Difference	2.16	2.01	

It also shows the rate of increase from 1870 to 1895, which in the case of Barnstable County is surprisingly low, and for which there is no especial explanation from its location at any rate.

At first it seems as if there was no geographical relationship between the counties if the numbers are exactly followed. The two lowest on the list are practically widely separated by position and general character of the land. The one bordering on the sea, low and sandy, the other inland and high, with ordinary soil.

If, however, the counties are associated by their position on the map, and a new ratio obtained for each group, it is found that the ratio rises progressively from southeast to west for those with about the same population, judging from the number of deaths. The northeastern group, densely populated, and having one and a half more deaths than the rest of the State, shows the highest percentage, but then only one-third of one per cent.

more than the western part, with less than a quarter of its population.

COUNTIES BY GEOGRAPHICAL GROUPS.

1895.

RATIO OF CANCER DEATHS. OVER THIRTY YEARS.

	Total Deaths.	Cancer Deaths.	Ratio.
1. Plymouth	1,115.4	57.12	5.12
2. Barnstable	401.4	24.12	6.00
3. Bristol	2,022.0	128.33	6.34
	3,538.8	209.57	6.35
4. Norfolk	1,294.6	83.17	6.42
5. Suffolk	5,950.0	395.41	6.79
6. Middlesex	4,638.0	312.04	6.72
7. Essex	3,028.2	220.50	7.28
	14,910.8	1,011.12	6.95
8. Worcester	2,955.4	183.13	6.19
9. Hampshire	574.4	33.51	5.83
10. Franklin	413.0	27.59	6.67
11. Hampden	1,305.0	89.54	6.85
12. Berkshire	784.8	51.14	6.51
	3,077.2	201.78	6.65

To briefly recapitulate what has been said :

(1) If death from cancer should go on at the apparent geometrical rate of increase of the past fifty years, in two and a quarter centuries every person over thirty years would die from that disease.

(2) This rate is probably only arithmetical at its worst.

(3) The increase is probably due to better diagnosis and registration, and until the ratio of deaths over thirty years has reached 8 to 9%, which is shown by autopsies to be the true rate for cancer, it is not justifiable to speak of the increase as inherent in the disease itself.

(4) For purposes of comparison with other places or years, a "graphic picture," composed of both the rate and ratio curves, covering the period over thirty years, divided into decades, is the best.

(5) Comparison with other states and countries shows the rate for Massachusetts to be about the same as theirs, with greater variation between the males and females than is the case in Austria, which is remarkable for the correspondence between the two sexes.

(6) In the distribution in the New England States, there is no geographical feature that explains the slight variation, which is easily within the limits of better registration.

(7) In the State itself there is a slight increase westward for groups of counties of the same density of population. The densest populated part of the State, apart from these, shows a little higher rate.

So we will leave the subject for the present, but I feel sure that, with this as a starting point, the Shattuck lecturer of 1926 should be able to tell you surely whether this alleged increase is anything but statistical, as it now seems to be.

In closing, I must ask you to linger a moment that I may recall to your minds Lemuel Shattuck, a distant kinsman of the beneficent founder of these lectures, who must be classed as one of those who initiated movements which from his time on are perpetual. He may be called the Father of Statistics in Massachusetts, and it is to his wise

foresight and persistency that we are indebted for what we have. Such names should not be allowed to drop from our memory.

Then, even more than to the master, are we under obligation to the multitude of unknown men who have collected these facts, one by one, for future investigation. They have sown that others may reap, and have spun threads that are to be twisted into cables. We owe our thanks to these unnamed workers.

Original Articles.

THE CLINICAL VALUE OF SOME OF THE NEWER HYPNOTICS.¹

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INSOMNIA is but a symptom, and hypnotics have no direct curative effect on the causative disease. Nevertheless, refreshing sleep is so necessary for the conservation of a patient's physical and mental powers, and has such an important bearing on the course of such a variety of disease processes, that the medical profession is ever clamorous for new means for its easy and safe production. Hence, there has been suggested all sorts of devices, and a long list of drugs, to be employed with this one end in view. Many of these means are so impracticable, or are used with such discomfort or danger, that they have but a scientific interest or can only rarely be employed.

Of the hypnotic drugs recommended, many are practically inert, while others are of such varying power or disagreeable taste as to greatly impair their reliability and general usefulness. In late years, by the advances in synthetic chemistry, there have been discovered many new compounds that have taken a permanent place in the list of available hypnotics. Every one who has used them extensively, however, finds that each has its drawbacks, but that there are special indications in practice where certain ones seem to act better than anything else. It is in the determination of these special indications that the chief difficulty in testing a hypnotic lies.

A great deal has been written about the *ideal* hypnotic, and efforts made by the advocates of some new product to prove that theirs alone meets all the requirements and should be used exclusively. But, in view of the great diversity of the causes of insomnia, it would seem unwarrantable to expect a universal remedy that would act best in every case. Indeed, it is not at all desirable that every case of insomnia should be treated alike.

Another reason for incorrect or biased opinion in regard to the value of hypnotics is the well-known fact that, in many cases where they are given, the

¹ Read before the New Hampshire Medical Society at Concord, N. H., June 16, 1901.