

a "cold" existing for from one to two weeks prior to hospital admission was given in approximately one third of all cases.

Almost without exception the cases at admission displayed a high fever, from 104 to 106 F., and an almost constant symptom was pleurisy, associated with severe respiratory distress. In twenty-one cases there was referred abdominal pain characteristic of diaphragmatic involvement, and in six cases the pain was referred also to the neck.

Herpes on the lips and face occurred in one third of the cases, and jaundice was distinct in fourteen cases, five of which terminated fatally. Cerebral symptoms were present in 12 per cent. of all cases, varying from the characteristic delirium to definite meningismus, the latter leading in three cases to a bacterial diagnosis by lumbar puncture.

USE OF THE KYES SERUM

In the treatment of all cases, systematic use was made of a polyvalent antipneumococcus serum prepared at the University of Chicago by Dr. Preston Kyes and described by him elsewhere.¹ In view of the results obtained by the previous use of this serum in 115 cases of pneumonia in a civil hospital, Major Joseph A. Capps, chief of the medical service, introduced the use of the serum as a routine procedure at Camp Grant, Oct. 1, 1917, and the results obtained were such as to indicate its continued use. It must be borne in mind, of course, that clinical evidence as to the efficiency of any therapeutic reagent is at best indefinite and must be accumulated in great amount and under varied conditions before final conclusions may be drawn. However, in this fairly large series of cases, the serum appeared to modify the course of the disease in several particulars with such constancy that it is the conclusion of those observing its use that the low death rate resulting should be interpreted as being in a considerable measure due to the therapeutic efficiency of the serum. In its action, the serum appears distinctly to reduce the toxemia, to reduce the general level of the temperature and especially that of the pulse. In most instances the leukocytosis is successively increased by injection of the serum; but this is not without exception. The impression is gained that in the large number of cases displaying a crisis on or before the fourth day, the sudden change bears a direct time relation to the injection of the serum.

The serum was employed for the most part intravenously, the usual dose being 2.5 c.c. once or twice daily. The total number of doses given varied from one to twelve with individual patients, in the average case from three to five injections being given.

A disadvantage attending the serum as first obtained was that on intravenous injection it provoked a marked temperature reaction accompanied by a chill of greater or less severity. The first twenty-five cases of this series were treated by serum which regularly produced this result, and the question naturally arose as to how great a part the foreign protein reaction might play in the apparent therapeutic effect of the serum.² To avoid this reaction, intramuscular injections of relatively large doses were resorted to for a

time as a substitute for the intravenous injection. Later, however, the serum was furnished in a form which allowed its intravenous use without this disadvantage, and this avenue of introduction was then established as a routine.

Of the 322 cases under consideration, twenty-five terminated fatally, the death rate being 7.7 per cent. In two of the fatal cases, extensive preexisting chronic pulmonary tuberculosis was detected at necropsy, in one case general syphilitic arteriosclerosis and myocarditis were revealed, and in one case tonsillectomy had been performed two days before the onset of the pneumonia and three days prior to death.

Table 2 gives the death rate obtained in the cases grouped according to the type of pneumococcus as determined by the sputum.

TABLE 2.—MORTALITY RATE IN THE SO-CALLED GROUPS

	Group				Not Typed	Total Series
	I	II	III	IV		
Cases.....	43	56	13	199	11	322
Deaths.....	4	8	0	13	0	25
Mortality, per cent.	9.3	14.2	0	6.5	0	7.7

CONCLUSION

The low mortality in this extensive series of cases, together with the favorable modification of clinical symptoms by the serum, as stated above, would seem to indicate the extension of its use in pneumococcus lobar pneumonia.

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BACTERIAL CARRIERS IN THE UPPER RESPIRATORY TRACT

REPORT OF A SURVEY *

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The cases of pneumonia that occurred at the Walter Reed General Hospital between Oct. 1, 1918, and May 1, 1919, were classified bacteriologically from cultures of sputum, blood or organs at necropsy. The number of cases that developed each week are shown in the accompanying chart. Pneumococci were the organisms most frequently found in these pneumonias, and Types II and IV were much more prevalent than Types I and III. *Streptococcus hemolyticus* was relatively unimportant until January, 1919, when the cases showing this organism suddenly increased in number. It was feared that a large number of streptococcus infections might occur, as was the case last year following the measles epidemic, and at the suggestion of Col. F. F. Russell, M. C., U. S. Army, a survey of the post was made to determine the number of normal persons carrying hemolytic streptococci in their upper respiratory passages.

In the survey that was made between Jan. 26, 1919, and May 1, 1919, 3,174 persons were examined. This included the entire hospital personnel, all patients in the infectious disease wards and all patients admitted

*From the Laboratory of the Walter Reed General Hospital.

1. Kyes, Preston: The Production of Antibodies to Pneumococci in an Insusceptible Host, J. A. M. A. 56: 1878-1881 (June 24) 1911; J. M. Res. 38: 495-501 (July) 1918.
2. Roberts, Dudley, and Cary, E. G.: Bacterial Protein Injections in Influenzal Pneumonia, J. A. M. A. 72: 922 (March 29), 1919.
Lamb, F. H., and Brannin, E. B.: The Epidemic Respiratory Infection at Camp Cody, N. M., J. A. M. A. 72: 1056 (April 12) 1919.

to the receiving ward. While we were primarily interested only in the prevalence of *Streptococcus hemolyticus*, it was decided to make pharyngeal cultures from the same persons for the pneumococcus and meningococcus. In the last 1,299 cases (March 13 to May 1, 1919) cultures were taken also for Klebs-Loeffler bacilli.

TECHNIC FOR TAKING CULTURES

Cultures were taken in each case by means of a long bent wire swab which was first introduced into the nasopharynx to obtain material for the meningococcus plates (glucose serum agar). After these plates were inoculated, the same swab was used to obtain material from each tonsil and this material was transferred to blood agar plates to be cultivated for hemolytic streptococci and pneumococci. This swab was also used for making diphtheria cultures on coagulated serum mediums in some of the cases. By this method we were able to obtain a fairly representative culture of the upper respiratory tract.

The hemolytic streptococci were identified by the morphologic appearance of the colonies and the type of hemolysis produced on plain blood agar plates. Readings were made after twenty-four hours' incubation at 37.5 C., and the number of colonies were recorded as +, ++, +++ and ++++, depending on whether the streptococci represented one-fourth, one-half, three-fourths or the total number of colonies present. The same method was used in recording the number of pneumococci present. No attempt was made to determine the types of these organisms, and the accuracy of the pneumococcus results are therefore questionable. Only nasopharyngeal material was used in making plates for meningococci, as pure cultures are more readily obtained by this method. The latter cultures were incubated in a moist chamber devised and used last fall by Lieut. F. L. Gates, M. C., and Major J. H. Austin, M. C., at Camp Zachary Taylor.

After eighteen hours' incubation, typical colonies, showing gram-negative diplococci were transplanted to be identified and typed by agglutination reactions later. Klebs-Loeffler bacilli were identified and typed by the morphologic appearance of the organisms after twenty-four hours' incubation on coagulated serum mediums.

RESULTS

Streptococcus Hemolyticus.—The total number of throat cultures made for hemolytic streptococci was 3,174, of which 1,774 (56 per cent.) were positive. Seven hundred and ten (22.4 per cent.) of the positive cultures were +, 462 (14.5 per cent.) were ++, 327 (10.3 per cent.) were +++ and 275 (8.7 per cent.) showed pure cultures and were called ++++. The highest total percentage of carriers was found in the

examination of patients admitted to the receiving ward, and the lowest in the hospital personnel on duty. The highest + and ++ percentages were obtained from the receiving ward group, the lowest from the infectious disease group; the highest percentage of

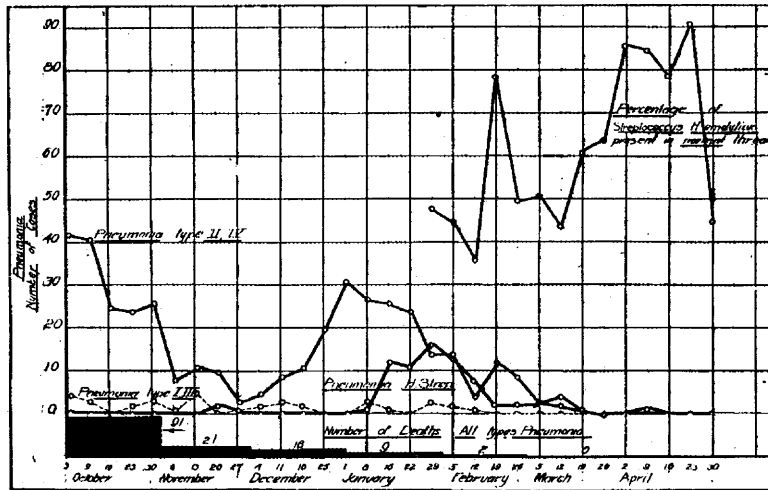
TABLE 1.—STREPTOCOCCUS HEMOLYTICUS RESULTS

Group	Total	Total Positive		+		++		+++		++++	
		No.	%	No.	%	No.	%	No.	%	No.	%
Hospital personnel....	1,517	712	47	271	18	183	12	144	9.5	114	7.5
Patients, infectious disease group.....	106	54	51	8	7.5	9	8.5	16	15	21	20
Patients, receiving ward group.....	1,551	1,008	65	431	27.8	270	17.4	167	10.8	140	9
Total number of cultures...	3,174	1,774	56	710	22.4	462	14.5	327	10.3	275	8.7
Persons in whom cultures were taken after tonsillectomy	66	15	23	6	9	9	13.8	0	0	0	0

+++ readings was from the infectious disease group, and the lowest from the hospital personnel.

The weekly variations in percentages of positives is shown in the accompanying chart. The highest point on the carrier curve occurred, April 23, while only one

case of streptococcus pneumonia occurred during the month of April. At this time cultures were made of sixty-six individuals on whom tonsillectomy had previously been performed. Six of these (9 per cent.) were +, nine (13.8 per cent.) were ++, and none were either +++ or ++++.



Course of pneumonia at Walter Reed General Hospital.

case of streptococcus pneumonia occurred during the month of April. At this time cultures were made of sixty-six individuals on whom tonsillectomy had previously been performed. Six of these (9 per cent.) were +, nine (13.8 per cent.) were ++, and none were either +++ or ++++.

Pneumococcus.—Twenty-five per cent. of the 3,174 throat cultures were positive for pneumococci. The infectious disease group gave

the highest percentage of positives (45 per cent.) while the receiving ward admissions were lowest (20.5 per cent.).

Meningococcus.—Ninety-four (2.99 per cent.) meningococcus carriers were found in the examination of the 3,174 nasopharyngeal cultures. Sixty-one (2 per cent.) of these were normal, thirty (0.94 per cent.)

TABLE 2.—PNEUMOCOCCUS RESULTS

Group	Total	Total Positive		+		++		+++		++++	
		No.	%	No.	%	No.	%	No.	%	No.	%
Hospital personnel....	1,517	433	28.5	132	8.7	176	11.6	96	6.33	29	1.7
Patients, infectious disease group.....	106	51	48	11	10.4	14	13.2	13	12	13	12
Patients, receiving ward group.....	1,551	319	20.5	144	8.7	91	5.9	51	3.3	33	2.1
Total.....	3,174	803	25	287	9	281	8.9	160	5	75	2.3

were para and four (0.13 per cent.) were intermediate types. Cultures were taken of forty-one of these positive carriers, none of whom had received any treatment, after eight weeks had elapsed. At this time only three "normals" and one "para" were still positive.

It is of interest to note that at this hospital, where no case of meningococcus meningitis has occurred since Oct. 28, 1918, the total percentage of nasopharyngeal carriers was only 2.99 per cent., while in a large number of nasopharyngeal cultures made from contacts of cases at Camp Zachary Taylor last winter, the positive reached 6.5 per cent.

Klebs-Loeffler Bacilli.—Eighteen (1.4 per cent.) positive cultures were obtained from 1,299 persons examined between March 13 and May 1, 1919. This is approximately the average percentage reported as normal by Goldberger, Williams and Hachtel.

SUMMARY

1. Over half (56 per cent.) of 3,174 persons examined at the Walter Reed General Hospital between Jan. 22 and May 1, 1919, were carriers of *Streptococcus hemolyticus*.

2. After tonsillectomy in sixty-six cases, only 23 per cent. of cultures showed hemolytic streptococci, and in all of these the number of colonies was small.

3. A comparison of the weekly percentage of carriers with the weekly occurrence of infection failed to show that any direct relation existed between the two. Jan. 29, 1919, the streptococcus pneumonia curve reached its highest point, while the carrier percentage was at its lowest; and as the latter continued to rise, the former fell to the zero line.

4. For other organisms, the total positive percentages were: pneumococci, 25 per cent.; meningococci, 2.99 per cent., and Klebs-Loeffler bacilli, 1.4 per cent.

THE VALUE OF CHEST FLUOROSCOPY

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In their article on "The Value of Chest Fluoroscopy," Diemer and MacRae¹ state that their material is based on the roentgen-ray findings in 425 patients rejected on account of pulmonary tuberculosis by the tuberculosis examining board at Camp Lewis, American Lake, Washington.

Considering the fact that I was president of the board and that the tuberculosis examinations of the second-draft men sent to Camp Lewis were carried out under my supervision; furthermore, since a considerable amount of the fluoroscopic work was done by me and I do not find myself in entire agreement with the above-mentioned authors as to the value of chest fluoroscopy, I feel that in order to be fair to both physical diagnostic and to roentgen-ray procedures, the results of a comprehensive study of the examination of the second-draft material comprising 72,985 men should be presented. (The findings on 35,984 first-draft men examined by Major Ray W. Matson are also available, totaling in all 108,967 men examined. The entire report will be published later.)

Moreover, the authors present some figures that represent an analysis of the data from the standpoint of fluoroscopic findings in the rejected cases only, with entire disregard of the findings in the accepted cases, and they have not noted for comparison even physical findings in the rejected cases, consequently the figures presented are misleading and do not represent the rôle

played by the roentgen ray, either in the examination of men rejected on account of tuberculosis, or in those who were accepted for military service at Camp Lewis.

NECESSITY OF COMPARING RESULTS

In dealing with a complicated subject matter such as "Value of Chest Fluoroscopy," trustworthy conclusions can be reached only after we have been compelled to look at the facts from opposite points of view, analyzing all the material at our disposition for study rather than a selected portion of it (rejects); and it is very doubtful also whether controversy is an effective means of determining the merits of opposing opinion regarding the value of a method or procedure, because most readers are left in a state of confusion as to where the truth lies and perplexity is certain to be the result of the discussion, unless full materials for controlling opinions are given. The logical weight of the different factors that influence opinions regarding the value of the fluoroscope in chest examinations with special reference to the tuberculosis examinations at Camp Lewis can be arrived at and given their proper value by the reader only when he has been made familiar with the organization and plan of examination followed by the tuberculosis board of Camp Lewis, and also when the fluoroscopic findings, not only of "rejects," but also of "accepts," are placed before him.

THE ORGANIZATION AND PLAN OF EXAMINATION

The organization and plan of examination employed at Camp Lewis has already been described by the writer.² The plan was the outcome of observations by Major Ray W. Matson in the examination of the command for tuberculosis at Vancouver Barracks, Washington, August, 1917. During the course of these examinations it became apparent that, in the absence of specially trained tuberculosis examiners, some plan would have to be worked out which would bring masked forms of tuberculosis and those with minimum physical findings to the attention of the president of the board. Accordingly an informal history form was devised and adopted for the work at Camp Lewis (Form 1, Camp Lewis Board).

The Camp Lewis tuberculosis examining board for the second draft was organized to examine 1,500 men daily and comprised twenty preliminary examiners (ten inexperienced) and two refer examiners (the president of the board and his assistant). The roentgen-ray work was done by Captain Diemer and Lieutenant MacRae with considerable assistance by the president of the tuberculosis board. Mention of my assistance is made because, in spite of many years of roentgenologic experience in the examination of the chest, I contributed to the hits and misses as shown by Table 1, and I have every desire to receive my share of the criticism directed against fluoroscopy and the part it alone played in the tuberculosis rejections at Camp Lewis.

SELECTION OF PRELIMINARY EXAMINERS

The preliminary examiners were selected from the infirmaries in the camp, few of them having had any recent training and none of them any special training in physical diagnosis. This should be borne in mind, because it has a very important bearing on the comparative value between the findings of the fluoroscop-

1. Diemer, F. E., and MacRae, R. D.: The Value of Chest Fluoroscopy, J. A. M. A. 72:172 (Jan. 18) 1919.

2. Matson, R. C.: Examination of Recruits for Tuberculosis, New York M. J. 108:199 (Aug. 3); 245 (Aug. 10) 1918.