

tion of the organisms. It appears as if the thyroid gland were a favourable spot for lodgment of these strains, resulting in the local production of a relatively large amount of toxic material during their disintegration and perhaps their slow growth.

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TUBERCULOSIS IN NURSES

A STUDY OF THE DISEASE IN SIXTY NURSES ADMITTED TO THE MANITOBA SANATORIUM*

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Ninette

THIS paper is based on a study of tuberculosis in sixty nurses or nurses-in-training who have been admitted to, or examined at, the Sanatorium within the last five years. Throughout this paper the term "nurse" includes undergraduates, and indeed any who have taken any part of the regular training of nurses. Of these all but a few came direct from their hospitals to the Sanatorium. The writer saw and treated fifty, but had to rely upon the history and records of the Sanatorium and the personal knowledge of others for the remaining ten. Since the list of sixty was closed for purposes of study, and before this paper was complete, four more nurses might have been added to the list of those admitted within the five years.

At present there are ten nurses in this Sanatorium as patients, and at one time there were as many as seventeen, or about twelve per cent of the total number of female patients. If the number of female patients in the Sanatorium can be considered as any indication of the number of tuberculous women in the Province, from seven to twelve per cent represents a high average for women of one age group. There are usually as many nurses in the Sanatorium under treatment at any one time as school teachers, stenographers and university women taken together.

A preliminary study of tuberculosis in nurses was made in this Sanatorium in 1926, and data were collected from thirteen Canadian sanatoria. A total of 1,514 women had been treated in these thirteen sanatoria, of whom 99 were nurses, a

little over six and a half per cent. Fifty-two of these were graduates and forty-seven undergraduates. The facts and opinions gathered in that series will be referred to in appropriate places throughout this paper, and used in drawing conclusions. A few cases are common to both series.

Of the series of sixty, forty broke down before graduation and twenty after graduation. Ten of the graduates developed symptoms within one year of graduation, five within three years, and the remainder within from five to seventeen years. Fifty of the sixty developed tuberculosis during training or within a year afterwards.

During such a four-year period, about 800 nurses were trained and graduated in this Province. About six per cent of these became Sanatorium patients directly from their training schools or within a year after leaving them. At this rate, then, one out of every seventeen young women entering upon training as nurses can be expected to develop tuberculosis. This appears far more striking when it is considered that in the twenty years following training there were three or four thousand graduates in the Province, and only ten of these, or about a third of one per cent, became patients in the Sanatorium. However, this is not a fair comparison because nurses in hospitals are more conveniently examined and among any group of women the incidence of tuberculosis is higher in the younger age group. Nevertheless, all data we have go to show that tuberculosis is relatively much more common among nurses in hospitals than nurses out of hospitals; it is more common among young nurses than older graduates, and would

* Canadian Tuberculosis Association Prize Essay 1929.

seem to be more common among nurses than among women in general.

The sixty nurses of this series came from twenty hospitals, all but five being hospitals in Manitoba. Six nurses were admitted who were training in or had trained in hospitals outside this Province, but all had their homes within it. Fifty-four nurses came from fifteen Manitoba hospitals. All the larger hospitals are represented and several of the smaller. This list might be considered fairly inclusive for nurses breaking down with tuberculosis in this Province during the past five years. The numbers of nurses per hospital were as follows: one sent eighteen, another eight, three sent four each, one sent three, four sent two each, and the remaining hospitals sent one each. The numbers who came in from the different hospitals are fairly well in proportion to the number of nurses trained in these hospitals. From this Sanatorium itself four were admitted. Three of these had pleurisy only, which cleared up completely, and one of these belonged to a heavily infected family. The only one who had a definite lung lesion came to the Sanatorium a comparatively short time after her mother's death from tuberculosis, and had a sister, not at the Sanatorium, who developed tuberculosis about the same time. It is interesting to note that from one general hospital during 1925 there were two nurses, during 1926 two, during 1927 one, and during 1928 six, four within two months. From another general hospital there were three within three months and none for many months before or after. From two other general hospitals there were two each in the same month. This may indicate that each case found increased the enthusiasm in diagnosis, but it also rather suggests what might be called an epidemic. It is our opinion that each such group of cases had some common source of infection, possibly among the patients under treatment in their hospital about that time.

Of the sixty, one entered upon training at the age of seventeen, fourteen at the age of eighteen, twelve at nineteen, eight at twenty, six at twenty-one, six at twenty-two and thirteen between the ages of twenty-three and thirty-one. A few years ago twenty-two was the youngest age at which training for nursing began. It is significant, perhaps, that three-fourths of this series began training before twenty-two, and some had even finished their training at that age. In the earlier series of ninety-nine, the age at entering training was given in only sixty-eight.

However, fifty-five of these, or eighty-one per cent, had entered before or at the age of twenty-two.

In the main series of sixty, fifteen broke down before the age of twenty, and thirty-four, or more than half the series, before the age of twenty-two. Between the ages of eighteen and twenty-four, forty-three broke down. The remaining seventeen developed symptoms between the ages of twenty-five and thirty-eight.

There was a positive family history of tuberculosis for fifteen of the sixty, or twenty-five per cent, and in the earlier series of ninety-nine cases a positive family history for fifteen per cent. In some of these there is little doubt that a latent focus existed on entering hospital and became active on account of lowered resistance or massive re-infection. However, the fact that only fifteen in our series of sixty, or fifteen of ninety-nine in the other series, gave a positive family history, making all allowance for errors in the histories and lack of knowledge of family antecedents, would help to support the presumption that in most cases the infection which caused disease was received while in hospital.

Twenty-four of the sixty knew, or thought they knew, of contact with tuberculosis while in training. Some had no idea whether they had or not, and not quite all were questioned as to contact.

The sixty nurses gave a record of a total of two hundred and fifteen illnesses, or an average of three or four each, before entering training. These, as would be expected, were chiefly, and in order of frequency; measles, chicken pox, whooping-cough, scarlet fever, otitis media, sinus infection and "colds." Four had erythema nodosum, but this may, perhaps, be considered a part of their present illness and so will be discussed separately.

As will be seen, the nurses of this series entered hospital young. Most had been brought up in fairly good homes, under average or above average conditions, with time before entering hospital only for school. Few had done any definite work or had had much responsibility to carry. It is not surprising, then, that forty-five of the sixty found the work definitely harder and hours longer in the hospital than they had been accustomed to. In hospital, the environment, routine and even the food was different. The period of probation was one of hard work and some worries. With the actual work of nursing came more responsibility and increased emotional

and physical strain. Besides hard work, there were classes to attend and studies to pursue. There had been for almost all an increase in social obligations or opportunities, even if only among the pupil nurses themselves. The hour of rising was necessarily much earlier, and they got to bed, whether necessarily or not, mostly later. In all these changed conditions there was much to lower resistance, even though there may have been elements in the life to increase resistance also.

Their breakdown had no special relationship to any particular hospital service. Some considered that the harder services played a part, and most had the idea that night duty was unfavourable. In the series of ninety-nine cases, seventeen had been on eight hour duty, fifty-seven on twelve hour duty, and for twenty-five the hours were not stated. Forty-three of the sixty developed symptoms of tuberculosis while in training, though three of these graduated before they came for treatment. Twenty-five broke down during the first half of their course, eighteen during the first year, thirteen in the second year, and twelve in the third year. Four fell ill in the first three months and twelve in the first eight months of their training.

Of the twenty who came to the Sanatorium as graduates, ten had broken down during the first year after graduation. It is very interesting to note that eight of these had remained in their hospitals on staff positions. Three years after graduation five more had broken down, by seven years four more, and for one the breakdown came seventeen years after graduation, though she had had a pleurisy even before training. During training and in the five years following, fifty-five out of the sixty broke down. It appears to be a very striking fact that the period of training and the time of breakdown correspond so very closely. In the three years of training and one year after, fifty of the sixty had their breakdown.

THE CLINICAL STUDY OF THE SIXTY

Thirty-four had what might be called an acute onset and twenty-six a more insidious onset. A few of those who developed basal lesions had such a very acute onset that their disease was considered not unlike the childhood type.

The relationship of the onset of symptoms to the diagnosis varied. Fourteen were correctly diagnosed within a few days or a week after the onset of symptoms, twelve within a month, and twelve within two months, or thirty-eight in all

within two months of developing symptoms. Most of the rest remained undiagnosed for from three to twelve months. For comparison, a study was made of the last sixty women, apart from nurses, admitted to the Sanatorium. Sixteen of these were diagnosed early, sixteen moderately early, and twenty-eight late in their disease. Using the same standards of classification in the series of sixty nurses, thirty-seven were diagnosed early, sixteen moderately early and seven late. The nurses were diagnosed much earlier, and that meant that they also got treatment much earlier. Earlier diagnosis of nurses in training should be expected, since their place of work is in hospitals whose whole business is the caring for disease. The x-ray was easily accessible in all cases. General hospitals are now realizing the definite possibility of tuberculosis among their nurses, so are much more alert regarding its early discovery. Another reason for earlier diagnosis is that nurses, as a rule, had an onset of disease with more acute symptoms, and so required medical attention early.

Cough was remembered as the initial symptom, or at least as noticed early, by thirty-six; pain in the chest by thirty-one; tiredness by twenty-six; elevation of temperature by twenty; expectoration by fifteen; and loss of weight by thirteen. Hæmoptysis was the first symptom noticed by six. Other symptoms, complained of less frequently, were: frequent "colds," weakness, fainting, nervousness, hoarseness, malaise and dyspnoea. In cases in which peritoneum, kidney, or eye were diseased, the early symptoms were referable to those organs. Four had erythema nodosum and later developed pulmonary disease. The most frequent early symptom-complex was cough, tiredness, pain in the chest and elevation of temperature.

In twenty-five the lesions were mainly apical, and thirteen of these had gone on to cavity formation. Nineteen (one-third of the pulmonary cases) had hilar or basal lesions. One had typical miliary disease and died, and one a miliary spread resembling very much that of the former, but she is alive and well, though still "taking the cure" at home. Nine had generalized bilateral fibro-caseous disease. Twenty-four of the sixty had cavities as shown by x-ray plates on admission. Of these, four are dead, twelve are still on treatment, and eight are working. Nineteen had the right lung involved, twenty-three the left lung, and fourteen both lungs.

Twenty of the sixty had a pleuritic onset,

eighteen of these with effusion and twelve with definite parenchymatous disease. Four had tuberculosis of peritoneum, two of kidney, one of eyes, and one of glands.

Erythema Nodosum.—Four of our series, as has been already stated, had erythema nodosum. All these were pupil nurses and had returned to duty as soon as their illness subsided. All later developed pulmonary disease of the acute hilar and basal type.

General hospital people, and we of the Sanatorium, have been impressed by the large number of nurses who have developed erythema nodosum. Opinions still differ as to its etiology and significance, but from our experience, especially in the case of nurses, there is but one safe procedure, and that is to consider it a manifestation of tuberculosis and to treat it as such. A physician of wide experience in tuberculosis, on the staff of a general hospital, and one much called in consultation about suspected nurses, states that when erythema nodosum patients are put to bed for from three to six months and treated as tuberculous people they almost invariably do well, whereas if not given this rest in bed they very often go on to definite pulmonary disease. Erythema nodosum, we consider, should be classed as in about the same relationship to tuberculosis as pleurisy with effusion. All who have had either pleurisy or erythema nodosum should have the significance pointed out and should have periodic, careful examinations, with well-taken and well-read x-ray plates of the chest. Dr. H. B. Cushing, in *The Canadian Nurse*, June, 1928, points out that the relationship of erythema nodosum to pulmonary tuberculosis, especially among nurses, is definite.

Is there a special type of tuberculosis in nurses?

Of the sixty, eight in x-ray plates and by physical signs showed disease extending out from the hilus, and eleven showed disease mainly in the bases of the lungs; that is, nineteen, or more than one-third, of those with pulmonary disease had either hilar or basal lesions. This type of tuberculosis is not common; indeed, it is frequently stated that primary basal lesions in adults occur in less than one-fourth of one per cent of cases. The proportion among the nurses of this series is therefore relatively extremely high.

Seven of the nineteen nurses who had basal lesions were graduates who had remained on the nursing staff in the hospital; twelve were still in training, nine of these being in their final year. With this same basal type, nine were twenty-two years of age or less at the time of breakdown, and the remaining ten were from twenty-three to thirty-one. Six gave a definite family history of tuberculosis, and nine recalled definite opportunity of infection while in training. All but three had found the work in the hospital much harder than they had been accustomed to before entering. Fifteen of the nineteen had an acute onset of symptoms. Nine had their onset with pleural effusion, and when the effusion cleared up revealed underlying acute basal or hilar lesions in the lung. Nine had cavities demonstrable in x-ray plates. Seven in this series with basal lesions were treated by pneumothorax. The four who had erythema nodosum all belonged to this basal lesion series. At the present time, ten are working, eight are still on treatment, either at the Sanatorium or at home, and one is dead.

The following case histories and plates demonstrate the special type of disease found in so very unusual a proportion of the nurses of this series:—

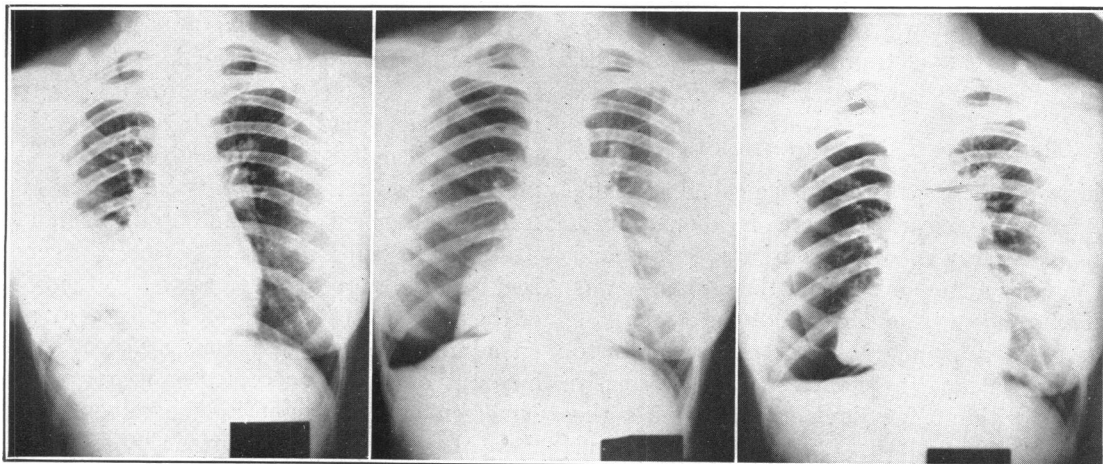


FIG. 1

FIG. 2

FIG. 3

CASE 1

Miss L., aged 25, admitted May 12th, 1925. No family history of tuberculosis. She was born, and lived, on a farm, attended school until seventeen, took a business course and did office work until she entered training at twenty-one. She graduated in January, 1925. In February, 1925, she noticed tiredness, in March began to cough and noticed that weight had been lost. At this point a diagnosis was made, and on admission to the Sanatorium there was a gross lesion in the lower half of the right lung with cavitation. (Fig. 1.)

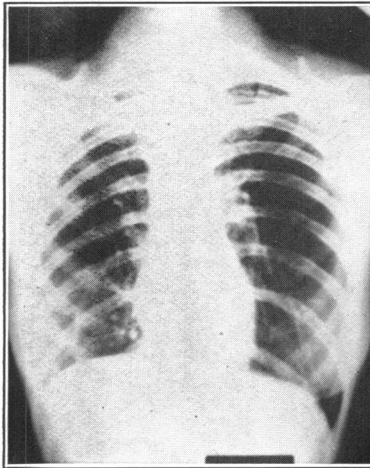


FIG. 4

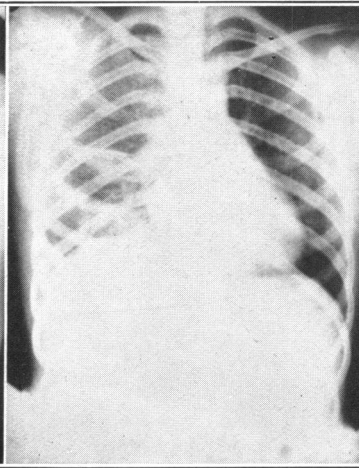


FIG. 5

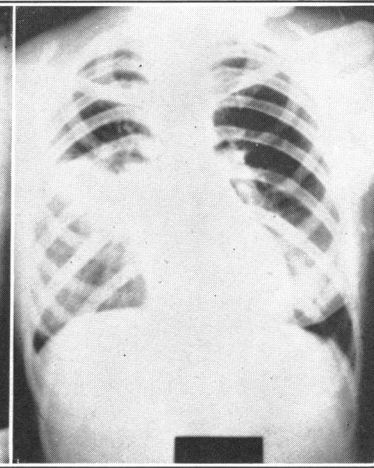


FIG. 6

Pneumothorax was started almost at once and collapse fortunately was "selective;" that is, the part needing collapse was the part which collapsed most. (Fig. 2.)

She immediately improved and progress was uninterrupted, except for a slight temporary extension of disease out from the left root. (Fig. 3.)

After two years' collapse, the lung was allowed to re-expand. The patient was free of symptoms and the plates were almost clear. (Fig. 4.)

She remained for several months on the nursing staff of the Sanatorium, then married; and is in good health, though she has taken the added risk of maternity, and has one child.

CASE 2

Miss J., aged 22, admitted on July 12th, 1927. No family history of tuberculosis. She lived on a farm and in a small town, and entered hospital for training at

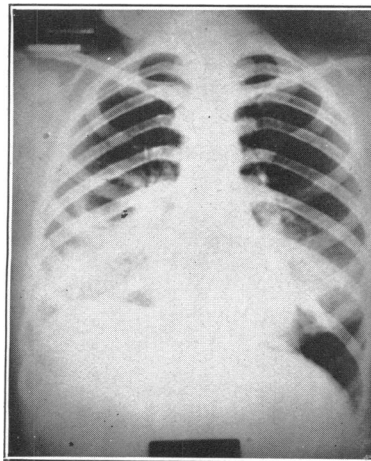


FIG. 7

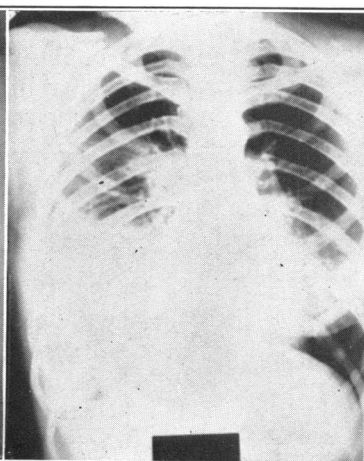


FIG. 8

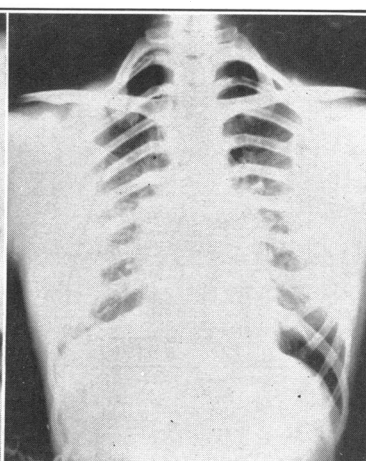


FIG. 9

18. Her first illness which might be related to present illness, and which occurred while in training, was classed as "acute bronchitis." This was in October, 1924. She had an infected antrum and otitis media in January, 1925, pleurisy in May, 1925, when she was under treatment for four months, and then returned to duty. (Fig. 5.)

Two years later, about one year after graduation, while on duty as staff nurse, and about three months before admission to the Sanatorium, she became aware of weakness, tiredness, and began to have pain in her right chest. On admission she showed an extensive lesion

extending out from the hilus and into the base of the right lung, with definite cavity formation. (Fig. 6.)

Symptoms were marked. Pneumothorax was attempted several times without any success. On full infirmary routine her general condition improved, but she had frequent hæmorrhages, troublesome and increasing cough, and profuse expectoration. The area of the lesion as shown by plates had definitely increased also. (Fig. 7.)

Avulsion of the phrenic nerve was done in October, 1928. This was followed by an unusual degree of elevation of the diaphragm, and x-ray plates show the cavity obliterated. (Fig. 8.)

She is now in excellent general condition and has practically no cough nor expectoration.

CASE 3

Miss M., aged 24, was admitted on December 5th, 1927. There is no family history except that a sister

also a nurse and also in this series, has a small lesion, as shown by the x-ray. The home conditions were very good. She began training at eighteen, and found the work hard and was tired most of the time. She graduated in 1925, worked as staff nurse for one year, and did special nursing during 1927. She had had bronchitis in childhood and an appendectomy while in training. In April, 1927, she had pleuritic pain in the right chest. Plates which were made at that time show definite abnormal shadows extending out from the right root (Fig. 9), although, strange to say, diagnosis was not made; at least, the patient was

It would seem to us associated with hospital training and work that there is a special prevalence of this acute type of disease. The majority in this special series with basal lesions broke down toward the latter part of their course or while in hospital work soon afterwards. More than half of them entered training before the

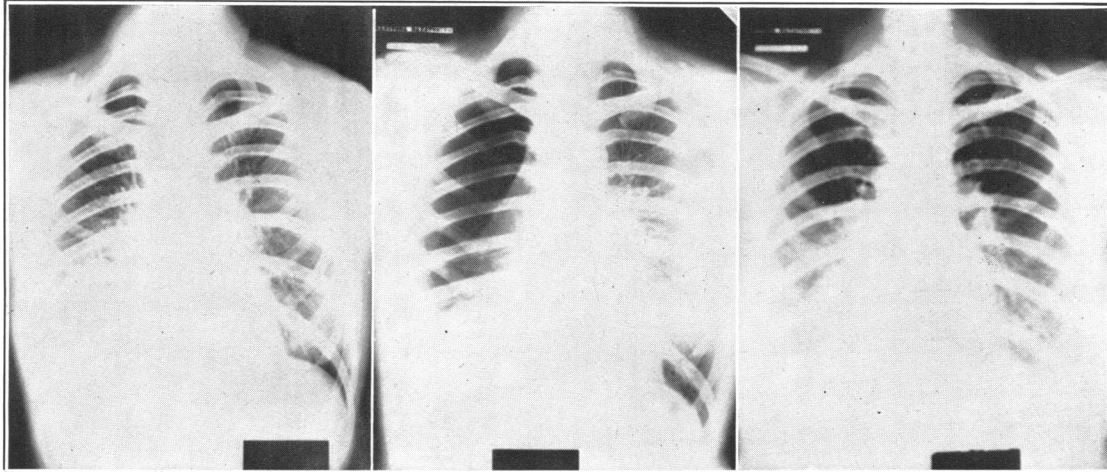


FIG. 10

FIG. 11

FIG. 12

not told of one, and was allowed to return to work. Later, in September of the same year, she took acutely ill with pleurisy and effusion, and had cough and positive sputum.

When first seen at the Sanatorium, there were extensive lesions at the right base, with cavitation, and some effusion. (Fig. 10.)

Pneumothorax was started and, although adhesions at the base have prevented a complete collapse, it has been very effective. (Fig. 11.)

She is in excellent physical condition, without cough or expectoration, and is doing a little light work.

CASE 4

Miss C. Figures 12 and 13 show very acute basal lesions in the right lung. In this case, pulmonary

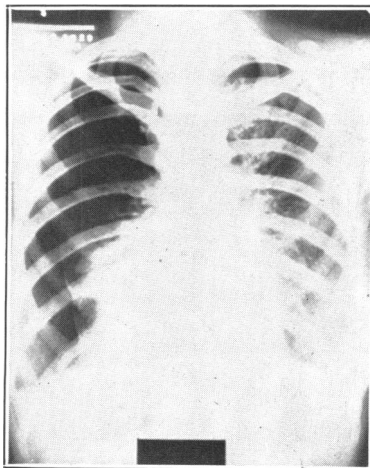


FIG. 13

symptoms were noticed three months after an attack of erythema nodosum. The disease has been steadily progressive, in spite of strict bed care, pneumothorax and phrenicotomy, and at the present time the prognosis is considered unfavourable.

age of twenty and broke down before the age of twenty-two. One-third had a positive family history of tuberculosis, and half of them knew of possibility of infection with tuberculosis while in hospital. In nearly all there was an acute onset, pleuritic in nine, with real underlying pulmonary disease. Erythema nodosum, which may be an allergic manifestation of tuberculosis, occurred in four. We offer as explanation of the special type under these special conditions the suggestion that most of these girls had very little tuberculous infection before entering hospital and consequently little opportunity to build up an immunity. They then, while resistance was lowered by unaccustomed work, and while among cases in the wards in which tuberculosis was a background disease, had opportunities to become heavily infected and so developed disease of a type not very unlike that in children who have met with massive infection.

TREATMENT

Of the sixty, seven were examined and advised at the Sanatorium from time to time, but were not admitted. Seven were in the Sanatorium more than twenty-four months; thirteen from twelve to twenty-four months; thirteen from six to twelve months; nine from three to six months; and eleven for three months or less. Seventeen had artificial pneumothorax. Fifteen

were given employment on the Sanatorium staff for a time, and thus were kept under supervision and tried out. Nine of these latter were among those who had pleurisy with effusion which had been cleared up by several months in bed.

Pneumothorax is more urgently indicated in acute hilar or basal disease than in ordinary apical disease. Many had a very acute allergic type of onset and cavitated almost immediately. In these especially pneumothorax should be begun at once. If it is begun early, collapse is usually selective and does not have to be kept up as long as in cases of the usual types with more fibrosis. Most of those of all types who began treatment early did well.

Of the sixty, thirty-one are now working and in apparently good health. Twenty-four are still on treatment, ten of these at the Sanatorium and the remainder at home, and almost all doing well. Five of the sixty are dead.

CONCLUSIONS

1. Sixty nurses have been admitted to this Sanatorium during the past five years. This is far beyond the proportion in which women of the Province in general, or any other class of women in the Province, have been admitted, and more than the proportion of girls of their average age also.

2. These nurses, who have come for treatment of tuberculosis, have with very few exceptions broken down during their training in general hospitals, or during the first year after that training, often while still on the staffs of general hospitals.

3. Fifty of the nurses in this series broke down during their training or within one year of graduation. This constitutes about six per cent, or one in seventeen, of the nurses in training within Manitoba during the same four-year period.

4. We consider that among the conditions unfavourable are the early age of entering upon training as nurses, the previous freedom of these girls from contact with disease, the softness of those unaccustomed to hard work, the comparatively little tuberculous infection they had met and the consequent lack of immunity built up. If nurses were not allowed to enter upon training until twenty-one years of age perhaps fewer would develop tuberculosis. The hours of work are, perhaps, well regulated, but it is important to investigate the *hours of energy*

expenditure. Supervision should be strict and the hours of sleep adequate.

5. Nurses on entering training should have a complete physical examination, and well-taken and well-interpreted x-ray plates of the chest.

6. An unfavourable condition in all general hospitals, we consider, is the presence of patients who are under treatment on account of special illnesses and needs, for operations, on account of fractures, childbirth, etc., etc., who have general chronic disease as well, which is not always fully enquired into, and which may be and often is at an infective stage.

A man had an ischio-rectal abscess and during five years had several operations in general hospitals. After the latest of these the wound sloughed and would not heal. On examination of the chest, then, he was found to have gross disease throughout both lungs with cavities, and on questioning him it was found that he had had cough and expectoration for years. No special precautions had been taken about his cough or expectoration. It can easily be seen that nurses not on their guard could easily be infected in the care of such cases.

7. General hospitals could be made more safe for their nurses. *All patients entering general hospitals should have a thorough history taken and a complete physical examination.*

Tuberculous people in general hospitals may be safely treated if known and classed as tuberculous, and if the training and experience of the nurses includes the essential measures for the care of the tuberculous. But undiagnosed and "untagged" tuberculous patients are always a danger, and especially so if the routine teaching and training of nurses in general hospitals do not include measures necessary for the proper and safe care of the tuberculous.

Nurses should receive definite and ample teaching about tuberculosis and the routine for tuberculous patients. *A cough is practically always dangerous, whatever the cause.* Every cough should be covered. Apart from tuberculosis, much could be done to prevent the spread of other upper and lower respiratory infections. Nurses presumably are instructed about the care and proper disposal of all other discharges and excreta, but the dangers of cough and expectoration they do not know so well. A woman recently admitted from a general hospital where she had been for six weeks, under treatment for advanced tuberculosis, had never been instructed to cover her mouth while coughing.

It is very rare to have a Sanatorium nurse break down with tuberculosis. Some reasons for this are: the work on the whole is less strenuous, routine and energy expenditure, apart from nursing duties, is usually of a quieter variety; all patients are known to be tuberculous and considered infective; proper precautions about cough and the disposal of expectoration and discharges are carried out. And it is also considered that by repeated small doses of tuberculous infection some immunity is established. The Lady Superintendent of the Trudeau Sanatorium, in which there is a school of nursing for women who have been tuberculous, but who, in affiliation with general hospitals, take a regular course of nursing training, states: "These students begin with a definitely known handicap, but with the

well regulated life they lead they are able, for the most part, to go through with little difficulty."

8. There is a special type of tuberculosis to be made out characteristic in the nurses of this series. Over one-third of them had basal or hilar lesions. It is somewhat similar to the type of disease in childhood, and likely the causes are the same. Children who have been kept away from infection develop acute disease, often basal. Young nurses from good, careful homes have met with little infection and developed little immunity, so if they meet with infective cases, especially if resistance is lowered, and are not on their guard and protected by a proper routine, they are virtually in the position of children.

9. If treated early, and especially with pneumothorax, most of those with basal lesions do well.

HYPOPITUITARISM WITH SPECIAL REFERENCE TO ITS SEXUAL MANIFESTATIONS*

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IN presenting this case which concerns the pituitary gland I should like to review briefly a few points of historical and scientific interest.

Our earliest conception of the function of this peculiar structure comes from Galen. His idea was that it acted as a filter for the sedimented waste products of the brain and that these passed out through the infundibulum as a *pituita* or slime from the nose. Now Galen was a true investigator who did much to rid the profession of the superstition with which the art of healing had always been associated; his writings were by far the best of ancient Rome; his dictum was law. It was, therefore, not surprising that this conception held sway for many centuries. As late as 1631 Robert Flood explained the etiology of coryza on the principle of a siphon action between the ventricles and the nose. Schneider, Willis, and others could not demonstrate any such communication, and, yet, how could a spontaneous cerebro-spinal rhinorrhœa, of which their learned predecessors most certainly had knowledge, be otherwise ex-

plained? Could they have known that in the lowest of vertebrates a canal lined by ciliated epithelium connects the cerebral and buccal cavities they would never have doubted the earlier teaching of Galen. In Thomas Gibson's anatomy (1688), it is inferred that in animals, such as calves, who have a large pituitary with rich arterial supply the gland seems to have the same relation to this arterial plexus, which he calls the *rete mirabile*, as the pineal gland has to the choroid plexus; its purpose is to separate a serous fluid from the lymph (a well established fact). But in man, according to the best anatomists, this rete is wholly wanting, showing that the pituitary must be of relatively less value to him than to the lower animals.

We smile, and yet all that was known at the beginning of the present century was that acromegaly and gigantism were associated with disease of this organ. Various observers then called attention to the fact that tumours and cysts of this gland were also associated with a heterogenous group of conditions comprising altered development, sexual infantilism, optic atrophy, metabolic changes, etc.

These and coincident observations led to a

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