Staff Meeting Bulletin Hospitals of the » » » University of Minnesota

Poliomyelitis Epidemiology

Volume XVIII | Friday, February 28, 1947 | Number 17

STAFF MEETING BULLETIN
HOSPITALS OF THE . . .
UNIVERSITY OF MINNESOTA

Volume XVIII | Friday, February 28, 1947 | Number 17

INDEX

Published for the General Staff Meeting each week
during the school year, October to June, inclusive.

Financed by the Citizens Aid Society,
Alumni and Friends.

William A. O'Brien, M.D.

I.

UNIVERSITY OF MINNESOTA MEDICAL SCHOOL
CALENDAR OF EVENTS

March 3 - March 8, 1947

No. 147

Monday, March 3

9:00 - 9:50 Roentgenology-Medicine Conference; L. G. Rigler, C. J. Watson and Staff; Todd Amphitheater, U. H.

9:00 - 10:50 Obstetrics and Gynecology Conference; J. L. McKelvey and Staff; Interns' Quarters, U. H.

10:00 - 12:00 Neurology Ward Rounds; A. B. Baker and Staff; Station 50, U. H.

11:00 - Roentgenology-Medicine Conference; Veterans' Hospital.

11:00 - 12:00 Physical Medicine Conference; Occupational Therapy; Borghild Hansen; W-200 U. H.

12:15 - 1:15 Obstetrics and Gynecology Journal Club; M-435, U. H.

12:30 - 1:20 Pathology Seminar; Benign Tumors of Small Intestine; F. R. Smith; 104 I. A.

12:15 - 1:30 Pediatrics Seminar; Clinical Pathological Conference; 6th Floor Seminar Room; Eustis, U. H.

12:00 - 1:00 Physiology Seminar; Stimulation of denervated muscles; Wm. G. Kubicek; 214 M. H.

4:00 - School of Public Health Seminar; Amebic dysentery with special reference to cysts; Helen Knudsen; 214 M. H.

Tuesday, March 4

9:00 - 9:50 Roentgenology-Pediatrics Conference; L. G. Rigler, I. McQuarrie and Staff; Eustis Amphitheater, U. H.

10:30 - Surgery Reading Conference; John R. Paine; Small Conference Room, Bldg. I, Veterans' Hospital.

12:30 - 1:20 Pathology Conference; Autopsies; Pathology Staff; 102 I. A.

2:00 - 2:50 Dermatology and Syphilology; H. E. Michelson and Staff; Veterans' Hospital, Bldg. III.

3:15 - 4:15 Gynecology Chart Conference; J. L. McKelvey and Staff; Station 54, U. H.

3:30 - Clinical Pathological Conference; Veterans' Hospital.

3:45 - 5:00 Pediatrics Staff Rounds; I. McQuarrie and Staff; W-205, U. H.

4:00 - 4:50 Surgery-Physiology Conference; Pulmonary ventilation; Richard L. Varco and H. S. Wells; Eustis Amphitheater, U. H.

5:00 - 5:50 Roentgenology Diagnosis Conference; Veterans' Hospital.

Wednesday, March 5

8:00 - 8:50 Surgery Journal Club; O. H. Wangensteen and Staff; M-515, U. H.

8:30 - 10:00 Psychiatry and Neurology Seminar; Staff; Veterans' Hospital.

11:00 - 11:50 Pathology-Medicine-Surgery Conference; Cor pulmonale; E. T. Bell, C. J. Watson, O. H. Wangensteen and Staff; Todd Amphitheater, U. H.

12:00 - 1:00 Physiological Chemistry Journal Club; Staff; 116 M. H.

4:00 - 6:00 Medicine and Pediatrics Infectious Disease Rounds; W-205, U. H.

Thursday, March 6

8:30 - Surgery Grand Rounds; John R. Paine and Staff; Veterans' Hospital.

9:00 - 9:50 Medicine Case Presentation; C. J. Watson and Staff; Todd Amphitheater, U. H.

10:00 - 12:00 Medicine Ward Rounds; C. J. Watson and Staff; E-221, U. H.

10:30 - Roentgenology-Surgery Conference; Veterans' Hospital.

12:00 - 1:00 Physiological Chemistry Seminar; Polarographic and related electrometric methods; Cyrus P. Barnum, Jr.; 214 M. H.

4:30 - 5:20 Ophthalmology Ward Rounds; Erling Hansen and Staff; E-534, U. H.

4:30 - 5:20 Bacteriology Seminar; Swine Erysipelas and Erysipeloid of Rosenback; Miss Marie Bohland; 214 M. H.

5:00 - 5:50 Roentgenology Seminar; Chronic Pancreatitis Associated with Calcareous Deposits; Daniel L. Fink; M-515 U. H.

7:30 - Physical Medicine Seminar; 111 MeS.

Friday, March 7

9:00 - 9:50 Medicine Grand Rounds; C. J. Watson and Staff; Todd Amphitheater, U. H.

9:00 - 10:00 Pediatric Grand Rounds; I. McQuarrie and Staff; Eustis Amphitheater, U. H.

10:00 - 11:50 Medicine Ward Rounds; C. J. Watson and Staff; E-221, U. H.

10:30 - Medicine Grand Rounds; Veterans' Hospital.

10:30 - 12:20 Otolaryngology Case Studies; L. R. Boies and Staff; Out-Patient Otolaryngology Department; U. H.

11:30 - 1:00 University of Minnesota Hospitals General Staff Meeting; The Role of the Out-Patient Department in Medical Education; George N. Aagaard; New Powell Hall Amphitheater.

1:00 - 2:00 Dermatology and Syphilology; Presentation of Selected Cases of the Week; H. E. Michelson and Staff; W-312, U. H.

1:00 - Roentgenology-Neurosurgery Conference; H. O. Peterson, W. T. Peyton and Staff; Todd Amphitheater, U. H.

Saturday, March 8

7:45 - 8:50 Orthopedics Conference; Wallace H. Cole and Staff; Station 21, U. H.

9:00 - 10:00 Neurology Grand Rounds; A. B. Baker and Staff; Station 50, U. H.

9:00 - 9:50 Surgery-Roentgenology Conference; O. H. Wangensteen, L. G. Rigler, and Staff; Todd Amphitheater, U. H.

9:00 - 9:50 Medicine Case Presentation; C. J. Watson and Staff; M-515, U. H.

10:00 - 12:00 Medicine Ward Rounds; C. J. Watson and Staff; E-221, U. H.

10:00 - 12:50 Obstetrics and Gynecology Grand Rounds; J. L. McKelvey and Staff; Station 44, U. H.

11:00 - 12:20 Anatomy Seminar; Hematologic Values for Women Living in Hawaii; C. J. Hamre; and The Aberrant Patterns of the Right Upper Lobe of the Lung; E. A. Boyden and J. G. Scannell; 226 I. A.

II. EPIDEMIOLOGY OF POLIOMYELITIS, 1946, IN MINNESOTA

Dean S. Fleming

This report is concerned primarily with studies made by the Minnesota Department of Health upon the epidemic of poliomyelitis which occurred during 1946 in the State of Minnesota. It is similar in nature to other reports made regularly for many years in quarterly and yearly reports of the Division of Preventable Diseases of the Department of Health, and was conducted by physicians and other staff members in the Department responsible for morbidity and mortality statistics. The present report is a general statistical and epidemiologic study of the epidemic of 1946. It is not, therefore, in the strict sense a clinical study of the disease as it appeared in individual patients seen here in the hospital.

The data upon which this report is based is taken from the records of the Minnesota Department of Health. These records in turn are gathered from many sources, with the intent of obtaining standard statistical information of diseases for purposes of comparison, analysis, and control measures. It must be pointed out that this report does not represent a study of the questionnaires or other investigation activities of the Minnesota Poliomyelitis Research Commission. (However, a portion of the work of the Department of Health in assembling its records has been done by physicians and others whose employment was made possible by funds contributed by the National Foundation for Infantile Paralysis.) The methods employed did not differ materially from those in general use in the prosecution of all such work. Through the courtesy of the City Health Departments of Minneapolis, St. Paul, and Duluth, it was possible to receive daily case reports and frequent summaries of all cases occurring in the cities. Physicians throughout the State were encouraged to report their cases promptly by telephone, and hospitals cooperated well in reporting admissions and changes of diagnoses on a daily basis. Reports were completed and additional data obtained by telephone, correspondence, or personal visit to the health department, doctor, hospital or patient, and this work is still continuing. Questionnaires used for many years by the Department in following each reported case are still being received and correlated.

This epidemic, by reason of its size, has offered a good opportunity for studies of an epidemiologic and statistical nature. The collection of such figures has been patterned closely to similar statistics reported in 1918 by Lavinder, Freeman and Frost in a study of the 1916 epidemic of poliomyelitis in New York, and by other investigators in other epidemics since that time.

It is desired to mention the splendid spirit of cooperation and courtesy that has existed throughout the State among all the agencies involved in the epidemic. In spite of very severe strains placed upon all normal facilities and channels of caring for epidemic disease, these demands were met at every turn. Public health investigation of the epidemic could not have been successful without this fine spirit of helpfulness.

The problem of poliomyelitis is a difficult one and with the increasing ability of the community to mobilize its treatment and convalescent facilities, the need for a satisfactory solution of the secret of prevention or modification becomes more and more insistent. Thus an extensive knowledge of many phases of the disease has accumulated without the final essential control being won. Poliomyelitis is no new disease though its differentiation and description dates back only a century, to 1840.

The epidemiologic characteristics of poliomyelitis may be briefly summarized. Its geographic distribution is worldwide and it is evident that the disease is independent of any special climate or other conditions peculiar to any restricted part of the globe. In regard to season, the disease has very distinctly characteristic seasonal prevalence, quite constantly reaching maximum preva-

lence during the summer and autumn months, declining markedly during the late fall and winter to its lowest point in mid-winter and spring. Poliomyelitis appears to be endemic, with eruptions at irregular intervals of marked epidemic proportions. These epidemics vary widely but in general are characterized by a seemingly unexplainable irregularity of geographic distribution of foci. Severe outbreaks may involve certain locations, while cities lying between these foci and in intimate contact by travelers may escape with only sporadic cases. On the other hand, epidemics tend to spread rapidly over wide areas only explainable by the travel of human individuals. Epidemic poliomyelitis is characterized by small total incidence in the population affected, seldom attacking more than one in a thousand, differing thus from many of the more common endemic diseases, which attain during epidemics much higher incidence rates. Nevertheless, poliomyelitis invariably declines in any limited area within a few months and generally does not recur in that locality for at least two years. As a general rule, epidemics are more intense in small towns and the country than in large cities. Close study has failed to show significant differences in the incidence of the disease with regard to hygienic, or economic conditions, racial differences, or topography. Poliomyelitis strikingly affects certain age groups, especially children under 15 years of age. It also commonly attacks more males than females. Local sources and routes of infection, such as water, milk or food supplies, animals, unusual rainfall or drought, do not seem to be important in the dissemination of epidemics. Transmission by insects is difficult to explain under all conditions. Healthy or unrecognized carriers of the virus, on the other hand, appear to be the chief sources of infection.

Before considering the incidence of poliomyelitis in the United States and Minnesota in past years, it should be mentioned that available morbidity and mortality figures are not entirely reliable. Morbidity figures suffer from failure to diagnose all cases correctly, especially the milder ones, and from the failure to report all cases recognized. Mortality figures are on the whole less subject to error. The ratio of cases to deaths varies widely depending on the presence of an epidemic and thus it is difficult to judge total morbidity from available death reports.

Table 1 presents the reported cases of poliomyelitis since 1915 in the United States and in Minnesota, and indicates the idea of poliomyelitis as a widespread endemic infection with a tendency to periodic epidemic occurrence, most similar perhaps to measles. In the United States as a whole, there occurred 10,000 or more cases in 1916, 1927, 1931, 1935, and in each year of 1943, 1944, and 1945. It is difficult to attach any definite unvarying periodicity to these figures but in general it is apparent that the disease comes and goes, uninfluenced by any known means. In Minnesota the occurrence of more than 300 cases in any year constitutes a notable variation, and this occurred in 1916, 1921, 1925, 1930, 1931, 1933, 1937, 1939, and 1944. It is easier to note a periodicity in these years.

With the general characteristics of poliomyelitis in mind, the 1946 epidemic in Minnesota may be approached. Minnesota, lying in the center of the northern tier of states along the 45th degree of latitude, is largely rural. According to the 1940 census, its population was 2,792,300. The total land area is 80,009 square miles. The average number of inhabitants per square mile in 1940 was 34.9. Minneapolis, St. Paul and Duluth are cities with over 100,000 population. Table 2 shows the range of population densities in the State, and Minneapolis and St. Paul. Of the 87 counties in Minnesota, when the three cities of the first class are excluded, St. Louis county with a population of 105,852, has the largest population, and Cook county, with 3,030 inhabitants, has the smallest population. Areas of the counties range from 6,281 square miles for St. Louis county, the largest, to 160 square miles for Ramsey county, the smallest. The density of population ranges from 1937.1 per square mile in Ramsey county, including St. Paul city, to 2.2 persons per square mile in Cook county. For purposes of recording mor-

bidity statistics, all cases of communicable disease are listed according to the sanitary district in which the case occurs. A sanitary district is the governmental unit of the State whose board of health has jurisdiction in that place, and accordingly is the township, borough, village or city where the case occurs. In Minnesota there are 1,876 townships, 1 borough, 654 villages, and 100 cities which are sanitary districts. The area and population density of these sanitary districts thus range widely. Usual townships comprise 36 square miles, and villages and cities differ considerably. Population of these areas may be very sparse or crowded. For purposes of this report, population figures used are those of the 1940 census. It is understood that changes have occurred since 1940 both in the absolute numbers of persons residing in the various sections of the State and in the age and sex specific fractions of the population.

The early months of 1946 gave no warning of especial liability to the development of an epidemic. Only 4 cases were reported in the first 4 months of the year, a smaller number than the average for the past 25 years. During the month of May only 7 cases occurred, although this number is greater than the 25-year average for May of 2.5 cases.

It is interesting to look at the location of these early cases on spot maps of the State, for in retrospect it is perhaps more than coincidence that these early cases occurred in centers that in following months became definite foci for epidemic conditions. Thus Minneapolis, Rochester, and northern Koochiching County all show cases early in the year and later outbreaks.

The epidemic began apparently during the week ending May 18 in an area in north Minneapolis. Two cases developed in that week in what subsequently developed as the essential focus of the epidemic. By the end of May, four additional cases appeared in this same area. This section was approximately 13 blocks by 11 blocks in extent, lying from Third to Sixteenth Avenues north, between Aldrich and Knox Avenues. Compared with other sections of the city, this area is not notably different in respect to general sanitation, water supply, sewerage, street cleaning, refuse disposal, population density, or other factors of public sanitation. Nevertheless, it was striking during the early weeks of the epidemic to observe the concentration of cases within this localized area.

The situation did not arouse alarm until the middle of June and even by the end of the mpnth only 15 cases had been reported to the Health Department. Later reports indicate that 33 cases occurred in June, as compared to the 25-year average of 5.5. The last two weeks of this month saw a rapid increase in the number of cases occurring in Minneapolis and now cases began to arise in areas outside of the city. Reports, however, continued to lag behind the onsets, as was to be expected.

July witnessed a steady increase in the number of cases developing in the city, and now in all sections, until the last week of the month when the epidemic in Minneapolis reached its peak. After that, the number of new cases in Minneapolis declined. The July cases in the city were widely scattered though the main prevalence was still in the north section. Outside of Minneapolis, cases increased steadily throughout July, markedly involving the sanitary districts adjacent to the city and in the surrounding counties. New foci of the epidemic began to appear in widely separated areas of the State.

In and about Rochester during July some 20 cases developed to form a definite focus of the epidemic. The first indications of an extensive and alarming local epidemic in the cities along the iron range appeared in July with the reporting of some 10 cases in and about Hibbing. In the northwestern portion of the State, one case occurred in Pennington county, later the center of an extensive outbreak.

In August, cases continued to increase ourside of Minneapolis until the 2nd week, which marked the crest of the epidemic for the State as a whole and for those cases outside the city. Minneapolis cases declined steadily

throughout the month. It was clearly , evident that the number of cases declined in the area first attacked, while the increase in cases occurred in the territory farthest from the primary focus. During August the epidemic flourished along the iron range and in St. Louis county, and in Pennington and Marshall counties in the northwest.

During September the number of cases declined steadily. In Minneapolis the e;idemic was practically ended but outside the city, particularly in areas far-removed, considerable numbers of new cases continued to occur. These cases appear well scattered on the spot maps but definite foci of the epidemic are still apparent in the grouping of cases along the range, about Thief River Falls, and in other counties. The area in northern Koochiching county still shows new cases.

In October the epidemic continued to decline with practically all new cases occurring outside the city. The decline of the epidemic was definitely slower than the upsurge of the invasion period. Cases continued to occur, however, throughout November and December, and the number of cases for December, 14, was 3 to 4 times the 25-year average of 4.2 cases for this month.

As has already been stated, only a few of the cases occurring in June were reported to the Department of Health until later in the epidemic. As the seriousness of the situation became apparent throughout July, physicians began to report cases more promptly, and in the early weeks of August far more cases were reported than were actually occurring at that time, the excess being made up of old cases previously unreported. Reporting became still more complete and prompt throughout the remaining months of the summer.

The course of the epidemic is shown statistically and geographically by the tables and charts which are presented. In each case the data are presented for Minneapolis, St. Paul, rest of State, and the State as a whole. This method of dividing the State for reporting purposes is recognized as arbitrary but it is convenient. Quite likely the metropolitan districts as described in the 1940 census reports would be a truer division of the population in regard to the epidemiological factors involved in poliomyelitis. A metropolitan district is an area including all the thickly settled territory in and around a city or group of cities. It tends to be a more or less integrated area with common economic, social, and, often, administrative interests. Such districts seem to fit the excursions of poliomyelitis more accurately than the artificial limits of city boundaries. However, the data in this report has not been organized by districts. Table 3 gives the number of onsets and reports by week. Table 4 gives the number of cases per 100,000 population and cumulative rates by weeks. This data is shown graphically on the slides presented.

The difference in prevalence in th various parts of the State are of interest in that Minneapolis, where the epidemic started and where opportunities for spread would appear to have been most favorable, had the highest rate of incidence. Minneapolis had a rate of 154.8 cases per 100,000 population; the State as a whole, 103.0 per 100,000; the State exclusive of Minneapolis and St. Paul, 92.6 per 100,000, and St. Paul, 87.2 cases per 100,000 population. It is of interest to compare the rates of incidence in the various sections of the State for the previous 5-year period, as shown in Table 5. It is apparent that while the entire State had experienced relatively little poliomyelitis during these 5 years, St. Paul had rather high rates in two of the 5 years, 1941, and again in 1944. Minneapolis, on the other hand, had suffered only slightly during this time. These findings support the idea of residual community immunity as a factor in the different attack rates. It may be recalled here that the density of population per square mile in Minneapolis is 8890.8 as compared to St. Paul with 5515.4 and the State as a whole of 34.9.

Attempts to explain these differences in incidence on the basis of differences in child population in the different

parts of the State, since poliomyelitis is well known to attack children predominantly, have not been made. However, in previous epidemics and in other locations such studies indicate that the rates of incidence among children in the various sections of the State would not differ significantly from the rates in the general population in those same sections.

This epidemic, as noted earlier, well demonstrated by study of the location of cases occurring during its course, the striking changes in the points of maximum prevalence as the epidemic advanced. In general, it conformed to the description of the 1916 epidemic in New York City, when the spread of the epidemic was markedly radial. The crest of the epidemic passed from within outward. The rate of incidence of the disease diminished with the distance traveled from the original focus. As multiple foci were set up throughout the State, the infection in a very short period of time was disseminated practically everywhere. It may fairly be said that the total State epidemic was made up of a number of more or less local epidemics all of which illustrated on a smaller scale the typical rapid invasion period followed by a slower decline. Most striking of these outbreaks perhaps occurred along the iron range, and other fairly well circumscribed outbreaks occurred about Rochester, Thief River Falls and northern Koochiching county. Table 6 presents the number of cases and deaths in the various counties ofthe State, together with case and death rates per 100,000 population. A number of the counties bordering the Twin Cities, especially those most closely linked with Minneapolis by normal movements of persons during the summer months, show high rates of incidence. These large numbers of cases probably belong from an epidemiologic standpoint with the city outbreak, rather than constituting a local, separate epidemic.

In considering the age distribution, Table 7 gives a summary of the number of and percentage of cases by standard age groups from the State as a whole. These figures do not differ materiallly from those of similar epidemics of recent years. There is some indication of higher incidence in younger age groups among urban populations as compared to rural individuals, in keeping with similar observations of other epidemics. This type of evidence supports the conception of the disease as similar to measles, conferring a general immunization early in life in communities where exposure to the disease presumably occurs generally and repeatedly.

It seems obvious that the predominance of cases in the lower age groups is real and not merely dependent upon the distribution of the population. This is further shown in Table 8., giving attack rates at different ages, for the State as a whole. By comparing rates with the numbers of cases occurring in the various age groups, it is seen that the age group 5-9 years had the highest rate and also the largest number of cases.

During the course of the epidemic it was felt that some change in the age distribution of cases was occurring. To study this aspect, the cases have been divided into successive groups of approximately 500 cases each, in the order of their onsets, and the age distribution of the successive groups determined. The percentage of cases in persons 5 years of age and older in the groups is shown in Table 9. This table shows a very interesting change in the age distribution of the cases as the epidemic progressed. There was a steady increase, from 65 to 83 per cent, of the cases occurring in persons five years of age and over. This same trend has been noted in other epidemics.

The sex distribution of the cases of poliomyelitis was quite characteristic of the disease as shown in Table 7. The excess of males in persons attacked is common at all age groups except that from 20 to 29. Attack rates for the different sexes at different ages in Table 8 indicate this apparent ratio is not dependent on the population make-up, at least as shown by the 1940 census.

Frost, et al, in similar inquiry after the 1916 epidemic in New York showed that males are somewhat more liable to attack in a majority of the common com-

municable diseases. In diphtheria and scarlet fever, females are somewhat more liable to attack. In measles the differences between the sexes are neither constant nor striking. Most striking was the marked excess of males in typhoid fever, poliomyelitis, and cerebrospinal meningitis. The data supporting these conclusions were based on reports of these diseases before the days of immunization.

The number of cases occurring each week during the course of the epidemic, the number of these ending fatally, and the percentage case fatality is shown in Table 10. The percentage fatality showed marked variations from week to week. The fatality rates for the different weeks do not show any definite trend to support the impression that the disease was more deadly early in the epidemic or late. Frequently the total number of cases in any week is not large enough to make the fatality rate significant.

The case fatality for the entire epidemic is 7.7 per cent. In Table 7 is shown the number of fatal cases for each group, by sex, and the percentage case fatality for the standard age groups. The case fatality is highest in the 5-14 age period.

Some idea of the infectiousness of the disease is given by consideration of multiple cases in the same family. Of the cases recorded, 2,877 cases occurred in 2,712 families as shown in Table 11. In this regard it is well known that only a fraction of the actual or very probable multiple infections in families are reported. Thus, the figures in Table 11 do not represent a very true picture. Closer questioning and investigation of the families would reveal a much higher incidence of illnesses that might properly be called poliomyelitis infections.

Studies of Frost, Chapin, Hill and others have shown that the immediate environment of a known case of poliomyelitis is somewhat more dangerous than that of the general community in which the epidemic prevails. This difference, however, is not nearly so striking as in scarlet fever and diphtheria.

The relation of temperature and rainfall to the epidemic was not remarkable. This is shown graphically by plotting the course of the epidemic week by week on logarithmic ordinate paper, when the rise and fall appears quite independent of any seasonal variations.

In summary, this report presents general statistical and epidemiological features of the largest epidemic of poliomyelitis to be reported in Minnesota. It is not possible from data at hand to analyze the proportion of paralytic and non-paralytic cases nor the results of clinical treatment.

Reference

1. Lavinder, C. H., Freeman, A. W., Frost, W. H.
Epidemiologic Studies of Poliomyelitis in New York City and the Northeastern United States during the Year 1916.
United States Public Health Bulletin No. 91, July, 1918.

Table 1

POLIOMYELITIS CASES AND DEATHS

Reported in United States and Minnesota.

1915 -- 1945

	United States		Minnesota	
Year	Cases	Deaths	Cases	Deaths
1915	1,639	661	123	26
1916	27,363	7,179	912	105
1917	4,174	1,451	75	10
1918	2,543	1,079	83	22
1919	1,967	813	85	16
1920	2,321	855	80	18
1921	6,280	1,862	702	102
1922	2,223	847	55	20
1923	3,314	1,013	83	17
1924	5,199	1,145	136	31
1925	5,926	1,632	955	145
1926	2,521	911	46	15
1927	10,445	2,176	139	36
1928	5,101	1,436	224	57
1929	2,838	854	32	6
1930	9,188	1,427	479	37
1931	15,780	2,139	811	66
1932	3,778	882	124	10
1933	4,983	797	383	37
1934	7,521	852	113	21
1935	10,839	1,040	99	10
1936	4,523	780	37	4
1937	9,511	1,461	354	50
1938	1,705	487	44	10
1939	7,343	773	564	53
1940	9,826	1,026	252	26
1941	9,086	807	292	33
1942	4,033	561	80	6
1943	12,450	1,151	159	10
1944	19,029	1,361	530	37
1945	13,514		233	25

Table 2

POPULATION AND AREAS OF SECTIONS OF MINNESOTA

Section	Population	Area in Sq.Miles	Density of Pop. per Sq.Mile
Minneapolis	492,370	55.38	8,890.8
St. Paul	287,736	52.17	5,515.4
Rest of State	2,012,194	79,901	25.2
State as a whole	2,792,300	80,009	34.9

Table 3

POLIOMYELITIS 1946

Cases by Weeks, according to Date of Report and Date of Onset

	By Date of Report				By Date of Onset			
	Total	State Excl. of	Mpls.	St. Paul	Total	State Excl. of	Mpls.	St. Paul
Prior to May 1	2	2			4	3	1	
May 1 - 4	1	1			1	1		
Week ending:								
May 11								
18	1		1		2		2	
25	3	1	2		4		4	
June 1	1		1					
8	3		3		3	1	2	
15	2	1	1		3	1	2	
22	2	1	1		8		7	1
29	7	1	5	1	19	8	8	3
July 6	20	3	14	3	47	14	29	4
13	42	12	25	5	91	41	44	6
20	92	34	47	11	193	86	87	20
27	189	73	84	32	279	112	133	34
Aug. 3	257	113	118	26	339	194	119	26
10	365	210	124	31	350	230	93	27
17	373	222	110	41	304	188	75	41
24	250	158	66	26	212	158	29	25
31	221	171	28	22	196	148	28	20
Sep. 7	201	150	33	18	180	138	31	11
14	178	138	30	10	147	114	22	11
21	124	103	14	7	107	91	9	7
28	121	99	17	5	80	65	11	4
Oct. 5	104	91	7	6	92	81	7	4
12	65	52	11	2	57	48	5	4
19	66	58	5	3	39	33	5	1
26	48	39	8	1	26	24	2	
Nov. 2	31	29	1	1	28	25	2	1
9	21	20	1		21	20	1	
16	24	22	2		9	6	2	1
23	8	6	2		15	14	1	
30	14	14			7	7		
Dec. 7	9	9			5	4	1	
14	5	5			2	2		
21	4	3	1		3	3		
28	4	4			3	3		
Dec.29-31	19	19			1	1		
TOTAL	2,877	1,864	762	251	2,877	1,864	762	251

Table 4

POLIOMYELITIS - 1946

Cases by Weeks, According to Date of Onset

	Cases by Date of Onset				Incidence per 100,000 Pop.				Tot. incidence (cumulative) per 100,000 to end of week.			
	State				State				State,			
	Tot.	Excl. Mpls.	Mpls.	St. Paul	Tot.	Excl. Mpls.	Mpls.	St. Paul	Tot.	Excl. Mpls.	Mpls.	St. Paul
Prior to May 1	4	3	1		.1	.1	.2		.1	.1	.2	
May 1-4	1	1			.04	.04			.2	.2	.2	
Week ending:												
May 11									.2	.2	.2	
18	2		2		.07		.4		.3	.2	.6	
25	4		4		.1		.8		.4	.2	1.4	
June 1									.4	.2	1.4	
8	3	1	2		.1	.04	.4		.5	.2	1.8	
15	3	1	2		.1	.04	.4		.6	.3	2.2	
22	8		7	1	.3		1.4	.3	.9	.3	3.7	.3
29	19	8	8	3	.7	.4	1.6	1.0	1.6	.7	5.3	1.4
July 6	47	14	29	4	1.7	.7	5.9	1.4	3.3	1.4	11.2	2.8
13	91	41	44	6	3.3	2.0	8.9	2.1	6.5	3.4	20.1	4.9
20	193	86	87	20	6.9	4.3	17.7	7.0	13.4	7.7	37.8	11.8
27	279	112	133	34	10.0	6.1	27.0	11.8	23.4	13.3	64.8	23.6
Aug. 3	339	194	119	26	12.1	9.6	24.2	9.0	35.6	22.9	89.0	32.7
10	350	230	93	27	12.5	11.4	18.9	9.4	48.1	34.3	107.8	42.1
17	304	188	75	41	10.9	9.3	15.2	14.2	59.0	43.7	123.1	56.3
24	212	158	29	25	7.6	7.9	5.9	8.7	66.6	51.5	129.0	65.0
31	196	148	28	20	7.0	7.4	5.7	7.0	73.6	58.9	134.7	71.9
Sep. 7	180	138	31	11	6.4	6.9	6.3	3.8	80.0	65.7	141.0	75.8
14	147	114	22	11	5.3	5.7	4.5	3.8	85.3	71.4	145.4	79.6
21	107	91	9	7	3.8	4.5	1.8	2.4	89.1	75.9	147.2	82.0
28	80	65	11	4	2.9	3.2	2.2	1.4	92.0	79.2	149.5	83.4
Oct. 5	92	81	7	4	3.3	4.0	1.4	1.4	95.3	83.2	150.9	84.8
12	57	48	5	4	2.0	2.4	1.0	1.4	97.3	85.6	151.9	86.2
19	39	33	5	1	1.4	1.6	1.0	.3	98.7	87.2	152.9	86.5
26	26	24	2		.9	1.2	.4		99.7	88.4	153.3	86.5
Nov. 2	28	25	2	1	1.0	1.2	.4	.3	100.7	89.7	153.7	86.9
9	21	20	1		.8	1.0	.2		101.4	90.6	153.9	86.9
16	9	6	2	1	.3	.3	.4	.3	101.7	90.9	154.4	87.2
23	15	14	1		.5	.7	.2		102.3	91.6	154.6	
30	7	7			.3	.3			102.5	92.0	154.6	
Dec. 7	5	4	1		.2	.2	.2		102.7	92.2	154.8	
14	2	2			.07	.09			102.8	92.3		
21	3	3			.1	.1			102.9	92.4		
28	3	3			.1	.1			103.0	92.6		
Dec. 29-31	1	1			.04	.04			103.0	92.6		
TOTAL	2877	1864	762	251	103.0	92.6	154.8	87.2	103.0	92.6	154.8	87.2

Table 5

POLIOMYELITIS 1941-1946

In Minnesota Cases Per 100,000 Population

	Minneapolis	St. Paul	Rest of State	State as Whole
1946	154.8	87.2	92.6	103.0
1945	6.7	3.8	9.5	8.3
1944	17.0	35.8	17.2	18.9
1943	10.3	10.1	3.9	5.6
1942	4.4	2.4	2.5	2.8
1941	8.3	30.3	8.3	10.4

Table 6

POLIOMYELITIS - 1946

Cases and Deaths by County of Residence

County	Total Cases	Total Deaths	***Rate per 100,000 pop. Cases	***Rate per 100,000 pop. Deaths
Aitkin	10	3	56.0	16.8
Anoka	72	9	320.8	40.1
Becker	26	5	97.9	18.8
Beltrami	17	3	65.1	11.5
Benton	31	2	192.5	12.4
Big Stone	8	1	76.6	9.6
Blue Earth	3	1	8.3	2.8
Brown	6		23.5	
Carlton	8		33.0	
Carver	13		73.8	
Cass	11		53.3	
Chippewa	18	3	106.3	17.7
Chisago	17	1	129.5	7.6
Clay	21		82.9	
Clearwater	1		9.0	
Cook	0			
Cottonwood	8	2	49.6	12.4
Crow Wing	20	1	66.2	3.3
Dakota	30	3	75.6	7.6
Dodge	16	1	123.7	7.7
Douglas	40	**5	196.4	24.5
Faribault	8		33.4	
Fillmore	30	3	116.1	11.6
Freeborn	12		37.8	
Goodhue	20	3	63.4	9.5
Grant	5	1	50.9	10.2
Hennepin	178	14	232.6	18.3
Minneapolis C.	762	48	154.8	9.7
Houston	5	1	33.9	6.8
Hubbard	4	1	36.1	9.0
Isanti	12	2	92.7	15.4
Itasca	61	2	184.9	6.1
Jackson	13	1	77.4	6.0
Kanabec	10	1	103.6	10.4
Kandiyohi	14		52.8	
Kittson	2		18.7	
Koochiching	35	4	206.7	23.6
Lac qui Parle	14		90.3	
Lake	1		14.4	
Lake of Woods	4		66.9	
Le Sueur	12	1	62.4	5.2
Lincoln	4		37.0	
Lyon	9	2	41.7	9.3
McLeod	10		46.8	
Mahnomen	6		74.5	
Marshall	22	2	119.8	10.9
Martin	20	2	81.1	8.1
Meeker	19	1	98.6	5.2
Mille Lacs	24	6	154.3	38.6
Morrison	54	1	196.6	3.6
Mower	14	1	38.8	2.8
Murray	7	1	46.5	6.6
Nicollet	3		16.4	
Nobles	14	2	66.0	9.4
Norman	5		33.9	
Olmsted	48	4	112.5	9.4
Otter Tail	35	6	65.8	11.3
Pennington	33	*1	255.6	7.7
Pine	10	2	46.6	9.3
Pipestone	5		36.2	
Polk	19	*3	50.4	8.0
Pope	17	2	125.5	14.8
Ramsey	37		166.7	
St.Paul C.	251	*20	87.2	7.0
Red Lake	12	2	161.9	27.0
Redwood	17	2	76.3	9.0
Renville	15	1	60.9	4.1
Rice	32	2	99.5	6.2
Rock	3		27.4	
Roseau	13	1	86.1	6.6
St. Louis	132	8	124.7	7.6
Duluth C.	61	5	60.4	4.9
Scott	25		160.4	
Sherburne	18	**1	172.1	9.6
Sibley	9		54.1	
Stearns	59	5	87.8	7.4
Steele	18		91.1	
Stevens	7	1	63.4	9.1
Swift	28	1	181.0	6.5
Todd	29	3	105.7	10.9
Traverse	6		72.4	
Wabasha	9		51.0	
Wadena	7		54.8	
Waseca	6	1	39.5	6.6
Washington	29	2	109.7	7.6
Watonwan	5	3	36.0	21.6
Wilkin	9		85.9	
Winona	17	1	45.0	2.6
Wright	52	3	188.8	10.9
Yellow Medicine	15	2	88.7	11.8
TOTAL:	2877	222	103.0	8.0

*Includes one Minn. resident who died out-of-state.

**One patient died in 1947.

***Based on 1940 census.

Table 7

POLIOMYELITIS - - 1946

Cases and Deaths by Sex and Age Groups

Age	Cases				Deaths			
	Male	Female	Total	Per cent	Male	Female	Total	Per cent
0 - 4	452	339	791	27.5	18	5	23	10.4
5 - 9	502	319	821	28.5	30	11	41	18.5
10 - 14	253	219	472	16.4	32	15	47	21.2
15 - 19	159	130	289	10.1	17	11	28	12.6
20 - 29	111	194	305	10.6	21	20	41	18.4
30 - 39	62	74	136	4.7	18	14	32	14.4
40 - 49	22	16	38	1.3	5	3	8	3.6
50 - up	4	4	8	.3	1	1	2	.9
Unknown	13	4	17	.6				
TOTAL	1,578	1,299	2,877	100.0	142	80	222	100.0

Table 8

POLIOMYELITIS - - 1946

Rate per 100,000 Population

Age	Cases			Deaths		
	Male	Female	Total	Male	Female	Total
0 - 4	383.5	302.2	343.8	15.3	4.5	10.0
5 - 9	446.5	296.1	372.9	26.7	10.2	18.6
10 - 14	207.8	186.9	197.6	26.3	12.8	19.7
15 - 19	122.6	101.8	112.3	13.1	8.6	10.9
20 - 29	47.3	82.2	64.8	8.9	8.5	8.7
30 - 39	31.2	37.4	34.3	9.0	7.1	8.1
40 - 49	11.6	8.9	10.3	2.6	1.7	2.2
50 - up	1.2	1.4	1.3	.3	.3	.3
Unknown						
TOTAL	110.5	95.2	103.0	9.9	5.9	8.0

Table 9

POLIOMYELITIS - - 1946

Per cent of cases over 5 years of age in Successive Groups of 500 Cases

Group	Onsets	Per cent over 5 years of age
1. Case 1 - 500	Jan. 1 to July 24	65.2
2. Case 501 - 1000	July 24 to Aug. 3	68.8
3. Case 1001 - 1500	Aug. 4 to Aug. 14	72.6
4. Case 1501 - 2000	Aug. 14 to Aug. 29	74.8
5. Case 2001 - 2500	Aug. 30 to Sept. 22	77.0
6. Case 2501 - 2877	Sept. 22 to Dec. 31	83.0

Table 10

POLIOMYELITIS - 1946

Cases, Deaths, and Fatality Rates by Weeks, According to Date of Onset

	Cases by Date of Onset	Deaths by Date of Onset	Fatality Rates
Prior to May 1	4		
May 1 - 4	1		
Week ending:			
May 11			
18	2	1	50.0
25	4	1	25.0
June 1			
8	3		
15	3	1	33.3
22	8		
29	19	1	5.3
July 6	47	4	8.5
13	91	13	14.3
20	193	16	8.3
27	279	24	8.6
Aug. 3	339	31	9.1
10	350	20	5.7
17	304	18	5.9
24	212	15	7.1
31	196	15	7.7
Sep. 7	180	19	10.6
14	147	12	8.2
21	107	5	4.7
28	80	3	3.8
Oct. 5	92	4	4.3
12	57	4	7.0
19	39	3	7.7
26	26	2	7.7
Nov. 2	28	3	10.7
9	21	3	14.3
16	9		
23	15	2	13.3
30	7		
Dec. 7	5	2	40.0
14	2		
21	3		
28	3		
Dec.29-31	1		
TOTAL	2,877	222	7.7

Table 11

MINNESOTA DEPARTMENT OF HEALTH
Section of Preventable Diseases

Poliomyelitis Cases - 1946
Multiple Cases in Families

	TOTAL		State, Excl.of		Minneapolis		St. Paul		Duluth	
	Families	Cases	Families	Cases	Families	Cases	Families	Cases	Families	Cases
Families with 1 case	2578	2578	1595	1595	689	689	237	237	57	57
Families with 2 cases	112	224	73	146	30	60	7	14	2	4
Families with 3 cases	18	54	15	45	3	9				
Families with 4 cases	3	12	2	8	1	4				
Families with 9 cases	1	9	1	9						
TOTAL	2712	2877	1686	1803	723	762	244	251	59	61

February 3, 1947

III. GOSSIP

Mary Virginia "Mollie" O'Brien, entry No. 6 from our house, arrived at St. Mary's Hospital, February 26, 1947. I dislike to use this space to speak of myself and my family so often, but this is an important event in our lives. I could discourse at length on her good points, but if your imagination is as good as mine, you can follow along without too many details. Her brothers and sisters, William, Margaret, Kathleen, Patrick and Michael, think she is pretty fine and we know you would if you could see her. Today is another important event in my rather uneventful existence for it is my birthday, which on previous occasions has been a focal point in the lives of some of my friends who want to blow off a little steam at this time of year. It is also the birthday of the charming wife of the head of the department of medicine, Joyce (Mrs. C. J.) Watson. What a chummy feeling it gives one to have a birthday on the same date as someone you know and like....Medicine has gone into the class of big business. I find that last year in the U. S., 4 billion dollars was spent for medical service. The hospitals also are big business. Minnesota Hospital Service Association Annual Report points out that now there are 754,000 residents in Minnesota covered by Blue Cross. It is expected that in the near future the total will reach a million. Nationally there are 26 million people in the program. In 1946 the total Minnesota assets were $2,582,577; 82,123 hospital cases received financial assistance; 82.3 per cent of the income of the group was used for hospitalization and only 11.9 per cent was required for administrative expense. This plan, owned and operated by the hospitals, was started on a shoe string just a few years ago. The new plan providing medical care on the same basis is just getting under way under the auspices of the Minnesota State Medical Association....The American Public Health Association is planning on sending a visiting team to the Center for Continuation Study, May 12 and 13. Local Public Health groups have expressed great interest in the programs. A request has been received from physicians and medical technologists fpr an Rh conference to be held in May....Staff meetings during March will continue without interruption until March 28 when we will recess for the spring holiday. Because of the occupancy of the room by a class which follows immediately, it is necessary for us to clear promptly at the regular time....This has been a red letter week at the Center with one of the strongest visiting faculty guest groups we have had to date. Included are: Samuel F. Haines, Professor of Medicine, Mayo Foundation; C. N. H. Long, Sterling Professor of Physiological Chemistry, Yale University; John deJ. Pemberton, Professor of Surgery, Mayo Foundation; Edward H. Rynearson, Associate Professor of Medicine, Mayo Foundation; and Willard O. Thompson, Professor of Medicine, University of Illinois College of Medicine....Sacred Heart Hospital, Yankton, South Dakota, with a present capacity of 170 beds and a building program which will add beds up to 240 is looking for a radiologist. There is the opportunity to combine the job with the state hospital, 3 miles away. It would be wonderful if enough radiologists could be trained to satisfy the obvious needs....My new radio time on WCCO is 9 a.m. on Tuesdays and Thursdays. As it is impossible for me to be at the station at this time, I have been transcribing. I must confess that I listen to myself every once in a while. It gives one an uncanny feeling, but I suppose it isn't much different than reading back something you have written.... These clear winter days with the sun shining and the temperature flitting around zero are the most stimulating of the year. It is well that they are for after the long winter, people are beginning to get loggy....I have not read anything about the Veterans' Hospital complaints for over a week. It is apparent that the Universities have their work cut out for them and in their sincere desire to prove the quality of medical care and to increase their teaching facilities. If the public only realized how important teaching is from the standpoint of care. Alan Gregg once said that if he was in a strange place and didn't know anything about the hospital where he was taken, he would ask for their annual report to see how many autopsies they had done. If the percentage was high, he would stay, for he knew "cases" would be well worked up at such institutions.....