Hospital statistics and hospital plans / by Florence Nightingale.

HOSPITAL STATISTICS

AND

HOSPITAL PLANS.

By FLORENCE NIGHTINGALE.

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In my paper on the Sanitary Condition of Hospitals, (read before the meeting of this Association at Liverpool, in 1858,) the defective state of hospital statistics was pointed out, as well as the necessity for all hospitals coming to a common agreement on the number and nature of the data to be tabulated for future use. It then occurred to me that the best thing to do to forward the object would be to prepare a set of forms to give effect to these suggestions, and to bring them for discussion before the International Statistical Congress in London last year, the subject being one of interest for all hospitals, foreign and British. To do this, it was necessary to adopt a common nomenclature of diseases, as the foundation. Such a nomenclature had been already adopted at a previous meeting of the Congress at Paris; and was used in substance in the forms I laid before the London meeting.

It was most important to arrive at some common agreement as to classification of diseases, in order to give the requisite facilities for reducing the statistical data and obtaining the results. This matter is confessedly beset with difficulties, not likely to be soon solved. But, as it would never do to leave hospital statistics in the unsatisfactory state they were found in, till everybody had agreed on a classification, that one in use by the Registrar-General of England (and now by a large section of the United States) was adopted.

The paper and forms which I now lay before the Association are those which, after a lengthened discussion, were adopted by the Statistical Congress. I thought it right to bring them before the Dublin meeting, because of an implied engagement to follow up improvements I had myself urged on the Liverpool meeting of the Association, as above said; and also because I have been given to understand that several eminent hospital medical authorities in Dublin (in that spirit of improvement which distinguishes medical

science there) had wished that the subject should be thus introduced.

It is proposed that one and the same form should be used for each statistical element. Seven such elements are required to enable us to tabulate the results of hospital experience ; they are as follow :—

1. *Remaining in hospital* on the first day of the year.
2. *Admitted* during the year.
3. *Recovered or relieved* during the year.
4. *Discharged* incurable, unrelieved, for irregularities, or at their own request.
5. *Died* during the year.
6. *Remaining in hospital* on the last day of the year.
7. *Mean duration of cases* in days and fractions of a day.

These seven elements printed as separate headings and attached to copies of the same form, or written in, would furnish us with the means of tabulating every fact we require. Provision can be made for different sexes in one or two ways :—the column for each age may be subdivided for males and females ; or it might be more convenient to have two sets of forms, one for each sex.

Again, surgical cases and injuries may be included in the same form with medical cases ; or, in large hospitals, a separate set of forms might be devoted to surgical cases.

For small hospitals, one set of seven forms might easily be made to contain the annual statistics of ages, sexes, and diseases (medical and surgical ;) but for very large hospitals, possibly four sets might be required.

The primary object of these Tables is to obtain an uniform record of facts from which to deduce statistical results, among which the following may be mentioned :—

1. The total *sick population*, *i.e.*, the number of beds constantly occupied during the year by each disease for each age and sex.
2. The *number of cases* of each age, sex, and disease submitted to (medical or surgical) treatment during the year.
3. The *average duration* in days and parts of a day of each disease for each sex and age.
4. The *mortality* from each disease for each sex and age.
5. The annual proportion of *recoveries* to beds occupied and to cases treated for each age, sex, and disease.

In reducing the data to give the annual results, either percentages or per thousands may be used.

The number of beds constantly occupied may be obtained by taking the mean of the numbers remaining at the beginning and end of the year, if the hospital has been fully occupied ; or the mean of the numbers remaining at the beginning and end of each quarter; or oftener, if the hospital be irregularly occupied ; or the total number of days spent in hospital by all the cases during the year might be obtained ; and by dividing the sum by 365, the mean daily sick would be arrived at. [The total daily "*diets*" issued during the year divided by 365 would give the same result.]

No. of Case.	Date of Admission.	Name.	Age.	Sex, M. or F.	Residence, and Place where taken Ill or Injured.	Trade or Occupation.
1					*Example of the Manner of filling*	
2	May 17.	John Johnson...	35	M.	263, Strand..... Run over by a cab on London Bridge.	Shoemaker.....
3	Aug. 5.	Maria Wood...	29	F.	28, Burrage Road, Plumstead..... Attacked at her residence.	Laundress .....
4	Nov. 3.	James Young...	14	M.	Workhouse..... ..... Attacked at workhouse school.	Son of a tailor
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						

AND DISCHARGE BOOK.

Disease or Accident.	Date. Of Attack.	Of Recovery.	Of Death.	Of Discharge (Relieved) or (Unrelieved,) or otherwise.	Of Transfer to other Division of Hospital.	Duration of Case in Hospital, in Days and Quarters.	Remarks. (Previous Diseases of Patients and of Parents.
up the Return.							
Compound fracture of tibia and fibula. Amputation, May 20.	May 17	Aug. 18	—	Aug. 18	—	94 days	—
Ague..................	Aug. 2	Aug. 28	—	Aug. 28	—	26 days	—
Smallpox, 12 days Pneumonia, 3 days. (Not vaccinated.)	Nov. 3	—	Nov. 18	—	—	15 days	—

B.—Proposed Hospital Statistical Form.

This Sheet will serve for the Classification of Cases in Hospitals under the following headings:—"Remaining, 1st January"—"Admitted"—"Cured (or Relieved)"—"Dead"—"Discharged incurable, for Irregularities, or at their own Request"—"Remaining, 31st December"—"Duration of Cases in Days."

Write the Name of Hospital, the Sex, the required Heading, and Date with the Pen.

Age	Months 0	Months 3	Months 6	1	2	3	4		10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95 and upwards	Total
CLASS I.—Order I. (Zymotic Diseases.) [illegible]																											
Order II. [illegible]																											
Order III. [illegible]																											
Order IV. [illegible]																											
CLASS II.—Order I. (Constitutional Diseases.) [illegible]																											
Order II. [illegible]																											
CLASS III.—Order I. (Local Diseases.) [illegible]																											
[illegible]																											
Order II. [illegible]																											
Order III. [illegible]																											
Order IV. [illegible]																											
Order V. [illegible]																											
Order VI. [illegible]																											
Order VII. [illegible]																											
Order VIII. [illegible]																											
CLASS IV.—Order I. [illegible]																											
Order II. [illegible]																											
CLASS V.—[illegible] Order I.—(Accident.) [illegible]																											
Order III.—[illegible]																											
Order IV.—[illegible]																											
[illegible]																											
Total																											

[illegible]

CLASS I.

Order I. [illegible]

Order II. [illegible]

Order III. [illegible]

Order IV. [illegible]

CLASS II.

Order I. [illegible]

Order II. [illegible]

CLASS III.

Order I. [illegible]

Order II. [illegible]

Order III. [illegible]

Order IV. [illegible]

Order V. [illegible]

Order VI. [illegible]

Order VII. [illegible]

Order VIII. [illegible]

CLASS IV.

[illegible]

CLASS V.

Order I. [illegible]

The "*sick treated*" during the year may be obtained by taking the mean of the admissions, and of the discharges from all causes, including deaths.

With fixed data, arrived at on these principles, we can readily obtain the proportionate mortality, not only of the whole hospital, but of every ward of it, and also the proportionate mortality and duration of cases for each age, sex, and disease.

The laws which regulate diseased action would thus become better known, the results of particular methods of treatment, as well as of special operations, would be better ascertained than they are at present. As regards their sanitary condition, hospitals might be compared with hospitals and wards with wards.

The whole question of hospital economics as influenced by diets, medicines, comforts, could be brought under examination and discussion.

The liability of particular ages, sexes, occupations, and classes of the community to particular forms of disease might be ascertained; other data, such as "married" or "single," previous attacks of illness of the same or different kinds, birthplace, &c., might be added for comparison, and hospital experience might thus be made to subserve sanitary improvement.

The data for these latter comparisons would have to be kept separately, as indeed they generally are in all well-regulated hospitals.

A. is a leaf of the hospital "Admission and Discharge" book, proposed by the secretaries to the Statistical Congress, for entering those details required for filling up the annual forms proposed by me and adopted by the Congress; and also for registering the additional particulars regarding the patients, required by the Congress.

B. is one of the annual forms referred to.

Especially I wished to call attention to the additional points of hospital statistics agreed to by the Statistical Congress, and which will be found at the end of my paper. They did not come within the scope of my forms. But they are of great importance, particularly those referring to the sanitary condition of hospital wards, and to the method of recording fresh attacks of disease *in* hospital, in the "Admission and Discharge" book. These data, if properly used, will enable a check to be kept over the sanitary condition of the hospital, at least as regards hospital diseases.

But it must not be forgotten that a hospital is in a bad sanitary state before such diseases can appear. They are evidence of bad constructive arrangements or of culpable sanitary neglect having produced their results, rather than indices of the actual sanitary state of the wards. All careful hospital physicians and surgeons, as well as nurses, can generally tell to what extent a ward is healthy, or otherwise, by the manner in which cases are progressing, before actual hospital disease appears. *This* is the time to prevent the occurrence of hospital diseases, not after they have occurred.

I refer to the point because, since my papers were read, some melancholy instances have occurred of fatal hospital diseases arising

from distinctly preventable causes. In one such case, in a small provincial hospital in one of the healthiest counties in England, twenty-four poor creatures ran the gauntlet of their lives in nine months, from erysipelas, of whom eight died. And this after very trifling accidents, or operations, none of which ought to have produced erysipelas at all—much less to have ended fatally. In this case there were both local causes of disease about the hospital, and there was also defective structure.

Especially am I anxious to recur to this latter point. I have seen several misapplications of the principles of hospital construction (briefly laid down in my former paper) defended because it was said they were adaptations of those principles; also bad principles of construction defended because they had been "already adopted"!

This is not the way to hasten human progress. Defects, the result of want of knowledge, must disappear; improvements, the result of experience, must advance.

I can do no more in the matter but reiterate the appeal (at the end of my former paper) that the real practical object and intention of these principles should be very carefully considered and embodied by those on whom it falls to design, to construct, or to manage buildings for the care of the sick.

Let us look forward to the time when the necessity of providing even for the record of *hospital* diseases, so much insisted upon by the Statistical Congress, will thus cease, and when the stigma of these diseases will be wiped out from hospital records.

EXPLANATION OF THE PLANS.

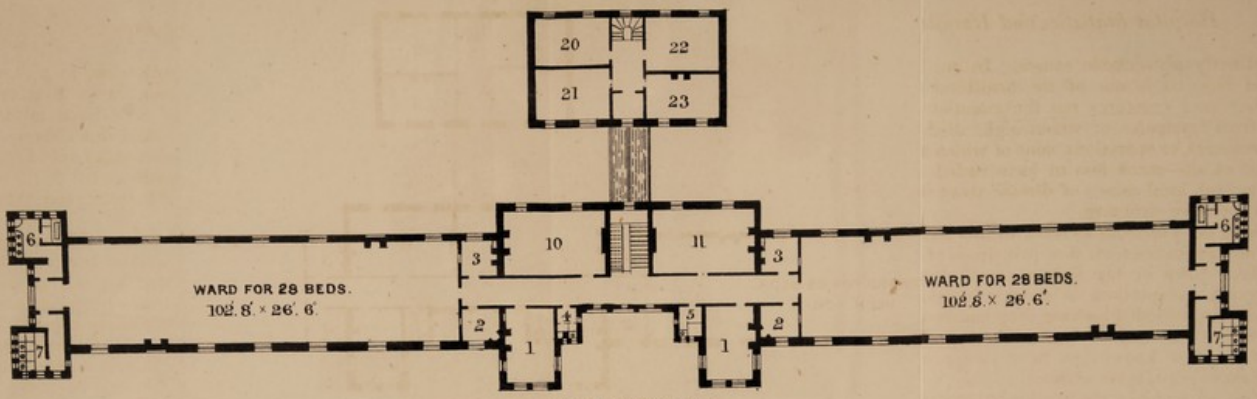
At the date of my former paper (1858) there was no really good plan of hospital construction in this country to refer to. Since that date, however, several excellent hospitals have been planned, and are now in process of construction. These will, when completed, practically show forth the principles required to give pure air to the sick, and to insure economical and efficient administration.

I beg to submit plans of two of these hospitals. They are both military—I am sorry I cannot give any civil ones as models, for they do not exist. Some, however, will soon exist, and it is fairly to be hoped that in all future hospitals generally, the same principles will be substantially adopted—yes, and improved upon. It need hardly be said that the details in civil must be somewhat different from those in military hospitals.

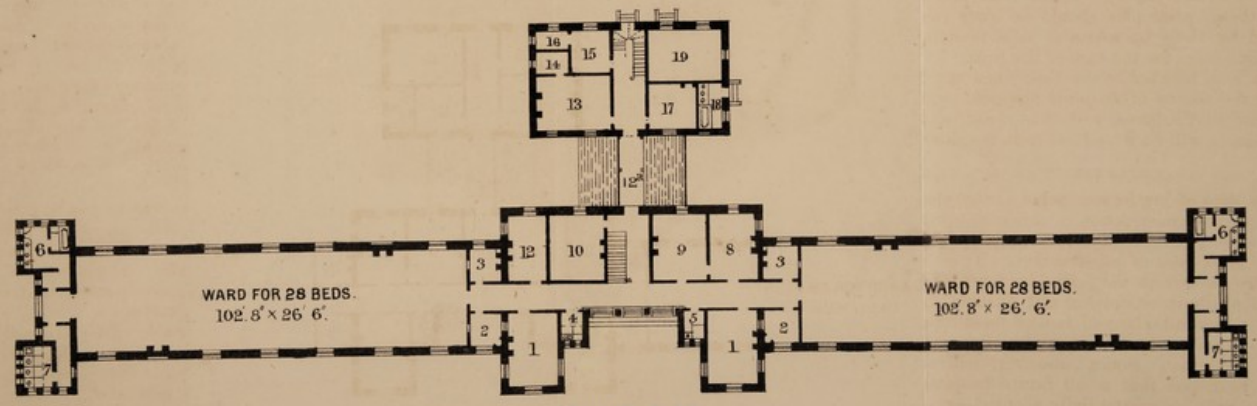
One of these plans is for an infantry regimental hospital for one hundred and twenty sick. The other is the plan of a General Hospital for the Royal Artillery Garrison, at Woolwich, (six hundred and fifty beds.)

The infantry hospital consists of one double pavilion containing four wards, each of twenty-eight beds, and four small wards of two beds each. The larger wards are open from end to end, so that the attendant in the nurse's room can see every bed in the ward. The small wards have windows on three sides, and are so arranged as to be under constant inspection from the same nurse's room. The

PLAN OF A REGIMENTAL HOSPITAL FOR 120 PATIENTS.

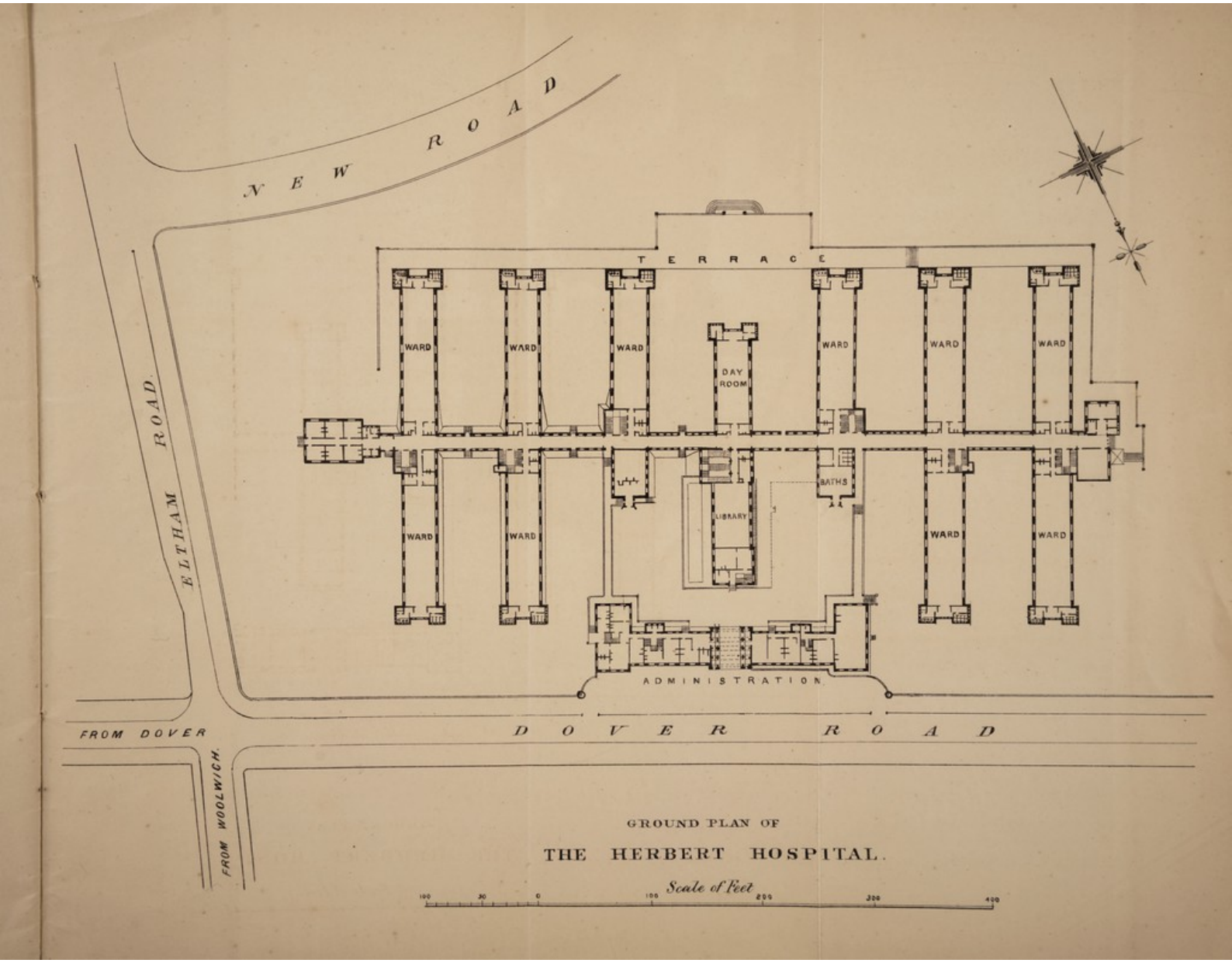


FIRST FLOOR PLAN.



GROUND PLAN.

1111. *2 Bed Wards.*
2.2.2.2. *Ward Orderlies.*
3.3.3.3. *Scullieries.*
4.4. *W.C^s, Sinks & Urinals.*
5.5. *W.C^s & Portable Baths.*
6.6.6.6. *Baths, Lavatories & Urinals.*
7.7.7.7. *W.C^s & Sinks.*
8. *Surgery.*
9 *Waiting Room.*
10.10. *Orderlies.*
11. *Day Room*
12. *Hospital Sergeant.*
12^a. *Covered Way.*
13. *Kitchen.*
14. *Scullery.*
15. *Medical Comforts.*
16. *Larder.*
17. *Cook's Room.*
18. *Orderlies' Bath & Lavatory.*
19. *Utensil Store.*
20. *Clean Linen.*
21. *Pack Store.*
22. *Bedding*
23. *N. C. O.*



GROUND PLAN OF

THE HERBERT HOSPITAL.

Scale of Feet

100 50 0 100 200 300 400

water-closets and baths are at the angles of the wards, opposite the entrance, and are entirely cut off from the wards by a method of ventilation which insures any foul air being blown away from the ward. The large end window allows of easy ventilation during the night.

In this hospital the fireplaces are in the walls, with a window over them. Each large ward has a separate scullery ; a matter of necessity, not choice.

The two pavilions are cut off from each other by a large passage and staircase traversing the building. The kitchen and stores are under a separate roof. The hospital sergeant and orderlies are quartered in the centre of the building; and surgery and waiting-room are in the same position, as also a day room for convalescents. Thus the whole administration is concentrated in the middle, and the hospital sergeant can always know at any moment where each of his orderlies is, and where he is not, and what he is doing; and the same of each of his patients. There are no dark corners nor spare rooms, and "skulking" is all but impossible.

This plan, then, combines the greatest facilities for economy in administration, with efficiency of discipline, (which includes the utmost care for the sick and the utmost obedience from the convalescent,) and pure air for all.

The Woolwich Hospital plan is simply an arrangement of a number of these pavilions—each having two floors of wards, connected by a corridor one floor in height—under one general central administration for the whole hospital.

There is one kitchen in a half basement under the library and chapel. It is connected with all the pavilions by a basement corridor, along which all diets, &c., are transported on rails and raised by lifts to each pavilion. There are separate shoots for foul linen and dust, hot and cold water are laid over the whole building, and there is a central bathing establishment besides the ward baths.

There are separate wards for sick prisoners and for lunatics and others requiring segregation.

There is a large library, also a dining and day room for convalescents.

The axes of the pavilions are arranged north and south, so as to have both walls exposed to the sun.

The nearest pavilions are sixty-four feet apart, or double their height. The others are much more. The eight wards in the end pavilions have a free look out to the open country.

The outer walls will be of white brick, to give the building a more cheerful appearance. The inner walls and ceilings are to be of polished Parian cement.

In this hospital there will be two fireplaces in the centre of each ward. They are to be of terra cotta, constructed so as to give the greatest warmth. The flues will be carried under the ward floors, and up the side walls of the pavilions. This leaves the view of the ward open from end to end, and enables the nurse to see every bed from her room window. [There are to be female head nurses in this hospital.]

The principles embodied in this plan are sub-division of sick under a number of separate roofs; separation between the hospital proper and the administration; no re than two floors of wards, opposite windows in each large ward ith the beds ranged between them, one window for every two be ; sufficient isolation and free ventilation of the water-closets an baths; one scullery and one nurse's room for each ward, and pla e at the entrance end, so that the attendants, while overlooking h patients, can be themselves overlooked; large separate day room convalescents; building to be placed on high ground in the ope ntry; abundant external ventilation.

The wards of each of these hosp are 14 feet high. Each bed has from 93 to 97 superficial t nd from 1,200 to 1,400 cubic feet. The width of the ward een the opposite windows is from 26 feet 6 inches to 26 feet 9 in es.

The cubic space of military hosp is not so large as that required for civil hospitals, because t great bulk of the patients in military hospitals are what we should call convalescents.

This building is to be called the "HERBERT HOSPITAL," after the great and good statesman whom we have lost, who was himself its founder.

Let Dublin, who knew him so well, join with us, who loved him so well, to give him worthy tears—such a tribute as he would have liked—he, who suffering under a fatal disease—he, who with every possession which God could bestow to make him idly enjoy life—yet ran like a race-horse his noble course, till he fell—and up to the very day fortnight of his death struggled on doing good, not for the love of power or place, (he did not care for it,) but for the love of mankind and of God. His glorious death would be almost too sacred to mention here, but for the sake of calling upon those who loved him—and who did not?—to carry out his purposes. It is five years since he began to carry out his chief purpose to restore the health of the British army; and how well he worked at it all know. But the soldier was not his only care. His cares were national; and one of his cherished inciples was the reconstruction of all hospitals according to the la improvements of the pavilion structure. It is not often that we a man, born to politics and high position, who would master, for love of his kind alone, every dry detail of this almost technical s ct. Yet he did. His loss is irreparable. Time will only show ore and more what we have lost in him. But at least let his p poses and principles outlive him in us.