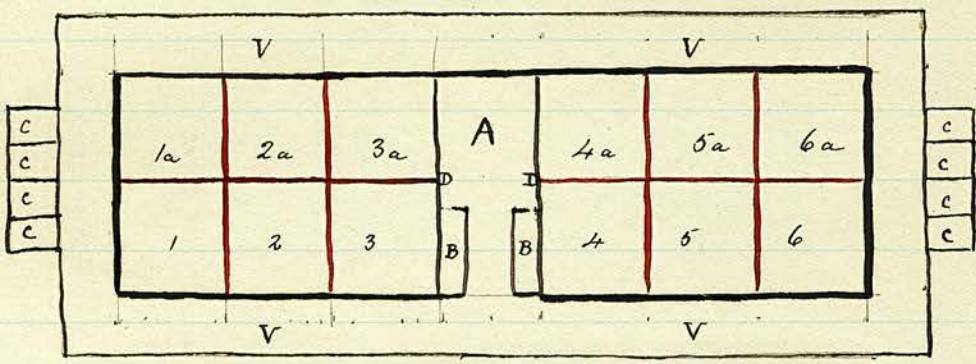


The Glass Cubicle System of Isolation - more especially in its application to the smaller isolation hospitals.

The glass cubicle system of separate isolation for infectious diseases is by no means a new one, but has been carried out in various continental towns for several years. It was not until 1906 however that the system was introduced into this country, a twelve bed pavilion, designed mainly on the lines of the cubicles in the Pasteur hospital in Paris being opened in March of that year at the Walthamstow Urban District Council's Isolation Hospital at Clingford in Essex. Several other isolation hospital authorities have since then erected cubicle pavilions more or less based on the plans of the original one at Clingford; in every case I believe they are considered to have fully justified their existence, ~~they~~ the original one has certainly done so, it may therefore be of interest to give a short description of the pavilion at Clingford, and of the methods employed in its

administration, with the results obtained. The remarks under the last two headings will be based on my personal experience as Resident Medical Officer of the hospital for the last eighteen months, and also on the case records for the preceding years since the cubicles were opened.

The accompanying rough sketch of the ground plan of the cubicles may be of some assistance in following the description.



The pavilion consists of a central duty room, (A in the diagram) with a ward for six beds on either side of it. The wards are ^{each} divided into six cubicles ~~each~~ by plate glass partitions which reach to the ceiling, and are supported on a wall of concrete

bricks, 27 inches in height. The partitions are indicated in red ink on the plan, and "V" marks the glass roofed verandah, seven feet in width, which surrounds the central building. Each cubicle is 2000 cubic feet in capacity. At either end of the verandah in the small annexes marked "C" are two water closets, a slop sink, and a cupboard containing a movable bath. At the entrance to the duty room are two store cupboards ("B", "B"), and in the duty room, just above the points "D", "D" in the plan, are placed two observation windows so arranged that from each a complete view of the six beds in the cubicles on the respective sides can easily be obtained.

Each cubicle has its separate door and window opening on the verandah, is heated by a hot water radiator, and contains a white enamelled hospital bedstead (or cot), a white enamelled locker with plate glass top, and a white enamelled stand holding a hand basin and soapdish. It was originally intended that this block should be used

for septic cases only, and, as these were to be removed to other wards as soon as they were convalescent, no chairs were provided. They have since been found necessary however, and a few bent wood armchairs which are easily disinfected when required, ~~for~~ have been supplied.

The floors are constructed of terrazzo throughout; the walls, ceilings, and wood-work are treated with Ripolin enamel.

There is an electric lamp suspended from the ceiling of each cubicle, it can be switched on either from the central duty room, or from outside the cubicle door. In addition there is a plug above the bed to which a hand lamp can be fixed.

Outside each cubicle just at the door are hooks on which hang the cloaks used by doctors and nurses while attending to patients, and on the verandah between every two doors is a lavatory basin, fitted with hot and cold water, and towel hook.

The ventilation is very thorough and may be briefly described as follows: -
 the windows of course open freely and

in addition are provided at the top of each with a faulight opening above the level of the glass roof of the verandah. A large air duct is carried under each floor from beyond the verandah on the opposite side of the building, over the opening of this duct at the floor level is placed a box with bit-and-miss ventilators on two sides. There is also a bit-and-miss ventilator beneath the head of each bed, an outlet flue in the ceiling, and a Sheringham valve above the head of each bed, this last opening, like the faulights, above the verandah roof.

Many of the above described features are illustrated in the accompanying photographs.





The view of the interior is a little confusing by reason of the various reflections from the numerous glass surfaces, but the low walls supporting the glass partitions outline each cubicle. The observation window in the duty room is well seen towards the left of the photograph; the second window in the cubicle on the right is of course merely a reflection. "X" indicates the cover of one of the air ducts.

The nursing and domestic arrangements will be presently discussed, but first the cost of the building may be briefly referred to. It seems to be a very general idea with those who come to

7

inspect the cubicles that the glass partitions must greatly add to the cost of erection, and that altogether the arrangement is a very expensive one. As a matter of fact the total cost of the twelve bed pavilion at the Walthamstow Hospital was a little under £3000 or £250 per bed, whereas the original separation block (now used as a discharge block) consisting of two small wards of two beds each, with duty room and the usual amusees cost just under £1260, or £315 per bed. These figures are in both cases exclusive of furniture, electric light installation, and cost of hot water heating. The comparison is perhaps not altogether a fair one, as the original separation block was erected by labour directly employed by the Council, while the cubicles were put up under contracts, it may however suffice to show that the new separation block compares by no means unfavourably with the old one even when cost alone is considered. When ease in administration is made the basis of comparison its

superiority becomes very evident.

The nursing arrangements are as follows: - the staff for the block consists of a charge nurse (who must have had 3 years general training), an assistant nurse, and a probationer. The assistant nurse, who must have had at least two years experience in fever nursing, takes night duty. In addition to the nurses there is of course a ward maid.

Each nurse before entering a cubicle puts on the cloak which hangs just outside the door; these cloaks completely cover the uniform, button closely round neck and wrists, and are provided with a hood which covers cap and hair. On leaving the cubicle she removes the cloak, thoroughly washes her hands with disinfectant soap at the nearest lavatory basin, and proceeds to the next patient or wherever else she may be required.

The ward maid does the rough work of the cubicles (which mainly consists in washing the floors) without taking any special

precautions as regards her uniform. She has no occasion to come in direct contact with the patients, and is strictly forbidden to do so. As may be understood, from the construction of the building supervision of such work by the charge nurse is very easy.

Each patient is provided with an electric push bell, usually placed under the pillow, these bells sound in the duty room, where there is also an indicator showing in which cubicle the bell has been rung. Children too young to ring the bell require of course a little extra supervision, and as all patients are visible from the duty room, and all ~~in~~ on one side of the block from any one cubicle of the six on that side, this is easily managed.

Feeding utensils are boiled once daily, after boiling the enamelled ware is marked in pencil with the different patients' names, and used for the respective patients for the next twenty four hours. After each meal all utensils are steeped in strong soda solution before washing.

In each cubicle there is a glass jar filled

with cyllin solution (which is renewed daily) in this is kept an aluminium spatula and the ball syringe used for throat treatment; the spatulas are boiled daily, the syringes and all toilet requisites are strictly individual, and never removed from the cubicles except for necessary cleaning.

As soon as a patient is discharged from a cubicle it is disinfected by means of a lamp burning formaldehyde tablets; as a rule the formalin vapour is allowed to act for three hours, the cubicle is then thoroughly aired and cleaned, and as soon as the bed has been freshly made up is ready for another occupant. As the cubicles are perfectly air tight with regard to ~~the~~ each other, any one of them can be so treated without the slightest inconvenience to the patients, or any interference with the ordinary routine.

The advantages and disadvantages of the system will be discussed after some particulars of the cases treated under it have been given. No doubt the methods of administration fall short of

11

perfection in very many particulars, and it would be easy to criticise unfavourably many of the foregoing details. This much may however be said - the methods adopted have so far proved effectual in preventing the spread of infection from one cubicle to another, as during the four years that the block has been in use in no case has a patient developed any symptoms giving rise to even a suspicion that any infectious disease could have been conveyed to them after their admission to the block. No attempt is made at grouping the patients according to the diseases from which they are suffering, in this connection the following two lists, chosen at random from many such records, may be of interest: -

On April 30th 1909 the cases in the cubicles were: -

1. E.E. - diphtheria, convalescent from whooping cough on admission
2. S.P. scarlet fever + acute nephritis
3. E.W. scarlet fever + acute nephritis
4. G.L. scarlet fever + diphtheria
5. S.G. admitted to general ward as scarlet fever, developed measles 2 days after admission.

- 6. M.A. scarlet fever, admitted from a house where there were several cases of measles
- 1a R.L. admitted as diphtheria, symptoms suggested scarlet fever.
- 2a H.C. admitted as diphtheria, later showed typical scarlet fever desquamation.
- 3a S.A. admitted as diphtheria, but considered to be scarlet fever only (very septic)
- 4a J.T. admitted as scarlet fever, but considered to have measles only.
- 5a E.F. scarlet fever + purulent conjunctivitis
- 6a D.W. scarlet fever + diphtheria

On June 20th 1909 the cases were: -

- 1 - Nurse L. (staff) mitral disease.
- 2 - F.R. : scarlet fever + acute nephritis
- 3 d.S. admitted as scarlet fever - measles only.
- 4 W.L. scarlet fever + diphtheria
- 5 R.P. very septic scarlet fever
- 6 A.A. doubtful scarlet fever
- 1a J.B. diphtheria + scarlet fever
- 2a D.M. doubtful scarlet fever
- 3a F.G. septic scarlet fever
- 4a D.V. doubtful scarlet fever
- 5a A.S. admitted as diphtheria, scarlet fever only
- 6a d. M. diphtheria + scabies.

No definite statistics as regards the results of treatment in the cubicles from a purely medical point of view, i.e. as to the effect on general progress and the incidence of complications, can be given. As a rule there is so much demand for accommodation in this block that septic and doubtful cases have to be removed to the convalescent wards as soon as in the former group acute symptoms have subsided, and in the latter a definite diagnosis has been made.

For the same reason it has not been possible to make any observations on the effect of separate isolation on the number of return cases although this would be a most interesting point to investigate. Dr A. G. R. Cameron, in his report on return cases occurring in the hospitals of the Metropolitan Asylums Board in the years 1901-1902, advocated separate isolation in scarlet fever from admission "with a view to the further observation and subsequent classification of cases." His view was that return cases were due to the defective elimination of the infective agent on the part of infecting cases, and that this

defective elimination was due in many cases to morbid conditions of the mucous membrane which render the patient peculiarly liable to superadded septic infections. These septic infections in turn still further lower the vital resistance of the mucous membrane, and possibly cause in cases in which the elimination of the scarlet fever infection was nearly complete, an actual reinfection with scarlet fever from the outside. Were this view proved to be correct, it is evident that separate isolation of at least those cases in which morbid conditions of the mucous membrane are present would be of great importance.

Von Jürgensen in his article on scarlet fever in Notunagel's *encyclopedia* quotes the regulations in force at the hospital for scarlet fever and diphtheria in New York, in which at the time the article was ~~wrote~~ written there had been no contagion traced from any discharged patient. Each patient there has a separate room during the whole course of the illness, and the disinfecting measures employed by all coming in contact with the patients are very thorough indeed. The satisfactory results as regards return cases cannot however

be by any means solely attributed to this separate isolation, as the routine adopted for disinfection of the patient before discharge is an unusually stringent one.

Moreover the part which the patient's surroundings play in his retention of infectivity is a very doubtful one, for it was pointed out by the Medical Superintendents of the Metropolitan Asylums Board hospitals in their observations on Dr Cameron's report that the percentage of return cases from patients discharged after 12 weeks detention was smaller than that from those discharged after eight weeks or under.

During the last eighteen months there has certainly been no return case of scarlet fever from the patients treated in the cubicles during the acute stage, or in fact during any part of their illness, but as the total "returns" during that time are under two per cent, it is unjustifiable to attach any importance to this fact. In any case the chief value of a block arranged in glass cubicles is, in the smaller isolation hospitals at least, that it provides a thoroughly

efficient and economical method of dealing with doubtful and mixed cases. In the Walthamston hospital, where there are 100 beds and only scarlet fever and diphtheria case are admitted, the daily average of patients being about 70, the twelve bed pavilion has as a rule proved sufficient for dealing with the doubtful and mixed cases which arise, although at most times a second such pavilion could be used to very good purpose. It is for instance impossible with the one pavilion to isolate nearly all the "septic" cases, only the worst of these can at present be placed in the cubicles.

During the year 1909 twenty five per cent of all patients admitted spent some part of their time in hospital in the cubicles. The reasons for thus treating such a large percentage may perhaps be best indicated by classifying these patients under the following headings:-

A. Patients notified as scarlet fever but presenting no definite signs or symptoms of that disease on admission = 34.

Of these thirty four, twenty afterwards

showed more or less typical desquamation, the remaining fourteen had no signs or symptoms of any infectious disease during their stay in hospital. To this class may be added four patients notified as "diphtheria or possibly scarlet fever" who showed no symptoms or signs of either disease while in hospital.

B. Patients who either on admission or during their stay in hospital had signs or symptoms of some disease other than that notified = 49.

Of these 12 diphtheria patients showed signs suggestive of scarlet fever but were not, after observation, definitely diagnosed as having suffered from the latter disease.

- 8 patients admitted as diphtheria proved to be suffering from scarlet fever only.
- 6 patients admitted as scarlet fever had signs of diphtheria also on admission (in 3 of those diphtheria bacilli were found)
- 5 patients admitted as diphtheria proved to have scarlet fever also.

- 5 patients admitted as scarlet fever were suspected to have measles on admission (in 2 of these the latter disease was later definitely diagnosed, in 3 the ultimate diagnosis was doubtful)
- 5 scarlet fever patients developed chicken-pox after admission
- 3 scarlet fever patients developed tonsillitis during convalescence, diphtheria was suspected, no Klebs Loeffler bacilli were found however.
- 2 patients admitted as scarlet fever proved to have diphtheria only.
- 1 diphtheria patient had on admission signs of recent chickenpox.
- 2 patients (1 diphtheria and 1 scarlet fever) were convalescent from whooping cough.

6. Patients who had on admission definite signs and symptoms of the disease notified, but who had been exposed to other infectious diseases = 7.

5 of these came from houses in which there were cases of measles, 1 had been exposed to measles, and 1 to chickenpox.

D. Patients who had a very septic condition of mouth, throat, or nose = 7.

5 of these had scarlet fever

1 had diphtheria

1 had scarlet fever + diphtheria

E. Cases of acute nephritis complicating scarlet fever = 12.

F. Miscellaneous = 19.

This heading includes various "overflow" cases, i. e. patients admitted with typical symptoms of the disease notified, but for whom there was no room in the appropriate ward, also some few cases removed to the cubicles on account of the greater quiet obtainable there, these were mainly patients with cardiac complications. It also includes a few children suffering from such conditions as ringworm, scabies, conjunctivitis etc which it is preferable where possible to isolate separately.

The above list is given mainly to illustrate the varied uses to which a cubicle block may be

put; it also shows how many cases, even in a small hospital of eighty to a hundred beds, arise which demand special isolation either for their own sakes or for the other patients.

On the cases classified under headings "A" and "B" it is hardly necessary to comment. It may be mentioned that, while twenty out of the thirty four patients in class A may seem to be a large proportion to have later shown ~~definite~~ signs of scarlet fever, and therefore to have been specially isolated with any real necessity, in the twenty all patients who showed any symptoms in the least suggestive of scarlet fever are included; it is very probable that several of them did not actually suffer from the disease. The remaining fourteen were almost certainly saved, by the cubicle isolation, from contracting the disease in hospital. During the year 1909 four patients, notified as scarlet fever, contracted that disease after admission. All four were considered to be "doubtful", but as the cubicles were all occupied at the time of their admission they had to be placed in

the general ward, and, in spite of being there treated on the "barrier" system as completely as possible, they developed the disease before room could be made in the cubicles.

On account of the large number of this class of case admitted one of the large London hospitals has decided to build a block of cubicles to be used solely as an admission ward.

The patients under group C - those exposed to other infections - are in many of the smaller isolation hospitals dealt with by being refused admission. So long as the available accommodation in the cubicle block permits, these patients are admitted to the Walthamstow hospital as freely as any others.

The small number of septic cases (class "D") is to be explained partly by the mild type of scarlet fever prevalent in Walthamstow during 1909, partly by the fact that such cases, if of only moderate severity are treated in the general ward on a modified "barrier" system. The seven treated in the

cubicles were cases of true scarlatina anguosa, and several proved fatal. Of the eight patients mentioned under heading B as having been notified as diphtheria, but proving to have scarlet fever three were also cases of scarlatina anguosa.

As regards group "E", i.e. acute nephritis cases, patients suffering from this complication are now always, if possible, treated in the cubicles on account of the warm equable temperature which can there be maintained. This has proved to give very satisfactory results; of the twelve patients mentioned, ten were discharged having made an entirely satisfactory recovery, the urine having remained free from any trace of albumen, and of normal specific gravity for at least a fortnight. In none of these was any trace of albumen found at any time after the seventh week, in most the duration of albuminuria was much less, the average being twenty nine days. In one patient blood was found, although not constantly, up to the thirty second day, the average duration of haematuria in the twelve patients

was fifteen days. One of the two children who were discharged before complete recovery took place was removed by her parents in the seventh week of illness with a faint trace of albumen still present in the urine; the other child had intractable, ^{chronic} vaginal discharge present on admission, and this discharge probably accounted for all the albumen found for three or four weeks before she went home.

Three cases of acute nephritis were treated in the general wards during 1909; while this is far too small a number to form a just comparison with the others it is interesting to note that one of those three was discharged twelve weeks after haematuria first appeared with a trace of albumen still present in the urine; a second patient, although ultimately making a complete recovery, had albuminuria until the end of the tenth week; the third case was more satisfactory and cleared up at the end of five weeks. It was after the first two of these three cases occurred that the practice of treating acute nephritis patients in the cubicles was adopted, so far the results

have been such as to encourage its continuance.

The miscellaneous cases (group 7) would have been decidedly more numerous had accommodation permitted; for instance many children with ringworm had to be treated in the general wards, and while with care inspection of others is of course avoided, separate accommodation for such patients is a great convenience.

All cases of illness among the staff, which happily were slight and very temporary, were also treated in the cubicles, but are not included in the numbers quoted. Any nurse who is warded is, if at all possible, allotted an end cubicle, where a couple of folding screens ensure complete privacy. In non-infectious cases the nurse in attendance wears no cloak.

In the foregoing description of the administration and uses of the cubicle block the advantages of this system have probably been sufficiently indicated; before finally summarising them it may be advisable to discuss the disadvantages, real and apparent.

First it is obvious that patients with

any marked delirium, or who for any other reason require almost constant attention (such as tracheotomy cases), cannot with safety be treated in the cubicles unless a special nurse is available for night duty at least. During the day, as there are usually a number of "doubtful" cases and others who require very little attention, the two nurses ordinarily on duty can as a rule manage one such "special" case for a limited period without neglecting the safety or interests of the other patients.

The risk of injury to the plate glass partitions does not appear to be very great, although it is an objection very often brought forward by visitors inspecting the cubicles. During the last four years the only mishap that has occurred in the Walthamstow hospital was the cracking of one of the central partitions during a very high gale. The wind suddenly and very violently burst open a cubicle door, and the glass plate immediately opposite cracked under the severe strain. No glass fell, and no injury could have been

done to patients even if this had occurred, as the cots are not near enough to the central partition. Had the catch of the door been a thoroughly satisfactory one the accident would not have happened, and ~~the~~ ~~the~~ the possibility of a repetition has been guarded against. Injury by delirious patients, when it is absolutely necessary to place such in the cubicles, is avoided by the provision of sufficient nursing staff; as however the partitions are a quarter of an inch thick considerable force would be required to fracture them.

As regards the extra labour entailed upon the nurses by putting the cloaks on and off, disinfecting the hands, and so on, it must be remembered that the proportion of nurses to patients is a high one for an isolation ward, especially as in the cubicles a considerable proportion of the patients are doubtful cases, awaiting definite diagnosis, who require very little attention. At meals a considerable saving in the nurses' time is effected by the lockers being so placed that

as to be easily reached both from bed and window, for convalescent patients the nurse opens the window from the outside and puts the food on the locker without entering the cubicle at all.

It cannot be denied that one is very much dependent on the conscientiousness of the nurses on duty for the successful carrying out of this system of isolation, and that it is very easy for ~~an~~ careless or ignorant nurses to bring discredit on it. In the Walthamstow Hospital we have been much indebted to the thoroughness of the two successive charge nurses of this block, who have always taken the utmost pains to keep up our satisfactory record, and to impress the probationers with the importance of the routine enforced.

From a patient's point of view the chief objections raised would probably be the limited space available for exercise during convalescence, and the somewhat monotonous existence (especially for children) due to the want of companionship. After all however the period passed in the cubicles is never

a very extensive one, and when the children are well provided with toys they do not seem to feel the comparative loneliness very oppressive. We find that the children in adjacent cubicles can fairly easily make each other hear through the partitions, and find it possible both to make friends and to quarrel in spite of them.

It would possibly be an advantage were the verandah provided with sail-cloth blinds, or some other such arrangement, to afford protection in windy or wet weather to the nurses as they pass to and fro; at the same time such blinds would considerably darken the interior of the cubicles when in use, and, in spite of the inevitable exposure to all varieties of weather, the nurses enjoy remarkably good health while working in this block, and moreover usually prefer being there to being in an ordinary ward. Were the verandah three feet wider with a roof projecting farther beyond the floor than at present, most of the discomfort entailed by

driving rain or snow could probably be avoided even without blinds.

We have so far had no great inconvenience to suffer from through the outside pipes freezing, such a contingency however requires to be guarded against in winter.

The terrazzo flooring has proved fairly satisfactory and there has been little cracking; it is probable however that were another similar block erected in this hospital Dolomont flooring would be used, partly on account of its freedom from cracking, and partly because there is no doubt that terrazzo makes a very cold flooring, and therefore causes no little discomfort to those working in the wards.

These points just discussed are the chief disadvantages or possible disadvantages which have occurred to me, or been suggested, during my personal experience in the working of the cubicle system; none of them have proved to materially interfere with the efficiency of the system, and so satisfactory has it proved that it has already been

decided that when an extension of the hospital accommodation becomes necessary, a second block of cubicles will certainly be the first addition.

The advantages of the system already put forth may in conclusion be briefly summarised: —

1. At a moderate cost of £250 per bed completely separate isolation for twelve different patients may be provided.
2. These twelve patients, even if suffering from very varied infectious diseases, may be attended by the same nurse without risk of infection being carried from one to another.
3. Separate isolation from admission is the only satisfactory method of dealing with mixed, doubtful, and septic cases, and can be very economically and thoroughly effected on a cubicle system such as has been described.
4. Each cubicle can be thoroughly

disinfected as soon as a patient leaves it, and if necessary be ready for the reception of another patient within a few hours, without any disturbance of the ordinary ward routine.

5. The system also provides for the immediate isolation of any child who develops symptoms indicative of danger to other patients after admission. In connection with this point it may be mentioned that a large county hospital in the South of England has recently decided to provide a separation block based on the plans of, and very similar to, the cubicles at the Walthamstow hospital. For any general hospital which has to deal to any extent with infectious diseases, especially where there are children's wards, the advantages of this system are obvious, and the new annex is certain to prove a very satisfactory method of dealing with many troublesome situations.

Jessie Kelly

The Glass Cubicle System of Isolation -
more especially in its application to the
smaller isolation hospitals.

Jessie H. Gellatly,
36 St. Albans Road,
Edinburgh.