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TREATMENT OF THE SICK
IN TENTS
AND TEMPORARY HOSPITALS.

THE HISTORY OF THE ...

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ON THE TREATMENT OF THE SICK IN TENTS AND TEMPORARY HOSPITALS.

By EDWARD COWLES, M.D., of Boston.

Read before the Massachusetts Medical Society, June 3d, 1874.

THERE are very many instances upon record that furnish ample illustration of the truth of the assertion that temporary hospitals are the best ones. A few of them may be cited. It is related that, in 1755, some men-of-war carried out from England to North America a malignant jail-fever. The fever continued to spread while at sea, but at Halifax the sick "were lodged in tents, or in very old shattered houses that admitted the air very freely, which put a sudden and effectual stop to this disorder."*

In 1758, says Sir Richard Brocklesby, a greater number of sick were landed out of transports on the Isle of Wight than could be contained in all the spare out-houses, barns and empty cottages that could be procured. A very rudely-built temporary shed of deal boards was constructed to hold 120 patients, and, though apparently inadequate to the end proposed, it was found that, notwithstanding much extraordinary cold and moisture, remarkably fewer died of the same disease than died anywhere else; and all the convalescents recovered much sooner than they did in the warmer and closer huts and barns, where fires and apparently better accommodations of every kind could be procured for them.†

The instance is often quoted of the use of the abattoirs at Paris, during the invasion of France in 1814 and 1815, when the sick and wounded were put in these simply constructed buildings, which had neither doors nor windows, so that the wind blew directly through; yet the mortality in them was only one half of what it was in the hospitals.

The same facts were observed by the Prussians in 1812 and 1813, and Sir James McGrigor fully recognized the immense importance of the distribution of the sick and wounded of the British Army in the Peninsular War.‡ Sir John Pringle had a great and wholesome fear of general hospitals for the English service, and strenuously advocated the dispersion of the sick in small establishments.§

Very many such instances may be found among the recorded observations of medical men of the past century, indicating that the educated opinion and experience of the profession has always been against the agglomeration of the sick in large numbers. In our own times, and within the personal knowledge of every one here present, there

* Parkes. Practical Hygiene, 4th ed., p. 327.

† Ibid, p. 328.

‡ Sir James McGrigor on Diseases of the Army. Medico-Chirurgical Transactions, vol. vi.

§ Pringle. Observations.

have undoubtedly been notable illustrations of the truth of this matter.

Since 1854, the sick of the Austrian army have been largely treated, during eight or nine months every year, in well-ventilated tents, in preference to field hospitals. The results were very satisfactory, and Dr. Krause reports that "the most severe maladies ran their course much more mildly in the free air, i. e. in tents, and recovered more perfectly and more quickly than in the confined space of hospitals." When, in following years, tents were kept open farther into the winter, it was noticed that when, by a sudden onset of cold weather, the temperature fell to the freezing point at night, the sick were in no degree damaged, and the men themselves, though severely ill, declined the offer to move them from the tents into the hospital. In the experience of six years (1854 to 1860), typhoid fever, in its severe forms, was treated more successfully in tents than in the hospitals, the rate of mortality being 20.9 per cent. in the former and 30.5 per cent. in the latter. The most favorable results were observed also in cases of small-pox, pyæmia, hospital gangrene and wounds. When, in 1859, a number of wounded (789) were sent from Italy, there was no death among any of those treated in tents, where all the severe cases were sent. No case of pyæmia occurred in tents, and in no single case could it be made out that hospital gangrene originated there, though there were such cases in the wards of the hospital building.* The story is well known of the terrible losses, in the Crimean war, of those treated in the large hospital at Scutari, with at one time 2,500 sick and wounded under its roof, of whom two in every five died, while there was afterwards not one half the mortality among those in the hospital tents, though badly fed and clothed and without proper medicines. The yearly death rate of 60 per cent. of the strength of the army, from disease alone, in the first seven months of the campaign, was reduced to a yearly average of $1\frac{1}{5}$ per cent. during the last five months.† Wooden barrack hospitals were for the first time made use of on a large scale during that war.

At the beginning of the civil war in the United States of America, as had been the custom in emergencies in all previous wars of modern history, public buildings, schoolhouses, churches, hotels, factories, &c., were used as hospitals; but gradually one-story wooden pavilions, erected for the purpose, came into general use. It was prescribed, by orders of the War Department, that the pavilions should be 187 feet long, 24 feet wide and 14 feet high from floor to eaves. Two small rooms were partitioned off, at one end for bath-room and water-closet, and at the other end for medicine closet and nurses' room. The space remaining, 165 feet in length, was occupied by beds for thirty patients, and there were sixteen windows on each side of the pavilion. Ventilation was partially obtained by doors and windows, but principally, in summer, through an open ridge. In winter, the wards were each heated by four stoves, the pipe of which, passing upward through wooden shafts, formed ventilating flues for the extraction of foul air. Fresh air was introduced through air-boxes opening under the stoves. The floors, roof and walls were of a single thickness of boards, with the joints

* Report on Hygiene by Dr. Parkes. British Army Medical Report for 1862.

† Report of the Royal Commission on the Sanitary State of the Army, 1858, p. 361.

in the walls battened outside, and the roof made water-proof with some cheap material. The floors of the buildings were required to be at least eighteen inches above the ground, with an open and free passage for the air beneath.*

The military hospital system was developed and perfected as had never before been done, and, at one time, in 1864, there were 202 general hospitals, with 136,894 patients in them. The average yearly mortality rate among the sick, of the whole period of the war, was less than 6 per cent. of the whole strength of the armies, a result obviously due to an excellent and efficient hospital organization.

Compare with this the annual mortality from disease of the British Army in the Crimea, which was 23.2 per cent. of its whole strength, and with that of the French Army, which was 30 per cent.

It is well known that great numbers of our sick and wounded were treated in tents in the field hospitals during the War of the Rebellion, and it was not the least important among the achievements of the Medical Department that it was proved beyond question that tents afford all necessary protection against unfavorable atmospheric influences, at least during all but the winter months, and that wooden barracks furnish entirely adequate protection and shelter all the year round in temperate climates.† Dr. Hammond, in his treatise on Hygiene, says, in writing of the earlier years of the war, that "nothing is better for the sick and wounded, winter and summer, than a tent or ridge-ventilated hut. But in one instance that has come to my knowledge has hospital gangrene originated in a wooden pavilion hospital, and in no instance, so far as I am aware, in a tent."‡

The history of the Franco-German War, in relation to this subject, is exceedingly interesting, and an examination of the hospital system, in each of the two countries, give additional proof of the superiority of special temporary structures. Tent hospitals were not so much used as in the war in America, their proper management being, apparently, not understood. The American Ambulance, in Paris, attracted great attention, by its remarkable success and its demonstration that the objections believed to exist against tent-hospitals for winter service were not well founded. One of the earliest barrack hospitals to be erected as a result of American military experience was designed by Dr. Esse, and annexed to the Charity Hospital at Berlin, in 1867. It was only 84 feet in length, and contained 20 beds, but otherwise resembled the American pavilion, with the addition of a gallery, 4½ feet wide, on each side, and a verandah at each end, and being constructed somewhat more substantially, with double walls and floor, as it was designed for use in winter, as well as summer. It was warmed by two stoves, and, by a peculiar and effectual method of ventilation, the foul air was drawn through the open space in the hollow walls and floor, and passed upward through pipes near the stove, escaping through the roof. The Germans afterwards built many barrack hospitals, differing chiefly from the American system, in use during the civil war, in being smaller, containing fewer beds, and

* Circular No. 6, Surgeon-General's Office, p. 152.

† See Medical and Surgical History of the War of the Rebellion, Part I, Appendix, pp. 148, 149, for a description of the winter huts and hospitals used by the troops of the Army of the Potomac in 1864. Report of Surgeon T. A. McFarlin, U.S.A., Medical Director.

‡ Treatise on Hygiene, p. 355.

being more hastily constructed. Many of them were so constructed that, in pleasant weather, the walls could be removed, and they could be thrown open on every side, with the galleries and verandahs screened and protected by canvas curtains.*

The English model-hospital barrack is constructed with double walls, and is raised above the ground, for the free circulation of the air beneath. Great pains are taken to prevent the deposition and accumulation of organic matter in the cracks and joints of the woodwork. The inner walls are made of hard material, which can be washed, and the floors are of hard wood, kept clean by waxing, with the joints filled with cement. Latterly paraffin has been used by being melted and poured upon the floors, and ironed in with a hot box-iron. It is also applied to the walls and furniture as a paint, dissolved in turpentine or paraffin oil.† The recent experience of the English in the treatment of epidemic diseases in such hospitals is not less remarkable than the instances before quoted.

The plans for permanent military hospitals at army posts,‡ adopted by the U. S. Government, carry out the essential principles of the barrack hospitals of the war. They provide for an administration building and attached pavilions, to hold from 12 to 24 beds each. They are to be built with double walls and quite substantial, but still are comparatively inexpensive. They are generally wooden structures, but sometimes they are built of brick upon the same plan. One of these brick hospitals may be seen at Fort Independence, Boston Harbor; it has a capacity of 24 beds and cost \$13,500.

Dr. Billings, in his Report on Barracks and Hospitals, in 1870, writes of the U. S. Army Hospitals then existing, "they are satisfactory in one respect, that they are almost all temporary hospitals. This I consider a decided advantage, as I believe that no hospital should be constructed with a view to its being used as such for more than fifteen years. If the money required to put up such structures as the New York civil hospitals, the Rhode Island hospital or the Cincinnati hospital, were divided in two equal parts, one-half being used to erect frame hospitals of the same capacity as the stone and brick hospitals actually built, and the other half being put out at interest at 6 per cent., a complete new hospital could be furnished every twelve years, for an indefinite period to come."§

Many objections are generally believed to exist against the use of tent and barrack hospitals—that they furnish inadequate shelter, are wet and cold, and cannot be properly warmed in bad weather, that the ground around and beneath them will become infected, &c. These objections must be considered as proved to be quite unfounded, by the very extensive and successful use that has been made of such hospitals. Proper management will overcome all these difficulties. The tent wards which you have seen at the Boston City Hospital have rendered most satisfactory service in the past two years. They were in use during only about four or five months in each year, between May and October. They are constructed of U. S. Army hospital tents, which

* History of the American Ambulance in Paris, 1870-71, pp. 207, 218.

† Parkes's Hygiene, p. 330.

‡ Circular No. 2, Surgeon-General's Office, 1871.

§ Circular No. 4, Surgeon-General's Office, 1870, pp. 22, 23. Report by Dr. J. S. Billings, U.S.A.

are 14 feet in length, 15 feet in width, 11 feet in height at the centre, with a wall 4 feet 6 inches, and a fly of appropriate size. The tents now in use have the two latter dimensions increased, being 12 feet high at the centre, and having walls 5 feet high. They are made of 10-oz. cotton duck, and, with poles, cords and pegs complete, can be bought for less than \$100 each. Tents of this size will hold very comfortably six beds each. At the City Hospital, the tent-wards have been constructed in the following manner: A floor of planed and matched boards, 37 feet long and 15 feet wide, is laid so as to be about 18 inches above the ground, and supported upon blocks at many points to give it firmness. A light and strong frame, just fitting the inside of a tent, is put up at each end of this floor, leaving a space of 9 feet in length in the centre between the tents. Two tents are then put upon the frames, and a narrow board placed between them to complete the ridge of the structure. A tent fly is then spread over each tent and fastened on each side by its cords to a rail on a level with the eaves of the tent, and about two feet distant from it. Below these rails and near the ground are others to which the cords from the eaves of the tents are attached. A third fly is then spread and fastened to the rails on each side to form an awning over the open space between the tents. In this space are placed a table, chairs, refrigerator, &c. The walls of the tents can be raised on all sides and looped up in pleasant weather, so as to form an awning of the whole, or they can be closely fastened down to keep out the rain and wind. During the last two seasons, 50 patients have been treated in these tent-wards with the most gratifying results.

The U. S. Army hospital tent has at one end a lapel, so that two or more tents being joined and thrown into one, a tent pavilion is formed, with a continuous covering or roof. In the field hospitals, during the war, it was customary to unite four or six tents together in each pavilion, and it was found to be an arrangement that was convenient and advantageous in many ways.

Many different forms of hospital tents have been devised in other countries, but none seem to have rendered any more satisfactory service than those just described.*

The heating of tents properly has been regarded as a matter of some difficulty. This has been accomplished quite satisfactorily, however, by the use of fireplaces, sheet-iron stoves, and by a plan called the "California stove." In this plan a small excavation is made in the ground, either within or just outside of the tents, and the fire being built in this excavation, the smoke and heat is carried along a covered trench, which passes under the floor of the tents into an upright flue, outside and beyond the tent wall. The tents are thus warmed through the ground or floor. This method was perfected and very successfully employed in the American Ambulance in Paris, in the winter of 1870 and '71.†

An important consideration that must never be forgotten is that perfect cleanliness must be maintained around and about such temporary

* Many different forms of tents and hospital barracks are figured and described by Dr. E. A. Crane in the History of the American Ambulance in Paris. See, also, Parkes's Hygiene, pp. 514-17.

† A very interesting and instructive chapter on this subject may be found in the History of the American Ambulance, p. 519.

hospitals. The ground about them should be thoroughly drained, and the surface replaced from time to time. Frequent and systematic policing must be enforced, and the location of tents must be changed, if long in use. The importance of this matter is generally overlooked, and the inattention to these very requirements at many of our popular summer resorts in the country, and at the seaside, has caused so much serious and fatal disease as to attract the general attention of physicians.

In the light of such experiences as have been set forth, it must readily be seen how easy and simple a thing it is to provide good hospital accommodations, in any emergency, no matter how sudden and unexpected, that the prevalence of epidemic and infectious diseases may occasion. In England such emergencies are now anticipated and preparation is made for them. Dr. Parkes says that "within the last few years it has become customary for all towns of any size to put up some temporary hospitals during an outbreak of cholera, smallpox, relapsing fever and typhus, and to remove persons ill with these diseases at once from their dwellings." Under the provisions of the Sanitary Act of 1866, the Medical Department of the Privy Council points out in relation to providing "hospitals or temporary places for the reception of the sick," "that villages should have the means of accommodating instantly four cases of infectious disease, in at least two separate rooms, and it is considered that a good cottage would answer the purpose." "For temporary emergencies, tents are recommended or huts are advised."* If tents cannot be procured or practicably used, a hastily built barrack hospital of boards may, in a few days, be prepared. And not only this, but it will be one that will sufficiently shelter the sick, and will not be surpassed in its healing influences by the finest structure in the land. Every large town may have a well-built, wooden, pavilion hospital, which will fulfil all the requirements of a hospital, and still be cheaply built and supported. The principles upon which a hospital should be constructed cannot be better set forth than in the rules given by Dr. Parkes.†

1. The sick should be distributed over as large an area as possible, and each sick man should be as far removed as possible from his neighbor.

2. The sick should be placed in small detached and perfectly ventilated buildings, so that there is no great number of persons in one building, and there shall be no possibility of the polluted air of one ward passing into another.

When we are called upon to devise a plan for a hospital, the prime object that should always be held in view is that it is for the healing of the sick. As far as its construction is concerned, we are to provide for the sick the *best permanent shelter*, and one that may be convenient for administration. Nothing more is needed, and when we begin to attach importance to other considerations, we begin to lose sight of and obstruct the attainment of our prime object. An infinite number of invincible proofs can be cited as positive evidence that temporary hospitals are the best. The reason why they are the best is simply because in them, better than in any others, we get pure air. Dr. F. H. Hamilton says, "other things being equal, the best place to

* Parkes's Hygiene, p. 333.

† Ibid, p. 328.

treat a sick or wounded man is, always, where he can get the most and the purest air." Florence Nightingale has comprehensively stated the whole matter in the first words of her "Notes on Hospitals," in which she says, "it may seem a strange principle to enunciate as the very first requirement of a hospital, that it shall do the sick no harm." These propositions may be taken as the axioms of hospital construction, and would undoubtedly be accepted as such by all who would build hospitals, from those who would treat the sick only in temporary and destructible huts and barracks, to those who would construct architectural monuments of their philanthropy. But when we come to inquire *how* we shall best provide the proper conditions for the treatment of the sick, give them abundance of pure air, and surround them with all the influences that can contribute to their recovery, then the difficulties begin, and the architects and the physicians are apt to disagree.

The lamentable errors of the past, in the histories of great hospitals, with their crowded wards and terrible mortality, furnish instructive lessons, and warn us to seek to avoid the evils of the old hospital system, of which the old Hôtel Dieu of Paris and St. Thomas of London, in the last century, are examples. We have the same evils in the hospitals of our own day, and do not need to go beyond the large cities of our own country for such examples. Even at so late a period as that of the Crimean war, the old system prevailed, and the disastrous events of that war may be said to be the starting point from which followed the great changes wrought by modern hospital reform. The extraordinary results that have been obtained in the treatment of the sick and wounded, in temporary hospitals, have given forcible demonstration of the superiority of tents and barracks over hospitals of complicated construction. The rapid advances that have been made in modern times in all departments of scientific knowledge, the better understanding of the true nature of disease and the influences that propagate and control it, have contributed largely to the progress of hospital reform.

A startling array of facts has been brought to light in regard to the bad management and high rate of mortality of the great hospitals of the past and of those still existing. Such facts point to an unmistakable and inevitable conclusion. It is declared by Dr. Simpson, Dr. Kennedy and others who have most thoroughly investigated this subject, that a great portion of the high rates of hospital mortality is preventable, and due to defects in the construction of hospital buildings, and that, as the well are made sick by "crowd-poisoning,"* so the sick, placed under the same influences, are surely hurried on to their death. The names "hospitalism" and "hospital influence"† are given to these evil conditions, and it is declared that there are hospital diseases which have their origin *in the hospital*, that they generate therein an endemic poison which, by its "*cumulation and saturation*,"‡ pervades the building, and surely kills many of the sick who come within its walls, who could get well elsewhere.

It is not intended, in this paper, to discuss in detail the progress of

* Dr. J. J. Woodward, U.S.A. Camp Diseases of the United States Armies, 1863, p. 42.

† Works of Sir J. Y. Simpson, vol. ii.

‡ Dr. Evory Kennedy. Zymotic Diseases and Puerperal Fever. Dublin Quarterly Journal of Medical Science, 1869. Remarks at a meeting of the British Medical Association at Leeds. Galton on Construction of Hospitals, 1869, p. 57.

modern hospital reform. The whole subject is clearly and ably reviewed by Dr. Derby in the "Report of the State Board of Health of Massachusetts," for 1874, recently published. The summing up of the whole matter in relation to the evils of "hospitalism" and "hospital influence" is, that the old system of hospital construction is bad and utterly to be condemned.

Many new hospitals have been built in the last twenty years, in which the principles enunciated by the advocates of hospital reform have been partially carried out. In all permanent hospitals, however, the plan has almost invariably been to build pavilions three or four stories in height, and not the true pavilions of one story each. As an example of these, and one of the first to be erected in this country, is the Boston City Hospital, which was first occupied ten years ago. It was then considered to be quite perfect in its general plan—that of detached buildings, &c.—and was copied in other cities. Not less than five or six civil hospitals, upon essentially the same plan, have been constructed in New York city alone during the last few years. Other examples are the celebrated Lariboisière Hospital of Paris, the new St. Thomas of London, and many more; but though a great advance upon the old hospitals, these and many others have now been long enough in use to have shown that many of the grave evils still exist in them which it was sought to avoid.

The great desideratum of the sick, pure air, is not obtained in them. All systems of supplying it in needed quantities, in hospital buildings of more than one story, have failed. The elaboration, complication and expensiveness of all the artificial systems of ventilating hospitals condemn them, making them difficult to manage, or practically unmanageable, and altogether unsatisfactory. One of the most elaborate systems of ventilation that has been developed by modern science and skill is that of the famous Lariboisière Hospital. In relation to this hospital, Dr. Evans, in his recent "History of the American Ambulance," quotes the words of a celebrated French surgeon as follows:—"Of all the Parisian hospitals, the best arranged, the one which has been constructed with the greatest care, according to all the rules of science, is the hospital Lariboisière, and the mortality there is frightful. In other words, it is a *great* hospital. It is vain to ventilate; the miasms penetrate the floors, incrust the walls, dance in the air which is breathed, and transform in a twinkle an illness of little consequence into a mortal malady."* *From one, know all.* If our best modern hospitals do not stand the test of experience, do not give us the results we can surely get in other ways, what are we to infer, and what is the mistake in them? The money invested in them makes large and satisfying returns, in the admiration their noble proportions excite. The good done in them is great and not to be despised. But something more is demanded—simply that "*they shall do the sick no harm,*" that the rate of mortality in them shall be no higher than in tents, barracks and sheds, the use of which emergencies have sometimes compelled. We know now that in these last-named structures, and by the segregation of the sick and wounded, we can get a lower rate of mortality than we would dare expect in any of our modern permanent three or four-storied hospitals. The truth, then, is, that the

* Op. cit., p. 62.

nearer we approach to simplicity of construction, the better are the results and the more sick get well ; and the mistake is, that most modern hospitals have been only an architectural compromise between the old system and the new one of the future.

The practical lesson for us to learn to-day is, that any small town or village can have, within forty-eight hours, by erecting one of these tents or a board barrack, as good, or rather, as we have shown, a better receptacle for the sick than hitherto has been attained in the largest and richest cities. It is not to be understood, however, that a good hospital is declared to be necessarily a hastily built temporary barrack or shed. When greater permanency is required, the building may be as well and neatly finished as the comparatively cheap wooden cottages in which so many pleasant and comfortable New England homes are made, and it may always be of simple construction and temporary, as distinguished from costly edifices of brick or stone.

The history of hospitals and hospital reform shows that the tendency now is, and has of late unmistakably been, towards simplicity of construction and the segregation, rather than the aggregation, of the sick. The most rapid and real progress has been made in the last few years, and is still going on.

We may soon find that the hospitals of to-day are to be regarded as only an approximation towards sound and enlightened principles. It is safe to predict that the hospital of the future will give no inferior results to those we know have been obtained in temporary structures ; and till as good results have been obtained in other ways, it is fair to regard the temporary as the best hospital.

It will be wise for us, then, to leave architectural adornments to their fitting use in such buildings as our churches, court houses and government halls ; and to build for our sick what they need, what is best for them, and what is within our means ; and what we hitherto have been without in too many of our towns and villages, at the risk of propagating epidemic and infectious disease. It will be wise for us to seek rather to heal our sick than to build enduring and costly structures that may be the pride of their projectors and the monuments of their philanthropic zeal, but of which it has been predicted (by Dr. Derby) that "they will, in the future, be regarded as the monuments of those who have needlessly died within their walls."

The first part of the report is devoted to a general survey of the
state of the country and the progress of the various branches of
the public service. It is followed by a detailed account of the
operations of the different departments and the results of their
management. The report concludes with a summary of the principal
features of the country and the prospects of the future.

The second part of the report contains a list of the names of the
officers and employees of the various departments, together with
their respective ranks and positions. This list is followed by a
table of the salaries and allowances of the different classes of
officers and employees. The report concludes with a list of the
principal public buildings and works of the country.

