

**THE ETIOLOGY AND PREVENTION OF RETURN CASES OF SCARLET
FEVER,**

**With a Critical Discussion on 147 Return Outbreaks
investigated in the Borough of Leicester during the
years 1906 and 1907.**

**A Thesis submitted for the Degree of M.D.
of the University of Glasgow**

By

JOHN LAMBIE, M.B., Ch.B., May, 1908.

ProQuest Number: 27626744

All rights reserved

INFORMATION TO ALL USERS

The quality of this reproduction is dependent upon the quality of the copy submitted.

In the unlikely event that the author did not send a complete manuscript and there are missing pages, these will be noted. Also, if material had to be removed, a note will indicate the deletion.



ProQuest 27626744

Published by ProQuest LLC (2019). Copyright of the Dissertation is held by the Author.

All rights reserved.

This work is protected against unauthorized copying under Title 17, United States Code
Microform Edition © ProQuest LLC.

ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 – 1346

THE ETIOLOGY AND PREVENTION OF RETURN CASES OF SCARLET FEVER.

The Etiology of Return Cases in Scarlet Fever forms the most interesting study in connection with that disease at the present day. Return cases are cases which develop scarlet fever after the return home from an infectious hospital of a member of the same household.

The original case is spoken of as the "Infecting Case," and the infecting and return cases are not necessarily cases of the same disease. It occasionally happens that a case of diphtheria develops in a household after the return of a scarlet fever patient, and it also happens fairly frequently that a case of scarlet fever occurs after the return home of a diphtheria case.

It is, however, with cases of scarlet fever occurring after the return of scarlet fever cases to the same house that I intend to deal here.

Return cases are peculiarly a phenomenon of the hospital treatment of scarlet fever. They certainly do occur after isolation at home, but are not nearly so frequent.

IMPORTANCE OF INVESTIGATING RETURN CASES.

The investigation of return cases is exceedingly important for various reasons. In the first place it gives a clue to the source of infection.

For many years it was held that one of the principal sources of infection in scarlet fever was the desquamating

skin. This, one must admit, was a very natural conclusion to come to. It was noticed that a case of scarlet fever continued to be infectious for about the same period that desquamation was present. This desquamating skin was something tangible which might account for the infection, and it is not surprising that it was regarded as the most fruitful source of infection.

The study of return cases, however, has made it apparent that the prolonged infectivity of cases of scarlet fever is not due to desquamating skin but to discharges from throat, nose or ears.

There can be no doubt that, of men who are experienced in scarlet fever at the present day, a large number hold that desquamation has nothing to do with infection, and the great majority are certainly of opinion that late desquamation is not infectious. Dr Millard, Medical Officer of Health for Leicester, one of the pioneers of the investigation of return cases of scarlet fever, has for many years paid no attention to desquamation when discharging scarlet fever cases. He has made a practice both in Birmingham, where he was medical superintendent of the fever hospital, and in Leicester of discharging scarlet fever cases much earlier than the usually recognised minimum time of six weeks, and affirms that his percentage of return cases was not increased in consequence. I was associated with Dr Millard for two years as Resident Medical Officer in the Leicester Isolation Hospital. During that period scarlet fever was epidemic in the Borough of Leicester and certainly the percentage of return cases was much increased. This, I think, was

not entirely due to the early discharge of patients, as the patients had been discharged in the same way and with the same precautions for five or six years. That the return cases were not due to desquamation is shown by the fact that patients who were kept in hospital till all traces of desquamation had gone, on account of discharging noses or ears, caused an enormously higher percentage of return cases than those who were discharged within six weeks.

To emphasise the importance of the study of return cases, several cases have occurred within recent years where parents have claimed compensation for return outbreaks. These claims have failed where the medical officer who discharged the infecting case could prove that he used reasonable care. The only possible way to shew that reasonable care has been taken is to make careful notes of the patient's condition before discharge on the patient's bed-card. In a few cases where such precautions have been neglected heavy damages have been obtained.

The study of return cases is also important in connection with the question of hospital isolation of scarlet fever.

A considerable number of Medical Officers of Health have of late years expressed the opinion that isolation hospitals are of no value whatever in reducing the number of scarlet fever cases or controlling its spread.

The question comes to be whether the isolation hospital, instead of preventing, is spreading the disease.

When a certain percentage of cases discharged from fever hospitals cause return cases in their own families,

it is natural to infer that such cases may infect a large number of children outside their own homes.

This no doubt happens, but it is impossible to say to what extent. It is important to use scrupulous care in dealing with return cases. In old reports on the subject it was the custom to eliminate a large number of what were probably genuine return cases, in the first place by placing an artificial limit on the interval between the discharge of the infecting case and the onset of illness in the return case. This limit used to be put at a fortnight - it being held that it was impossible for a discharged patient to retain infection after that period. Again, various explanations were offered of other outbreaks, and these were eliminated in consequence.

A limit is still used for this interval, but it is usually three months. Even this limit of three months is not reliable, but even if a certain number of patients are still infectious after that time, the number is trivial.

DISCUSSION OF 147 OUTBREAKS

During the year 1906 and the greater part of 1907, while acting as Resident Medical Officer to the Leicester Borough Isolation Hospital, I had occasion to investigate 147 return outbreaks of Scarlet fever. Very great care was taken by the Medical Officer of Health and myself to secure the strict accuracy of the returns. Return cases notified to the Medical Officer of Health were entered as such in the register of notifications, with a distinguishing mark for easy identification. The sanitary in-

spectors, who visited all houses where infectious diseases were notified, made special inquiry as to whether a previous case had been recently discharged from hospital.

In some cases parents were rather unwilling to give information about the previous case. It was the practice in Leicester when patients were discharged to send a printed notice of discharge in which parents were requested to take certain precautions. When a return case occurred some parents fancied they were in some way to blame for not carrying out the instructions, and consequently wished to conceal the fact that another member of the family had recently returned from hospital.

This same difficulty has been noticed by some of the investigators to the Metropolitan Asylums Board, and commented on in their reports.

In Leicester, however, in such cases the inspector remembered having been in the house before, and by reference to his books could easily trace the previous case.

I also took a note of all return cases admitted to the hospital. On comparing my list of cases with those on the books at the Sanitary Office, I occasionally found that I had names which did not appear in the office books as return cases, and more often found names in the office books which were not on my list.

This goes to show that in all probability the percentage of return cases is very frequently underestimated.

There can be little doubt that the Metropolitan Asylums Board never hear of a large number of return cases annually. In London the fever hospitals are not governed by the health authorities, and the Metropolitan

Asylums Board depend on the hospital officials alone to supply returns of these cases. Under the Board each case admitted to a hospital is examined by one of the medical officers in a receiving room on admission, and all particulars of the patient and illness are entered on the bed-card by him before the patient is sent to the wards. If the ambulance nurse has noted on the history sheet that it is a return case, the medical officer enters the facts in a book kept for the purpose. Thus it depends on a nurse, who may have had very little experience, whether the case is entered as a return case or not. It also depends on the Medical Officer, who may forget to enter the case. I have discussed this matter at some length because I wish to show that the figures obtained at Leicester are much more likely to be accurate than those given in the three otherwise excellent reports issued by the Metropolitan Asylums Board.

Each case at Leicester was investigated as soon as possible after the return case was notified to the Medical Officer of Health.

Professor Simpson and Dr Cameron in their reports to the Metropolitan Asylums Board have divided their return cases into various classes. The interest in the study of return cases centres round the infecting case, and Cameron, whose report is the largest and most comprehensive of the three Metropolitan Asylums Board Reports; has divided his infecting cases into three groups - A. B. and C.

Under Group A. are classified those cases in which the evidence indicated that the return cases were infected by the discharged patient.

Under Group B. those cases in which the evidence conclusively showed that the return cases were mere coincidences, and did not derive infection from the alleged infecting cases.

Under Group C. doubtful cases in which the evidence was insufficiently conclusive to enable him to arrive at a definite decision.

This method of grouping the cases is really on the face of it an attempt to explain away a certain number of return cases, and I think diminishes the value of the evidence. Obviously the most reliable way is to assume, in the first place, that the return case is infected by the original case. It is very easy to jump to the conclusion that infection has arisen from, say, insufficient disinfection, but that does not explain why return cases are so much more frequent from hospital treated than from home treated cases. The methods of disinfection are the same in each case. Dr Turner, who wrote the third Metropolitan Asylums Board report, does not agree with Cameron, that a large number of so-called return cases were mere coincidences.

In preparing my figures, I have excluded all cases where the return case sickened before, or at the same time as, the arrival home of the infecting case. Otherwise all cases have been accepted as genuine return cases.

PERCENTAGES

The 147 infecting cases which I have investigated occurred among 2,693 cases discharged from the Leicester Isolation Hospital. This means that 5.45 per cent of the patients discharged, infected members of their families

after their discharge, giving rise to 177 return cases. This percentage compares very unfavourably with that of 3.27 found by Turner in his investigation of similar cases in connection with the Metropolitan Asylums Board Hospitals. The explanation lies, I think, in the fact that scarlet fever was exceedingly prevalent in the Borough all through the period during which these cases occurred. The hospital was accordingly taxed to its utmost to deal with the epidemic and the wards were considerably overcrowded. The over-crowding was to the extent that wards intended to accommodate 15 patients were made to accommodate 20 and sometimes 25.

There can be no doubt that overcrowding to this extent is in some degree harmful to scarlet fever patients, particularly if the wards are kept congested for a considerable period of time. I believe, and I know that my belief is shared by some highly experienced men, that a scarlet fever ward which has been working at full pressure for a period of several months often gets into an unsatisfactory condition, so that severe cases do badly and complications are more than ordinarily rife. The only remedy in these cases is to temporarily close the ward, clean and disinfect it.

This, however, was not easy to do in the hospital at Leicester, so that the wards often remained in this unsatisfactory state for long periods. Rhinorrhoea and otorrhoea were common among the patients and the cases of rhinorrhoea were very persistent and difficult to cure. The wards became, in fact, incubating chambers for the germs of the disease.

THE INTERVAL

I now come to discuss the interval between the discharge of the infecting case and the onset of illness in the return case. A table showing the number of patients attacked at various intervals of time is exceedingly interesting and goes far to prove that the source of infection in the great majority of cases must be in the "infecting case."

TABLE No. I.

Interval in days	1-7	8-14	15-21	22-28	29-35	36-42	Over 42
Total number 147	52	39	26	11	11	4	4

It will be seen from the above table that the greatest number of return cases were infected in from one to seven days, and that the numbers decline rapidly as the interval becomes greater.

It certainly shows that the infectivity of discharged patients became less as time went on. This same fact has been noticed by every writer on return cases, including Millard, Simpson, Cameron and Turner, and the fact that the number of return cases decreases rapidly as the intervals become longer, tends to show that the number of coincidences must be small. That coincidences may account for some return cases is undoubted. It frequently happens that a patient comes into hospital with scarlet fever a day or two before a brother or sister is discharged. I have had two cases in my own experience where a brother or sister entered hospital on the day on which a patient was discharged.

Had those patients been discharged a few days earlier, their brothers or sisters would certainly have been described as return cases.

In this connection my interval of one to seven days in the table perhaps requires explanation. I have used the figure 1, because I have found from experience that the incubation period of scarlet fever may be as low as 24 hours.

I remember a case in which a nurse, who had not been previously exposed to scarlet fever in any way directly or indirectly, entered a scarlet fever ward, Within 24 hours she sickened and a diagnosis of scarlet fever was made within 36 hours.

As it happened, no interval among the 147 cases was less than 2 days, but if there had been any, I should certainly have included all of one day's interval.

Looking at Table No. I, one might be tempted to look on the four cases in each of the last two divisions as being merely coincidences, and to conclude that four cases might logically be deducted from each of the other divisions, so as to get at the number of genuine return cases.

In my investigation, however, I found that of the four in which the interval was over 42 days, three had been discharged after a long period of isolation in hospital, with the request that they should be isolated at home under the supervision of a medical man. This was necessary on account of discharges from ears or nose. In each case this isolation was carried out at home. One case was isolated for over four weeks and the other two

for three weeks. The discharges still continued after they began to mix with other members of their families and return cases were the result.

The fourth case possibly was a coincidence.

Of the four cases occurring at interval 36 to 42 days, two of the infecting cases were found to have rhinorrhoea and one otorrhoea. Thus, of the eight cases in those two columns six suffered from discharges from the mucous membrane and were probably infectious.

CONDITION OF INFECTING CASE.

I now come to what is probably the most important thing in the investigation of return cases: that is, the condition of the infecting cases at the time the return cases occurred. The infecting cases were examined as soon as possible after the return case was notified and the condition of each carefully noted, particularly as regards discharges from ears or nose, throat and glands of the neck.

I have tabulated the results below.

A number of cases suffered from a combination of the complications noticed, for instance, otorrhoea and rhinorrhoea, rhinorrhoea and sore nose, or otorrhoea and enlarged glands. All of these have been counted, as it would be quite impossible to say which gave rise to the return case.

TABLE No. II.

Rhinorrhoea	55
Sore nose	21
Otorrhoea	17
Unhealthy throat and enlarged glands	26
Eczema and sores	10
Ill since discharged	10
Quite well.	27

It will be seen from the above Table that of the 147 infecting cases 55, or 37.4 per cent, suffered from discharging noses.

As this preponderance of rhinorrhoea is constant in reports on the condition of infecting cases, the probability is that rhinorrhoea is the most fruitful source of infection.

Professor Simpson in his report found the percentage of rhinorrhoea in infecting cases to be 40, while Cameron found a "morbid condition of the nose" in 52.31 per cent.

Out of the 147 cases only 8 were discharged from hospital still suffering from rhinorrhoea. The others developed it afterwards, and in quite a number of cases it was ascertained that the return case occurred a few days after the nasal discharge began in the infecting case, the causal relationship being obvious. In the same way several return cases occurred a few days after the onset of otorrhoea in the infecting cases.

It is an open question at present whether the infection is due to a recrudescence of virulence on the part of organisms which have become quiescent in the mucous membranes of the nose or ears, or whether the dis-

charge acts simply as a vehicle for conveying the infecting organisms. My own opinion is that there is an increase of virulence in some cases, a reinfection of the mucous membranes which gives rise to a discharge, and that in other cases the discharge may be due to a cold, but acts as a carrier for scarlet fever germs which still remain in the mucous membrane,

Professor Simpson in his report states that the discharges are simply carriers, and that the germs sown on the mucous membrane in hospital quickly disappear at home, and the discharge rapidly becomes innocuous. He states that discharges coming on ten days after a patient's return home possess no active powers of infection. Professor Simpson's report, however, only dealt with 90 scarlet fever infecting cases, and it is noteworthy that Cameron and Turner, his successors, who dealt with a much larger number of cases do not bear him out in this.

From my own series of cases I have picked out three cases of rhinorrhoea coming on at intervals of 8.8 and 14 days after discharge, and four cases of otorrhoea coming on at intervals of 6, 14, 18 and 32 days after discharge, the return case occurring a few days after the commencement of rhinorrhoea or otorrhoea in each case.

It would appear from this that, though it is true that infection gradually disappears from the mucous membranes, it takes much longer than ten days to disappear.

An unhealthy condition of the throat (enlarged tonsils and adenoids, chronic pharyngitis, etc.) is also a fruitful cause of infection. Swollen glands of the neck are usually an indication of infection from the throat.

It is probable that most return cases due to these causes are infected by some discharge, though that discharge may not be present when the infecting case is examined.

It is never safe to discharge a patient with open sores, particularly if the sores are on the face. Sores are common in scarlet fever round the mouth and ears. The folds of skin round the auricles show a peculiar liability to "crack" in some cases of scarlet fever and these cracks are sometimes very difficult to heal. When healed they often break down again and may do so after a discharged patient has gone home.

It seems clear that patients who are in a poor state of Health when discharged, or who suffer from illness after discharge, are more liable to convey infection than those who remain in robust health.

In 27 of my cases, none of the usually recognised causes of infection were noticed. They seemed to be healthy in every respect.

I have not noted desquamation in any of the infecting cases, because at least 80 per cent of the patients discharged from the Leicester Isolation Hospital were still desquamating on discharge.

PERIOD OF ISOLATION OF INFECTING CASES.

I next propose to examine the period of isolation of the infecting cases. For this purpose I have prepared the following table.

TABLE No. III.

Time in days	Under 35	35-41	42-48	49-55	56-62	63-69	70-76	over 76
	8	53	30	23	10	6	10	7

It will be seen from the above that the greatest number of infecting cases were discharged after being isolated from 35 to 41 days. Now the average period of isolation for all cases was 42.8 days, and as practically no patients were discharged under 33 days it is safe to assume that the greatest number of scarlet fever patients were discharged after 35 to 41 days' isolation. Still the large number of return outbreaks following discharges at this period tends to show that a shorter period of isolation as a routine procedure in fever hospitals would not tend to reduce the number of return cases. I have explained before that Dr Millard, Medical Officer of Health for Leicester and Medical Superintendent of the isolation hospital had for five or six years made a practice of having all patients "shown up" for discharge about the thirtieth day in hospital. Previous to 1906 he found that the return case rate was in no way increased by the shortened period of isolation.

Professor Simpson in his report thought that the period of isolation usual in the Metropolitan Asylums Board Hospitals was too long. He showed that the largest number of primary infective cases were among those who were detained in hospital the longest and gave the following tables in illustration.

"The percentage of infective cases on the discharges at several periods from the Board's nine infectious hospitals is as follows: - "

Periods	Scarlet Fever.
4 weeks and under 6 weeks	1.9
6 " " " 8 "	1.0
8 " " " 10 "	1.5
10 " " " 12 "	2.0
12 " " " 15 "	1.1
15 " and over	2.5

The figures for Gore Farm Convalescent Hospital were as follows: -

Period of Detention	Number of Discharges	Number of Primary Infective Cases	Percentage
Under 2 weeks	2	0	0.0
2 weeks and under 4 weeks	45	0	0.0
4 " " " 6 "	128	0	0.0
6 " " " 8 "	247	0	0.0
8 " " " 10 "	403	3	0.7
10 " " " 12 "	390	4	1.0
12 " " " 15 "	331	7	2.1
15 " and over	114	4	3.5

It must be understood that Professor Simpson dealt with a very limited number of cases, but his figures are nevertheless striking. I think they really point to a very satisfactory state of affairs; that the great majority of infective cases were recognised as such in hospital and were detained longer in hospital in the hope of freeing them from infection. I believe that, had all

cases been discharged at 10 weeks many more return cases would have been the result. Before leaving the subject of Professor Simpson's figures, I should like to point out that the period of detention in the Gore Farm table represents the period of detention in that hospital only.

No acute cases are admitted to Gore Farm Hospital, but cases are transferred there from other hospitals for convalescence.

Returning to my own table, I think it appears certain that the isolation period of ordinary cases was not long enough under the circumstances.

I think it more than likely that, had all patients been detained at least six weeks a considerable number of the complications mentioned in Table No. II would have been got over in hospital and that the number of return outbreaks would have been less in consequence.

AGE INCIDENCE.

I have tabulated the number of infecting cases and return cases occurring in different age periods as follows:

TABLE No. IV. Infecting Cases

Age period	0-5 yrs.	6-10	11-15	16-20	21-25	over 25 yrs.
Total Number 147	57	60	23	2	2	3

TABLE No. V. Return Cases

Age period	0-5 yrs.	6-10	11-15	16-20	21-25	over 25 yrs.
Total number 177	70	67	28	8	2	2

These tables bear out what most observers have noticed, that not only do children at the most susceptible ages form the bulk of the return cases, but they also form the bulk of the infecting cases. I mean by susceptible ages the ages at which children are most susceptible to the infection of scarlet fever.

Children of 10 and under are not only more susceptible but they are more likely to be infected for other reasons. For instance, it often happens that a young child on discharge from hospital is put to sleep with a little brother or sister who are thus exposed to any infection there may be. Parents are usually warned nowadays to make children discharged from fever hospitals sleep in a room by themselves, but in the houses of the poorer classes it is often difficult for the parents to provide a separate bed for a discharged patient, much less a separate room.

Young children are also more apt to get infected by drinking from the same cup or sucking the same piece of toffee.

SEASONAL INCIDENCE.

I found that the season influenced the incidence of return outbreaks to a certain extent. Return outbreaks were most numerous during the months November, December and January, giving a percentage of 6.5 on the discharges during those months. They were least numerous during May, June and July, giving a percentage of 4.7.

These percentages were calculated on the cases occurring between February 1906 and January 1907, inclusive. It is probable that weather conditions influence the in-

cidence of return cases to a considerable extent. In severe weather there is a greater tendency among scarlet fever patients to complications like rhinorrhoea and swollen glands, and these undoubtedly play an important part in the prolongation or recrudescence of infectivity.

PROLONGED INFECTIVITY.

Of the 147 infecting cases, 4 were infective after a period of 15 weeks from the commencement of illness. Return cases occurred at intervals of 107, 110, 121 and 123 days after the onset of illness in the infecting case. Much longer periods are instanced in some of the Metropolitan Asylums Board reports. There is one case in my own experience, not included in these 147 cases, in which a boy was discharged from one of the Metropolitan Asylums Board hospitals after an isolation period of six and a half months. I operated on him in hospital for mastoid disease and when he was discharged there was still some otorrhoea. Three weeks after his discharge his brother took scarlet fever, and was admitted to the same hospital under my care.

CASE MORTALITY.

The case mortality of return cases is usually higher than the mortality for "all cases". Many observers have drawn attention to this point.

Dr Boobyer, Medical Officer of Health for Nottingham, says in his annual report for 1897: "Severity of type and high mortality are, unfortunately, the rule among return cases. I have now observed this on so many occasions, and for so long a period, that I feel no doubt of its

general truth."

Dr Millard, in recording 171 return cases occurring in connection with the Birmingham Fever Hospital, found that the case mortality was 7.6 per cent, as against a case mortality of 4.8 per cent for all cases.

Of my 177 return cases at Leicester, 5 died, giving a case mortality of 2.8 per cent, as against 2.5 for all cases. Thus there was a slightly higher mortality among return cases, but I cannot say that the return cases were on the whole of a more severe type than ordinary cases.

The explanation given to the fact that return cases are often of severer type than ordinary, is that the causal organism is of more than usual virulence, inasmuch as it does not lose its infective power during the period of isolation of the infecting case. This seems at least feasible.

It may be noticed in this connection that Turner found that the case mortality for return cases in his series was slightly lower than that for all cases, Cameron, on the other hand, found the case mortality for return cases greater than that for all cases. Simpson does not refer to the subject at all.

RETURN CASES FROM RETURN CASES

It is rather interesting to note that five of my infecting cases had been themselves return cases. This would seem to point to a virulent strain of infecting organisms. Of the six return cases from these five, one died, and two others were of a very severe type.

PREVENTION OF RETURN CASES.

The only way in which the efficiency of hospital isolation of scarlet fever can be tested is by finding how many fewer secondary cases occur after removal of the primary case to hospital than after isolation of the primary case at home. By finding the average number infected after removal of the primary case to hospital and also the average number after isolation at home the gain by hospital isolation can be calculated. To get the net gain, however, we must consider the return cases as secondary cases.

Dr Niven, Medical Officer of Health for Manchester, having worked out his cases for 1901, in some such manner, says: "The number of return cases occurring in 1901 seriously reduced the advantage accruing from the hospital." It is only fair to point out that no calculation like this can give a correct idea of the value of hospital isolation, because the home conditions of patients removed to hospital are usually so different from those of patients isolated at home. The Medical Officer of Health usually selects for isolation at home, those cases where there is no great likelihood of a secondary case occurring. Still, the method is of some value, and, so far, it has shown that hospital treatment reduces the number of secondary cases, but that the advantage so gained is to a great extent nullified by the number of return cases. The problem that requires solution then is, how to administer the hospital so as to reduce as far as possible the number of return cases. Many different plans have been tried but without any great measure of success, the chief

reason for this being, I think, that no single one of them is suitable under all conditions.

METHODS OF DISCHARGE.

In a great number of fever hospitals there is a specially built block set apart for discharging patients. These usually consist of two rooms with a bath room between. The patient to be discharged is taken into the first room and stripped. Then he is bathed in the bath-room and taken into the other room, where he is dressed in uninfected or disinfected clothing. He is then passed out of the discharge block by another door. The first room is, of course, an infected room; the bath room removes the infection from the patient, and the third room is an uninfected room. This method of discharge has been almost entirely given up, and the elaborate discharge blocks either stand empty or are used for something else. The objection to this method of discharge is that the patient has a warm bath on the day of discharge, and usually goes out into the cold air with the hair wet, with the result that colds frequently follow, giving rise to nasal discharge.

In some smaller hospitals the plan has been tried of bathing the patient the night before discharge and allowing him to sleep in clean linen in the infected ward. On the morning of discharge he is removed from bed to a ward kitchen or separation ward, dressed in uninfected clothing, and handed over to his relatives.

It has been shown that no increase in return cases follows this method of discharge.

In larger hospitals a more satisfactory plan has been adopted. When patients are passed for discharge they are bathed, put into disinfected night shirts and taken to a specially set apart "discharge ward." While they are in this ward sometimes an attempt is made to free the mucous membranes of throat and nose from infection by douching with antiseptic lotions or with plain tap water. It has not been proved, however, that this douching is of the slightest value, and it has been generally given up. As a general rule the discharged patients are simply kept in this uninfected discharge ward for a day or two, bathed the night before discharge, and dressed in uninfected clothes in the ward on the morning of discharge.

It is an invariable rule that discharged patients are seen on the morning of discharge by one of the Medical officers, who makes careful notes of the condition of each and may detain anyone who does not seem fit for discharge.

These methods of discharge are all for the purpose of getting rid of the infective influence of the infected ward. That they do not do so is proved by the fact that return cases still occur, whatever the method of discharge may be.

It has been satisfactorily proved by the study of return cases that no method of discharge can free all patients from infection.

CLASSIFICATION OF PATIENTS.

There can be no doubt that the prolonged infectivity which is a peculiarity of hospital treated patients is in some way due to the aggregation of patients in hospital wards. Various attempts have been made to minimise as

much as possible the effects of aggregation by classifying the patients and distributing them in different wards according to classification. In the Leicester Isolation Hospital the acute patients were admitted always to the same wards.

After the fever had subsided and the throat had become normal, the patients were drafted into a semi-convalescent ward. Then again about the end of the third week of illness, they were sent to convalescent wards. This plan worked admirably as long as the wards were light, but whenever the hospital began to fill up, the difficulty of classification became greater and greater, till at last the convalescent wards became much more foul than the acute wards.

The Metropolitan Asylums Board have adopted the plan of sending as many convalescent patients as possible to convalescent hospitals in the country. The patients are sent to these hospitals at about the 26th day of disease. This method is subject to the same defect, namely that when the convalescent hospital is working at full pressure the wards are liable to become seriously contaminated. In any case the return case rate of the convalescent hospitals is not less than that of the acute hospitals.

Since these methods of classifying patients do not seem to be satisfactory, it is not surprising that methods of segregation have been suggested.

Isolation of patients in separate cubicles was suggested by Cameron. This method has been tried in France, in America, and at Walthamstow, but as far as I can ascertain there are no satisfactory statistics in existence

with regard to the return case rate.

If any method of dividing up wards by glass partitions such as is suggested by Cameron in pages 55 and 56 of his report were adopted, it would necessitate a considerable increase in the expense of the hospital treatment and would greatly curtail the freedom of the patients, but the results I believe would be excellent as regards return cases.

PRECAUTIONS AT HOME.

It is a general custom, when scarlet fever patients are discharged to send the parents or guardians a printed form, warning them as to the possibility of a return outbreak and giving instructions as to the treatment and observation of the discharged patient.

They are warned to give him a separate bed, and if possible a separate room.

They are asked to look for any signs of discharge from ears or nose, and if such appear, to place the patient under medical supervision. The patient is also to have a fork, knife, spoons and eating and drinking utensils set apart for his sole use. Three weeks is the usual period during which parents are asked to carry out these instructions.

It is, of course, necessary that all clothing worn or slept in by a scarlet fever patient should be efficiently disinfected immediately after his removal to hospital. Return cases are often ascribed to the turning out of clothes worn by the patient when first taken ill and not disinfected. These clothes are supposed to retain the infectious material during the patient's stay in hospital,

and, on being brought out for him to wear on his arrival home, infect other members of his family.

REMARKS AND SUGGESTIONS.

I have given a short description of the more common methods of administration which are in use to prevent return cases, and I propose to conclude this Thesis by making a few suggestions for the prevention of return cases.

From an experience of well over 3,000 cases of scarlet fever which I have treated in hospital, I have formed the opinion that the most important factor in the prevention of return cases is a sufficiency of space for each patient in hospital and an abundance of fresh air. A minimum of 2,000 cubic feet of air space is absolutely essential, and on no account should less be allowed.

It is a common practice to allow less cubic space for a child than for an adult, but this is not permissible in scarlet fever.

In scarlet fever the worst cases are children, and they require more, and not less, cubic space than adults. So much is this so that Dr. Boobyer, of Nottingham, has for some years treated his septic cases of scarlet fever on open air principles the same as are in general use in phthisis pulmonalis.

A large fever hospital should always have at least one ward empty, and no scarlet fever ward should work for more than three months at a time without being emptied, cleaned and disinfected. This, of course, is very difficult to do in epidemic times, but I believe it would make a difference for the better both in the mortality and in the return case rate.

Dr F. J. Woollacott, in the Medical Appendix to the Metropolitan Asylums Board Report for 1906, puts forward the opinion that the conditions in hospital are too artificial and that there is too sudden a change when the patient goes home. The hospital wards are kept at an uniform temperature by means of steam pipes, so that the mucous membranes of the patients become less and less acclimatised to changes of temperature, with the result that when the patient returns to his old way of life, his mucous membranes readily inflame and discharge on exposure to extremes of temperature.

Dr Woollacott gives in support of this theory the fact that of the Metropolitan Asylums Board acute hospitals, those which consistently give the best results as regards return cases are the old-fashioned, out-of-date, "hut" hospitals, while those which consistently give the worst results are the recently-built palatial establishments with every modern improvement.

This seems to me to be a very important point with regard to the building of new hospitals. The best kind of hospital to treat scarlet fever in would be of simple construction, with the wards heated by open fires instead of steam pipes. The patients, too, ought to spend as much time in the open air, and should have as much exercise out of doors, as possible, so that their mucous membranes may become inured to all kinds of weather conditions.

Nurses in charge of wards are very apt to keep children inside on cold days, and they often require a considerable amount of talking to before they can be made to understand that it is better for the child, in the long

run, to go out.

In cold weather a guardian nurse to look after children out of doors is absolutely essential, and the medical superintendent ought to insist that the guardian nurse shall be a person of experience and common sense. Her duty would be to see that the children, instead of standing about in the cold, take exercise by starting games.

As regards the isolation period, I am of opinion that no patient should be discharged before the 42nd day of disease. Adults may quite safely be discharged after isolation for six weeks, provided throat, nose and ears are normal, but children ought to be kept longer.

The best method of discharge is that of providing a special discharge ward. I believe that attempts to disinfect the throat and nasal passages by douching do no good, but may do harm.

Unless separate isolation of each patient be provided for each patient, I do not think return cases can be entirely prevented, but the numbers can be very considerably decreased by careful attention to the administrative details I have described.
