RCC3.960518.001

UNITED STATES AIR FORCE

School of AVIATION MEDICINE

A STUDY OF THE INCIDENCE OF PRIMARY ATYPICAL PNEUMONIA FOR A PERIOD OF ONE YEAR AT THE INDOCTRINATION CENTER, LACKLAND AIR FORCE BASE

PROJECT NUMBER 21-02-122

PROJECT REPORT

A STUDY OF THE INCIDENCE OF PRIMARY ATYPICAL PNEUMONIA FOR A PERIOD OF ONE YEAR AT THE INDOCTRINATION CENTER, LACKLAND AIR FORCE BASE

CHARLES H. MORHOUSE, COL., M.C. (USAF)
E. ELBRIDGE MORRILL, Jr., MAJ. (USAF)
CARL L. HANSEN, CAPT., M.C. (USAF)

PROJECT NUMBER 21-02-122

USAF SCHOOL OF AVIATION MEDICINE
RANDOLPH FIELD, TEXAS
JUNE 1949

PRECIS

OBJECT:

To study the incidence of primary atypical pneumonia at an Indoctrination Center of the U.S. Air Forces for a calendar year and to determine from such study the calculated risk relative to this illness in airmen. Secondly, to determine, if possible, the factors resulting in the propagation of the infection.

SUMMARY AND CONCLUSIONS:

1. Primary atypical pneumonia is essentially a disease of recruits although it does occur in older airmen.
2. The disease in recruits parallels very closely the incidence of common respiratory disease in the Air Forces and in the Air Training Command. Peak of admissions was in late winter.
3. The average occupancy of hospital beds for primary atypical pneumonia during the year was six percent. Since percentage was based on all hospital admissions, the ratio for strictly military patients would increase by at least two percent since many civilian employees receive hospitalization at the Station Hospital, Lackland Air Force Base, where the study was made.
4. The average number of days spent in the hospital per case was 19.3.
5. The non-effective rate from this disease was 2.12. (Non-effective rate is daily rate of number men sick in hospital per 1000 strength.)
6. Available data indicates that more cases develop in personnel with an urban background than in those from rural areas, *i.e.* from communities of less than 5000 inhabitants.
7. In 24.5 percent of cases there were no siblings and another 18.8 percent had but one sibling and thus in this study the disease was less prevalent in airmen coming from larger families suggesting the previous infection from herd association may be a factor in the incidence of the disease.
8. Therapy with aureomycin appears to be effective in reducing time lost from primary pneumonia but no controls are as yet available, other than from general measures. At the time of mobilization or other emergency which assembles large groups of young persons for training or indoctrination, this disease must be expected to result in from 7-10 percent of all hospital admissions. The development of an effective vaccine would materially alter this for the military establishment.

A STUDY OF THE INCIDENCE OF PRIMARY ATYPICAL PNEUMONIA FOR A PERIOD OF ONE YEAR AT THE INDOCTRINATION CENTER, LACKLAND AIR FORCE BASE, TEXAS

Primary atypical pneumonia as a clinical entity is of recent origin and was not officially recognized as such by the Armed Forces until 1942[1]. Without doubt the disease has existed much longer than this under such names as: broncho-pneumonia of adolescence, acute pneumonitis, virus pneumonia, pneumonia with leucopenia and other descriptive titles. It is of interest to note that the Army Medical Museum has preserved Civil War specimens with lesions very similar to those found at autposy of a case of this infection[2].

The Respiratory Disease Commission's Report[3], and the Bulletin of the New York Academy of Medicine[4], as well as many other articles have given an excellent picture of the disease clinically, of its diagnosis, and have produced evidence which strongly suggests that the etiology is that of a virus from the respiratory tract spread by contact with cases. Mortality is not high but the morbidity from the infection is such as to make it a distinct medical problem in the Air Forces, especially at the time of mobilization or any other national emergency which would assemble and train in groups large numbers of young adults. Many workers have pointed out that this type of pneumonia is by far the most common pneumonic infection of young people, with a general tendency to peak in fall and spring.

Lackland Air Force Base, San Antonio, Texas, was chosen as the site for this study. Lackland is the Indoctrination Division of the Air Training Command and offers not only a colony where susceptibles are fed in constantly, but also the conditions which would without doubt prevail during an emergency as far as living quarters, hospitals, *etc.*, are concerned.

On arrival at San Antonio, the basic airman or recruit is brought directly to the incoming processing line at Lackland A.F. Base. Here he is given a physical examination and immunization, consisting of vaccination for smallpox, and first injection each of typhoid, paratyphoid, and and tetanus, is started. Influenza is included if it has been ordered by higher command. Blood for a STS is taken and chest X-ray is made. Recruit is then given a haircut, a shower, issued clothing and assigned to a flight.

The flight, the basic organization for training, consists of sixty men. To each flight is assigned one frame type barracks, two story, hot air heated, which was orginally designed for housing 35 men. In addition, four permanent party men are given individual rooms in each barracks. Ten flights, 600 men, mess in one mess hall but because of varying duty hours, other assignments, *etc.*, the usual number so messing is around 450. Classrooms accommodate two flights which usually come from adjacent barracks.

The training period for the recruit consists of 258 classroom and 260 out-of-doors periods of fifty minutes each. Association is rather close in flights during training but after hours intermingling of flights occurs. Recreational facilities are extensive and include 4 theaters, 3 hobby shops, 5 libraries, 1 gymnasium, 8 swimming pools, 1 golf course, 23 bowling alleys, 21 tennis courts and 6 chapels for various faiths. Until basic instruction is over the recruit has little chance, other than on conducted tours, to visit the nearby communities or even leave the reservation. At the conclusion of his period of training the airman goes home for a ten day leave and then joins his permanent

organization. No quarantine of newly arrived personnel exists except for those obviously ill.

The typical recruit is 18 years old, 5 feet, 9½ inches tall and weighs 150 pounds. His routine day is as follows:

Reveille	0530
Breakfast	0600-0700
Training	0800-1100
Lunch	1100-1230
Training	1230-1700
Retreat	1700
Supper	1700-1830
Taps	2145

The dietary is well balanced; 3600 calories with a minimum of 100 grams of protein per day. The average recruit gains 6-10 pounds during basic training.

This study was made by examining the Sick and Wounded report cards of the Station Hospital, Lackland Air Force Base, starting with the first admission of 1948 and ending with the last admission of the same year. The standards for diagnosis were the accepted ones and laboratory tests, such as cold agglutination, were done on some of the early cases but were not done routinely. While it must be admitted that some cases were perhaps wrongly diagnosed and that some were also missed, the final picture without doubt is that which would be obtained at any Station Hospital in the Air Forces. All rates are based on figures obtained from the Statistical Control Office Headquarters Lackland Air Force Base.

In addition to the Sick and Wounded report cards some clinical records were available for more complete study. These were limited due to the sending of records to a central depot for storing when they become three months old. In addition, many of the forms which were available were the "short" type which was used almost entirely after atypical pneumonia became a rather commonplace admission at the Station Hospital. These short forms contain little beyond chief complaint, physical examination, laboratory findings, progress notes, and final diagnosis.

As a comparison, admissions for primary atypical pneumonia at Lackland A.F. Base and Randolph A.F. Base were studied[5]. One, Lackland, is west of San Antonio while the other, Randolph, is east of San Antonio. The essential difference between the bases is that Randolph personnel is "old" from a military point of view and all but a few recruits there have completed basic training at some other base.

PERCENTAGE HOSPITAL ADMISSION FOR PRIMARY ATYPICAL PNEUMONIA

Month	*Lackland A.F. Base*	*Randolph A.F. Base*
January 1948	6.75	0.53
February "	10.47	3.68
March "	6.41	5.19
April "	5.08	0.91
May "	7.31	0.63
June "	7.42	0.00
July "	7.03	0.00
August "	5.43	0.99
September"	6.08	0.00
October "	3.55	1.06
November "	4.38	0.00
December "	4.10	0.00

It will be noted that in only one month, March, did Randolph's admission rate even approximate that of Lackland and an examination of the Sick and Wounded cards on these cases shows that the majority had less than one year's service and only two were chronologically older than the Lackland group.

The comparison between the annual admission rates for primary atypical pneumonia of recruits and permanent party at Lackland A.F. Base and for common respiratory diseases in the Air Training Command and for U.S. Air Forces is presented. Rates for the latter are from the U.S.A.F. Monthly Medical Statistical Summary published by the Office of the Air Surgeon. Common respiratory rates at Lackland were not included for the relatively high admission rate of primary pneumonia at that Station exerts a material effect in the total admissions. The explanation of the peaks in permanent party rates in January, June, and September, which do not follow either the pattern of the disease in recruits nor that of common

FIGURE 1
Comparison of Atypical Pneumonia in recruits and permanent party at L.A.F. Base with the Air Training Command and with USAF.

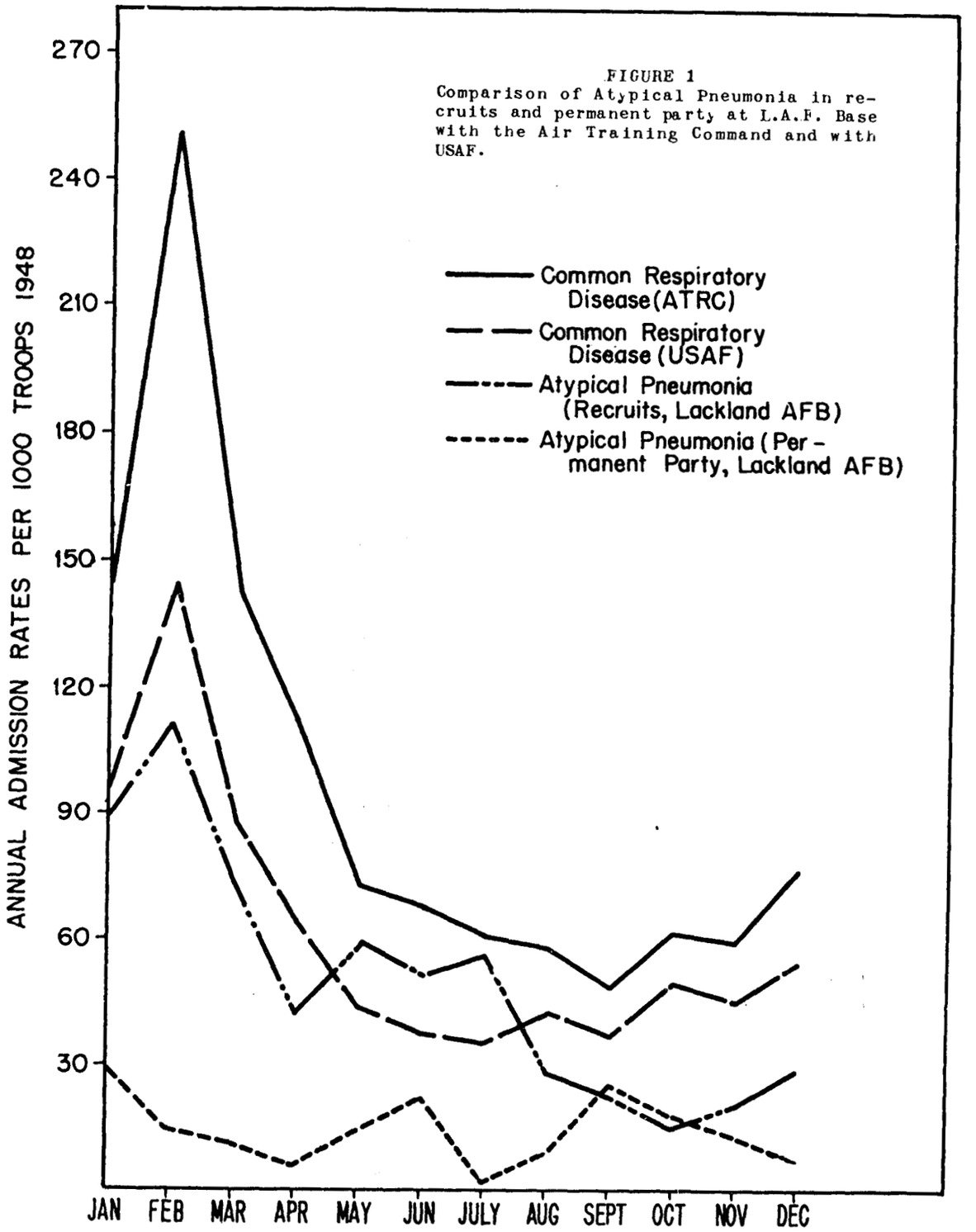

TABLE NO. 1

Data on Atypical Pneumonia
Indoctrination Center
Lackland A.F. Base, Texas
Year 1948

Period of Hosp. (days)	Number of Patients by Months												
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
0-5	4	5	1	2	0	0	0	1	2	0	1	0	16
6-10	16	33	18	4	4	2	7	6	22	13	7	6	138
11-15	16	25	20	10	25	20	27	28	20	10	14	14	229
16-20	24	26	19	13	16	17	14	7	4	2	2	4	148
21-25	13	17	14	19	8	23	8	10	3	0	5	5	125
26-30	14	13	11	7	10	4	3	4	2	2	0	2	72
31-40	8	17	10	1	4	2	4	1	2	1	0	1	51
Over 40	5	20	18	5	6	4	8	2	1	0	0	2	71
	100	156	111	61	73	72	71	59	56	28	29	34	850
Mean	19.6	20.8	22.3	20.9	20.5	20.2	19.6	16.9	13.4	12.9	13.5	17.4	19.3

respiratory disease in general, suggests that in stable populations primary atypical pneumonia is a cyclic affair.

Length of service is shown in figure 2. This again points out that in the Air Forces as in other branches of the Military Establishment, primary pneumonia is a disease of recruits. The mean service plotted against months of the year shows the force which resulted in the data given in figure 3. Why men with more service should contract the infection in three peaks of incidence instead of the one peak in the late winter for the recruit, is not clear (figure 1). This phenomenon does explain why many writers have expressed the opinion that primary atypical pneumonia in civilian communities peaks in fall or early winter and in the spring, *i.e.* in a stable population, such as among older airmen this characteristic does occur.

In giving consideration to the age of the patients with atypical pneumonia at Lackland, it must be borne in mind that the population there is a young one. The average age for all recruits is given as 18 so that one should expect the average age of patients to approximate that of the population.

Distribution of cases by age is shown in figure 4. Over 50 percent of the cases in airmen over 26 years old (36 total) occurred in March (6), September (6), and October (7). This again suggests that the pattern in stable communities varies from the pattern noted in recruits.

The average period of hospitalization per case was 19.3 days. Several writers have stated in the past that primary atypical pneumonia tends to be more severe when it occurs in summer. Data obtained in this study does not bear out this contention. The table below shows that cases in February and March were more severe.

Clinical records of 202 consecutive cases of primary atypical pneumonia were available at the Lackland Station Hospital for detailed study. Certain data taken from these records are given below:

Percent of cases with positive X-ray findings	100
Average highest temperature	102.1 (F)
Average duration of fever	11.4 days
Average white blood cell count	10986
Place of residence:	
Over 5000 inhabitants	61%
Under 5000 "	39%

Due to a rather extensive use of short forms and to a tendency to report family history as unimportant, records of actual family size were available in but 53 cases. In these, siblings were reported as follows:

Siblings	Cases
0	13
1	10
2	10
3	9
4	6
5	4
6	1

No definite conclusions can be drawn from this, particularly as the general tendency today is for smaller families and since no family studies were made on recruits who did not contract primary atypical pneumonia.

A change of climate apparently had little effect on the incidence rate, for in the study of cases admitted September through December 1948, at Lackland, 40 percent of the total cases were from homes in southern states (California included) and 15 percent were from the State of Texas.

While awaiting the complete identification of the agent in primary atypical pneumonia and the determination of its presence in healthy carriers, recovered cases, and sub-clinical cases, it is of interest to speculate on the epidemiology of this disease. Respiratory disease among recruits may have several general causes. Among them it is considered that the exchange of respiratory flora under crowded living conditions accounts for many cases of URI; strangeness of surroundings and companions as well as separation from family and friends may contribute a psychic factor in disease causation; increased physical effort may lead to relative exhaustion; outdoor activity produces exposure to inclement weather; and lastly immunization procedures may temporarily reduce general resistance.

In giving weight to these factors, as far as primary pneumonia is concerned, it is impossible to assess the role of respiratory flora exchange until the flora content is known relative to the causative agent of the disease. The pressure of the agent in respiratory flora of frank cases has been established by the work of the Commission of Respiratory Diseases and if healthy carriers exist the above factor should be important. Evaluation of psychosomatic factors is done but certainly these elements in the disease picture would not result in an almost exact parallel with other respiratory disease. The work load at the Indoctrination Center does not vary from month to month, for the schedule is being constantly repeated and whatever force is applied by this element is certainly operating throughout the year. The weather in San Antonio is mild the year around, as a rule, but cold rains and dark days are more prevalent in the late winter and spring. Immunization procedures, as given at the Center, could materially affect the general resistance of the host. Reagin, for example, is often stimulated to excess production by smallpox vaccination and bodily defenses may be considerably altered for a short period of time.

Too little information was obtained in this study relative to either rural-urban areas relationships or to family factors. It may be that in larger families the infection is encountered early in life but the immunity from previous attacks of atypical pneumonia is not yet established. Rural inhabitants would be more used to outdoor exposure and more accustomed, in general, to physical labor, but again these are theoretical factors only. No matter the explanation, primary atypical pneumonia is common among recruits and not among older airmen and no definite control exists at this time.

The epidemiology is not known but it is possible that the agent is present in the normal respiratory tract and that the disease results when general body resistance is reduced by any or all of the factors of increased physical activity, strange surroundings, homesickness, exposure to inclement weather and general disturbance of bodily resistance to infection because of immunization procedures.

Therapy seems to be materially improved by the use of aureomycin as reported by Finland, Collins and Wells[6]. The dosage chosen (1gm, every four to six hours until the temperature had become essentially normal and then every six to eight hours for an additional two to three days) was arbitrary and no attempt has been made as yet to determine the optimum dose. Nausea occurred with some lots of aureomycin given in large doses but usually subsided with clinical improvement even though the drug was continued.

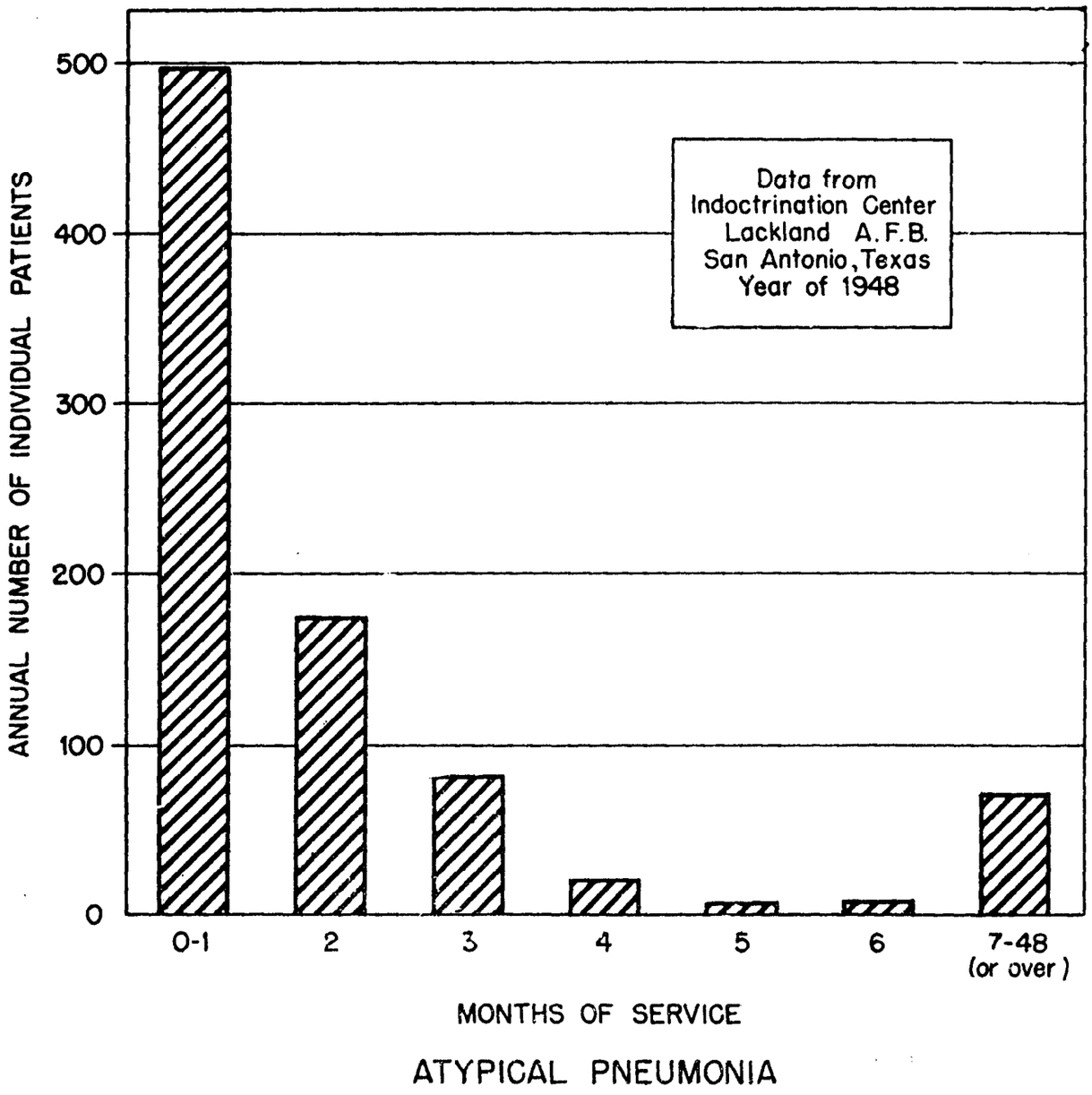

FIGURE 2

Atypical Pneumonia as related to length of Service

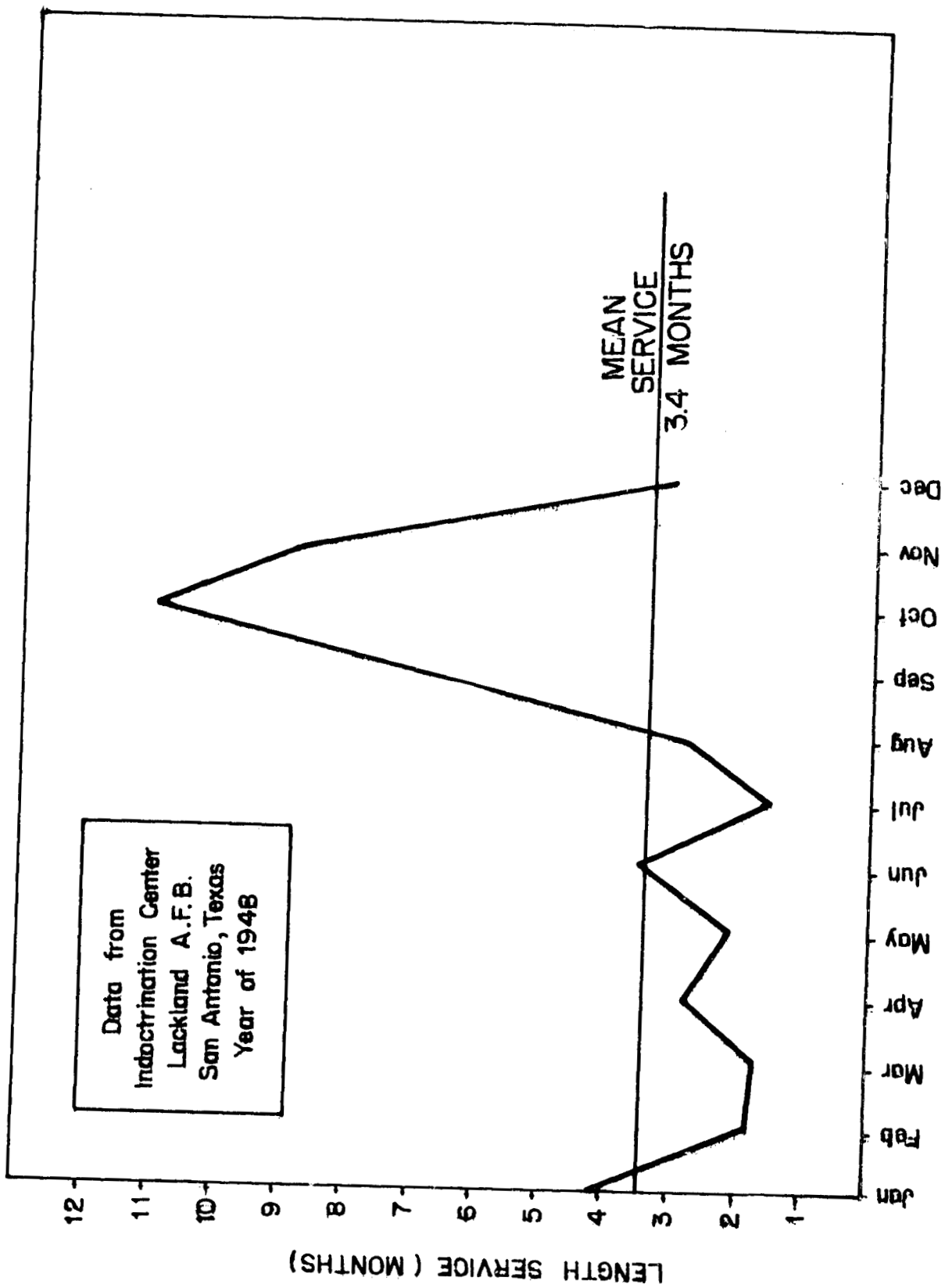

FIGURE 3

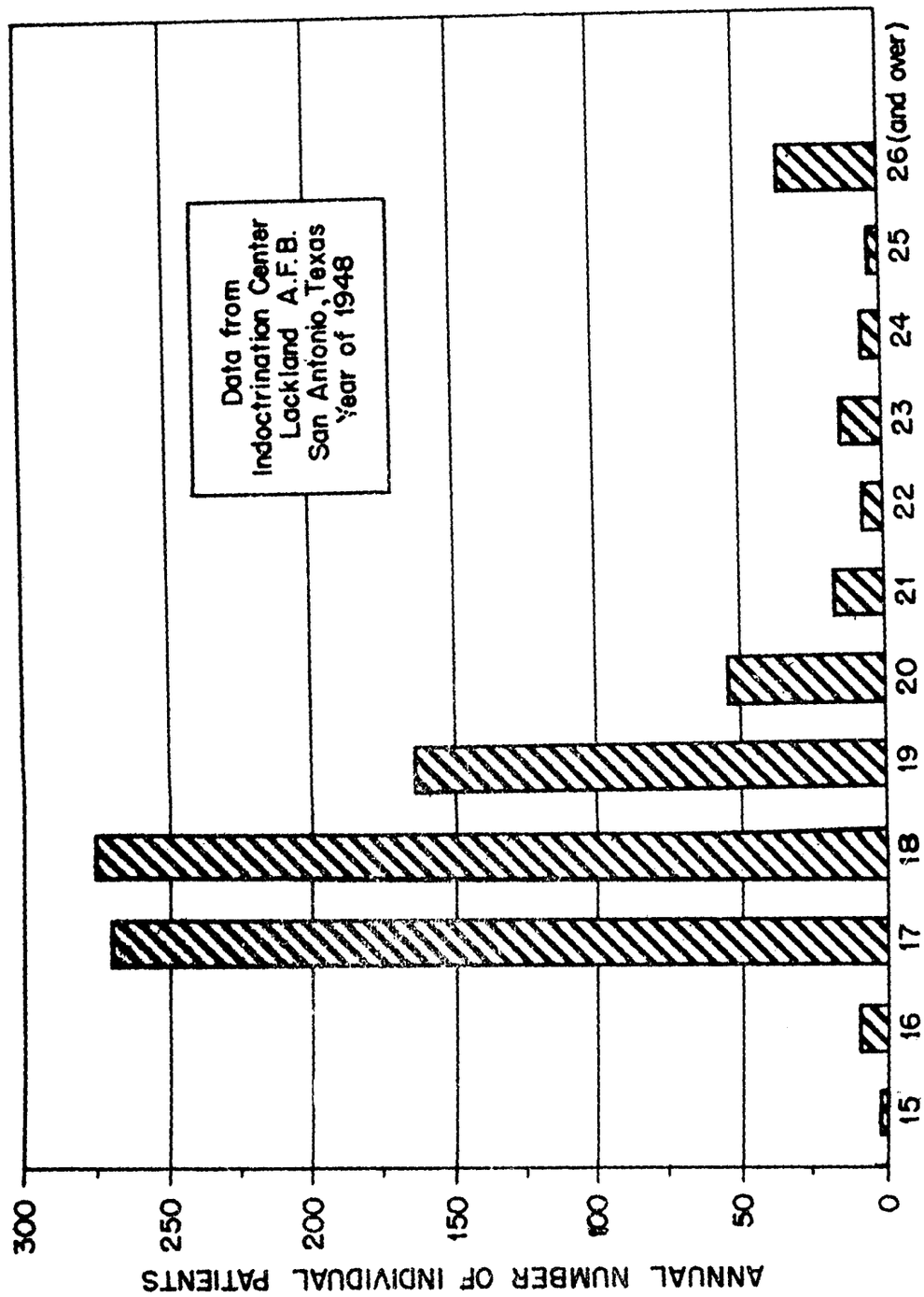

FIGURE 4
Admission for Atypical Pneumonia by age in years

The first twenty consecutive patients meeting the diagnostic criteria of the authors for this primary atypical pneumonia were all markedly improved within 12-48 hours, the great majority within 24 hours.

On the basis of these consecutive favorable responses, aureomycin may be said to be highly effective in the treatment of cases of primary atypical pneumonia of the variety that is associated with the development of cold agglutinins. X-ray of chest does not show, however, the rapid clearing that one would expect from clinical improvement.

BIBLIOGRAPHY

1. Official Statement, War Medicine, 2:330, March 1942.
2. MacCullem, W.G., Textbook of Pathology, Ed. No. 7, Philadelphia 1940 W.B. Saunders Company.
3. The Respiratory Disease Commissions Report, J.A.M.A. 127:146, 20 Jan. 1945.
4. The Bulletin of the New York Academy of Medicine, 21:235, May, 1945.
5. Station Hospital, Randolph Air Force Base, Randolph Field, Texas.
6. Finland, M., S.H. Collins, E.B. Wells, Aureomycin in the Treatment of Primary Atypical Pneumonia, New England Journal of Medicine, 1949, 240, No. 7, 241-246.

National Archives, College Park, MD
Review of 4 April 1996 and 8 May 1996

Record Group 341
Entry 44
Box 289