

THESIS.

M. D.

Dis M1.
. B1837

THE INFLUENZA PANDEMIC OF 1918

As Seen At a Casualty Clearing Station

In France.

E. J. Boome,
M.B., Ch.B., D.P.H. (Birm.)
Capt., R.A.M.C.T.F.

October, 1918.

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87 Cornwall St.

Birmingham

Dis M1

B. S. B. S.

Nov 29. 1918

Dear Dr. Glynn

I enclose a thesis for the M.D. by

in preparation, after reading it several

times, is that though the candidate

has worked hard, thus, perhaps ⁱⁿ ~~an~~

finally in original manner, noticed

some points, likewise with knowledge,

regarding the pulmonary symptoms

associated with influenza, the

thesis is not of a nature sufficient

to secure ^{passing the ordinary examination} ~~in~~ ~~the~~ ~~degree~~ ~~of~~ ~~M.D.~~

it would be let me have your views

it by Monday please? I am
sorry to send it late, but I have
been laid up, ^{consequently} slow
in my work.

With kindest regards
Yours sincerely

B. K. Thompson

INTRODUCTION.

During the past three or four months. May to July, 1918, there has been a great pandemic of so-called influenza which, starting in Spain, has spread over the whole of Europe and even other parts of the world. It has caused considerable wastage in our own Army and those of our Allies and has, therefore, been the object of much study amongst the medical Services.

During this period cases sent down to us as P.U.O. showed a great increase and presented signs and symptoms which had not been previously recognised as forming part of the usual clinical picture, loosely covered by the pseudo-diagnosis of P.U.O. (pyrexia of uncertain origin).

The various types of influenza with which we have become acquainted in previous epidemics have all been represented, but have to some extent been modified by war conditions.

So close was this resemblance and so distinct the line of demarcation that the diagnosis of influenza had supplanted that of P.U.O. long before bacteriological evidence was conclusive.

STATISTICS.

The present epidemic of influenza was really at its height about the middle of June and was then recognisable as an epidemic of some dimensions.

In the attached table, it was considered that all cases of P.U.O. should be included as part of the epidemic. After repeated examinations, in the great majority of cases sent down as P.U.O. during this period it was found that the symptoms presented were those of influenza.

Again, the respiratory type of influenza was sent down as bronchitis and these cases are included.

Diarrhoea cases often turned out to be pure influenza.

One case was sent down as tetanus.

NO. C.C.S.PERIOD 12th JUNE, 1918 to 12th JULY, 1918.

NUMBERS OF CASES DIAGNOSED AS:-															
P. U. O.				INFLUENZA				BR. PNEUMONIA				LOB. PNEUMONIA			
ADM.	BASE	DUTY	DIED	ADM.	BASE	DUTY	DIED	ADM.	BASE	DUTY	DIED	ADM.	BASE	DUTY	DIED
404	384	14	-	1273	1085	107	1	27	21	-	2+2	1	-	-	1

BRONCHITIS			
ADM.	BASE	DUTY	DIED
38	37	-	-

13th July, 1918.

TYPES.

I have not attempted to enumerate the various types, because of the tendency for them to be merged into one another; but have rather tried to discuss them under the heading of symptoms or generalities.

Some of the cases I have added illustrate this.

Such was the virulence of the disease in certain cases that the patient might be considered to be suffering from all the four usual types, e.g., Respiratory, Nervous, Gastrointestinal and Febrile. I was particularly impressed by the frequency of kidney complications, that I have called the paragraph "Nephritis", a subject in which physicians at the front are extremely interested. I have, unfortunately, been unable to delve in the literature on the subject, as of necessity our medical books were limited to essentials, owing to difficulties of transport.

INCUBATION PERIOD.

This was difficult to establish, as there were so many sources of infection, but it seemed to be from two to four days. One was often told that a lot of men were taken ill suddenly in a dugout or billet about two days after one of their number had been sent down sick.

Two gas cases { Chlorarsene
Yellow Cross No.2. } had no symptoms of influenza, developed a temperature, pains in the limbs, cough after being in the acute medical ward after two days. I am inclined to think that those men were infected in the ward and that their symptoms then were not due to the gas.

ONSET.

Almost invariably the onset was very sudden and often the patient could say what he was doing at the time, e.g., he was on picket, on sentry, or was cleaning his horses, when he felt ill. Very few men gave a history of a gradual onset, these only complained of feeling "a bit out of sorts" a few hours before being taken ill.

Several men stated that they collapsed on the march.

SEGREGATION.

Special tents were reserved, as far as possible, for influenza cases. But it was quite impossible to secure absolute segregation. A common receiving ward is used for all cases, whether sick or wounded. Sometimes it was necessary to evacuate influenza cases and wounded in the same car. It was noteworthy that among the orderlies looking after the influenza tents not one contracted the disease.

RASHES.

Rashes were very rare. Several cases showed a bright erythema on chest and abdomen which usually lasted a few hours only.

A few cases showed a discrete macular rash on the trunk, not unlike the rose spots of enteric. In one case it was thought that it might be one of the enteric group. Blood cultures and bacterial examinations of faeces were repeatedly negative but a West swab showed pneumococci and Pfeiffer. Two cases presented a rash not unlike that of a Rose Measles; these were thought to have been, ~~due to~~ drug rash, ~~due~~ due to either Salicylate of Soda or Antipyrin.

RASHES (Continued).

One case had a dusky nodular rash on his chest, axillae and abdomen - he was in a particularly toxic condition and eventually died.

Urticaria was frequently met with in the form of large weals, which were intensely irritating.

PINK EYE.

Conjunctival infection was the rule at the onset, but in most cases disappeared rapidly. A few cases presented a very marked infection, with watering of the eyes - so much so that one began to wonder if they had been gassed with mustard gas. This was found not to be the case and was really part of the condition.

RESPIRATORY SYMPTOMS.

In the mild cases, the majority complained of a "rawness down the sternum", with pain on coughing, which could be accounted for by an acute tracheitis.

A few rhonci here and there in the chest were also generally found.

In the less mild cases, rhonci and musical râles were found, indicating that there was a bronchiolitis, or congestion at the bases, which would possibly go on to broncho-pneumonia; in the great majority of cases, the physical signs cleared up, the patient was able to return to duty or to be evacuated to the base for convalescence, depending on the military circumstances at the time.

The severe cases presented the usual signs of broncho-pneumonia, patches of bronchial ^{breathing} ~~heating~~ here and there and hypostatic congestion at the bases.

The latter condition not infrequently resolved in two or three days under treatment.

Pleurisy was a quite usual symptom in the severer cases, and caused the patient a great deal of intense pain.

Pleural effusions, strange to say, were very rare in the first part of the epidemic; it is possible that they developed later in cases who were evacuated, but in the acute stage when

RESPIRATORY SYMPTOMS (Continued).

they were under my care, only two cases occurred in over two thousand cases.

Lobar pneumonia, arising as such, I am inclined to think did not occur. I am convinced, by very careful watching of the physical signs in the chest and p.m. appearance that all cases of marked consolidation originated as a lobular pneumonia going on to complete consolidation of one or other lung.

During the latter part of the epidemic, I have had a good number of pleural effusions, who generally gave a history of influenza about three weeks before. One patient had been doing fatigues until the day before admission here, when he "felt faint and could not get his breath". He was aspirated & 381. removed from his right chest!!

During the past ten days I have had three cases of inter-lobar empyema. These cases were sent down to us as bronchopneumonia and certainly had the ordinary physical signs of bronchopneumonia at first and then, after repeated examination, one found an area of dulness which was surrounded by feeble breath sounds or tubular breathing. This area was explored and pus found.

The more chests one listened to during this epidemic the more one realized the difficulty of recognising the obscurer lung conditions.

RESPIRATORY SYMPTOMS (Continued).

The detection of fluid or consolidation was often extremely difficult, and there was often a combination of the two; this difficulty was thus increased.

Apical pneumonia occurred in two of my cases.

One day one would hear a small patch of tubular breathing, the next day friction, and so on. The physical signs changed even from day to day and the most careful watch for fluid or consolidation was necessary. It was imperative to treat symptoms as they arose, owing to the severe nature of the infection.

This variation of symptoms gave opportunity for following out closely the clinical signs produced by the very rapidly changing condition of the lung.

SPUTUM.

In the slight cases, there was none, or extremely little. If the case became more severe, there was at first the ordinary mucous sputum of bronchitis, which, however, as time went on became greenish-yellow, with round lumps (nummulated). This was very noticeable in a large number of cases.

When broncho-pneumonia set in, the sputum was often rusty and in large quantity. In five cases the sputum contained a large quantity of blood for some days. Repeated examinations of this

RESPIRATORY SYMPTOMS (Continued).

latter kind of sputum revealed no tubercle bacilli, only influenza bacilli or pneumococci, and usually both. It was interesting to note that in practically every case where there was a large quantity of blood in the sputum, that the patient's condition cleared up relatively more rapidly and only one death occurred.

GASTRO INTESTINAL SYMPTOMS.

It has been suggested that the present epidemic is not due to the influenza bacillus, on the grounds that gastro-intestinal symptoms and the other complications of influenza were not present. That has not been my experience. Gastro-intestinal symptoms were often very marked.

Several cases presented symptoms of an acute gastro-enteritis with either very little chest symptoms or concomitant with a broncho-pneumonia.

Prolonged attacks of vomiting often occurred at the onset and continued until the temperature dropped.

Diarrhoea was a not uncommon symptom; blood and mucus were noted in two cases. Specimens of these were sent to the laboratory on the off-chance that they might be cases of the dysentery-enteric group, but were reported negative.

General abdominal tenderness was a feature and in six cases there was a definite tender spot over McBurney's point. These cases were sent down to us as appendicitis, but under the usual treatment adopted for flu cases they rapidly cleared up.

Five cases diagnosed as appendicitis were in all probability influenza.

Two of these cases presented symptoms that warranted an opinion as to the advisability of surgical interference. One

GASTRO INTESTINAL SYMPTOMS (Continued).

case was operated on and the appendix removed.

The appendix was found to be congested but not thickened and had undoubtedly set up an appendicular colic with local tenderness.

In several cases it was extremely difficult to decide whether they were of the enteric group or simply those of the prevailing epidemic. In the case of No. 4277, the notes of which are appended, blood cultures and examinations of the faeces were all negative to the enteric group. At the autopsy, which was not unlike that of an enteric, swabs taken from the larger bronchi showed Pfeiffer's bacilli and pneumococci. Jaundice occurred in three of my cases, one of whom (notes appended) was in the typical typhoid state, e.g. carphology, muttering delirium and restlessness, relapsing into a state of stupor and death.

4277. Pte. H.C. E. 7th Yorks and Lancs.

Br. Pneumonia. No Notes from Field Ambulance.

Admitted to 56 C.C.S. 1. 7. 18.

Temp. 103.6. Was not examined but sent direct to ward as he was extremely ill and delirious.

1.7. 18. Notes in Ward. Very delirious. Very difficult to examine. B.S. Bronchial Rt. base. Friction left base.

Abdomen tender. Hardly rational; complains of pains in the belly.

GASTRO INTESTINAL SYMPTOMS (Continued).

2. 7. 18. Fairly quiet night. Still delirious.

Rt. lung: Consolidation. Left apex Bronchial Breathing P.N. dull.

Crepes left base.

Patient got steadily worse and died at 5 p.m.

Post Mortem examination:

Lungs: Fresh adhesions everywhere.

Bronchopneumonia both bases and left upper lobe.

No fluid.

Bact. Exam: from bronchi. Direct smear - showed pneumococci and influenza.

Heart: Fatty. Enlarged. Petechial haemorrhages in pericardium. Early pericarditis Rt. auricle.

Liver: Pale.

Intestines: There were six patches of subserous haemorrhage in the middle of the ileum. Two solitary follicles were found to be swollen, congested and inflamed. Cultures from these showed - acid and gas in Dulcitate and Mannite. No Influenza.

Spleen: Enlarged $1\frac{1}{2}$ times.

Kidneys: Pale.

GASTRO INTESTINAL SYMPTOMS (Continued).

183128. D.T. H.J. 293 Army Bde. R.F.A.

Bronchopneumonia, following Influenza.

F.A. Notes. Went sick on 25. 7. 18. and pains all over, headache, pain in chest, cough.

July 29.	103.2.	July 30.	101.2
	P.100.		105.2 P.110.

Admitted to the 56 C.C.S. 30. 7. 18.

Sudden onset four days ago - shivering. Influenza.

Pains in chest, cough, looks very ill. Haemoptyses.

31. 7. 18. Blood-stained sputum. Breath very foul. Tongue very dirty. Very deaf. Fauces inflamed. Urine - dense cloud, albumen, blood.

Left lung. Friction axilla, creps base. P.N. - Br.Br. behind.

Right Lung. Creps base, in front and behind.

1. 8. 18. Very toxic. Br.Br. right base and axilla.

Jaundiced at 6 p.m. Delirium. Carphology.

2. 8. 18. Jaundice increasing. Very foul breath. Listless.

Rt. base Creps. and Br. Br. Urine very scanty and bile stained.

3. 8. 18. Br. Br. right base, very jaundiced, much worse.

4. 8. 18. Patient got very much worse and died at 7.30 a.m.

Attached to P. 15

CLINICAL CHART.

(To be attached to Case Sheet.)

Army Form B. 181.

Corps 293 Bde R 700

No. 183120

Rank and Name Sgt. Thompson

Age _____ Service _____

Disease Pneumonia

Date of admission _____

Date of discharge _____

Result _____

Dates of Observation	30		31		1		2		3		4		July 29		July 30																					
	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time								
Temperature, Fahrenheit	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
107°	102.8	102.8	101.8	102.0	101.5	101.5	100.8	101.0	99.8	100.0	100.5	100.5	101.8	101.0	101.0	101.0	102.8	102.8	101.0	101.0	102.8	102.8	102.8	102.8	102.8	102.8	102.8	102.8	102.8	102.8	102.8	102.8	102.8	102.8	102.8	102.8
106°																																				
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97°																																				
Pulse per Minute	112	112	106	92	110	108	114	105	105	105	120	120	126	120	132	124	132	132	100	100	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110
Respirations per Minute	24	24	20	20	22	22	26	24	24	24	40	40	38	36	40	44	44	44	100	100	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110
Motions per 24 Hours																																				

Blood Culture taken

Sputum

Beds 7 30 am
H 8 18

Field Amb

Signature _____

In charge of case _____

CLINICAL CHART.
(To be attached to Case Sheet.)

Army Form B. 181.

Corps _____

Military Hospital _____

No. _____ Rank and Name _____

Age _____ Service _____

Disease _____ Date of admission _____

Date of discharge _____

Result _____

Dates of Observation	Time																											
	A.M.	P.M.																										
Days of Disease																												
Temperature, Fahrenheit																												
107°																												
106°																												
105°																												
104°																												
103°																												
102°																												
101°																												
100°																												
99°																												
98°																												
97°																												
Pulse per Minute																												
Respirations per Minute																												
Motions per 24 Hours																												

30 7/16 Sudden onset & swelling
 31 1/16 All 6 ears. Battered influenza. Pain in
 chest; chills. Coughs little.
 31 1/16 Hoarseness.
 31 1/16 Bloodstained sputum. Breath very
 offensive. Tongue white. Very deaf.
 31 1/16 Hoarseness. Inflamed
 uvula. Good cleavage of air.
 31 1/16 Stakes.
 31 1/16 L. traction on lower ear. Right ear
 P. Ear case in front & behind of
 31 1/16 Very loose. B. B. Right ear
 31 1/16 Unimpaired.
 31 1/16 Very foul breath. Coughs. Crisps R.
 31 1/16 B. B. Urine. V. scanty.
 31 1/16 B. B. Urine. Very unimpaired.
 31 1/16 Much worse.

Signature _____ In charge of case.

GASTRO INTESTINAL SYMPTOMS (Continued).

Post Mortem Exam:

Right Lung: Lower and middle lobes consolidated. Upper partially ^{with} ~~and~~ bronchopneumonic patches. Fresh adhesions. Upper ~~and~~ middle lobes had patches of necrosis. No fluid.

Left Lung: Lower lobe - red hepatisation. Bronchopneumonic patches. Markedly adherent. No fluid in chest.

Stomach: Markedly congested. Pylorus very thickened.

Duodenum: Inflamed and swollen. Much mucus.

Jejunum and Ileum: Very congested.

Appendix: Inflamed and kinked.

Kidneys: Accessory ureter left. Enlarged and inflamed; probably acute parenchymatous nephritis. Capsule strips

Spleen: Enlarged.

Liver: Fatty, almost nutmeg.

Heart: Fatty degeneration. Heart muscle pale and flabby. On aortic and mitral valves fresh vegetations.

Early pericarditis of rt. auricle.

Blood culture - sterile after four days' growth.

Faeces: negative to dysentery - enteric group.

GASTRO INTESTINAL SYMPTOMS (Continued).

The following case is added in that it shows a case of cascara sagrada" poisoning, complicating influenza.

Pte. F. R.A.M.C. F.Amb. Orderly.

Field Amb. Notes: Onset of illness 1. 7. 18. Patient was admitted to F. Amb. for "Debility and D.A.H."

8. 7. 18. On the evening of the 8. 7. 18. he complained of headache and pain behind the eyes and pains all over, and was diagnosed as influenza. Bowels had been moved daily but not well for several days.

About 1 a.m. 9.7.18. pain commenced in the abdomen and localised to epigastrium. He was kept awake by the pain. He commenced vomiting at 5 a.m. and at intervals of half an hour since then. Vomit consisted of particles of food at first, then mucus with occasional streaks of blood.

Every time he vomited he was obliged to go to stool.

9. 7. 18. Motions very loose now; at first they were very costive. He stated that he started taking cascara sagrada tablets on the Sunday previous - 7.7.18 - and in 24 hours consumed twelve tablets. They had no effect on the bowels until to-day. He took the pills "on his own account". They were not ordered by his medical officer. Has not taken anything else.

Tongue coated and dirty. Occasionally has hiccough, pain in epigastrium and iliac regions. No rigidity. He looks pale and a little collapsed. Pulse 78, feeble. Temperature subnormal.

Admitted to C.C.S. 10.7.18.

Diarrhoea, vomiting. Bowels moved about 10 times to-day.

Hiccough. Pain in the abdomen. Pink eye. T.101.

In Ward.

Epigastric pain and tenderness. Foul tongue.

Vomited. Trace of blood in stools. Pupils dilated.

11. 7. 18. Vomited (bile stained).

Epigastric tenderness. Tongue cleaner. Nil in chest.

Two stools only during night, trace of blood.

12. 7. 18. Not vomited; much better.

Evacuated to the base.

NEPHRITIS.

Practically every case during this epidemic has had albuminuria with or without blood. Cases with a large amount of albumen and blood have been sent down to us as "Nephritis" and not Influenza.

The condition found in these nephritis cases is quite unlike the ordinary nephritis or any form of war nephritis. In the extracts from the Research Committee's Findings it will be seen that these cases differ in almost every particular. (Page 24.)

The onset is invariably sudden and similar to that of influenza, and often the condition that caused the man to report "sick" was because he noticed that his water was "bloody".

No history of previous infectious disease - e.g. S.F. - was discovered in twelve cases. Exposure would hardly play an important factor as it is summer, and the weather has been relatively fine. Notes of 6 cases Pages 26 to 30.

There was no oedema of the extremities noticed in any of these cases, and nothing to draw attention to the case being one of nephritis from a superficial glance at the patient, beyond very slight puffiness of the eyes, which was exceedingly transitory. Looking at six nephritic patients amongst a ward of twelve. I have now under my care, I think the keenest observer would fail even to hazard which were the nephritic cases.

About half the cases had a few rhonci, but there was no severe respiratory trouble, except to the more advanced cases of

NEPHRITIS (Continued).

serious bronchopneumonia, who also had a large quantity of albumen and blood.

No enlargement of the heart was noted in the mild cases. Headache was slight and the patients occasionally complained of pains in the limbs and backache.

The blood pressure was consistently low and the only case above normal I have noted was 140 and that rapidly came down to 115, and this was in a man who was a miner in civil life, aet 25. The usual pressure noted was about 100 mm. for the systolic pressure and about 60-70 for the diastolic. The systolic-diastolic interval seemed to keep fairly constant.

There was a large amount of albumen and blood in these cases but under treatment the albumen tended to clear up rapidly and the blood disappeared in all but the very severe cases after the second or third day.

Microscopical examination of the urine showed red blood corpuscles in a greater or lesser number, but was constantly present in the cases examined; leucocytes, a few granular casts were occasionally met with, and in two cases epithelial casts.

Phosphates were noted in one case.

The quantity of urine passed varied from 35 - 50 oz. Suppression of urine did not occur in the cases uncomplicated by bronchopneumonia showing a more intense infection. The case

NEPHRITIS (Continued).

of Sgt. R. (1/5 Man.) is illustrative of this more virulent type. With the severe bronchopneumonias, I had several cases with suppression of urine and difficulty in micturition.

With the first cases admitted one was inclined to look on them as a primary acute nephritis, but on investigating the onset and by bacteriological examination of the nasopharynx, where the influenza bacillus was recovered, one realised that they were part and parcel of the present epidemic.

Post-mortem examinations also revealed in nine cases enlargement of the kidneys, with much infection.

Sgt. R. 1/5 Man.

Br. Pneumonia.

22. 7. 18. Sudden onset whilst resting. Headache, pains in back and legs, cough, weakness, vomiting.
23. 7. 18. P.N. (→) Both bases Br. Br. in patches - very toxic.
24. 7. 18. Pain in right side; friction.
25. 7. 18. Friction ^{SOUNDS} ~~SOUNDS~~ left axilla, herpes, (sod. bic. treatment)
26. 7. 18. Creps. both bases, delirious during night. Fine creps right lung, coarse rales.
27. 7. 18. Much worse; tongue dry; pains in the belly; delirious.
28. 7. 18. Better night; still delirious; rt. base P.N. — V.R. ++ Br. Br. L. base P.N. —. Fine creps. right apex; diarrhoea, incontinent.

NEPHRITIS (Continued).

29. 7. 18. Urine: Dense cloud of albumen - trace of blood.
 (Sod. Bic. treatment)
 Abdomen very distended; spleen + P.N. - bases
 Br.Br. in patches, both lungs, behind.
30. 7. 18. Pseudocrisis - heart ^{sounds} ~~sore~~ feeble. Urine - cloud -
 albumen - blood.
31. 7. 18. Heart ^{sounds} ~~sore~~ feeble. Urine - haze of albumen; no
 blood.
1. 8. 17. Haze albumen, Heart ^{sounds} ~~sore~~ feeble. Very drowsy, apa-
 thetic.
2. 8. 17. Very listless - chest clear - difficulty in micturi-
 tion.
3. 8. 17. Evac. lying - urine, slight haze of albumen.

Sgt. W. 1st Herts. Broncho-pneumonia.

Field Amb. Notes - Onset sudden on 5. 7. 18. - headaches,
 pains all over body, sore throat and cough.

8. 7. 18. Temp. 102.4

10.7. 18. " 104.2. P.120. Rales both sides chest. Dulness
 left base.

C.C.S. Notes: 10. 7. 18. Sudden onset with faintness and sore
 throat. Could not walk. Pains in the limbs came on soon
 after - and headaches.

CLINICAL CHART.
(To be attached to Case Sheet.)

Corps 1/5 Mann.

Military Hospital _____

No. _____ Rank and Name Sgt Ruedde

Age _____ Service _____

Disease Br. Pneumonia Date of admission _____

Date of discharge _____ Result _____

Dates of Observation	23				24				25				26				27				28				29				30				31				1				2			
	Days of Disease																																											
Temperature, Fahrenheit	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time				
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.				
107°	104.8	103.5	103.8	104.2	103.8	103.5	103.2	103.5	103.2	102.8	103.2	103.5	103.5	103.2	103.5	103.8	103.8	103.2	102.5	103.8	103.2	102.8	102.5	102.8	102.5	102.2	102.5	102.8	102.2	101.8	102.2	102.5	102.5	102.2	102.5	102.8	102.8	102.5	102.8	103.0				
Pulse per Minute	120	112	120	116	116	108	108	100	96	100	96	102	96	96	108	104	108	108	108	108	112	116	116	112	96	78	72	88	86	84	76	80	84	84	84	84	80	80	80	80				
Respirations per Minute	32	30	34	32	30	28	30	25	26	24	24	26	26	26	28	30	42	40	36	42	42	42	42	42	40	44	44	44	36	30	28	30	30	28	28	28	26	24	24	24	22	22	22	22
Motions per 24 Hours					1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

High water in breasts
 when warm

Signature _____ In charge of case.

29

NEPHRITIS (Continued).

Tongue brown fur - dry - now complains of pains in the back, stomach and chest. Very cyanosed dyspnoeic and looks extremely ill. Pulse 120.

11. 7. 18. Cyanosis rather less. Pain in chest. Creps. both bases. Friction ~~S-S-S~~^{SOUNDS} left base. Breath sounds very harsh at apices and inclined to be bronchial. Insomnia and depression. Pains in the belly. Suppression of urine.

(After hot fomentations to belly passed 6 ozs.)

12. 7. 18. Urine very scanty. Bronchial breathing here and there all over both lungs. Cyanosis more marked and patient much worse. Heart enlarged to right. Stools very loose.

13. 7. 18. Patient got steadily worse and more cyanosis and died at 2 a.m.

Post Mortem Examination:

Lungs: Pleuropericardial adhesions old.

Left lung - consolidation probably lobular at first, going on to complete consolidation of lower and lower part of upper lobe. Fresh adhesions and lymph. No fluid. Emphysema at apex.

Right Lung - Lower and middle lobes practically solid.

Heart: Pericarditis at right base of heart. Heart in systole. Heart muscle congested; right auricle and ventricle dilated.

NEPHRITIS (Continued).

Spleen: Congested.

Liver: Congested, with fatty areas.

Kidneys: Enlarged - kidney capsule strips fairly easily.

Acute parenchymatous nephritis.

Intestines: Jejunum and Ileum very congested and inflamed mucous membrane. Glands of mesentery enlarged and congested.

Appendix: Congested. Mucous membrane inflamed; contained two faecal concretions. No peritonitis & fresh lymph.

CASES OF NEPHRITIS OCCURRING DURING THE
PRESENT EPIDEMIC.

I have extracted some of the conclusions of the Medical Research Committee on War Nephritis as published on June 7th, 1918 (No. 3.) in order to afford a comparison between the old war Trench Nephritis and the Nephritis to be described.

1. The onset of the disease is frequently insidious and in the majority of cases there is a history of symptoms, extending for more than two weeks previous to admission to field ambulance.

NEPHRITIS (Continued).

2. A history of immediately preceding infectious processes is infrequent. Scarlet fever appears to play little or no part in the etiology of the disease. In seven cases only was there a more or less definite history of previous renal disease. Exposure appears to be a factor in the production of the illness.
3. The cases seen by us agreed with the general description of war nephritis in low rate of mortality, severe respiratory symptoms and short duration of oedema.
4. The blood pressure was constantly raised, the rise synchronizing, in the great majority of cases, with the period of oedema. The rise in the diastolic pressure corresponded with that of the systolic, but was less marked, the systolic-diastolic interval being increased during the period of raised tension.
5. Hydraemia was present in the great majority of patients in whom it was looked for. In most cases this hydraemia corresponded to the course of the rise in blood pressure. In some cases the blood appeared to be more dropsical than the tissues, while in others the reverse held.
6. In a large proportion of the cases definite enlargement of the heart to the left was present, usually of a temporary nature. In the absence of post-mortem evidence, the nature

NEPHRITIS (Continued).

of this enlargement could not be ascertained.

Pte. W. H. No. 71646. 16th R.W.F. 38th Div.

Age 39 years. Service 2 years. France 5/12.

Never had scarlet fever. Occupation - gardener.

17. 8. 18. F.A. diagnosis - Albuminuria.

2 days ill. Wine coloured urine, sudden onset. Diarrhoea day previous - headache and weakness of limbs - then noticed that his urine was coloured - no oedema.

18. 8. 18. Urine, very dense cloud of albumen and blood - no

diarrhoea. Weakness in the legs. Systolic 115
Diastolic 70

No headache.

19. 8. 18. Cloud of albumen, blood, slight occipital headache

and pain in his knees and legs, (and in civil life also)

Nil heard in chest; cough. Systolic P. 110 m.m.
Diastolic P. 70 m.m.

20. 8. 18. Urine - dense cloud of albumen, blood, cough, pains

in the back of the head. Pains in the knees.

Systolic P. 105 m.m.
Diastolic P. 65 m.m.

A.B. normal. No enlargement of the heart.

21. 8. 18. Thin cloud of albumen - blood. Systolic P. 100 m.m.
Diastolic P. 65 m.m.

Complains of chill in the lower extremities.

Evacuated lying.

NEPHRITIS (Continued).

Pte. I. J. 168 1st East Surreys.

Age 31. Service 4 years. Service in France 3-3/12 years.

Occupation - bricklayer.

20. 8. 18. F.A. Diagnosis - P.U.O.

20. 8. 18. C.C.S. " Ill 3 days - onset sudden, with back-
ache and headache. T. 100.4. (P.M.)

21. 8. 18. Urine wine colour. Systolic P. 120. T 99.8° a.m.
Diastolic P. 90. 101.2 P.M.

Headache and pains all over.

22. 8. 18. Evacuated lying (under pressure) T 99.8° a.m.

Pte. M. R. No. 24874. 10 D.C.L.I. 2nd Div.

Age 25 years. Occupation - miner - no history of S.F.

13. 8. 18. F.A. Diagnosis - albuminuria.

14. 8. 18. C.C.S. 3 days ill. Tender over bladder. Frequent
micturition. Urine: cloud of albumen. No blood.

15. 8. 18. No oedema of legs. Eyes slightly puffy. Pains in the
belly over bladder. Systolic P. 140.
Diastolic P. 100.

16. 8. 18. Urine: Faintly acid, faint haze albumen. No blood.

17. 8. 18. Urine: Dense cloud of albumen - no blood.

Pains in the belly. Systolic P. 140.
Diastolic P. 100.

18. 8. 18. Urine: Cloud of albumen. No blood.

Microscopic examination urine: Red blood corpuscles;
leucocytes, granular and epithelial casts.

P.28

CLINICAL
(To be attached)

Corps 1/4 Lance Fus

No. 39296

Rank and Name Pte Harlock

Disease Nephritis

Date of admission 14/8/18

Dates of Observation														
	14	15	16	17	18	19	20							
Days of Disease														
Temperature, Fahrenheit	Time													
	A.M.P.M.													
107°														
106°														
105°														
104°														
103°														
102°														
101°														
100°														
99°														
98°														
97°														
Pulse per Minute	72	78	70	64	68	60	64	68	66	64	64	60		
Respirations per Minute					22	24	22	24	24	20				
Motions per 24 Hours				1	1		1							

Amount Urine

15 31 27 40 40 42

NEPHRITIS (Continued).

examination - red blood corpuscles - leucocytes,
Phosphates - no casts. Pain at the end of micturition.
Tongue furred - nil in chest.

20. 8. 18. Urine - thin cloud albumen -
Evacuation lying.

Pte. P. F. 77074. 205 Empt. Coy.

Age 19 years - Service 13/12. France 4/12. Occupation in
civil life, warehouseman.

12. 8. 18. F.A. diagnosis - N.Y.D. Pyrexia.

Headache, nausea, dizziness; Aspirin gr.V. Mag. Sulp. $\frac{1}{2}$ oz.

Thick cloud of albumen in urine. Blood.

14. 8. 18. C.C.S. diagnosis - NEPHRITIS. 3 days ill, sudden
onset, passing much urine, no pain.

Urine test: Dense cloud of albumen, blood present.

15. 8. 18. Nephritis treatment, no pains, no headache, no
oedema of legs. Rather puffy. Systolic B.P. 112 M.M.
Diastolic 70 M.M.

16. 8. 18. Acid, cloud albumen, no headache.

Blood - systolic 105
Diastolic 65

17. 8. 18. Systolic 100
Diastolic 60

Nil in chest, urine dense, cloud of albumen. Blood.

Corps 205 Empty Coy

No. 47044

Rank and Name Pvt Russell F

Disease Nephritis

Date of admission 14/8/18

Dates of Observation														
	14	15	16	17	18	19	20							
Days of Disease														
Temperature, Fahrenheit	Time													
	A.M.P.M.													
107°														
106°														
105°														
104°														
103°														
102°														
101°														
100°														
99°														
98°														
97°														
Pulse per Minute		68	64	72	76	64	72	64	62	64	62	60		
Respirations per Minute					18	20	20	20	20	20	22	20		
Motions per 24 Hours														

NEPHRITIS (Continued).

18. 8. 18. Dense cloud of albumen. Blood. No oedema.

Systolic B.P. 95.

Diastolic 60.

No headache; microscopic examination - red blood corpuscles, leucocytes, granular and epithelial casts.

19. 8. 18. Urine - thin cloud of albumen - Blood -

Systolic 90.

Diastolic 60.

Very slight headache.

20. 8. 18. Cloud of albumen - blood -

Evacuation, lying.

Pte. L. 315278, 14th R.W.F. 38th Div. (3 months)

Age - 20 years. Service 19/12¹⁹¹⁵ France (3/12.17) (Has not been in the line).

Fireman in civil life. Not had scarlet fever.

17. 8. 18. F.A. Diagnosis - Albuminuria.

3 days ill, onset sudden, with dyspnoea, face swollen, polyuria, headache. T 100.6. (p.m)

18. 8. 18. Urine test - thin cloud of albumen, no blood, sudden onset, frequent micturition. Pain in the stomach and chest, tongue furred.

Systolic 100.

Diastolic 70.

T. 99.0 a.m.

99.4 p.m.

20. 8. 18. Urine - haze of albumen - no blood - Systolic 105
Diastolic 70

Evacuated - lying.

NERVOUS SYMPTOMS.

Amongst men who were evacuated to us from the trenches there was a tendency to be very highly strung alternating with periods of depression.

Muttering delirium and carphology leading to even the typhoid state were observed in the more toxic cases, especially those with a severe bronchopneumonia.

Some of the men who had been badly shelled presented symptoms of a hysterical nature, and several men burst into tears on being questioned. This, however, rapidly cleared up with treatment, and a night's rest in bed.

Pain in the limbs was a common symptom. I observed only two cases of what one would consider a true neuritis. These were of the sciatic nerve.

Pleurodynia was noted in over 40 cases. I thought at first these cases were pleuritic in origin, but I failed after the most careful examination to detect any friction sounds in the chest. This was a very distressing symptom and was difficult to cure. I myself had it for some 10 - 14 days and realised that it was an extremely painful condition.

The attached case is illustrative.

NERVOUS SYMPTOMS (Continued).

Sgt. P. R.E. Field Coy.

Influenza - (Tetanus).

Admitted to C.C.S. on 10. 7. 18. Headache - pains all over and general twitchings (sent in with diagnosis of Tetanus and had been given 1500 A.T.S. before departure from Field Ambulance).

Past History - he had been wounded in the back and side in November 1917 by shrapnel. A.T.S. injected at Advanced Dressing Station and another dose at the C.C.S. whence he was evacuated to No. General Hospital at the base.

On Admission to ward.

Bilateral clonic spasms of both arms and trunk; these are said to have started at 2 a.m. of to-day with pain in the back and legs and back of neck especially.

On examination - there was no rigidity of neck muscles.

No Kernig's sign.

No spasm of the Masseter Muscle.

Knee jerks ++ No ankle clonus.

The hands were held in position of "tetanus" (carpo-pedal spasm).

He told me that he had vomited some "nasty stuff" which was very bitter. The tongue was furred.

NERVOUS SYMPTOMS (Continued).

11. 7. 18. Jerks much less. Did not occur during sleep.
No nystagmus. Knee jerks ++
Autosuggestion and hypnosis were then tried by me with
success.
12. 7. 18. Jerks ceased. Headache and pains in the limbs.
13. 7. 18. Tongue cleaner. Pains practically gone and the man
professed to be anxious to return to his Unit. However, it
was thought advisable to evacuate him to the base.

TREATMENT.

The cases were grouped roughly for purposes of treatment into two - mild and severe - with chest complications. Dealing with a large number of cases, it was necessary to make the treatment of a routine nature.

On admission the mild cases were given Cal. Gr. IV. Mag. Sulph. Mane. and a mixture containing Sod. Sal. and Antipyrin. The first night they were given Pulv. Ipecac. Co. Gr. X.

If there was still a cough, an expectorant mixture and tonic treatment was given before they were sent to light duty. Light duty was done at the C.C.S. if possible, or the men, on being discharged to duty, were given a note suggesting that they should be given three days' light duty.

The more severe cases were treated with the undermentioned mixture of Ammon. Carb. and Strophanthus, and stimulants freely given when necessary. Depression was marked in most cases and they reacted well to brandy.

Several cases were given rectal injection of 5% Sod. Bic. solution, with the view of combating an acute toxæmia which might cause death from myocardial degeneration. This was thought advisable in that the bronchopneumonia was not considered sufficient to cause death from pure mechanical blockage of lung space. This condition was confirmed by post-mortem examination

TREATMENT (Continued).

in several cases.

Prescriptions: Mist. Sod. Sal. c. Antipyrin

R. Sod. Salicylas Gr. viii

Phenazoin Gr. iv

Tr. Nuc. Vom. M. iv

Glycerine M. xv

Aq. Chlor. ad. $\mathfrak{z}\ddot{\text{i}}$
 $\mathfrak{z}\ddot{\text{i}}$ 4tis. hor.

Mist. Ammon. Carb. c. Strophanthus.

R. Vin. Ipecac. M. x.

Tr. Strophanthus M. iv.

Ammon. Carb. Gr. v.

Potass. Iodid. Gr. iv.

Aq. Chlor. ad $\mathfrak{z}\ddot{\text{i}}$
 $\mathfrak{z}\ddot{\text{i}}$ 4tis hor.

Rectal Injection Sod. Bic. $\mathfrak{z}\ddot{\text{i}}$ to $\mathfrak{v}\ddot{\text{i}}$.

To the more toxic cases Sodium Bicarbonate was given in all feeds and in the very severe cases was given as an enema of $\mathfrak{z}\ddot{\text{i}}$ to the pint night and morning. I did not think it advisable to give it intravenously, as I considered it might overburden an already tired heart. The patient then retained as little or as much as possible without increasing the amount of circulating fluid.

TREATMENT (Continued).

The reason for giving Sod. Bic. in the first instance was because one noted the great frequency of blood and albumen in the urine of these patients. Sod. Bic. has been found of the greatest use in the treatment of war nephritis.

Chest cases with delirium and restlessness were given morphine Gr. $\frac{1}{4}$ and Atropin Gr. $\frac{1}{100}$ subcutaneously at night. This acted almost as a charm in some of the cases and they awoke refreshed and invigorated by a good night's sleep.

Paraldehyde was tried for sleeplessness, but without any real good effect.

Several cases presenting an intense cardiac dyspnoea with restlessness reacted well to large doses of brandy. Brandy was given every hour for five doses and then at the sixth hour $\frac{3}{4}$ were given. This also seemed to combat sleeplessness and the patient often drifted into a calm and placid sleep.

Pituitrin was tried, but I think that if anything it tended to do harm by giving the heart more to do.

Treatment by quinine I found was quite useless after the first day of fever. ^{however,} from a prophylactic point of view, I have discussed it at length in another paragraph. (Page 34)

PROPHYLAXIS.

There is no question that during an epidemic the prophylactic use of quinine is beneficial in reducing the number of cases, in diminishing the disease and preventing complications.

Quinine was given to 40 men of traffic control in doses of Gr. ii (tablet) t.d.s.

Although not absolutely preventing the disease, the men were attacked to a lesser degree and there were no complications. Some of the men were able to carry on their work when it was necessary.

I was consulted by an officer of a Traffic Control re the prophylactic use of quinine, after a few cases had broken out in his Unit. His unit was broken up in detachments in different areas near by. I recommended that 4 gr. of Quinine Sulphate be given in doses of Gr. ii morning and night to the headquarters unit.

At the headquarters of this unit there were 40 men of whom there were 3 who introduced the disease. These men were eventually evacuated through the clearing station to the base. After this, two men contracted it and were evacuated to hospital and were under my care.

Quinine was then given with the following result:

PROPHYLAXIS (Continued).

About six men were seedy and were given quinine, also the rest of the unit. No more cases occurred.

The other detachments had the following cases:-

<u>At Roquemaison</u>	15 men	Every man contracted influenza. <u>Not</u> given quinine. Several evacuated to hospital.
<u>Nunc</u>	12 men	Bad attack with chest troubles; 1 case developed pneumonia; 3 evacuated to hospital. <u>Not</u> given quinine.
<u>Gouy en Artois</u>	28 men	20 cases. 10 evacuated to hospital. 2 men evacuated to the base through a C.C.S., with complications. Quinine <u>not</u> given.

The following experience of a colleague of mine is interesting in supporting the view that quinine is of use as a prophylactic.

A certain R.H.A. Battery started with influenza in its centre section, about 12 cases among 80 men. Their officer went and slept with them to maintain isolation. He went down with it in two days' time. This officer did not take quinine. The other six

PROPHYLAXIS (Continued).

officers took quinine (4 gr) and escaped the disease. Of the mess servants, 3 in number, 2 took quinine and the other did not; the latter was the only case.

There were three other sections - right, left and mobile - each of 60 men. The right section (of about 60 men) took gr.ii. of quinine only a day. The mobile and left went down fairly quickly. The right section went down much later - roughly ten days later - with very few cases and those comparatively light.

It then broke out in the M.G.C. (Machine Gunners Coy.), owing to a sergeant of the mobile section aforementioned going over to teach the Transport section of the Machine Gunners. Practically every man of the transport went down heavily.

Of the remainder, A. and B. sections (about 30 men in each) were lodged in a chateau. It then started in A. section. B. section were put on quinine, gr. vi. daily, with the result that only a very few cases occurred in B. section, but it ran the usual course through A. section. A. section had not been given quinine.

All the officers of all sections of the M.G.C. took quinine and escaped the disease.

ANOMALOUS CASES.

Enlargement of the Thyroid following influenza.

39957. Pte. C. 1st Wirts B. Roadman in civil life.

History of pres. illness. Pains and headache about one month ago.

The officer said he had a slight attack of influenza. He reported sick with this and was given medicine and light duty.

He states that up to the present time had not "felt himself" so reported sick on the 18. 7. 18. and was diagnosed by the Field Ambulance as Debility and sent down to the C.C.S.

On admission to C.C.S. Complains of weakness of the legs and feeling "shaky", and attacks of palpitation. Sweating.

On examination - anaemic appearance. Pulse feeble - 90.

Exophthalmos present; fulness of the thyroid.

Von Graefe's sign present. Fine tremor of the fingers.

Tongue somewhat tremulous.

No bruits were heard in cardiac region. Patient very depressed

NOTE:

Patient said that he had never had tremors or palpitation before the last illness. He had 2-2/12 years' service of which 20 months were spent in France. I am inclined to think that none of his symptoms were due to shell shock and he had not been in hospital before.

It might be difficult to say that this enlargement of the thyroid was due to the influenza bacillus, but as I have had 3

ANOMALOUS CASES (Continued).

other cases of marked enlargement of the thyroid in cases who were undoubtedly influenzal in origin, and as this case had occurred during the epidemic, I thought it worth while recording.

EPIDEMIC IN MY OWN UNIT.

During the early part of May, 1918, there was an epidemic amongst the officers and personnel of my own unit. It was of a mild nature and the men were perfectly well in about 5 to 7 days. There were no after-effects. The symptoms presented were those not unlike that of a mild influenzal infection. Is it possible, in view of the great epidemic that is now diminishing in violence, that this slight epidemic was the herald of the greater one? It is conceivable that the infection of both was due to the same organism or organisms and that as the disease progressed the infection became more virulent. In this unit roughly consisting of 112 officers and men, 30 cases occurred, 28 amongst the men and 2 amongst the officers. The onset was in all cases quite sudden and often the time of feeling ill was known. All cases complained of intense headache, pains all over, a rawness down the sternum, slight sore throat. The temperature was never higher than 103 and generally about 101. Several men complained of feeling shivery at the onset, although definite rigors occurred only in 3 cases.

All cases complained of feeling limp and intense lassitude for the first few days; this gradually passed off.

The fever was of three days' duration in every case and came down to normal on the fourth day.

EPIDEMIC IN MY OWN UNIT (Continued).

There was slight cough with very little tenacious sputum.

~~PINK EYE.~~

"Pink eye". This occurred in every case.

Nystagmus occurred in about ten cases.

There was no enlargement of the spleen noted.

There were no spots.

Herpes labialis occurred in three cases, two among some batmen who occupy the same tent. The incubation period seems to have been two days from the time these two batmen were infected.

This epidemic has much in common with the milder cases of the present epidemic. The bacteriological evidence also points to there being some connection. Pfeiffer's bacilli were seen from a direct smear in one case, and several cases presented a growth of Gram(-) bacilli which might possibly have been Pfeiffer. It was some days before we realised that we might be dealing with cases of pure influenza and not cases of P.U.O. (Pyrexia of unknown origin or potential trench fevers). However, there was also difficulty in getting the organisms found to grow and the influenza bacillus is not one of the easiest to culture, except under the most favourable conditions.

EPIDEMIC IN MY OWN UNIT (Continued).

Clinically these cases were influenza and not at all like those of the trench fever type.

I have added two cases to illustrate this type. It will be noticed that respiratory symptoms were present in the form of cough and the "rawness of the sternum," showing a "tracheitis". There are, as a rule, no respiratory complications in the ordinary P.U.O. or trench fever cases.

ILLUSTRATIVE CASES OF EPIDEMIC IN MY OWN UNIT

Padre T.

15. 5. 18. Taken ill quite suddenly at 10.30 a.m. Complaining then of slight sore throat and rawness of the chest. Felt exhausted and tired. Shivering. Then headache and backache. Pains in the limbs later. T. 100.6

P.S. Pink Eye - slight nystagmus. No spots. Spleen not enlarged. Tongue furred.

16. 5.18. T. 99. Headache better. Eyes still ache. Slight nystagmus present. Throat easier. Pains in the limbs easier. Tongue cleaner. West swab taken.

17. 5. 18. T. 98.4 Feels better except for slight backache and an irritable cough.

ILLUSTRATIVE CASES OF EPIDEMIC IN MY OWN UNIT (Continued).

18. 5. 18. Feels better. Voice still husky. Herpes labialis.

19. 5. 18. Much better.

Bacteriological examination - Gram + coccus
 of West Swab Gram - coccus ? Catarrhialis
 " - bacilli ? ?

Captain E.T.B., R.A.M.C.

16. 5. 18. Temp. 101.6. Headache, feeling limp, tendency to
 shiver, irritable cough. Tongue furred.

Dovers Powder and Aspirin
 Gr.x. Gr.x.

17. 5. 18. Temp. 99. Headache, pains in the limbs. Cough.

Sputum of tough consistency and tendency to nummulate.

18. 5. 18. Temp. 99. Slight headache - pains in the limbs.

19. 5. 18. Feeling slack. Cough. Obscure aches. T_{98.0}

20. 5. 18. Better.

Bact. Exam:- Sputum.

Gram + coccus
 " - cocci ? Catarrhialis.
 " - bacilli ? ?

AETIOLOGY AND PATHOLOGY.

Doubts have arisen as to the epidemic being caused by the influenza or Pfeiffer's bacillus. Articles have appeared in the Lancet and British Medical Journal from time to time during the epidemic stating that the writers had not been able to find the bacillus. However, there can be no question that in conjunction with the pneumococcus, the influenza bacillus was the predominant factor.

In every case we investigated during the height of the epidemic, either sputum or West swabs of the nasopharynx, the pneumococcus was invariably found either with Pfeiffer's bacillus or not.

It has been suggested that the pneumo-coccus outgrows the influenza bacillus after 3-4 days, and this was our experience in the great majority of the cases we investigated.

Smears from the larger bronchi taken post mortem show also pneumo-cocci in conjunction with Pfeiffer.

Blood cultures were invariably disappointing, no growth as a rule being obtained.

During the epidemic in my own unit, in several cases I was able to get sputum and from this we were able to demonstrate a Gram negative bacillus, which morphologically resembled Pfeiffer's bacillus. Unfortunately we were unable to grow it and confirm it by culture.

AETIOLOGY AND PATHOLOGY (Continued)

However, in the light of things that have taken place later, I am convinced that this organism (Gram negative bacillus) was Pfeiffer, and that the series of relatively slight local epidemics, or shall we say endemics? - were the forerunners of the great pandemic which was to scourge the armies later.

The figures I have given are only those of whom came under my care for one month. I was unable to get further statistics of the next two months owing to the military situation.

However, I performed a number of autopsies during the later part of the epidemic, and propose to roughly indicate the changes I perceived.

Thyroid: Enlargement of the thyroid bilaterally occurred in 5 of my cases, one of which was very marked, and a section was cut which showed on microscopic examination acute inflammatory change.

Lungs: The essential condition found was that of a Broncho-pneumonia which varied according to the length of the disease. Some cases presented large areas of consolidation, which almost suggested a lobar pneumonia, but on further inspection typical broncho-pneumonia patches could be made out.

In three of my cases, there was a relatively small area of lung involved, and death in those cases must have been due to an extreme toxæmia and not due to any mechanical blockage of the lung tissue.

AETIOLOGY AND PATHOLOGY (Continued).

Fresh pleurisy and pleural adhesions were the rule. Two of my cases showed marked diaphragmatic pleurisy, which during life caused intense distress and pain to the patients. Where the consolidation was marked, areas of early necrosis were found.

Oedema of the lungs was infrequent.

Emphysema of a compensatory nature was also found.

In one case a small interlobar empyema was present. Pleural effusions were rare and only occurred in two of my cases. Practically every change could be noticed in the lungs; the small bronchi and bronchioles were full of frothy and not infrequently muco-purulent or purulent fluid, areas of congestion, mostly at the bases, areas of red hepatisation going on to grey hepatisation or even necrosis.

Heart: Greater or lesser enlargement of the heart was common. Cloudy swelling or fatty change of the heart muscle was constant. The heart was generally found in the position of systole (left).

Pericarditis occurred with effusion in 2 cases. From one we recovered the pneumococcus by direct smear.

A fairly constant feature was the presence of a few small fresh pericardial adhesions on the right auricular appendage.

Endocarditis occurred in one case (Sgt. W.).

AETIOLOGY AND PATHOLOGY (Continued).

Stomach: No marked change seen, beyond the ordinary signs of an acute inflammation of the mucous membrane. Dilatation was observed in two cases.

Intestines: The ileum and jejunum often presented a very congested appearance and in one of my cases there was well marked subserous haemorrhages, with swelling of the solitary follicles and Peyer patches, suggesting the 'enteric' group; this was, however, proved to be negative to the dysentery enteric group of organisms.

Appendix: This often appeared to be very inflamed, thickened and in four cases contained faecal concretions.

Spleen: In about 50% of the autopsies, there was marked enlargement, up to $1\frac{1}{2}$ - $1\frac{3}{4}$ times the normal.

Liver: Often enlarged, cloudy swelling or even fatty change. Sometimes congestion.

Kidneys: These were often enlarged and pale with prominence of the stellate veins, showing a condition resembling an acute parenchymatous nephritis. The capsule invariably stripped quite easily.

Bladder: Nothing abnormal noticed.

Brain: Nil abnormal beyond occasional congestion of the vessel of the meninges. No signs of basal or cortical meningitis noticed.

AETIOLOGY AND PATHOLOGY (Continued).

Orchitis and epididymitis: This was noted in 2 cases, one of which was in an autopsy performed by one of my colleagues.

CONCLUSION.

This epidemic has had far-reaching results both for the armies of the Allies and those of the belligerents. The wastage at the time was enormous for both sides. So much so that one wonders if prophylaxis, even if the results are not conclusive, should not be more extensively undertaken.

Under the present conditions of drug shortage, it might not be possible to indulge in experiments on an immense scale, until it is proved up to the hilt to be of value.

As to the mortality at the front, or even in the cases treated in my own Unit, I have not been able to get accurate figures, but I am convinced that the deaths from broncho-pneumonia - the usual fatal sequela of influenza - have been considerably less than those at home. This, of course, must be accounted for in the increased fitness of the soldier, compared with that of the civilian, notwithstanding the exposure, stress and fatigue that the soldier undergoes.

Possibly, in the course of time, during this age of protective inoculation, a suitable prophylactic will be discovered to drive this scourge from our midst.

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