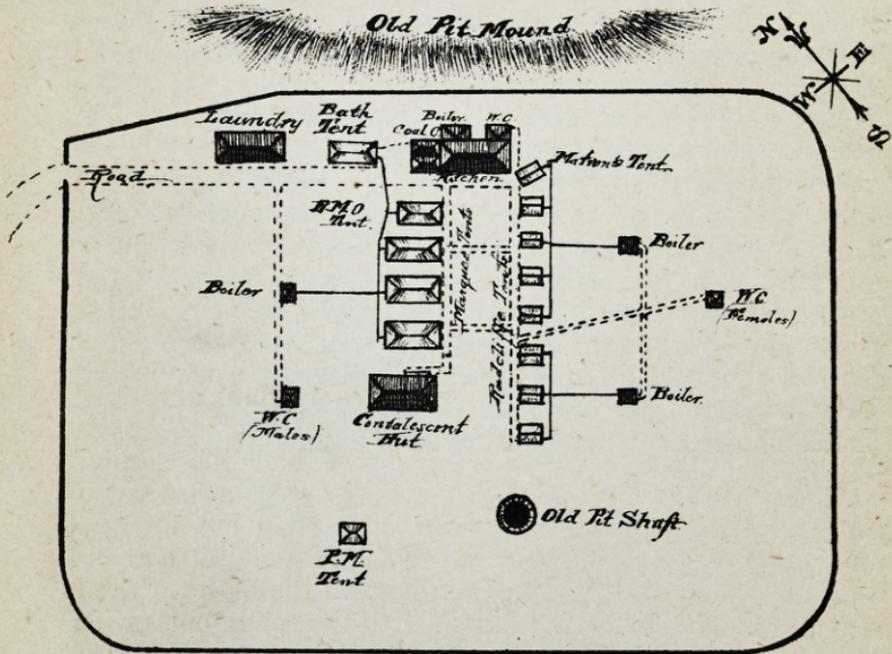


Plan of Small-pox Hospital.

Wexnesbury.



THE USE OF TENTS IN THE TREATMENT OF
SMALL-POX.

BY G. W. COLLINS, M.R.C.S.

(Read: Jan. 3rd, 1883.)

It is my purpose to lay before the Society the most prominent features in the arrangement of the Small-pox Tent Hospital under my charge at Wednesbury, Staffordshire, during the recent epidemic at that place, and to show, from my experience there, and at Finchley, where, in 1881, I superintended a similar hospital, the relative merits and demerits of the methods adopted for the accommodation of small-pox patients. In order that my remarks may be more easily followed, I will give a brief outline of the disposition of the Wednesbury camp and the general arrangement of the tents.

The camp was situated on a bleak hill, at a distance of about seven hundred yards from the outskirts of the town, partially sheltered from the north by a disused pit-mound, but very exposed to the east wind,—a circumstance that materially affected the temperature of some of the tents. Two kinds of tents were in use, viz., the Radcliffe hospital tent, and the hospital marquee. These were respectively pitched in two parallel lines; with a wooden hut for convalescent patients at one end, and the bath-tent, kitchen and laundry, two separate brick buildings, at the other. There was also a *post-mortem* tent attached to the camp, but, owing to popular prejudice, I was unable to make use of it. The whole camp was surrounded by a wooden hoarding seven feet high, which enclosed about two or three acres of ground. The plan which I have had prepared will more readily explain this to you. Of the twelve tents forming the encampment, eight were Radcliffe and three were hospital marquees; two of the Radcliffe tents being appropriated to the nurses and matron, and the remaining six to patients. There was also a Mildmay tent provided for myself.

The dimensions of the two kinds of tents were as follows:—

Radcliffe, 16 feet long, 14 feet wide, and 13 feet high to the ridge, containing 1,850 cubic feet of air, and 224 super-

ficial feet area, and holding four patients, giving 56 superficial feet to each patient.

Hospital Marquee, 30 feet long, 16 feet wide, 7 feet high at the sides, and about 11 feet high to the ridge, containing 3,800 cubic feet, 400 superficial feet area, and holding eight patients, giving 50 superficial feet to each patient.

The heating of the tents was performed by hot-water pipes running round each tent, supplied from three furnaces, two of which supplied the eight Radcliffe tents, and the other the three marquees. The bath-tent had a separate boiler and supply. Two systems of drainage were used. The sewage from the kitchen and laundry was conveyed to the common sewer of the town, and that from the wards was collected into two deep pits, sunk at opposite sides of the enclosure, and lined with brick, over which the closets were built. The porous nature of the soil readily absorbed the liquids of the drainage, and the deposit was daily covered with carbolised sawdust. This appeared to answer the requirements of the camp sufficiently well. All linen from the wards was soaked for twenty-four hours in carbolic acid to the strength of 1 in 50 before going to the laundry.

Having thus epitomised the arrangement of the camp, which in its organization and disposition was similar to the Small-pox Hospital at Finchley, sketches of which I likewise place before you, I come to the object of my paper, viz., that of discussing the various advantages and disadvantages of each kind of tent as adapted to small-pox, so far as my own experience goes. And I may say at once that I consider the Marquee greatly superior to the Radcliffe, both on account of the greater convenience which the larger tent affords, and also for its higher sanitary qualifications. This opinion, formed by my experience of both seasons of the year, during the summer at Finchley, and during the present winter at Wednesbury, I base on the following grounds.

From the figures I have quoted, it will be seen that the Marquee tent contains more than double the amount of cubic space (100 cubic feet more) than the Radcliffe. It is true that it holds double the number of patients, and this might *prima facie* seem to place them upon an equal footing, but the several advantages connected with the ventilation of the larger tent, will, I think, lead you to agree with me that the Marquee serves the purpose most adequately. In the first place, it is extremely difficult, if not impossible, under some circumstances, to maintain a sufficiently high temperature in a Radcliffe tent, whereas in the marquee this can be

accomplished with comparative ease. This is mainly due to the small size of the former tent and the absence of proper means of ventilation. Joined to this, in the smaller tent, a much greater volume of cold air is unavoidably allowed to enter with each opening of the door; and this volume of cold air is not only proportionately but practically larger than that which enters a Marquee from the same cause. When constantly repeated, as in attending confluent cases, which require frequent visiting, this disturbance will cause a reduction of as much as 15 deg. in the course of an hour. And as, in order to prevent the super-heating of the tent, it is necessary to keep the canvas more or less raised at the aperture of entrance—there being no other adequate means by which ventilation can be effected at will—the difficulties to be encountered in wet or snowy weather are sufficiently apparent.

It is but right to say that these tents, when empty, properly closed, and heated by hot water without gas, can be kept at a temperature varying from 50 deg. to 60 deg., but, when occupied, the temperature rapidly runs up to 75 deg., and they become unpleasantly warm. Wind also, when these tents are subject to its direct force from any particular quarter, sensibly affects them, owing to the manner in which the canvas is fastened at the entrance; and when the wind is accompanied by snow or rain, the inner and outer walls at the front and back are blown together, thus rendering the inner wall wet; both snow and rain, too, find their way to the inside of the tent, through the inadequate arrangement of the ventilators in the roof. It is, therefore, obvious that in wet or snowy weather a want of care on the part of the nurses in adjusting the canvas, and the goings in and out according to the necessities of the patients, combine to form a serious drawback.

Again, the small size of the Radcliffe tent renders it particularly unsuited for the reception of confluent cases, because the smell from only one such case quickly pervades the whole interior to a most objectionable degree, and when two bad cases lie together under one canvas, it becomes unbearable to both the nurses and the other patients for any length of time. When it is remembered that there is either insufficient or ill-regulated ventilation at hand to remedy this inconvenience, it becomes a factor assuming a prominence which entitles it to special notice and consideration. I may likewise mention that there is a large number of straps, six in all, to unbuckle and refix at each entrance or exit, and, not-

withstanding this precaution, the cold air from without still succeeds in forcing its way in.

As opposed to these disadvantages, the Marquee tent answers all the requirements that the Radcliffe in its present shape fails to accomplish. Its chief advantage is that an even temperature may be maintained day and night with a minimum of trouble, notwithstanding the variations of the external atmosphere. As a fair instance of this, I may state that a tent of this description, when unoccupied, was kept at 62 deg. Fahr., without gas, and by the hot-water apparatus alone, while the thermometer outside stood at 28 deg. Fahr., and this was effected without other trouble than that of keeping the furnaces properly charged. This regularity of temperature is to be accounted for by the presence of that method of ventilation which is absent in the previously considered type of tent, and the arrangement of the canvas at the entrance. Here the ventilation is perfect and under complete control. The cold air which finds its way in with the opening of the door is merely nominal, and, owing to the capacity of the structure, the effect of the small amount that does enter is entirely neutralised by the large volume of warm air with which it comes in contact.

In consequence of the admirable system of ventilation adopted in these tents, there is entire freedom from draughts, and the snow and rain never get in, either through the door—owing to the efficient overlapping of the canvas,—or through the ventilators in the roof—owing to their property of being closed at will from the inside; nor does the inner wall of the tent ever become wet, as is the case with the Radcliffe tent. In conjunction with the system of ventilation, the size of this form of tent prevents the unpleasant smell from the confluent cases being perceived, and it is only when the ventilators are kept closed, and the temperature is allowed to rise, that this inconvenience becomes perceptible.

The larger tent, containing as it does double the number of patients, as it were in one room, it is apparent that the necessary attendance is less divided, is centred more into one focus, and is consequently under more direct supervision—an item of as much importance to the patients as to the medical staff; so that it requires less trouble to attend eight patients in a Marquee than the same number in two Radcliffe tents. In fact, I found that two day nurses and one night nurse were sufficient for the twenty-four patients under three Marquees, where two day and two night nurses, for the same number of patients, had their attention divided over six

Radcliffe tents. The Marquee has also the advantage of greater comfort, and if the preference of the patients themselves be taken into account, it leaned invariably to the larger tent. The facility of ingress and egress likewise makes these tents preferable, for while allowing a speedy entrance or exit, the opening of the canvas is unaccompanied by a rush of cold air from without, on account of the suitable disposition of the canvas.

With reference to the hut attached to the camp at Wednesbury I have little to say. It was a four-sided wooden structure of a single floor, and was roofed with slates. It measured about 30 feet long, 20 feet wide, and 7 feet high at the sides, being divided by a transverse partition which separated the male and female patients, and contained twelve beds. It was used exclusively for convalescents. The heating was performed by means of a large stove in the centre, burning coals, and two ventilators were fitted to the roof, and one at each end of the building. This arrangement left much to be desired in the maintenance of an even temperature, for despite the greatest care draughts were frequent, and only with much difficulty could the temperature be prevented from undergoing variations corresponding to those of the external atmosphere. The comfort also of this building, although furnished in precisely the same style as the tents, was greatly inferior to that of the canvas structures.

As regards pulmonary complications, all of those which came under my notice were due to the effects of the disease itself, and none could be attributed to exposure to the cold air either in the Radcliffe or Marquee tents.

To sum up, then, the conclusions I have arrived at. The Radcliffe tent as at present constructed is not, in my opinion, so well adapted to the accommodation of small-pox patients as the Marquee, nor in fact to any disease characterised in some of its forms by powerful smells; but with suitable alterations in the mode of ventilation it would doubtless be eminently successful as a general hospital tent. The wooden hut I consider a still less appropriate form of lodgment, it being neither compact, commodious, nor so serviceable as a tent. The Marquee, on the other hand, is, owing to its efficient ventilation, admirably suited to the treatment of this disease, both in winter and summer. In winter the temperature can easily be preserved from the influence of the weather outside, so long as the heating apparatus is properly attended to; and in summer—even in very hot weather, as some of the days in the year before last, when the temperature was 105 deg. in the sun—perfect ventilation may be secured by opening both extremities of the tent, and looping up the sides.

Three important points I should like to impress are these. 1. All tents should have a trench surrounding them. 2. The floors should in every instance be raised a foot or more above the ground. 3. The canvas walls should not be pegged down to the ground, but fastened by ropes so that they may be looped up at the sides.

For the following digest of weather reports since September I am indebted to the courtesy of Mr. Symonds, F.R.S., and Mr. Marriott, both of the Meteorological Society; and I think it will serve to show very conclusively that tent hospitals can be successfully conducted under the most disadvantageous atmospherical influences.

The temperature varied considerably during my stay at Wednesbury, the two extremes being 66.8 deg. and 17.4 deg. Fahr. The highest mean was 46 deg.; the lowest mean was 33 deg. On fourteen days the temperature was above 60 deg., and on twenty-three days the temperature was below 32 deg.

During the ninety-eight days of my residence we had only nineteen days of sunshine. Of snow we had nine days; fog and rain, sixteen days; rain alone, forty-two days; and frost, twenty-three days. In spite of this continual variation, I found the Marquee tents capable of having their even temperatures maintained with very little more trouble than that required during the summer months at Finchley.

An abstract of the statistics obtained during the recent epidemic gives us the following figures, which may perhaps be interesting. Of the 118 patients treated during three and a half months, thirteen died, giving a mortality of 11 per cent. Ten of these succumbed to the severity of the disease; two died from pneumonia; one died from facial erysipelas; five cases had slight bronchitis on admission, and all the confluent cases had symptoms of the rash in the trachea and larynx. Twenty-four unvaccinated patients were admitted, and amongst these there was a mortality of nearly 21 per cent. (20.83 actually), the death-rate of the vaccinated patients being $7\frac{1}{2}$ per cent. In eleven vaccinated cases the rash aborted either entirely or in part.

The following is a Table of the cases admitted:—

	Male.		Female.		Total.
Confluent	18	.....	20	.....	38
Semi-confluent ...	7	.....	11	.....	18
Discrete	32	.....	29	.....	61
Hæmorrhagic	1	.....	—	.....	1
					118