

# THE USE OF CONVALESCENT HUMAN SERUM IN INFLUENZA PNEUMONIA—A PRELIMINARY REPORT.\*

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WE are all aware of the high degree of fatality resulting from the pneumonia following the influenza of the present epidemic. All of our deaths have been due to the pneumonia complication and none to the influenza as such. Here at the Naval Hospital, the percentage in the first groups reached as high as 50 to 60, and more recently the mortality has dropped to 30 per cent. No doubt this complication will continue to give a high mortality rate, especially when the disease invades new territory. For this reason, the authors have decided to make public their results in the treatment of a small group of cases, by the use of serum from patients convalescing from pneumonia, following an attack of influenza. It will be readily seen that a complete report at this time is out of the question, but we hope to present sufficient data to indicate the possibility in the use of convalescent serum so that further work can be carried on in territory where the disease is now active, and where proper equipment is at hand to carry out the necessary laboratory details.

The observation and treatment, by the writers, of over four hundred cases of influenza pneumonia in this hospital has afforded opportunity to compare the various methods of treatment with a fair degree of accuracy.

The use of serum from convalescent influenza pneumonia patients was suggested by the junior writer as possibly having curative value, because of probable anti-

body content. The reason for this was the experimental evidence presented by Flexner and Lewis,† with convalescent serum from poliomyelitis patients, and later the clinical evidence presented by Amoss and Chesney,‡ during the poliomyelitis epidemic in 1916.

The serum was first tried on two patients with a very severe and extensive broncho-pneumonia—an officer and a nurse. The officer developed influenza September 23. On the 26th he had some evidence of a beginning broncho-pneumonia. His temperature was 103; some elevation of pulse and respiration. On the 28th, he was desperately sick; temperature 104.4°; respiration 36; pulse 104; he had considerable nausea and vomiting, looked toxic and had beginning cyanosis and vaso-motor disturbances; also a profuse sanguino-purulent expectoration; 100 cc. of serum was given at 1.30 p. m. Another 100 cc. at 8 p. m. The next morning, the 29th, patient was distinctly improved; less nausea, cough and expectoration; temperature 102; respiration 40; pulse 104; 75 cc. of serum given at 11.30 a. m. On the 30th, a decided improvement noted; 8 a. m. temperature 100.8°; respiration 30; pulse 88; 75 cc. serum given; temperature normal at 4 p. m. Patient in excellent condition,

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† Flexner & Lewis showed definite exp. results in monkeys. *Jour. Amer. Med. Assoc.* 1910, Liv. 1730.

‡ Amoss & Chesney, *Jour. Exper. Med.* 1917, XXV, 581, and others.

stating that he felt well; after which he made an uneventful recovery. Laboratory report of sputum injected in peritoneum of mouse showed influenza bacilli and type IV pneumococcus.

The nurse took sick with influenza on September 24th. On the 27th, running a continuous temperature of 103; respiration 36; pulse 104. On the 29th, temperature reached 104; respiration and pulse same. Areas of broncho-pneumonia present, especially in the right middle lobe. Patient very toxic, unable to keep anything on her stomach for three days. Water given per rectum. Marked cough and muco-purulent expectoration present. At 11 a. m., the 29th, 100 cc. serum was given. On the morning of the 30th, patient ate some breakfast and was much improved, although very sick; vomiting practically stopped. Temperature 103; pulse 114; respiration 22; 75 cc. of serum given. October 1st, temperature normal; all symptoms subsided and she made an uneventful recovery. See clinical charts.

Up to the present time, thirty-seven cases in all have been treated with serum. This represents all the pneumonia patients who have been admitted since October 1st, except the officer and nurse previously mentioned. Of this group, thirty are convalescent; six are under treatment; one dead. Of the six under treatment, two are much improved; two have received only one injection of serum; two cases not improved, one of whom is critically ill. Of the thirty convalescents, eight received treatment on the second day of the pneumonia; fifteen on the third day; four on the fourth day; three on the sixth day. Of the six under treatment, three received serum on the second day; two on the third day, and one on the fourth day. The fatal case received the first serum on the fifth day.

#### SERUM TREATMENT

Convalescent patients were bled as soon as convalescence was well established, the majority within a week or ten days of a drop to normal temperature. The serum was given as early as the diagnosis of the pneumonia complication could be made, so there has been no doubt about the lung involvement. The dose of serum has varied from 75 cc. to 125 cc. intravenously and the interval between doses has varied from eight to sixteen hours. Treatment was continued until there was no doubt about the recovery of the patient. The majority received about 300 cc. Three received only 100 cc. and two received from 600 to 700 cc. It was found, as we anticipated, that there was a marked difference in the potency of the convalescent serum. At least ten out of seventy sera had no effect on patients. Under these conditions, the succeeding doses of serum were from other patients. Results from this serum are usually obtained in the first twenty-four hours after its use. If no results are obtained this time, the serum from another donor should be used. An attempt was made to judge the potency of the serum by the amount of lung involvement. This was done by obtaining careful statement of the physical findings and the clinical course of the disease in the donors.

#### PROCEDURE

Wassermann tests were made on all donors as soon as possible in order not to waste time on bleeding those who showed a positive reaction.

Compatibility tests of donors' serum, with recipients' corpuscles, was made as soon as new cases appeared on the ward. Then usually ten to fifteen sera were tested against the corpuscles of each recipient in order to have plenty of available serum for complete treatment.



At present, the potency of the convalescent serum can be tested only by its clinical effect. Further attempts are being made to titre the serum.

Experience shows that the most beneficial results will be obtained by giving the proper serum within the first forty-eight hours of the pneumonia complication.

It has been our observation that the virulence of the organism has decreased in this hospital as the epidemic progressed, but, making allowance for this diminu-

tion in severity of the pneumonia cases, it is believed that the serum from convalescent influenza pneumonia patients has a decided influence in shortening the course of the disease and in lowering the mortality.

This treatment requires the coöperation of a well-equipped laboratory, where the proper laboratory procedure, as previously noted, can be performed; and should be used only by those who are prepared to have this necessary laboratory work carried out.



## CENTRALIZED HEALTH AND RELIEF AGENCIES IN AN INFLUENZA EPIDEMIC.

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THE earliest and most striking feature that came to our attention in planning our campaign for combating the pandemic of influenza, which has ravaged this state for the past month, was the absence of uniform methods of organization in the various health agencies upon whom we were obliged to rely. It was perfectly apparent that everyone was anxious to help, each willing to work unceasingly till the appointed task had been accomplished, but there was likewise evidence that each wanted to go along in their own accustomed groove, not realizing that at such a time unification of effort and direction could only be obtained by the loss of their personal identity.

A short time sufficed to prove to us that unless we were to be buried under a multiplicity of agencies, and to court disaster, we must coördinate these forces under one administrative head to work for the common good of all. As calls for assistance coming to this department became more

urgent, organizers were sent out by Miss Bernice W. Billings, who had immediate charge of the nursing forces, to investigate conditions in each city or town, ascertaining if possible if all local health agencies were giving maximum service to the locality in which they were situated.

In many instances, it was clearly shown that if these local bodies would consent to centralization and coördination, they would be fully able to handle their own problem.

The law directs specifically that each local board of health shall make such regulations as it deems necessary for the control of communicable diseases within its limits, and here, already established, was a logical administrative head under which all activities for checking this outbreak were to be placed.

After several organizing visits had been made to various places, it was deemed advisable to formulate a plan for distribution to local boards of health, and to other