TRAVEL REPORTS No. 2

Visit of Captain J. E. Stone

to the

United States and Canada

KING EDWARD'S HOSPITAL FUND FOR LONDON

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VISIT OF

CAPTAIN J. E. STONE, C.B.E., M.C., F.S.A.

TO THE

UNITED STATES and CANADA

Subjects of this Report. 1. Development of hospital and health services.
2. Planning and construction of hospitals.
3. Hospital equipment and supplies.

Organisations and Hospitals, etc., visited. See Appendix A.

Date of Visit .. .. September 16th, 1947–November 17th, 1947.

King Edward's Hospital Fund for London

To the Chairman and Members of the Management Committee.

I now have pleasure in presenting my Report on the tour of visits made to hospitals, central organisations, etc., in the United States and Canada.

I left England on September 12th, 1947, and returned on November 22nd, 1947. During the tour I visited New York, St. Louis, Chicago, Battle Creek, Toronto, Montreal, Boston, Philadelphia and Washington.

I am convinced that tours of this kind are a sound investment. No one country can possess all the knowledge and experience possible on hospital and health matters. We, in Britain, can learn from American and Canadian ideals and methods; they on their part can learn from us. This was admitted quite frankly by many with whom I came in contact and is supported by the fact that a number of hospital executives and others from both countries are contemplating visits to Britain. Correspondence contacts are most useful, but personal interchange of views is essential to a proper and full understanding of common problems in this, as in all other fields of human endeavour, and to the working out of practical solutions of those problems. In addition, I feel that visits of this kind achieve not a little in bringing about a closer relationship and better understanding between the peoples of our respective countries.

The purpose of the tour was to establish personal contact with the leading hospital authorities, central funds, and other organisations actively interested in hospital and health service, and to obtain first hand information on a number of subjects, more particularly—the functions and organisation of central funds; the development of hospital and health services; the planning of hospitals and methods of construction; hospital equipment and supplies; university training courses for hospital officers; medical records and the training of medical record librarians; and the methods of organising and conducting hospital information bureaux and advisory services.

The programme of the tour was worked out well in advance and all organisations and personnel scheduled to be visited were supplied with copies. This preliminary work, in which I was assisted materially by much useful information from correspondence friends of many years standing in both countries, contributed in large measure to the success of the tour.

Where necessary to give a more complete picture, my own notes have been supplemented by reports, letters and other literature either handed to me during my visits or received since my return. I much appreciate the courtesy of all those who have helped in this way. The detailed discussions were so numerous that they will not permit of a full review in every case. This Report does not, therefore, claim to be comprehensive. To have included everything seen and heard in detail would have made it a volume of unreasonable length, whereas to have condensed it excessively would have made it of little interest. For these reasons it is confined to a statement of essential features on matters of major importance, and others of lesser significance which nevertheless may be of sectional interest or are considered necessary to convey more adequate information on certain points. I am happy to report that arrangements have been made with the leading hospital authorities and central organisations in both countries for an exchange of information from time to time.

I have pleasure in placing on record in this Report the names of all those whom it was my privilege to meet, and I desire to express to them my grateful thanks.* The great majority of them hold high positions in the hospital and medical field of the United States of America and Canada, and by reason of this, they must receive numerous visitors, all seeking information and help. I know from my own experience in this connection how much time is taken up by such visits, but if any of my calls were burdensome it was certainly never made to appear so. I was everywhere received most cordially, the utmost kindness was extended to me, and no effort was spared to see that I obtained the maximum benefit possible in the time at my disposal, which in many cases was all too short.

J. E. STONE.

May, 1948.

* These names are not included in the present publication.

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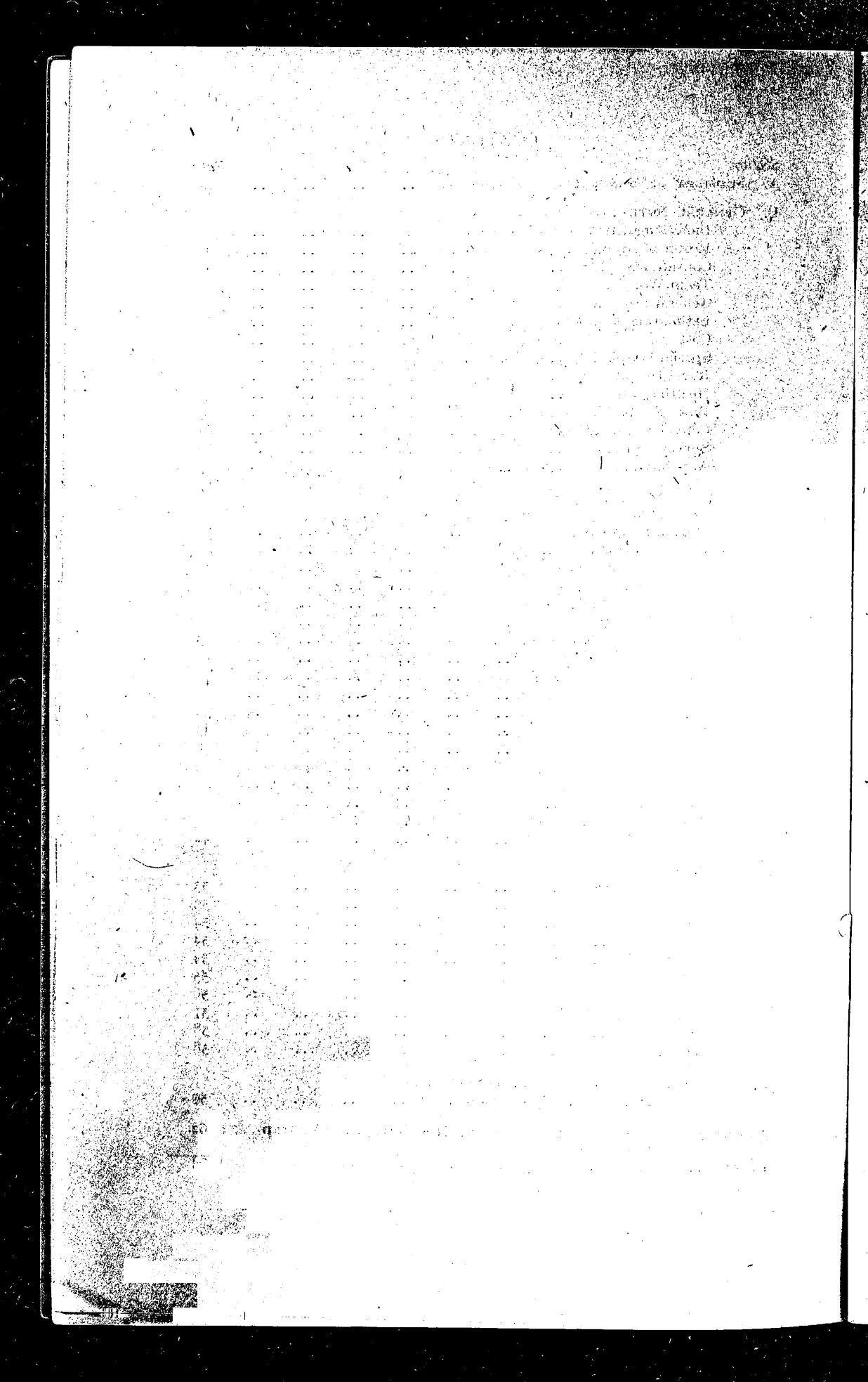

Section A

SUMMARY OF GENERAL IMPRESSIONS

1. Before proceeding to deal with the subject of my Report in detail it may be convenient if I indicate briefly some of the general impressions I formed from my tour.

2. The hospitals in the large cities are much bigger and more massive in appearance than those in Britain. Externally, with some exceptions, they exhibit little that is beautiful in design, but one cannot fail to appreciate the attention given to what may be called " breaking the line " and " staggering " which has the effect of distinguishing the buildings of a hospital from those of a factory. This is often cleverly done and the result is a building much less displeasing than would otherwise be the case.

3. The majority of the hospitals are of the multi-storied type. This type is not adopted necessarily because of ground space limitations but because a compact building is invariably preferred in order to reduce horizontal travel. Lift service is excellent; lifts are adequate in number and size, and quiet in working. The alternative method of isolated blocks is also seen, separate blocks being used for medicine and surgery, maternity, neurology, private patients, etc. In some cases the pathological laboratories are also in separate blocks.

4. Many of the hospitals are built in a lavish and expensive manner, with large amounts of accommodation for every conceivable purpose. Space is regarded as important. The entrance halls are in keeping with the buildings—large, light and lofty. They are imposing and dignified and they give an air of spaciousness which a visitor from Britain finds refreshing. These halls are not merely waste space. In many of them may be found the cashier's office, the front being flush with the wall and arranged like the counter of a bank; an information desk (a feature in nearly all American hospitals) with a pleasant attendant (often a girl neatly dressed in white) who answers all inquiries and directs visitors, etc., and also a gift or hospitality shop. In one I saw a beauty parlour and a shoe-shine room. Many hospitals have a visitors' lounge, opening off the entrance hall, containing plants and flowers and comfortably furnished with arm-chairs and small tables. In some hospitals there is a visitors' room in each nursing unit.

5. Glass bricks are popular; they are used both externally and internally, in the latter case as partition walls. They increase natural

lighting with no loss of privacy. Equipment in all sections is excellent and no expense is spared to provide the best. Stainless steel is seen everywhere. If an item can be obtained in this material no other will do. If a machine can be found which will obviate the necessity of performing a task by hand or which will save time, labour and energy, that machine is installed. Contrary to popular belief American hospital authorities have very little use for gadgets as such. Will it work and will it save time, labour and energy are the all-important factors. Price is a factor which is given more consideration to-day than hitherto, but it is nevertheless far from being a deciding factor. Dictaphones; stenotyping machines; pneumatic tubes and other systems for the transmission of documents; telautograph and chefalon systems for the transmission of messages; up-to-date filing equipment; electric carts for drawing trolleys or trucks conveying material; electric scrubbers and polishers, etc., are features of a great many hospitals. The same principle holds good in the kitchen and the laundry, and indeed all sections of the hospital.

6. The lay-out is carefully planned and much attention is given to the prevention of cross traffic and noise and the avoidance of excessive walking, either horizontally or vertically. Models are much used in this connection. Acoustic treatment is standard in all recently-built hospitals and the treatment is being applied to a large number of the older ones. With some exceptions the wards, called nursing units, are well supplied with good size and adequately equipped auxiliary rooms. The public wards are rather larger than those in Britain but there is now a definite trend towards smaller ones. There is also a tendency to divide an originally almost square ward into several compartments by the use of curtains running on rails suspended from the ceiling. In some wards each bed can be curtained in this way. The nursing station is a feature of American hospitals; it is really the office of the ward and it is not necessarily staffed by nurses. Patients' records are kept here on mobile trolleys. Practically the whole of the clerical work of the unit is done in this station.

7. There are three types of accommodation for patients—private (single bed rooms), semi-private (two bed rooms), and general or public wards of from 10 to 26 beds. The majority of the patients are able to pay for their maintenance and because of this the proportion of private bed accommodation is higher in practically all the hospitals, varying from a quarter to a third of the total bed accommodation. Generally, hospitals have a fixed charge for each type. If a patient in a public ward is unable to pay the charge, the hospital makes a contribution towards the charge. It does not reduce the charge. State and local authorities make grants in respect of certain services of a national or semi-national character. An increasing number of people are making

provision for hospital care by joining Blue Cross Plans. These correspond in many respects to the British Contributory Schemes. They are making considerable headway.

8. Corridors are much wider than in the hospitals of Britain, many being 8 ft. These facilitate traffic and where ceilings are low they prevent the " tube " appearance, but they add considerably to the cost of maintenance in the way of heating, lighting, and cleaning, etc. Corridor ceilings also seem to be higher. All the hospitals are centrally heated ; to me they appeared over-heated. The situation of the stores, refrigerators, preparation rooms and distribution services in relation to the kitchen shows much thought. The kitchen is a feature in the newer hospitals. In the older ones it is now too small and little space is available in most cases for expansion in its present position. The same remarks apply in some hospitals to the works departments and general stores. These are important departments of a hospital and they require as much care in planning as ward and other departments if the hospital is to function effectively and economically. The controversy concerning central and de-centralised food service still persists, generally with a preference for the de-centralised system, where the food is conveyed in bulk to ward or unit serveries or diet kitchens in electrically heated trolleys. Cafeteria service combined with separate dining-rooms for the various staffs is very popular.

9. Central Supply Service is now almost standard. Trained personnel is generally employed and the service is efficient and economical. In some hospitals women volunteers render service in cutting, rolling bandages, etc. Medical records are well kept, a large number of hospitals having on their staff qualified medical record librarians with adequate assistance, and a well set up record routine, adequate accommodation, and all necessary filing and indexing equipment. There is an increasing demand for such librarians and a number of training schools have been established, some at universities. Consulting rooms are provided for the senior medical staff. Sometimes they are furnished by the hosiptals, but more often by the staff using them. The staff have their own secretaries, and pay a rent to the hospital for the room. In one hospital visited all the medical staff are full-time salaried officers. I was told that this is the practice in many hospitals in America.

10. Many of the nurses' homes are palatial places with spacious general and private rooms and every conceivable comfort in the way of accommodation, facilities and service. One contained a number of self-contained well appointed flats. A large number of hospitals give nurses the alternative of living out ; in some cases the privilege is confined to graduate nurses. One hospital has bought a big

apartment house to accommodate its nursing staff. It is about 100 yards away from the hospital. More attention is being given to the provision of better conditions for nurses and domestics. Many American authorities express the opinion that nurses should be housed away from the hospital.

11. The training of hospital administrators is now a major activity in the hospital field of America, and it is spreading to Canada. American hospital authorities are definitely of opinion that the successful management of a hospital in these days necessitates the services of an administrator trained in the basic principles of hospital and related subjects as against one trained merely in the narrow confines of hospital work. Training courses of two years duration have been established at a number of universities. Students spend the first year in a school of the university, *e.g.*, public health, medicine or business, and the second as interns in selected hospitals. The movement is supported by many central organisations, and although to some extent still in the experimental stage, it has made good progress.

12. Considerable attention is being given to the making of surveys with a view to the provision of much needed additional hospital accommodation in country or rural areas ; the establishment of health centres ; the regionalisation of hospitals, including the more effective co-ordination of hospital and health services. A special commission has recently published an important report on the subject following an extensive pilot survey in one State as a guide to other States. The United States Public Health Service has set up a special department (Division of Hospital Facilities) to carry out the provisions of the Hospital Survey and Construction Act. Many other central organisations are also keenly and actively interested in this subject.

13. American and Canadian hospitals and health agencies are fortunate in having at their disposal the services of a number of central organisations, which in addition to carrying on other activities, operate also as information bureaux and advisory services. These organisations include some of the great philanthropic institutions, hospital associations, and hospital councils. They possess a wealth of knowledge, experience, information and literature on all phases of hospital work and practice which is made available to the hospitals free of charge.

14. Other matters to which more and more attention is now being given include Public Relations ; Personnel Management, and Hospital Medical Social Service. Many of the larger hospitals have their own public relations officers and personnel managers. Personnel Management is now considered an integral part of hospital administration and the American hospital authorities have learnt much from the methods

used in industrial circles. In Social Service, or Medical Social Service as it is now known in America and Canada, particular emphasis is now placed on the follow-up of patients and the making of personal visits.

15. The business departments—secretarial, accounting, purchasing, etc., are everywhere excellent. They are well organised and managed. Much more use is made of office equipment to expedite work, and a good internal telephone system obviates the necessity of much walking. The accounting systems, particularly that of the United Hospital Fund of New York, are far in advance of anything in Britain. Purchasing is looked upon as a business and the majority of hospitals have a purchasing manager or agent to carry out this work. Staff is invariably plentiful. The only shortage I heard of was in regard to nurses. The position in America in this connection is on a par with that in Britain. A drive for trainees was started last year. It met with some measure of success but not as much as had been hoped, and the campaign is being continued.

Section B

GENERAL NOTES

16. Hospital planning and construction is very much in the minds of the people in the United States and Canada, and many hospital authorities and central organisations are continuing special studies on the subject. With the large sums of money involved in building a modern hospital with all its ancillary and auxiliary departments, the importance of skilled planning is fully realised and a continuous programme of education is being undertaken to raise the standard and to secure some kind of uniformity. This does not mean that all hospitals, general or special, large or small, are being planned alike in every detail, but that proved principles, adapted to the functional requirements of each project, will be incorporated wherever possible in order that a service may be given in keeping with efficient modern standards.

17. The United States Public Health Service has developed a special Research Department on Hospital Facilities to study trends and advise hospitals on the subject. This department, which is under the control of a qualified architect, assisted by specialists in every branch of the work, has undertaken extensive research into hospital design and planning, including functional requirements, and it has published a number of extremely useful specimen plans and other literature on the subject.

18. Certain of the large philanthropic organisations have also shown great interest in the subject in an attempt to improve the standard of hospital planning and construction. Among these are the Commonwealth Fund of New York, the Duke Endowment and the W. K. Kellogg Foundation, which have specialised more particularly in the smaller country or rural hospitals. The American Hospital Association too, has appointed a Council on Hospital Planning and Plant Operation and has established a department, with an experienced executive and staff, to advise hospitals on the subject. It has also set up a Roster of Architects. Candidates for inclusion on this roster, who must be qualified architects, are required to submit an application to the Qualifications Committee of the Association, giving full details of their experience and work done, together with copies of two sets of plans. Consideration is given to young men provided they have had hospital experience. Membership on the roster is personal to the architect appointed ; it does not extend to the partners in a firm of architects.

The Association does not recommend architects. When a hospital applies for assistance in the making of an appointment it is supplied with a copy of the roster from which it makes its own selection. The Qualifications Committee is composed of a chairman (appointed by the President of the Association), four architects and four hospital administrators selected by the Council of the Association. I was informed that hospitals make considerable use of this service.

19. CONSULTANTS. American hospital authorities favour the appointment of a consultant to work in collaboration with the architect. They realise that although specialised hospital architectural experience is essential, this should be supplemented by the special knowledge which can be brought to bear by engaging the services of a hospital consultant. Such consultant, who is really the representative of the Board of Trustees or Building Committee, may be an experienced hospital administrator or medical superintendent of known and wide experience. He assesses the hospital needs of the community and at the same time, in collaboration with the architect, plans their functional expression in the proposed hospital. The hospital building is constructed around the needs and in one sense plays a subsidiary role to them ; in other words, the architectural design is subordinated to the best lay-out of the services and facilities required within the hospital. When the best plan has been devised for the most efficient functioning of all units, then it rests with the architect to give it concrete expression and finally to agree his plans with the consultant.

20. Where the hospital already has an experienced administrator, lay or medical, thoroughly conversant with modern design, construction, functional relationship and trends, the service of a consultant may not be required. His services, however, should not be dispensed with solely on the ground of cost. American experience proves that he can save a hospital an appreciable amount by reason of his wide knowledge and experience. His services are not confined to the planning of new buildings. Often consultants are called in by hospitals desirous of carrying out extensions, alterations, etc. It is practically a profession in America. Architects with the special qualifications necessary for hospital architecture are not to be found in every town. This is another reason given why hospital authorities deem it wise to appoint a consultant to collaborate with the local architect. He determines the best means of incorporating the desired facilities into a well designed plan. The local architect then incorporates the designs into working drawings and under the guidance of the consultant supervises the building contractor in the carrying out of the work.

21. HIDDEN LOSSES. In planning a hospital one must ever keep in mind what may be termed the " hidden loss." A hospital where the

traffic plan has not been carefully thought out will probably prove inefficient from the point of view of time lost by its staff in unnecessary movement. If from faulty planning a nurse or orderly has to travel one and a half times as far as would be necessary in a well considered plan, then those responsible have reduced materially the efficiency of that hospital and increased the cost of maintenance.

22. The general average number of paid employees to each patient varies from 1½ to 2. As more than one half of the maintenance cost is spent on salaries and wages of employees any design or plan which helps to cut down unnecessary effort, or any equipment which saves labour, is fast assuming an increasing importance in hospital economy. The saving of unnecessary labour is a problem to which hospital authorities and architects in America are giving much thought.

23. TEAM WORK. It is perhaps relevant to emphasise here the fundamental fact that each person who will be concerned in the working of the hospital should be given the opportunity to express his or her views. In this connection I was informed of the method adopted by the late Mr. H. Cederström, architect of the new Southern Hospital.* He devised a number of rooms with expandable walls. He then arranged with the doctors, nurses, engineers and other personnel of the hospital to study the traffic plans most suited to the requirements, having in mind also the types and sizes of the equipment to be installed and their positions. No person who had to use the rooms was excluded from the discussion. When the size of the room and its interior design and its equipment had been decided upon, it was then incorporated in the plan. The importance of team work in planning was stressed by many hospital authorities and architects.

24. GENERAL LAY-OUT. The keynote of hospital planning in America is that hospitals should be built around their functions and designed in a simple straightforward manner with little or no external ornamentation. For this reason many of them present a rather severe appearance outwardly. Internally the appearance is just the opposite, everything being done to give an air of comfort as well as of dignity. The large entrance halls at many hospitals are particularly good. An endeavour is made to reduce "dispersion"; to make not only the building but all the services within the building as compact as possible. Thus each floor is a self-contained unit; a sub-hospital in itself. Corridors generally are much shorter than in Britain. Vertical planning is almost universal; even where the question of space is not a consideration opinion is in favour of the vertical type. Lift service is plentiful and excellent. Flat roofs are universal and are arranged for lounges, sun parlours, etc.

* Stockholm.

25. More attention is being given in the original planning to the possibility of future expansion ; the prevention of noise ; standardisation of materials and equipment ; the prevention of cross traffic and reducing travel ; and the provision of more adequate accommodation for laboratories, medical records, works' departments, and stores. Less importance is now attached to patients' units facing south. This is due to the fact that the average stay of a patient in American hospitals is low—8 to 10 days, and the question of wards facing south to receive sunshine is not therefore considered of major importance. This helps materially in planning the general lay-out. Large wards are definitely out of favour, the agreed opinion now is that no ward should contain more than 4 to 6 beds. Nurses' stations are invariably placed in a central position giving a complete view of all the beds in the ward unit. This saves much walking on the part of the nurses.

26. Many authorities are definitely of opinion that the general hospital of the future must contain accommodation and facilities for all the specialties.

27. ESTIMATING NUMBER OF BEDS REQUIRED. A new method for calculating the number of beds required for a given area has now been devised by the Committee on " The Master Plan for Hospitals and Related Facilities for New York City " of the Council of New York. It is set out in " The Master Plan " as follows :—

> " Analysis of data for the past ten years indicates that an average of 120 patient days of general care has been provided for each death occurring in the city. From these data a formula has been developed which indicates that 0·41 general care beds should be available for each of the deaths occurring during one year in any population group within the city. The ratio of general care beds needed per thousand of the population, therefore, may be determined by multiplying this factor (0·41) by the number of deaths which occurred in a community or study area."

The Commission on Hospital Care recommend a somewhat similar formula. I found general agreement among hospital authorities with this method.

28. The United States Public Health Service suggests the following as " adequate " :—

(1) General Hospitals—(*a*) In States having 12 or more persons per square mile, 4·5 beds per thousand population ; (*b*) In States having less than 12 and more than 6 persons per square mile, 5 beds per thousand ; and (*c*) In States

having 6 persons or less per square mile, 5·5 beds per thousand population.

(2) Chronic disease hospitals—2 beds per thousand population ;

(3) Mental hospitals—5 beds per thousand population ;

(4) Tuberculosis—2½ per average annual death from tuberculosis ;

(5) Public health centres—1 per 30,000 population or up to 1 per 20,000 in States with less than 12 persons per square mile.

These allowances are for a State as a whole.

29. Authorities are very definite that no hospital should exceed 1,000 beds. The majority put the maximum figure at 700 to 800 beds.

30. Cost. As in Britain, advances in medical science and modern improvements in construction and equipment have, apart from appreciable increases in labour and material charges, raised the cost of hospital service to a marked degree. One cannot now budget for the building and equipping of a hospital by using pre-war figures. While finance is admittedly an important factor, it should, in the opinion of many American authorities, never be considered the deciding factor in determining what is to be done to provide an efficient and up-to-date hospital service. Their view is that hospital service exists to restore the sick and injured to the fullest possible degree, and in the shortest possible time, so that they may take their place once more as active and healthy citizens in the community. Thus service must be the predominant factor in deciding what is best to be done. Frequently enough when service directs finance it is cheaper in the long view than when finance restricts service. Penicillin was given as an example. Had finance been inadequate penicillin would have remained a subject of academic interest in the laboratories. The enormous expense of launching this drug has already been more than amply repaid, not only by the human lives and limbs which it has saved, but also in the reduction of time spent in hospitals by these patients. Penicillin can rightly be said to have restored, in the fullest sense of the word, assets of great importance to the State.

31. Other authorities, however, viewed the mounting cost of hospital care with certain misgivings. The principle that nothing is too good for a sick person and that he should not be denied anything, on the ground of expense, that might improve his condition, is considered creditable to humanity but they thought it was possible to carry the application of the principle too far.

32. The above conflicting views raise at least one important question. Is there a point at which expenditure on costly drugs and

forms of treatment becomes unjustifiable ? When some new drug or piece of equipment or procedure is recommended every hospital naturally wishes its patients to have the benefit of it, with the result that nearly every hospital hastens to add the new weapon to its armamentarium. Much waste and avoidable expense occurs in this way. New drugs, methods, etc., even if expensive, ought to be given a fair trial and it will be agreed that one important function of hospitals is to investigate and test them, but it does not follow that each innovation is to be tested and adopted by all the hospitals simultaneously. A few hospitals might very well be selected as the experimental ground and when the value and limitations of the innovation have been established in this way, it should then be decided what other hospitals, if any, ought to adopt it.

33. Much the same remarks apply to a large number of items of equipment and supplies used in hospitals, and also to procedures, routines, etc. Simplification and standardisation wisely carried out will do much to reduce the high cost of maintenance.

34. Special Hospitals. Several authorities expressed the opinion that the day of the isolated specialised hospitals is over and that if they are to render efficient service in future they must work in close association with medical centres or general hospitals. (The opinion in some cases more particularly concerned tuberculosis, a subject which has been tackled with great vigour, the lead being given by the National Tuberculosis Association. Early diagnosis is important and here mass radiography is playing a large part. At many hospitals every patient on admission is subjected to a chest examination ; a special machine is used for the purpose, and the examination is a matter of minutes only. Radiography is also carried out on persons as they emerge from railway stations as a part of periodical campaigns in various cities. It is recommended that in future all large hospitals should have a T.B. Ward or a block as an Annexe.)

35. The same view is held concerning the Veterans' Hospitals : they are to be brought in and built alongside medical centres, medical schools and large hospitals in order that they may have the best available consultant service and treatment.

36. The trend is definitely towards making the large general hospital complete in every respect.

37. Rural Hospitals. The provision of small hospitals and more adequate facilities for examination and treatment in country or rural districts is another subject to which hospital authorities and

certain central funds have given considerable attention. These hospitals vary in size between 40 and 150 beds, a large number being of the 100-bed class. They are all voluntary and are complete in that they cater for all classes of the community, providing private or single rooms, semi-private or double rooms, and public rooms of from 4 to 6 beds, and are equipped and staffed for all general purposes. In some cases the latter beds are not in separate rooms but in a large ward curtained off into 4 and 6 bed sections. In the words of the Commonwealth Fund of New York, they form " the middle-of-the-road merger of the charity hospital and a private facility "—a service is sold to those willing and able to pay ; while a service is given free to those unable to pay.

38. Three central organisations—great philanthropic foundations —are keenly and actively interested in this problem. The Commonwealth Fund has set up a Division of Rural Hospitals with a view to acquiring all the experience and knowledge possible and adapting it to the needs of rural communities. The Fund considers it of the greatest importance that any hospital assisted should be a local institution, locally maintained, and eventually independent of the subsidy allotted to it. This is a condition of assistance. Another is that only communities which are willing and able to share the capital cost of establishing a hospital and to guarantee funds for its subsequent maintenance should be given assistance. The Fund's policy is one of developing self-help. Until a community appreciates the principles of common responsibility for hospital service it cannot, in the view of the Fund, be regarded as capable of wisely governing and directing such a service. It believes also that with the opening of a well-appointed hospital in a town previously without one there is an added incentive to well-equipped medical men to settle and practice in the town. The minimum capacity of the hospitals assisted by the Fund is 40–50 beds, and the hospitals are open to all reputable registered practitioners in the district.

39. The W. K. Kellogg Foundation also possesses a considerable experience on the provision of country or rural hospitals and, in addition, of the type of diagnostic facilities, *e.g.*, X-ray, pathological, etc., required for efficient medical service. It prefers the words " middle-ground " to " middle-of-the-road." Its policy is, however, much the same as that of the Commonwealth Fund—a desire to obtain a co-operative solution of hospital and health problems, locally, and without government assistance or domination. The experience of this Fund is that the provision of good hospital accommodation and facilities on a co-operative basis not only attracts well equipped medical men but also technicians and other personnel to staff the hospitals.

40. Another central organisation which has done much to improve hospital care in the rural areas is the Duke Endowment. The policy of this Fund is, however, somewhat different to that of the two Funds above mentioned. It aids hospitalisation in two ways—firstly, assisting existing hospitals by paying to all hospitals in the Carolinas not operating for private gain a sum not exceeding one dollar per day for every free bed occupied, that is, beds occupied by people unable to pay ; secondly, assisting financially the erection of hospitals not operating for private gain, in certain circumstances.

41. All three Funds stress the fact that the practice of modern medicine is dependent upon, and therefore centres around, the hospital, but all three agree that there is a vast difference between metropolitan or urban and country or rural medical facilities, hence their readiness to assist the latter. They all desire to bring good community hospitals to the country areas, but at the same time they desire also to foster and encourage the independence of the people served. They assist financially and with advice, but they do not relieve the community of its own local responsibility. Experience of these three Funds over a number of years proves that the implementation of their policies provides a practical solution to the problem. It should be noted that no project has been assisted by any of the Funds without a careful review of the requirements of the area concerned. All three are strongly opposed to the erection of a hospital merely to satisfy local philanthropy or pride. Necessity or need is in all cases the guiding principle.

42. It is not without interest that these three great funds with every facility for research into the best methods of attaining adequate and efficient hospital and medical facilities for rural communities should have arrived at the same appreciation of the situation.

43. HEALTH CENTRES. Allied to the subject of country or rural hospitals is that of Health Centres, the whole problem of which has been investigated by the United States Public Health Service and other organisations. The problem is how to make an emergency medical service available in areas which are so sparsely populated as to make the construction of a hospital giving full service inadvisable. If the health centre is the answer to the problem, then how will it be equipped and staffed, and what will be its relationship to the hospitals nearest to it in an integrated service.

44. I discussed this subject with a number of people. So far as integration is concerned the United States Public Health Service propose a plan on the following lines—firstly, a base hospital or medical centre, preferably a university medical school. Beyond this, district or general hospitals fully equipped to treat all acute diseases, etc. Beyond these, the rural hospitals which are smaller and provide a

more limited service. And lastly, the rural health centres which would combine certain public health facilities with a medical service of limited hospital type, principally including obstetrics and minor and emergency surgery. It is suggested that the centre should have a unit of 10 beds with operation and isolation facilities, but that where hospital facilities exist elsewhere the hospitalisation of patients in the centre would not occur. In-patient care in the centre would always be in association with the larger hospitals in its area.

45. The public health side of the centre's activities was stressed. At present, although great emphasis is properly placed on the quality and training of professional public health personnel, but little attention has been given to the physical surroundings in which they do their work. I was told that with few exceptions the quarters housing local health departments were quite unsuited to their needs. The view is that the educational aspect of the work of health officers in either personal or civic hygiene could not be maximal in poor surroundings. The health centre is the answer.

46. The activities of these centres vary but generally they include child health ; dental hygiene ; eye service for school children ; tuberculosis service ; V.D. service ; nursing service, especially visiting ; health education ; co-operation with local agencies, etc. The co-operation of voluntary associations is a strong feature of the centres already established and excellent relationship exists between them.

47. Boston's Health Centres. The Boston Health Department set up its first Health Centre in 1916. The project was successful and created a desire for extension of this integrated service. The income of a fund created by a Mr. George Robert White, who died in 1922, provided the means to establish a chain of such centres in the sections of the city that evidenced the greatest need. This need was determined largely by the character and economic level of the population, the health problems of the neighbourhood, and the necessity for preventive health services. To-day, there are eight such centres in Boston and many others, patterned on Boston, have been established in other parts of the United States.

48. The buildings generally conform to the following arrangements :—they are three or four storeys in height, are built of brick, and are erected on spacious plots of land. The basement is devoted to the heating and other maintenance services, showers for the personnel of the centre, locker rooms and lavatories. The administrative offices and clinical services are situated on the ground floor where a spacious lobby is used as a waiting room. There are ample facilities for pre-natal hygiene, dental, tuberculosis, and other clinic services. Complete X-ray equipment is available on this floor, adjacent to the examination rooms. The first floor is occupied in the

main by the voluntary agencies. A large auditorium on this floor is used for meetings, health lectures and other assemblies. The second floor is used for the headquarters of other participating agencies and for rest and consultation rooms. The roof, completely furnished and equipped for solarium purposes, is used as a nursery school. Small chairs, tables, and cots for the use of pre-school children are supplemented by sand boxes, gymnasium apparatus and other equipment for organised play.

49. No difficulty was experienced in securing the whole-hearted support of individual citizens, leaders of the medical profession and influential civic groups (Boston Health League, Boston Council of Social Agencies).

50. As each health centre is completed and equipped it is handed over to the Health Department. The administration of each centre is under the direction of a Health Department Medical Inspector, who is a member of the staff of the Deputy Commissioner in Charge of all health centres. It is interesting to record that the Deputy Commissioner is the Superintendent of the Beth Israel Hospital, Boston. He kindly escorted me personally to some of the health centres. The medical inspector correlates the efforts of the private agencies engaged in health and welfare work housed in the centre, carries out medical examinations, etc., develops and maintains relationship with the medical profession and presides at meetings held in the centre in order to encourage greater knowledge of disease prevention and health protection. These centres, by bringing together under one roof the outstanding agencies engaged in health and welfare work, make possible the promotion of efficiency, economy and dispatch in the conduct of public health and welfare effort. The authorities in Boston regard health education as an important branch of their activities on the ground that health education develops in individuals a sense of responsibility for the public health as well as for their own. Organisation of the people, their clubs, societies, churches, social agencies, health and welfare groups, physicians, dentists, nurses and schools, integrates the programme and prevents duplication and wasted effort. The health centre is the meeting and working place for these groups. Exhibits, literature, posters and moving pictures are developed through these activities and this material is sent to stores, libraries, schools and works. Literature covering a wide variety of subjects is distributed at every centre. News articles and copy for editorials are furnished to the city-wide local papers. Radio announcements and special health broadcasts are also supplied regularly to stations.

51. Sight conservation clinics are established in some but not all centres ; supplies of sera and vaccines as well as culture and sputum

outfits are always kept at hand. Physicians may leave specimens at the centres to be taken to the City's Bacteriological Laboratory for examination.

52. CONVALESCENT PATIENTS. Considerable attention is being given to the subject of accommodation for convalescent patients. It is felt that future provision for such patients should include (1) more complete recovery in the individual patient than has existed up to now, and (2) continuity of medical supervision. This will call for certain changes in present-day practice with early ambulatory activity closely following surgical operation or acute illness, and improved methods for treating convalescent patients of all conditions. Hospital facilities for convalescents in the future will have a different rôle to play from that of the traditional convalescent home. Additional equipment, etc., will be needed and the rôle of the doctor and other professional personnel will be increased. The convalescent home of the future will have to be equipped and staffed to receive patients as soon as they no longer need the services offered during the acute stage of illness. This means that they must be able to take bed patients and provide the personnel and facilities necessary to meet the nutritional, physical and psychological problems involved. Many additional beds will be required and there will necessarily have to be the closest association between the hospital and the home.

53. SURVEY. The first step in the planning of a hospital is a survey to establish the actual need for a hospital to be built or extended. The donation of private buildings and special sites by individuals or groups of individuals, however worthy, has in the past often proved most costly. Further attempts to mould, by alterations or extensions, existing unsuitable buildings have often resulted in considerably increased maintenance costs. One authority advocates the setting up of a "Fact Finding" Committee. This committee would make a thorough survey of the area to be supplied, having regard to nearby hospitals and their accommodation, facilities and condition, population, anticipated changes in population, and the type and extent of medical service expected to be supplied, etc. Generally such a committee, more often called a Survey Committee, engages, on a fee basis, the services of a hospital consultant to advise on procedure, and in some cases to undertake the actual survey. This is a feature of American hospital life. Hardly a week goes by without one or more States or some organisation on their behalf carrying out a survey. Sir Joshua Reynolds once said: "There is no expedient which man will not resort to in order to avoid the necessity of thinking." This, of course, is not the reason why a consultant is appointed. A survey is not a task which can be carried out by anyone; it requires a wealth of experience if reliable information is to be obtained.

54. APPOINTMENT OF ARCHITECT. Once it is decided that a hospital is necessary the next step is the appointment of the architect. This has not always been the practice in the past, but it is now regarded as all important and it was stressed by many with whom I talked. Invariably the Building Committee has selected and purchased the site and the architect and the consultant have had to make the best possible use of it. It says much for their ingenuity that good hospitals have been built in spite of many handicaps caused by an unsatisfactory site. The site has a considerable influence on the actual planning.

55. SITE. The points to be considered in the selection of a site have now become more or less standardised. It must be adequate in size to ensure maximum privacy, having in mind all the services to be installed and including the nurses' home, maids' home, etc., and regard must be had to extensions and the possibility of the hospital being "built-in" by the spread of industry or housing estates. Ample parking space,* present and future, is essential, as are also recreation areas, and it is necessary to see that these are planned not to interfere with future extensions. A covered space for prams, adjoining the entrance to the out-patient department is also necessary. A shed or covered space with cycle racks will be found an advantage. Traffic lines into the site must also be carefully considered and planned so that they will not disturb the patients more than is absolutely necessary. Accessibility, or access to and from the site, is an important factor as is also quietness. The public utilities, such as water, gas, electricity, sewerage, telephone, etc., may also be important considerations if the hospital is to be built in an area relatively inaccessible. Good lighting in the roads by the hospital is essential as are also fire fighting facilities in spite of the fact that modern buildings are now built of fire-proof materials. Much of the material used in a hospital is not fire-proof. Nuisances must be avoided. Noise is one of the worst—noisy highways, railroads, schools and playing grounds should not be adjacent. A cemetery should not be visible. Industrial smokes, dust, etc., if in the line of the prevailing wind are also noxious. Insect infested areas should be avoided. Sub-soil conditions must also be investigated. High ground is usually considered to be ideal and it is definitely an advantage if the site has a slope to the rear to allow for basement services. The orientation and exposure of the hospital will naturally be influenced by the topography; and the sunlight and prevailing wind in ventilation, etc., must be taken into account.

56. Finally, the cost of the site, whilst important, is to be assessed having in mind at least the above considerations. To go from a large community centre to cheaper land may make the hospital so costly to the community that it would have been wise in the first place to have bought a more expensive site nearer the centre.

* One hospital visited has space in which to park over 200 cars.

SECTION C

NOTES ON SPECIFIC DEPARTMENTS AND SERVICES

57. CENTRAL SUPPLY SERVICE. Central Supply Service, although a comparatively new development has made rapid headway in American hospitals and it has proved economic and efficient in hospitals of all sizes.

58. This service prepares ready for dispatch and immediate use all medical and surgical supplies to wards, theatres, etc. Theoretically the department is divided functionally (in the larger hospitals the division is physical as well) into three quite distinct areas—(1) receiving—all new supplies and equipment as well as supplies and equipment returned after use: the latter are cleaned, reconditioned and stored pending transfer to the second area; (2) preparation, where the items are prepared, sterilised and assembled into sets in accordance with standards laid down; and finally they enter (3) storage —where the assembled sets are stored ready for immediate delivery and use.

59. With intelligent staff this department provides an outstanding service, eliminating duplication and waste, not only of materials, but also in working time. I had many opportunities of watching the work in progress. I was told that by confining the handling of instruments and supplies to trained personnel breakages, damage, and deterioration had been greatly reduced.

60. In many of the larger hospitals a steriliser for septic contaminated instruments, etc., returned from use is installed in the receiving area. Many central supply service departments prepare their own solutions for intra-venous or other use and these are stored in the sterile or third area. There is, however, a difference of opinion on this question. Some hospital authorities prefer to buy the solutions ready made from reputable drug houses, and I was told that the practice of hospitals making their own is on the decrease.

61. The situation of the department is important. It was seen in many positions—in the basement, on the top floor, and on the third floor (the latter in relation to the operating theatre suite). The tube system is used in a number of hospitals for conveying requisitions to the service and, in some cases, small supplies are sent by the same means. In small hospitals the service is generally combined with other departments, *e.g.*, the pharmacy or the operating theatre suite.

62. In one hospital visited some thirty types of treatment trays were designed by the doctors and nurses and these are set up in the service ready for immediate dispatch. Intra-venous solutions are bought outside and set up in the service, the needles, etc., used being re-conditioned and sharpened here. All trays are labelled, and in the event of any complaint about a tray the person responsible can be questioned. The trays include all dressings, solutions, plasms, intra-venous sets, etc.

63. A Central Supply Service requires ample space. Some of those visited were too crowded, particularly the storage room. Plenty of shelving and cupboard space is essential if the service is to function efficiently. In some cases the shelves were too high necessitating the use of steps. It is preferable that they should not be more than four tiers so that supplies are readily accessible not only for use but also for inventory purposes and for cleaning. Cupboards recessed in the walls with sliding doors are better than individual cabinets which take up much space. Generally an electrically driven sharpening stone is used for needles although at some hospitals sharpening is still done by hand. Gloves after being washed are put on a glove rack under a fan to dry and then put into the glove room for repair and preparation. This room is separated from the solutions room because of interference with the preparation of solutions by the powder. One hospital has an ingenious device to prevent any discomfort to the workers powdering gloves. It consists of a box with a glass front which contains a hole large enough for the worker's arms encased in elastic wristed sleeves to be put through. She can see what she is doing without any of the powder reaching her.

64. Needles are sterilised in glass tubes. In some cases cotton wool is pushed into the end of the tubes, in others the tubes have a central constriction which holds the shoulder of the needle thus preventing the point from being damaged on the end of the glass tube.

65. Many hospitals buy surgical dressings, bandages, etc., already made up thereby cutting down much time and effort on the part of the staff. Others save staff by having a team of voluntary lady workers who visit the hospital regularly every week to do this work. They are keen, enjoy the work, and do it well. In others the work is done by nurses.

66. The size of the department depends upon the extent to which the hospital makes up its own preparations, dressings, etc. If all solutions and dressings, etc., are bought, the latter prepared ready for sterilising, a small area only is required. At the same time provision must be made for possible expansion of work. It is a department which grows as its successful application becomes so apparent. Lack of space was a complaint heard frequently.

67. Prepared trays, if not used, are re-sterilised every ten days. Distilled water is laid on to many Central Supply Service departments.

68. CHILDREN'S UNIT. It is estimated that 5 to 15 per cent. of the beds in a general hospital should be for children, and as children need more individual nursing care the usual 20–30 bed unit of an adult ward has been reduced to 10 to 14 bed unit. In the majority of cases the unit is acoustically treated and completely separated from the adult section. Where possible the unit should open on to lawns and gardens, but failing this wire protected balconies or solaria with added playrooms are advisable. Glass partitions separating one, two and four bed cubicles are universal. Curtains provide the necessary privacy.

69. The Americans believe in individualised bedside care for children to protect them from cross infection. In many cases there is a wash basin in each cubicle for the doctors and nurses to wash their hands, also a hook for a gown at the entrance. Each child has its own bed-pan in a bedside locker and a cabinet for its toys, clothing, etc. Easily removable partition walls are much used.

70. Each unit contains an isolation section, self-contained with all its nursing and utility services.

71. Nearly all children's units had paintings (not hanging pictures) on the walls depicting nursery rhymes, and the children were well supplied with toys. The toilets are of the "junior" type for children. The key of the hot tap to the bath was removable to prevent tampering by children who might thereby scald themselves.

72. CLINICAL LABORATORY. One of the minimum standard requirements for hospitals desirous of being approved by the American College of Surgeons is that the hospital shall provide "a clinical laboratory giving a complete and properly supervised service, including at least the minimum or emergency service within the hospital and the major or more complicated service through acceptable affiliation when necessary."

73. The laying down of this standard, easily reached by the large hospitals, has had the effect of bringing about a considerable improvement in the work of this department in smaller hospitals. It is expected that this laboratory in these hospitals should be able to cope with the essential examinations immediately necessary in assisting the clinician in making or confirming his diagnosis, *e.g.*, urinalysis, blood counts or examinations, coagulation time, smears, sputums and spinal fluid cell counts. If possible some blood chemistry should be done. Other more elaborate examinations such as tissue pathology, Wasserman and Widal tests, etc., should be passed on to

the nearest large hospital or centre equipped to do them. The standards committee has always linked the clinical laboratory and X-ray facilities as being the two clinical " musts " in attaining any desirable standard of efficiency in hospitals. This is also the view of the Hospitals Division of the W. K. Kellogg Foundation.

74. American hospitals, both large and small, are proud of their laboratories. Generally, they are well equipped and adequately staffed. One 40-bed hospital has an outstanding laboratory and X-ray service, and complete departments exist in a large number of hospitals of 100 beds. If the hospital has no resident pathologist it utilises the services of a visiting pathologist. In some areas unable to support a pathologist general hospitals were included in a circuit, the pathologist touring periodically.

75. CLINICAL PHOTOGRAPHY. This subject was not included in my schedule but I heard much that was of interest concerning it that I have thought it desirable to include a reference. It has assumed an increasing importance in clinical work in America, and in many hospitals a special department has been set up and equipped.

76. Generally, photographs are taken in all cases where in the opinion of the doctor they would prove helpful. By this means it is possible for different members of the medical staff to form an accurate picture of the progress of a case. Further, a good photograph cuts down the narrative in many case records. Lantern slides are made for lectures and demonstration purposes as well as for " movies " of new techniques in treatment. Illustrations for various professional journals and a series of illustrations of industrial rehabilitation have proved of great educational value. For example, in the plaster room illustrations showing the correct use of apparatus, etc., have been made and are displayed for the assistance of the staff. Coloured films are featured in many cases. Where such departments exist the hospital authorities encourage the staff in their work.

77. One hospital has a medical art department which deals with photography and painting combined. The Director has teaching rank in the medical school. Many other hospitals are developing this idea—one in Toronto has an artist who does medical illustrations in colour.

78. One hospital attaches a photograph of each patient to his medical record, and it is claimed that this is a very useful method of remembering the patient and recalling his condition.

79. It would seem that provision for clinical photography should not be overlooked in planning at least the larger hospitals.

80. DIETARY DEPARTMENT. This important department requires very careful planning and more attention is being given to it. The

selection of equipment is also receiving every consideration. The final test is that good quality food should reach the patient well and attractively served, with each article of diet at its required temperature and its nutritional values unimpaired.

81. The arrangements for receiving and checking food follow a well recognised "routine of travel." Generally they are carefully thought out and very little cross traffic was found. Checking in is well done. The food then traverses various storage rooms to the preparation and cooking areas. When thoroughly prepared, certain articles are held in suitable storage spaces pending distribution. Following distribution there is the disposal of waste and the cleansing of kitchen utensils and crockery.

82. Distribution is all important and before a plan can be prepared by the architect it is necessary to decide on the methods to be used in distribution and service, apart from the type of equipment to be installed. The kitchen must in other words first be planned from the distribution angle. This is now general practice but it has not always been the case. A kitchen which is too small is intolerable and unfair to the staff working it ; while a kitchen too large is wasteful of money both in its original outlay and in subsequent maintenance. Moreover it requires much additional effort on the part of the kitchen staff. Much black labour is employed, and the pay is at the same rate as for white labour.

83. Much labour saving kitchen equipment is in use. Americans will not do anything by hand that can be done as well or better by a machine. Their attitude is that any machine which shows after careful examination and test a diminution, however small, in running costs, or which shows an increased efficiency in service will pay for itself sooner or later. Stainless steel is also much used, and all spoken to were most enthusiastic about its appearance and wearing qualities.

84. Provision for expansion and additional or larger size equipment is essential. One kitchen visited had completely outgrown its original accommodation, and major alterations and extensions are necessary to bring it into line with modern standards. It is well to provide for a few pieces of extra equipment but to omit these at the beginning ; as the hospital grows, it will only be necessary to install the needed apparatus. Unless the architect has had a broad experience in planning a kitchen outside expert advice should be secured. In all cases the kitchen plan should be carefully studied by the dietitian. Some architects have a kitchen specialist on their staff either full-time or as a consultant.

85. Many kitchens are tiled from floor to ceiling ; others to about half the total height, which is generally about 12–14 feet. Floors vary,

but generally red tile seems to be most popular. Terrazzo was used in some cases. In all cases the lighting, both general and individual, was excellent.

86. The type of service employed may be broadly divided into Centralised and De-centralised, but varying grades between these two extremes were seen. There is considerable controversy on this question. The centralised service involves a complete service of the tray in the kitchen and its transport to the patient without further change ; whilst the de-centralised service involves the transportation of the food in bulk from the kitchen, either to the ward servery or else to the actual bedside. Various methods are utilised to maintain the correct temperatures of the different articles of food in either system. Certain variations are applied in different hospitals, and they usually concern the preparation of the crockery and cold foods which are added to the trays in the kitchen or servery on the ward floor ; the hot foods being brought to the servery in heated containers. Easy access to elevators for bulk foods and to dumb waiters for special articles of diet and special diet trays, etc., is essential. In principle the de-centralised service would seem better suited to the pavilion type of hospital where ward serveries are obviously essential. The food retains its heat better whilst in bulk in the specially designed trolleys. These are generally heated by electricity. Most trolleys have cooled and heated compartments well insulated from one another. All trolleys have bumpers padded with rubber to stop them damaging the walls. In some the bumper encircles the trolley at a height below the upper skirting level of the walls which in some cases are lined with a harder wall substance than the plaster above. Others have this band nearer the top of the trolley.

87. Centralised service is obviously more suited to the multi-storied building where vertical transportation by means of lift, dumb waiter or trayveyor, fed by a travelling belt or directly, is more rapid than horizontal transportation. If the trays can be got to the corresponding floor stations by mechanical means, and transported to the patient individually by hand or by means of tray trolley, then something approaching the ideal has been achieved. The system requires a well organised and synchronised routine, any hitch upsetting this routine resulting in delays and the service of unsatisfactory meals. The siting of the kitchens has undergone many changes, and there is no decided opinion in favour of any one situation. As its position affects the position of the dining rooms it is a matter of more than passing importance. It cannot be considered as an isolated service department. Kitchens were inspected on the top floor and on varying floors in different hospitals. The old idea of the ground floor for the kitchen, sometimes in a basement, as a guiding principle, has now been relegated

" to the discard." The dining rooms used by the staff, medical, nursing and domestics, as well as those now provided for the convenience of visitors to patients at the hospitals, must obviously be reasonably adjacent to the kitchen service. Careful planning to prevent cross traffic here is essential. The cafeteria system is very popular.

88. All the various kinds of fuels are utilised—coal, coke, gas, electricity and oil. The types of fuel available will obviously determine the types of cookers, etc., which can be used. Gas is used quite a lot but cheap electricity in many places has brought this form into increasing favour. Stoves on the Aga and Esse principle are giving satisfaction. These burn anthracite or coke.

89. The " route of travel " of the foodstuffs has been mentioned previously but requires some further elaboration. The receiving rooms have doors large enough to allow easy ingress of all food containers and of their easy inspection by the receiving clerk. In the larger hospitals this officer is distinct from the storekeeper. In the small hospitals one officer combines both offices. From here to the main storage rooms is easy access for both perishable and non-perishable foods. The bulk supplies, including non-perishable foods, are stored in well ventilated vermin-proof rooms. The perishable foods are stored in their respective refrigerator spaces, and there is usually a root cellar or ventilated cool room with slatted bins for air circulation for root vegetables. In some cases a separate store is provided for canned or bottled goods. The cold storage rooms open indirectly into the main kitchen through the preparation room or rooms to give protection from the heat of the kitchen.

90. The cooked and prepared foods are served in the kitchen to the trays or containers for distribution either by trolley, dumb waiter, trayveyor or other means. In some cases special diets are sent direct to wards by an independent route. The pots and pans are washed and stored in an annexe to the kitchen. Returning trolleys are cleaned (and in a few cases sterilised also) as well as the tray racks, these being then placed in their respective storage places. A special room for washing trolleys has proved a great advantage. In general the fewer rooms used in the kitchen area the better the supervision by the dietitian. Only in large kitchens would it appear necessary to separate in this manner the special diets and the bakery. Opinions differ on the question of central dish washing as against washing up in the ward kitchens or serveries. Many examples of both methods were seen.

91. The serveries are complemental to the kitchen and more or less preparation and cleaning of utensils may take place there depending on the methods of service and supply previously determined.

92. Opinions also differ as to the position of the formula, or babies' feeding room. Should it be in an annexe to the kitchen or in the maternity section ? In all cases it was agreed, however, that it should be under the control of the dietitian.

93. The dish washing area definitely needs acoustic treatment as it is one of the noisiest sections in the department. Its siting with regard to reception of soiled crockery, and to storage of cleaned and sterilised crockery should be carefully considered, bearing in mind the question of cross traffic.

94. In the majority of cases garbage is refrigerated and the refrigeration area includes a wash rack for washing and sterilising the containers when emptied ; and generally ample space for their storage. It is advisable where possible to rake over garbage to recover cutlery, etc. Several hospital administrators stated that this simple procedure had prevented definite wastage and was well worth while, as it was amazing how many articles found their way into the garbage pail either by accident or negligence.

95. Much attention is given to the provision of adequate plumbing, piping and electrical points, etc., and their respective positions. Because of the great importance of these service lines architects, when planning kitchens, always require early decisions on the type and size of equipment to be used. One architect stated he would not start to plan a kitchen without this information.

96. Domestic Staff. As with nurses much more attention is now being given to the question of improving conditions for the domestic staff. They may or may not live in the hospital. Where the staff live in, the quarters are more or less on the same lines as those for nurses except that in some hospitals a number of domestics have to share bedrooms. I was told that the ideal in new hospitals was to give each domestic a separate bedroom, with amenities closely approaching those in nurses' homes. Male and female dressing rooms, with lockers, toilets, showers, etc., are provided for domestics living out. In many cases rest rooms are also provided. The domestics have their own dining rooms and sitting rooms.

97. Much is being done to relieve the labour of domestics by the use of mechanical equipment and other means. For instance, buckets with mop wringers on castors for ease of movement ; trolleys for cartage, etc., ample cleaning rooms, well fitted to house all implements without crowding.

98. Entrance Hall and Admitting Office. One of the features of American hospitals is the excellence of their entrance halls and arrangements for the admission of patients. The efficient and

smooth working of these sections depends on the care given to their planning, and in particular once again to the traffic lines. Apart from the co-ordination necessary between its integral departments and also with many other departments of the hospital, allowance must be made for estimated expansion of the hospital and its effect on this department. Further, as this is the department which is first contacted by the patient, his visitors and relatives, and from which they form their first impressions, it is essential that its dignity, pleasing design and comfort should be in keeping with the importance of the function of the hospital.

99. The main entrance lobby is usually centrally placed and convenient both to the administrative area and the corridors, stairs and lifts to the wards. Much thought is given to the comfort of the visitors, the majority of hospitals providing adequate waiting accommodation including lounges comfortably furnished for their use. In this hall one invariably finds an information bureau with a neatly dressed pleasant girl continuously on duty, flower stall, gift shop (sale of stationery, cigarettes, newspapers and journals, etc.), public telephone, drinking fountain, and up-to-date cloak rooms. Generally also there is a cafeteria for the use of both patients and visitors. This may be at the back of the hall or in an annexe leading off. In one there was a baby crèche with a children's nurse in charge. In another (in the out-patient waiting hall) there was also a stand for health propaganda with literature and specimen fruit and vegetables on view, and I understand that this innovation has been adopted by many other hospitals. Many entrance halls have paintings on the walls, and the whole area provides a pleasing appearance. One criticism raised against these large halls is that they take up much space which might otherwise be used to greater advantage. They are, however, much favoured.

100. The admitting office either leads off from, or is convenient to, the entrance hall, and is invariably adjacent to the Social Service Department. Here facilities for privacy in writing particulars as well as the interviews which may be necessary concerning finance, etc., are provided. In the larger hospitals these offices are separate; in the smaller ones they are combined, the staff fulfilling both the function of admission and social service. In some hospitals a registered nurse admits all the patients on the ground that she is better able than a lay officer to place them in their proper departments. She refers to the credit manager only if the patient cannot pay one week in advance.

101. In small hospitals the information desk and telephone switchboard are combined. In nearly all cases they control the public entry to the administrative offices as well as to the hospital. In the larger hospitals they are always separate.

102. The medical staff room was found in various places, often off the entrance hall and in the line of entry to the medical staff cloakroom. This is generally agreed as being the best position so far as case records are concerned as the staff are then more likely to call in and complete their records.

103. A feature in some hospitals is the assistance given by different coloured lines to patients and visitors to enable them to find their way to the different departments. These lines may be on the floors, walls or ceilings. Sometimes coloured cards are handed to visitors and patients and they are directed to follow the corresponding coloured line.

104. The " In-and-Out " Register for the medical staff is situated where it can be seen easily by the officer at the Information Desk if the switchboard is here, otherwise it is situated with the switchboard operator. In addition to the " In-and-Out " Register, there is a patients' register and a room register. At one hospital the register is placed off the main hall at the entrance to the medical staff cloakroom. On pressing a button a white light shows " In " and a red light " Out," and this is duplicated automatically at the switchboard.

105. There should be a waiting room for the Superintendent or Director. It should be kept as a waiting room and have a door opening into the Director's office. The Director's secretary may use the room as an office. In some hospitals the Board Room was used as the waiting room and also as the Director's office. Neither arrangement is satisfactory.

106. Administrative office accommodation varies with the age of the buildings. In old hospitals it is very cramped and the arrangements quite unsuited to modern requirements. In the newer hospitals, however, the offices of the administrative department are excellent—they are of ample size, well designed and furnished and they present a most businesslike appearance. (Office labour-saving devices are used extensively—calculating machines, electric typewriters, book-keeping machines, dictaphones, fountain pens with neat special desk rests, etc.) These eliminate much of the drudgery of office work and speed up the work ; there is no doubt as to their efficiency.

107. LAUNDRY. With improvements in washing equipment and the manufacture of plants of varying size there is much to be said for all hospitals undertaking their own laundry work. In the smaller hospitals, however, it is probably still more economical to send it to a commercial laundry or make arrangements with another hospital laundry. Nearly all the large hospitals have their own laundries and those visited were very efficiently run. As in kitchens, much black labour is employed in this work.

108. Laundries were seen in separate buildings but more often they were in the basement. Traffic lines are most important. The main object to be aimed at is to secure " straight-line " production, with total elimination of cross traffic. This requires careful planning, more particularly taking into account future expansion both as to accommodation and equipment. The soiled linen should enter the laundry and advance without interference of any kind until finally it is sorted and stored prior to being distributed to wards and departments of the hospital. Generally these arrangements are carried out in laundries until such time as the hospital grows and the laundry then becomes too small and makeshift arrangements are introduced. This was seen at some hospitals and it was obvious that working conditions were somewhat difficult. It is essential that the laundry is not placed near ward units, because of the noise, odour, etc.

109. It is important that having decided on the equipment to be installed the manufacturer's experts should be consulted as to the lay-out of the laundry and the best method and ways of installing the equipment to be used. Some architects utilise the services of a laundry specialist. There is general agreement that equipment must be considered first—this allows adequate provision to be made for drains, water, steam, and electrical service connections. This has not always been done in the past but it is a point to which consideration is now given.

110. Sorting bins and similar equipment should have large easy running castors, at least 7 inches in diameter with good rubber rims. Linen is collected from wards, etc., by means of linen chutes which project the linen into a soiled linen room on the ground floor or in the basement. This room should have a drain to cope with the flushing either by water or steam. A 24-inch chute is recommended. Heavily contaminated linen is invariably first disinfected in the utility rooms on the ward floors. In some hospitals it is so arranged that the linen drops into bins or trolleys which can be wheeled direct to the laundry. This is a great convenience. Water softeners are used where the water is hard—the saving in soap is said to be appreciable, and moreover the linen is given a better finish and lasts longer.

111. Ventilation is important and moist heat should be removed mechanically. Generally this is done by means of hoods over the equipment, but extractors are found to be more efficient, the steam being drawn down into floor ducts and forced to the outside air. The ceiling height should be at least 12 feet, and where possible all walls should be tiled. If this is not possible at least the walls in the sorting room(s) should be tiled, and the remainder of hard plaster enamelled to allow of easy washing down. These remarks also apply with equal force to the kitchen.

112. The working arrangements—sorting, washing, extracting, ironing, etc., do not differ materially from those generally in use in Britain, except that nothing is done by hand that can be done by a machine.

113. THE MATERNITY UNIT. There is now a very definite opinion that the Maternity Ward or Suite, which comprises maternity patients, the new-born nursery and the delivery suite, should be segregated from other patients' sections in the hospital. This principle is easy of application in the larger hospitals. In hospitals of only a few beds it is practically impossible; in these cases it is possible, however, by careful planning to maintain the autonomy of this section. Hospitals generally regard their maternity suites with some pride, and there is a noted tendency for expectant mothers to avail themselves of the facilities provided in hospitals as the following statistics will show:—In the fifteen years ended 1944, 73·1 per cent. of all births in the United States occurred in hospitals and approximately 12 per cent. of all admissions were for maternity care. It is appreciated that the normal mother needs very little attention differing from any other patient, and the normal new-born baby needs little beyond warmth, cleanliness, proper feeding and sleep. In America it is considered that a hospital is the safest place for the new-born baby to-day.

114. Special arrangements are necessarily required in the Maternity Suite and American hospital authorities have given considerable attention to its planning. Generally, with some exceptions, it is planned in such a way that it may be reached by doctors, visitors, and supply services, without their passing through any other patients' unit.

115. It is estimated that there should be one labour room to every ten patients, and one delivery room to every 20 maternity beds. All these rooms should be sound proofed. The labour room should have its own toilet and generally be equipped as a private room. The bath should be replaced by a shower with a stool so that the patient may be seated whilst having her shower. An emergency nurses' call system is provided so that the attending nurse can summon help without leaving the room. Labour beds in some hospitals have side rails which can be raised or dropped like a cot, and the beds can be put in the Fowler or Shock positions. The labour rooms may have to serve as emergency delivery rooms and so should be adequate in size, approximately 180 square feet. Portable or pedestal lighting should be available.

116. The delivery rooms are essentially similar to operating rooms in design. An addition, in many hospitals are rest rooms for the doctors of both sexes, including a bed call sign, generally of the buzzer type, and telephone, etc. Such rooms are considered essential in view of the irregular and uncertain periods of waiting.

117. It is estimated that the number of bassinets required is about 80 per cent. of the number of maternity beds, and that each bassinet requires 30 square feet of floor space and 270 cubic feet all told. The maximum number of new-born babies that a nurse can care for adequately is said to be eight, or at the outside ten. This figure is maximal and should never be exceeded. Air conditioning in the nursery is recommended at 78° F. temperature with a relative humidity of from 50 to 55 per cent.

118. Generally the babies are viewed through glass, the visitor standing in a corridor or recess without obstructing the traffic. The nursery arrangements in all hospitals visited forbid anyone admission except the nurses who scrub and gown before entry. The entrance is through an examination room where the babies are brought by the nurses for examination and treatment by doctors. The doctors scrub, mask and gown before making examinations. In one case the nurse passes the babies through a sliding window to the examination room. Glass partitions are everywhere used in this section. The nurses' station is placed so that it controls the whole of the nursery. Fluorescent lighting is used extensively and these areas are all acoustically treated. Glass bricks are also used.

119. Babies are identified in various ways. The bead wrist bracelet seems to be the most popular method, with, in some cases, the addition of a record of their footprints. The beads are lettered with the name of the baby.

120. MEDICAL STAFF LOCKERS, LOUNGE, ETC. The situation of the medical staff lounge, locker rooms, etc., has been a subject of discussion for many years. In America they have arrived at a solution by siting the locker rooms conveniently near the main entrance, the traffic line passing by the medical record room. The lounge is generally on the ground floor. In some hospitals it is used also for staff conferences but in others it is deemed advantageous to have the library and conference rooms combined, the lounge being kept separate. In these cases the combined rooms are adjacent to the medical record room. This makes it easier for the medical record librarian to control case records and provides adequate space for members of the staff to consult them. At the same time the reference library is readily available. Private cloakrooms (in some cases with an attendant in charge), comfortably furnished lounge, bulletin board (invariably at the side of the cloakroom), lavatory and toilet accommodation are standard requirements.

121. NURSES' HOMES. Nurses' homes vary considerably both as to position and as to accommodation and facilities. Where separate homes are provided they are invariably well planned and contain all

modern facilities. Where the " home " is in the hospital the arrangements were not so good. Generally, this is due to lack of adequate accommodation, the staff having outgrown the original accommodation provided. Modern facilities such as wash basins in each room, hair washing rooms, personal laundries, guest rooms, floor tea rooms, are either lacking or have had to be provided where at all in odd places where space was available. Opinion is definitely in favour of a building separated from the hosiptal building proper but adjacent to it, with congenial surroundings and a good outlook wherever possible. Many stressed the fact that this is their home and also that recreational facilities, both indoor and outdoor are essential. Further that the lecture rooms and laboratories necessary for their training schools should be planned with regard to possible future expansion and that when the school is combined with the home the distinctive character and the needs of the school should not be submerged.

122. Generally, each nurse has a single room but these vary considerably in size and make up. The best are of sufficient size to accommodate a roomy built-in cupboard in which dresses can hang easily and with hat shelf above and shoe rack below, etc. ; a comfortable bed with bedside table, dressing table (some with a pull-out slide for use as a writing table), a desk in other cases ; student-type arm chair with shelves ; an ordinary chair ; wash basin with hot and cold water ; a full length mirror either on, or at the back of the cupboard door ; rug ; ceiling lighting ; bedside lamp and metal waste paper basket.

123. It is estimated that there should be a sitting room on each floor for each group of 20 nurses ; four baths and two showers, or three baths and three showers for each 30 beds ; and one water closet for each five beds. There should be a wash basin in a separate room adjacent to the water closets in addition to the wash basin in each room. If the bedrooms do not contain a wash basin then one lavatory to each three rooms has been estimated as sufficient. If communal washrooms are used light partitions, with curtains, should be provided to give some measure of privacy. This applies to all female communal washrooms, including domestics. Communal washrooms are definitely out of favour. All authorities agree on the provision of a wash basin in each bedroom.

124. In all the newer hospitals personal service facilities are provided. In older hospitals they have been introduced wherever possible. These facilities include at least small kitchenette on each floor (with hot-plate, urn, toaster, sink, cupboard, tea table, and hot and cold water) ; refuse container ; small laundry on each floor or else a large one with multiple tubs, ironing boards and a drying room for several floors ; a sewing room (with two or three sewing machines,

pressing table and cutting table); and a shampoo room with a drier. One hospital visited had a beauty parlour. Each floor has a small incinerator for the nurses' use.

125. Acoustic treatment of all bedroom corridors will be found an advantage, especially where the night staff is not accommodated in a separate wing of the home, as was seen in some hospitals. There is a tendency in this direction.

126. The lobby and reception hall should be light, airy, and pleasantly designed. Some of those seen varied considerably in this connection. Here again much depended on the age of the buildings, the newer ones creating a very favourable impression. The home office contains the switchboard, key board, letter rack, etc., and is generally in or adjacent to the lobby. Small reception rooms, or a space divided by screens into alcoves, are provided for the nurses to see their relatives and friends in privacy. This entails a cloak room with lavatory and toilet for male visitors, and also one for female visitors, care being taken in both places to see that the entrances are not too conspicuous. Pay telephone booths are provided in the lobby together with postal facilities.

127. A general library of good books is an asset of great recreational importance. Many stressed the advantage of this. It is separate and distinct from the technical library in many cases.

128. An assembly room is essential. This should be designed so as not to disturb, on account of noise, the sleeping quarters. It should have a floor prepared for dancing, etc. Sliding doors will be found useful for dividing the room into smaller rooms when required. A trunk room for storage on racks, with floor space for examining trunks, is essential on each floor. The central trunk room has not proved satisfactory mainly owing to the fact that it is invariably placed in the basement out of the way. Some homes contain a sick bay with beds for nurses who are ill. In others they are accommodated in private or semi-private rooms in the hospital. Dining room facilities vary according to the policy laid down, the situation of the home and whether or not it has its own kitchen. Where the home is separate from the hospital the general practice is to provide a kitchen in the home with the necessary dining rooms. Some were found in the nurses' home and some in the hospital proper.

129. The training school is invariably situated in the home. Reference libraries with the latest nursing manuals and current journals were general in hospital nurses' homes visited. Apart from appropriate lecture rooms, stress is laid on the importance of sufficient and adequately equipped demonstration rooms. A number of small ones

is better than one big one. The room contains a nursing room, utility room, bath and linen closet, inset cupboards, work tables, dressing room, bandaging and splint room, chemical laboratory, biological laboratory, museum, dietetics laboratory, etc. Blackboards (wall type) are better than the easel variety. To add realism to the training these rooms and laboratories should be fully equipped.

130. Opinions vary on the question of whether or not nurses should be allowed to live out. Some authorities agreed that the trained nurses should have the right to live out, but thought that the position of trainees was different, and that they should be accommodated in a nurses' home properly designed for their comfort and welfare. Others expressed the view, in some cases quite strongly, that the nurse should be free from hospital life once her duties are finished. In many hospitals the nurses live out, coming to the hospital at their appointed hours. This is only possible where suitable accommodation can be found within a reasonable distance of the hospital. One hospital has solved the problem by purchasing a large apartment house about 100 yards away, and out of sight of the hospital. It houses about 300 student nurses and a limited number of graduate nurses. Each apartment comprises living room, a good size comfortably furnished bedroom (where large this accommodates more than one person), kitchenette, bathroom and w.c. In addition laboratories, class rooms, general dietary facilities, and libraries have been provided. In short a complete nurses' home and training-school. It has a large entrance hall and lounge, reception office, etc. Another, a really palatial building, contains both single rooms and self-contained flats and every conceivable comfort in the way of accommodation and facilities. It is the latest to be built and is not yet occupied.

131. Operating Theatres. The orientation of operating theatres in America is not now considered as of great importance because of the almost entire use of artificial lighting. Some theatres still retain the studio type windows while in others glass bricks are used. Glass bricks are popular in American hospitals and other buildings—I saw them on many occasions. It might be thought in operating theatres that the irregular pattern on the wall from the glass bricks might prove disturbing to the surgeon and theatre staff in contrast with the uniform lighting through glazed windows, but I was told that this was not so. Skylights and very large windows to improve natural light are no longer recommended.

132. It is generally agreed that there should be one operating theatre for each 40–50 surgical beds. In small hospitals, basically, there should be one major and one minor operating theatre in addition to an emergency room in the admission department. In a very small

hospital where it is not possible to provide more than one operating theatre, minor surgery could be performed in the emergency room.

133. There seems to be no agreement as to the exact position of the operating theatre suite, except that it should adjoin the surgical wards and not be too far away from the Central Supply Service for instruments, dressings, gloves, etc. American authorities prefer to isolate the theatre block mainly, I gather, with a view to avoiding cross traffic. Much thought is given to this question of traffic lines and also to future extensions and additions.

134. Generally, the standard lay-out comprises twin theatres with a scrub-up between them, and a sub-sterilising room similarly placed opening only into the theatre on each side of it. A general sterilising room is often found on the opposite side of the corridor. Opinions differ as to the provision of anæsthetic rooms and some hospitals have dispensed with them. In one hospital the operating theatre unit consists of seven theatres ingeniously arranged around a central work area. This, it is claimed, economises space, time and effort. The entrance for patients is from an outside corridor thus avoiding cross traffic and there are no anæsthetic rooms. A number of theatres were seen. They vary considerably but with the exception of one which was much too small they all conform to sound surgical principles. In size it is estimated that the theatre itself should be approximately 320 to 400 square feet.

135. Lighting, both general and special also varies considerably ; there is no agreed opinion on either. Shadowless lamps, overhead and on floor stands are of many designs, the former being fixed or movable. Where movable the light fixture ran along rods let into or attached to the ceiling. The light could be adjusted to any desired position in relation to the operating table. Criticisms were heard against the movable type from the ceiling on account of the danger of dust falling from the runners or rollers, this being said to offset the advantages of flexibility. Also they require oiling at times to ensure smooth running.

136. The use of fluorescent lighting, plus ordinary electric lighting from lamps fixed to the ceiling, is proving satisfactory. The former gives almost the equivalent of daylight. The arrangement of the centre light is such as to allow the air to escape above and so keep the theatre cool. A floor or pedestal lamp is often used for " spotting " the operation position on the patient.

137. Emergency lighting is almost everywhere kept continuously charged from the main and is thus always ready for emergency. A few hospitals rely on the battery system. The switch over in both cases is

completely automatic. For contagious disease units some hospitals are making use of ultra-violet sterilisation lamps pre-operatively in the operating theatres and I was told that the practice was spreading to the general hospitals.

138. Much research has been conducted in recent years on the subject of anæsthetic explosion hazards. While the incidence of such explosions is not great they are preventable, and as such they should be guarded against to the extent that they are prevented. Most operating floors are of terrazzo (other material was seldom seen) with metal (not vulcanite) grids to dissipate static electricity when generated and noiseless, sparkless electric mercury switches are in general use. Generally, all equipment is grounded. At one hospital the surgeons and theatre staff have aluminium incorporated in the soles of their shoes. An overhead plug for electrical fittings was said to be a definite advantage, especially for use with a flash steriliser.

139. X-ray viewing boxes, taking full-size films and flush with the wall, and electric clocks are standard equipment. Apart from the operating table all movable equipment, practically all of stainless steel, is on good size easy running castors. Practically all operating theatre suites are air conditioned. Complaints were made in hospitals where air conditioning was not installed.

140. Viewing operations by students and visitors has given hospital authorities and hospital architects many sleepless nights, and it may be that the best method has still to be found. Generally it is agreed that all persons not connected with the actual work in the operating theatre should be kept away from the theatre and that other provision should be made for them. A good example of this was seen. The ceiling of the theatre has been specially constructed, the students and visitors sitting in a semi-circular glass enclosed dome almost directly above the operation table. The seating area is air conditioned, and there is a two-way radio of the chefalon type to allow of the surgeon carrying on a conversation with those in the enclosed area outside the actual theatre. This method obviously has definite advantages and is superior to the old fashioned sloping gallery and the movable metal stand on the theatre floor, although the latter, if supported on easy moving silent castors, is still found useful. I much regret that owing to circumstances quite outside my own control it was not possible for me to visit the Mayo Clinic, but from inquiries on this subject I was informed that use is made here of a very steep gallery and that this, combined with the technique of the surgeons which has been designed especially with a view to demonstration purposes, has proved very successful.

141. Some hospitals maintain an individual supply of instruments for each operating theatre as against a central instrument room or,

what is more frequent, a combination of both. It is perhaps an advantage for special theatres using special instruments to have complete responsibility for such instruments. In other hospitals where the Central Supply Service has been highly developed, this serves all the theatres; where this service is not so well developed it would seem that each theatre has control of its own instruments. The surgical equipment seen was first-class—locked cabinets were recessed and flush with the walls. Buckets were everywhere of the kick type and practically all equipment is of stainless steel. Sponge or swab racks for ease and accuracy of counting and checking swabs are in general use. Hospitals not using stainless steel equipment are ready to change over immediately supplies become available.

142. The scrub-up annexe is invariably in view of the theatre and in accordance with American practice serves the twin theatres. The scrub sinks, three for each pair of theatres, are of the splashless type and have knee or foot control mechanism to regulate the flow of water. Built in soap and brush containers are used in many hospitals; in others liquid soap containers are used, the soap being forced up by a foot pedal. An alcohol hand bath adjoins the sinks in most cases. In some cases no sinks are used in the scrub-up—merely an anti-splash board supported obliquely against the wall, the water draining into a shallow gutter. This arrangement seemed to be most efficient.

143. The sterilising or sub-sterilising room is generally situated between the twin theatres. This contains no new features beyond a small high pressure fast time or flash instrument steriliser. This was seen in the theatre itself at some hospitals. The current is supplied from an overhead flex hanging from the ceiling. The lids of the sterilising apparatus contain a special sealing rim which prevents the escape of steam. These work well so long as the lids and rims remain undented.

144. Hospitals were visited where anæsthetic rooms had been dispensed with. Whether or not this is wise is not a subject upon which a layman can express a definite opinion, but some comment seems to be called for. Such rooms play their part in giving instruction in anæsthesia, and they free the theatre staff to continue their duties of preparation either for the present patient or the next. One assumes also that a patient is more likely to be placid in the quiet of the anæsthetic room than in the comparatively more busy theatre itself. It is not necessary to have an anæsthetic room to each theatre; one to four might be found sufficient.

145. Storage rooms, or preferably recessed cupboards, for the storage of linen and other supplies are essential and adequate space

should be left below the shelves for heavy equipment. A blanket warming cupboard is necessary. There is a growing tendency to bring the patient to the theatre in his bed. Where this is done a stretcher or trolley space is not necessary.

146. Dressing rooms and lockers are necessary for at least three classes of personnel—surgeons, dressers and nurses, with possibly a fourth for visitors. Generally visitors use the surgeon's room. This latter room contains a dictaphone—this instrument is practically standard in American hospitals for note taking and by its aid medical records are made more promptly than would otherwise be the case. In some of the larger hospitals a stenographer attends to take down the notes. The rooms for personnel should contain a table, easy chair, sit-up chair, full length locker, shower and toilet facilities. The nurses' room should not be used as a store room, as was the case in a few hospitals.

147. A small laboratory is a useful adjunct for the examination of frozen sections, etc. The equipment may be brought upon a portable truck or be available in the room in a recessed cupboard. In the larger hospitals a specimen cupboard is provided—it is built in and flush with the wall and its contents can be taken out by means of a door outside the theatre.

148. There is a definite trend in America towards the supply of Recovery Wards or Rooms. The advantages claimed are twofold—(1) highly trained nursing personnel are obviously better fitted, and these wards better equipped, to cope with the early post-operative complications and emergencies. The patient, therefore, receives greater protection. (2) Nursing personnel in the surgical wards are relieved of the strain of major nursing at its most anxious period.

149. Thus, they can devote most of their time to the other patients who, when an emergency occurs are frequently, perforce, neglected for longer or lesser periods. The Recovery Ward has the facilities, such as oxygen, suction, electric power points and instruments and equipment ready prepared for emergency. If the theatre is air-conditioned the ward is also so treated. The number of recovery beds required varies; generally it would seem that there should be 3 to 4 beds for each major theatre. The number depends on the type of operation and the desires of the surgeon. I was told that in the Southern Hospital, Stockholm, no operation patient is returned to the ward at times which would disturb the other patients in the ward. They are held in what may be called holding wards until they can be returned to the ward with a minimum of inconvenience to the other patients. This applies also to accident and emergency admissions.

150. The orthopædic operating theatre should have its ceiling and walls reinforced to take the necessary suspension apparatus. There should be a plaster room adjacent with a plaster sink and special trap. A plaster drier is a proved time saver for the staff, and a splint cupboard or room is also necessary. There should be ready access to either a portable X-ray outfit or alternatively the room should be reasonably near the X-ray department. It is an advantage to have a small developing room in close proximity to the theatre. Some hospitals make their own plaster bandages; others buy them—there is no uniform practice.

151. There is also a difference of opinion as to the best position for the urological theatre. Should this be in the X-ray department or in the surgical block? If in the surgical block the X-ray developing room could be used in conjunction with the orthopædic theatre as is the case in some hospitals. Sterile water is piped from sterilisers outside the theatres at regulated temperatures and a device is used to regulate the flow, this being cut off when the container by the table is full.

152. In operating theatres which require to be darkened, *e.g.*, eye, ear, nose and throat, etc., the use of lighting in built-in instrument and supply cabinets which automatically light the interior when the doors are opened is a great help to the nursing staff and to the surgeon also as it avoids interference, however momentarily, with his lighting set up during operation.

153. Out-Patient Department. With a few exceptions the entrances and exits for out-patients are separate from those of in-patients, and there is therefore no crossing of traffic lines to cause congestion. The planning and situation of many of these departments is well considered in relation to the position of certain service departments which have to cater for both in-patients and out-patients, *e.g.*, X-ray, pharmacy, physiotherapy, etc.

154. The routine does not vary much from established British custom. Every attempt is made to maintain a steady movement of patients through an entrance convenient to street traffic routes, into a sufficiently large receiving room for registration. Patients on their first visit to some hospitals pass through the Social Service Department to their respective clinics. The remainder pass direct to their clinics. In other hospitals the Social Service Department is not concerned with finance, the patients being referred to the Credit Department if they are unable to pay the usual charges.

155. The appointment system is fairly general. The newer departments are excellent; the old ones leave a lot to be desired. The latter are invariably too small, leading to over-crowding and the old fashioned long hardwood seat with a flat wooden back is used.

156. A feature of most out-patient departments is that they are well marked with directing signs, and contain an information bureau to assist patients and visitors. I was told this was a great convenience not only to patients and visitors but also to the staff of the hospital who were not being asked dozens of times how one could get to such and such a department.

157. One hospital established a Food Clinic in its out-patient department in 1939 and I understand that the example has been followed by many others. The object is to serve as a help towards successful treatment by instructing patients how best they can carry out the orders of the doctors. Educational materials comprise foods, food models, pictures and posters. These are established in the out-patient department with an assistant to explain them to the patients. Copies of the health and nutrition pamphlets are also distributed to patients while they are waiting.

158. PAGING AND TRANSMISSION OF MESSAGES. Various methods are in use for paging members of the medical staff and other personnel, in different hospitals. In the main they are of two types—visual and auditory. The latter, which may be a buzzer or the calling of the name of the person wanted as is done in hotels and clubs, is thought to be inferior to the visual on account of the noise associated with it. However good the equipment the noise cannot be eliminated. The visual is the more usual method and combinations of coloured lights, and/or numbers are used in various patterns in appropriate locations. Beneath all the clocks at one hospital are the letters A, B, C, D, E and below them the numerals 1, 2, 3, 4, 5, and both may be illuminated to provide any desired combination.

159. As with paging, various methods are in use for the transmission of messages. The ordinary telephone is much used (probably because it is so efficient) but a number of the larger hospitals use the Chefalon. With this instrument the officer is able to get immediate and direct contact with each and every section of the hospital, or any combination of sections, merely by pressing a button of the desired section(s), and speaking into the transmitter. The reply comes back similarly amplified and no earphones are necessary. It saves a considerable amount of walking about. This method has been used in the business world for many years and is of proved efficiency.

160. Another method is the Telautograph. The sender writes the message and it is simultaneously transmitted to the switchboard where it appears re-written on a paper pad or roll. It can then be relayed to wards and other departments.

161. The tube system is much used in the larger hospitals. In one hospital there is a battery of 12 tubes worked by one girl. This

system allows of the transmission not only of messages, but also of patients' records, admission slips, other documents, and also small articles. It works well, is a great time saver, and economical. It takes the place of some ten to twelve porters or orderlies.

162. THE PHARMACY. Opinions vary as to the necessity of a pharmacy in small hospitals. Where there is no out-patient department in a very small hospital a mere drug room is found sufficient. In other cases this function is absorbed by the Central Supply Service. I was told that there is rarely sufficient work to justify a full-time pharmacist in a hospital of less than 75 beds. Generally in hospitals up to 150–200 beds the pharmacist also handles the Central Supply. In small hospitals this can be done either directly or by supervision of workers under the control of the pharmacist.

163. Where the pharmacy has to be accommodated in a small space an essential piece of equipment is the Schwartz Sectional System of storing drugs, poisons, and small boxes or packages, etc. The shelves are contained in small vertical cupboards which are pulled out and swivelled round to disclose the contents. All who use the system speak most enthusiastically about it. The system is, of course, applicable to any size of hospital.

164. Many hospitals manufacture a number of preparations, *e.g.*, injections, excepting semi-proprietary lines such as insulin, but including tablets of all kinds. The saving is variously estimated at 15 to 25 per cent. depending on the number and kind of items manufactured. The general opinion is that it does not pay a hospital to make liquid extracts and tinctures, which require a vacuum still for removing industrial spirit after extraction. A number of hospitals which manufacture certain items buy plaster bandages ready made.

165. A successful arrangement in distribution is the pre-packing for issue to wards and departments of drugs, dressings, bottles, etc., in wire baskets with names of the wards and departments thereon. These are collected by a porter and taken to the wards, etc. Empty bottles and boxes are returned in these baskets.

166. Nearly every hospital visited had a blood bank unit and I was told that it was general in all hospitals. Processing of blood plasma, however, is carried out only in the larger hospitals.

167. In many hospitals the pharmacist has a good office complete with the usual office equipment including a bookcase, and he is supplied with copies of all journals pertaining to his work. Departmental libraries are a feature of American hospitals.

168. REFRIGERATION. No effort is spared to supply adequate refrigerators. Refrigeration in the kitchens is roughly divided into three sections. One for meats with, as an addition, a fish box; one for dairy products; and one for fruit and green vegetables. A separate section is added for low temperature refrigeration for the storage of quick frozen products. These chambers are large and of the walk-in variety. It is considered wise to have a smaller refrigerator for left-overs and also for salads, usually in association with the main refrigerator section. Also ice-cream freezers with hardener and storage cabinets are almost universal. It appeared that most administrators favoured individual unit refrigeration for refrigerators outside the actual kitchen area. At the same time central operation was noted in some hospitals. An important development was seen in garbage refrigeration. This was certainly an advance and had removed all nuisance from an otherwise objectionable area. The importance of this, particularly in hot weather, cannot be overlooked.

169. A new method for icebag service was seen at two hospitals and I was told it was in use in many other hospitals. It is an instant freezing flake ice machine, called the Freeze-a-Bag. The old cracked ice method for use in icebags and collars, with all the attendant discomforts to nurse and patient alike, is being discarded. Various shaped rubber bags containing 10 per cent. glycerine and water, vulcanised and sealed, without any metal parts are used. The contents freeze in flakes and so the bags remain malleable. The shapes are designed for application to various parts of the body and are kept in the Freeze-a-Bag on direct expansion freezing shelves. Some have been in use continuously for six years without any repairs. One Freeze-a-Bag is sufficient for a 50-bed hospital unit. The saving in cracked ice and containers is great.

170. X-RAY DEPARTMENT. To avoid the effects of fluctuations in current, American hospital authorities recommend that the wiring for all X-ray department equipment should be quite separate from the general wiring system of the hospital. This applies also to other departments using equipment which would be affected in the same way.

171. There is a growing tendency for X-ray departments in small hospitals to utilise the services of a visiting radiologist from a large hospital nearby. Whereas in the smallest hospitals the equipment might be only a mobile unit, which can be used by the staff within the limitations of the staff itself, by utilising the services of a visiting radiologist additional equipment may be installed for use. Generally, however, the limitations of the treatment which can be given by small hospitals is not overlooked and the general opinion seems to be in

favour of these hospitals undertaking simple emergency conditions and to building up the larger hospitals and centres.

172. Practically all X-ray reports are prepared by means of a dictaphone.

173. The use of a viewing box with glass top, let in and flush with the surface of a table saves much time and effort for nurses in sorting and packing X-ray films in their folders or containers. Using the illustrated table top the nurse does not have to lift up the films to recognise the date, number, etc., but has simply to slide them over the glass top.

174. WARDS OR NURSING UNITS. In America the day of the large general ward with anything from 20 to 30 or more beds is definitely over, the present trend being to limit the size of such wards, and to give more privacy to each patient. This is a point to bear in mind when planning the nursing unit, as the size and character of this unit will largely govern the general plan. Opinions differ materially as to the number of beds which form the ideal nursing unit, but generally it would seem that it should be between 20 and 30 beds, depending on the size of the hospital. The American Hospital Association, through its Director of Hospital Research (Dr. W. P. Morrill, whose death, the day after I reached the offices of the Association, I much regret), made a study of this subject and arrived at the following definition and estimate :—" a nursing unit is that area and number of patient beds with their accessory facilities which can be effectively supervised by one head nurse, and which can be properly served by one nurse on the night tour of duty. Since the head nurse will, during the day hours, have as many assistants as are needed, it is the number of patients the night nurse can properly care for that becomes the determining factor. This number is variously estimated at from 18 to 22 in single rooms, 20 to 30 in a two-bed room, and not over 40 in four-bed or large rooms. These figures likewise represent the maximum number of beds that can be properly supervised by a single head nurse."

175. It should be noted that these estimates are based on pre-war experience, an average distribution of patients as between the acutely ill and semi-convalescent, and an average proportion of special nurses. The present tendency and one which promises to persist is the discharge of patients earlier in their convalescence than was the practice before the war. This will result in a greater proportion of acutely ill patients and thus reduce the number that can properly be cared for by a single nurse. Conversely, if there is a recovery room in connection with the surgical suite, in which patients are held for the first 24 hours, the load of the surgical unit will be less and more can be cared for in a single nursing unit.

176. The United States Public Health Service holds the view that the nursing unit will normally consist of approximately 25 beds if mixed (private, semi-private and ward); of approximately 30 beds if all ward patients; and of approximately 20 beds if all private room patients. They express the further view that in small hospitals there should be private, semi-private, and ward accommodation in each nursing unit in order to facilitate nursing service. This makes it more nearly possible to group patients on a basis of their medical or surgical conditions.

177. In allotting private and ward beds, unless there is a definite local reason for not doing so, American authorities recommend a relationship of about one-third of the beds in private rooms, one-third in semi-private (2-bed) rooms, and one-third of the beds in 4-bed wards. A large proportion of single rooms gives a more flexible unit, simplifies complete isolation, aids in distribution of patients by sex, is better for really sick patients and post-operative cases, and helps to avoid the housing of conflicting personalities or noisy or obnoxious cases in the same room or wards. On the other hand there is always the dread of single rooms to be remembered. When these are few in number they become associated with death in the minds of many patients. Further, it is not wise to leave some patients alone.

178. There is a definite trend in both America and Canada to reduce the number of beds in the general or public wards. The number varies from four to six. The reason is the unpracticability of proper segregation of age, sex, race, and medical or surgical conditions in wards of large size. A Canadian hospital authority gives the figures as 6 to 8 beds, but nowhere in America did I find anyone to agree to more than 6 beds.

179. I saw a number of 2-bed rooms, but generally such rooms are out of favour owing to the difficulty of selecting congenial companions who would not argue or quarrel. The 4-bed ward is favoured because it is easier for the sister to select psychological agreeable people. It was admitted that the open ward is happier and easy to handle. Three-bed wards are not favoured on the ground that two patients will often combine against the third causing unpleasantness. A number favoured hospitals composed solely of single rooms and offset the increased building costs by stressing the greater flexibility in the assignment of patients and the practicability of complete utilisation. Curtains are used a lot to give more privacy in rooms or wards with four or more beds. Metal rings make these noisy. This may be reduced almost entirely by using leather encased metal rings or else rings of plastic material.

180. SIZE OF ROOMS. A room 10 ft. 6 ins. x 14 ft. is considered satisfactory for a single bed. It takes the bed easily and yet can accommodate two beds in an emergency. A satisfactory size for a 4-bed ward is 21 ft. x 16 ft. and a 2-bed ward 15 ft. x 11 ft. 6 ins. The minimum depth of a single room from corridor wall to outer wall should be not less than 14 ft., but if bath and toilet facilities, or built-in wardrobes are to be added then 16 ft. is recommended as a minimum. The bed is best placed parallel to the outer wall free on two sides and at the foot end. (If two beds are in the room there should be a minimum of 3 ft. between them.) The patient does not then have to face the window. The distance from the floor to the windowsill should be such that the maximum view is obtained. Several patients told me how much they appreciated this. This is a point often overlooked in earlier planning both in America and Britain. Practically every room had its own wash basin and in a number of cases a w.c. as well.

181. DOORS. Door handles varied from the usual knob to a most effective type with a one arm hook which could be lifted up with the elbow. Practically all are fitted with an anti-slamming device to prevent noise. In private rooms the doors contain a metal card holder for the patient's name. Any door through which a patient's bed may have to be wheeled should be not less than 3 ft. 10 ins. in width. Flush doors are standard. Some are of solid wood, others metal framed wood covered. The latter are lighter, cheaper and just as effective.

182. LIGHTING. Apart from window or natural lighting the planning of artificial light must be carefully thought out in relation to the position of the bed, or beds, in each room. This principle is carried out in many ways. Ceiling illumination is semi-direct or indirect and located so as to avoid irritation to the patient. Many forms of bed light or reading lamps were seen. Some were partly sunk in the wall with which the opaque glass front of the inset was flush and a small canopy or shade above to localise the light. Others were on brackets standing out from the wall. This type is now completely out-of-date. It would seem that the ideal bed-light has not yet been reached. These lights should be shaded sufficiently to protect the other patients in the room and allow maximum lighting for reading. In single rooms portable reading lamps with a long flex are found an advantage. Night lights for the use of the night staff are important and moreover they add to the comfort of the patient. These are invariably indirect, the nurse, if with a table in the ward, having a shaded table lamp. The position of corridor and other outside lighting should be considered in relationship to the position of the beds. Absence of glare is important.

183. NURSES' CALL SYSTEM. Both visual and auditory systems are in use. The usual method is visual with a light over the patient's

door and a lighted number on the annunciator in the nursing station. Sometimes a buzzer is added. This would in all cases seem to be advisable. But this still does not obviate the necessity of a nurse having to walk from the station to find out what is wanted, with its wastage of time and effort. In one case, from an actual test, it was found that a nurse making a first journey to ascertain the needs of the patient, plus that supplying the needs in a further journey was one-eighth of a mile. To overcome this some hospitals have installed a direct call system from every bed to the nurses' station. The patient signals the nurses' station talking into a small bed telephone and the nurse gets the message before visiting the patient.

184. Call buttons are invariably installed in bathrooms and toilets. Wall plugs include those for the reading or bed lamp, nurses' call, wireless, power point, and in all private rooms for telephone also. In one hospital there is a portable telephone on a trolley which can be plugged in at the bedside thus permitting any patient to use it. At another hospital there is an important addition in each room of an emergency switch of buzzer type by means of which the nurse can switch on to call for help when she cannot leave the patient.

185. METAL FURNITURE. Metal furniture is now used extensively in American hospitals and is giving satisfaction. I heard no complaints against it on the grounds of coldness, damage, etc. It is neat in appearance and easily kept clean.

186. BEDS. There has been a great improvement in castor construction and in the majority of hospitals the beds are fitted with good easy running castors. Others still retain old fashioned beds which are without castors and therefore difficult to move, and also to lift because of the absence of lifting gear incorporated in the framework of the bed. In one hospital two nurses raised the foot of the bed while another placed blocks beneath to keep it in a raised position. Labour beds in one hospital could not only be put into the Fowler and Shock positions but also had side rails which dropped like those on a child's cot. Trolleys conveying unconscious patients also had sides which could be swung up to prevent patients falling off. The usual tubular type of bed is used. Many are painted a dull white or silver colour.

187. MATTRESSES. At a number of hospitals the mattresses are the improved Dunlopillo latex rubber and they give every satisfaction. One hospital has had them in use for twelve years and no replacements have been necessary. The internal coiled spring mattresses are equally popular and satisfactory. I heard no complaint against either type. Few hospitals are now using the old institution type. One architect expressed the opinion that if the mattress covers were waterproofed

there would be no necessity to sterilise them; it would be sufficient simply to wash them and hang them to dry in adjoining porches under the control of a nurse, where they would be in circulating air and sunlight. This statement was supported by hospital superintendents. Owing to the expense of having existing mattress covers treated in this way, one superintendent was considering having waterproof covers made to fit existing mattresses. Autoclaving is considered an expensive method, and many hospitals do not possess an autoclave large enough to take the internal spring mattresses which cannot be bent and must be inserted on end. Mattresses undoubtedly play an important part in giving comfort to patients. The original cost should be carefully considered in relation to durability, ease of cleaning, etc. It may well be that an increased initial outlay will prove more economical in terms of money and labour saving.

188. Overbed and Bedside Table or Locker. I saw many overbed tables—they varied considerably in design and construction. The best type was one that went right across the bed (as against the floor stand or locker attachment which goes only half way across) and which can be raised or lowered by a revolving handle, and which also has an enclosed adjustable mirror and bookrest. The enclosed portion is large enough to hold the usual toilet articles. As to bedside tables or lockers, one has an ash tray on a swivel bracket, urine utensil shelf, detachable lamp, detachable wash basin support, and attachment for buzzer and place for telephone. In another hospital the back portion of the bedside table has, in addition to a shelf for the urinal and bedpan, four drawers (top for toilet articles, second which could be pulled out in the form of a basin and which could be removed for washing, the third for small articles of clothing, and the fourth containing a blanket). Above these drawers is a table with small folding legs which may be pulled out and placed on the bed. Tops of bedside tables were covered in various materials—rubber, linoleum, tiles, etc. Wood and metal are both used—the latter is gaining in popularity.

189. Service Facilities. Nursing units are invariably well supplied with service facilities, *e.g.*, toilets, bathrooms, bedpan rooms, utility room, linen and supply closets, sun porch or solarium, and isolation accommodation; visitors' room, conversation room, food servery, flower room, domestic or cleaners' closet, stretcher and wheeled chair storage, treatment room, and special nurses' lounge.

190. Unless a hospital has adequate service facilities it cannot function properly. It is an expensive mistake to try to secure too many beds at the expense of service units. Special attention is now given to this subject, and to that of providing for future expansion in such a

manner that the expansion may be made with a minimum of structural alteration, inconvenience and expense. This involves careful thought to the original siting of wards in relation to the service facilities on the various floors, as well as to the general administrative services of the hospital as a whole. The draft plans of the United States Public Health Service take cognisance of the principle that patients should be away from the administrative services, noisy approaches, etc., and where it is necessary for services to enter blocks with nursing units, they are always on the side opposite to that of the patients.

191. NURSES' STATION. This is a feature of American hospitals and many excellent examples were seen. They are invariably well planned and situated in good central positions for the best overall supervision of the nursing unit, including stairs, lifts, corridors ; in short, all avenues of approach. There is a separate station to each unit ; if there are two units on one floor there are two nursing stations. Recently in the large hospitals floor or unit secretaries have become popular. These take practically all the general clerical work from the nursing staff. The stations were of differing types, varying with the shape of the wards. One was in a recess in a corridor, another a room separated by glazed partitions on the corridor side. In others it was at the back of a hall facing the top of the stairs and lifts. The usual arrangement is a wood structure up to a height of about 3 ft. 6 ins. with, in some cases but not all, a glass screen above. The wood structure is straight or semi-circular and about 1 ft. 6 ins. to 2 ft. wide at the top forming a counter. Vases of flowers are very much in evidence on all these stations. The patients' records are generally kept in the nurses' station (seldom in the wards), the more general arrangement being an easily movable trolley in which the records are placed in bed order. The records are attached to rigid folders made of metal. When in its place on the trolley only the name or the number shows. In other stations the records are kept in a specially designed table or desk.

192. These nurses' stations are bright and cheery. They provide an air of welcome and create a most favourable impression to patients and visitors alike.

193. SPECIAL NURSES. Where special nurses are employed additional accommodation is provided both for their work and personal comfort, and as one superintendent said, also to keep them out of the way of the routine work being carried out by the ordinary staff. The accommodation includes rest room or lounge with easy chairs and a day bed and a dressing room with a call signal installed. Special bathroom and toilet may be necessary. (Where nurses live out adequate locker and dressing-room facilities are provided for them in the hospital.)

194. POISON CUPBOARD. Most of these were self-locking. Some of them were incorporated in a general drug cupboard with glass doors.

In one hospital where a separate cabinet is not used for poisons they are stored in the general drug cupboard, the poison section having red shelves. In another, day and night cupboards are used, each being under the responsibility of the staff on duty. Definite responsibility is laid down as to the use of these cupboards. An acid resisting sink below with hot and cold water and knee or elbow control was found in some hospitals. Sometimes the cupboard is in the ward at the service end but more often in the duty room.

195. TOILETS, BATH, ETC. All patients' toilets and baths have a nurse's call button. In units dealing with infirm patients, metal or porcelain hand grips are provided to give assistance to the patients in lowering and raising themselves from the pedestal. The doors open outwards.

196. The bathroom should not become a store room as was the case in one hospital. Here it was obvious that sufficient care had not been given to the original planning of ward service facilities, and that the supervision of the ward was weak.

197. Most baths were built in—they had no space beneath to accumulate dust and rubbish, and their outer wall extended down to the floor. On three sides it was incorporated in the walls. This results in a greater saving in the cleaning effort of the domestic staff.

198. The height of the bath depends on the use to which it is being put. For example, a bath for children should be small and elevated so that the nurse does not have to bend down in an uncomfortable position while bathing the children. The same remarks apply to lavatories for children which should be placed lower than those for adults.

199. Many baths have thermostatic control and in children's wards a detachable key for the hot water tap to stop the children interfering with the hot water supply and so possibly injuring themselves.

200. The shower is a feature in many hospitals. In one hospital this was arranged so that the patient could sit down on a stool under the water spray.

201. Patients' bathrooms generally have an emergency call button and when necessary, *i.e.*, in an emergency, the doors may be opened quickly from outside. This is done in some cases by having a small aperture with a suitable screen which permits the hand to pass through and so to unlock the door from the outside. This can be used also by the nurse to observe her patient without opening the door.

202. Bathrooms and toilets are either tiled or wainscotted to a minimum height of 4 ft. 6 ins. with tile, or terrazzo. Washrooms for

ambulatory patients have panel partitions between the basins and in some cases with linen curtains in addition. This is specially appreciated by female ambulatory patients. Chairs should be placed in the washing room for waiting patients.

203. BEDPANS AND URINALS. All hospital authorities in America and Canada are very definite that bedpan and urinal utensils should be of stainless steel. This material is more costly in initial outlay but all claimed and with evident justification that utensils made with this material were durable and practically indestructible. Wherever I saw enamel utensils on the racks they were chipped and damaged, and the comparison left no doubt whatever as to the economy to be effected by using stainless steel. A good substitute, although much inferior to stainless steel, is aluminium, with stove enamel baked.

204. During the Convention of the American Hospital Association I was told of an innovation by the late Mr. Cederström, Architect of the Southern Hospital, Stockholm. He designed for this hospital a special room, called the enema room, for each nursing unit and into which patients can be wheeled in on their beds for ordinary bowel evacuation, or else for enemas, bowel washouts, etc. The room has a flush pedestal raised from the floor to the height of the bed surface so that if the patient is permitted he can attain the pedestal with a minimum of effort. There is also a bedpan flusher and steriliser in the room. The nursing unit at this hospital is 16 beds ; in units with a larger number of beds further accommodation would be necessary. The idea underlying the new arrangement is that anything obnoxious should wherever possible be kept away from the patients' bedrooms, or in other words, his living room. Moreover, it removes the discomfort and embarrassment suffered by patients and the necessity of removing bedpans.

205. UTILITY ROOM. These do not vary to any appreciable extent, but it was noted that some hospital authorities advocate separating the bedpan unit from the utility room. This, certainly, has advantages. In many hospitals, possibly the majority, the utility room is divided into at least a theoretical dirty section and a clean section. This is done by having a partial partition formed of a movable table in the centre of the room. Unless the room is large enough it is better to have two rooms instead.

206. One utility room for a unit of 22 beds is centrally placed, opening on one side to the corridor and on the other side to the treatment room. On one side is a bedpan washer, bedpan steriliser, slop sink, utensil steriliser, linen hamper and counter sink with drawers beneath and shelves above. On the other side is a cabinet to store linen used in the utility room and also sterile materials, an instrument steriliser, a counter sink with a gas plate, cracked ice box below and shelves above, and lastly a utensil rack. There is a movable counter

separating these in the middle of the room. This has drawers with cupboards below.

207. The advantages of supplanting the ice box by a refrigerator for freezing ice bags are many, and have been referred to in paragraph 169.

208. FLOWERS. Storage of flowers is generally done in an annexe to the utility room or in a separate room. Special attention is given to the care of flowers in American and Canadian hospitals.

209. LINEN. One linen room per nursing unit is general. The size varies considerably but most of them seemed to be on the small side. Adequate cupboard room and shelving is essential in this room, also a table or counter. If a central linen supply room is used all reserves are kept here and on the unit exchange system it is only necessary to provide for one day's quota of clean linen plus a small reserve of say 10 to 20 per cent. of this quota. If the linen service is de-centralised then provision must be made in the linen room for a three days' supply plus extras such as blankets, pillows, etc. Subsidiary rooms may be necessary in large nursing units. Where space is limited tables of the let down type will be found an advantage. Many hospitals favoured this type.

210. SOILED LINEN ROOM. The soiled linen room is usually in the basement and is fed by the upper floors through a soiled linen chute. This chute has special doors which close in water-tight fashion, and (in some cases) have a water flushing attachment. There is no necessity to line the chute with stone. It is placed either in or near the utility room and is about 3 ft. 6 ins. above the floor level. In women's wards and nurses' home especially, small gas incinerators are installed for personal use.

211. INCINERATOR CHUTES. Incinerator chutes have been installed in many new hospitals as a ready means of disposal of all refuse from wards and floors. The siting of the chutes is such that the incinerator is below and fed directly by them. Patients' rubbish is, almost as a standard procedure, dropped into paper bags and disposed of either down the incinerator chute or else placed in refuse bins and removed by trolley. On the question of clearing incinerator chutes, an architect with considerable knowledge of hospital planning, told me these chutes sterilise themselves by the smoke and heat from the incinerator below. In his opinion it is necessary to lock up the chute to stop improper use, but this necessarily spoils its accessibility. An incinerator is needed for ordinary garbage and will handle floor waste but not kitchen garbage. Raking of garbage

is carried out systematically before incineration as a check against loss of eating utensils, etc., due to carelessness or misuse of garbage tins.

212. SOLARIA. Interesting viewpoints were obtained concerning solaria. They are suitable for convalescents only, unless provision has been made for their use as a ward in emergency, when lavatory accommodation, nurses' call system, etc., should be installed. Such areas should be attractively furnished and made artistic with the use of plants and flowers, etc. At one hospital creepers were incorporated in the interior decoration and it was a refreshing change.

213. Porches or outdoor spaces as distinct from sunrooms or solaria were seen at times. Their use needs consideration. If used they should adjoin the wards which should open directly on to them for ease of access of beds. Ample space should be provided for circulation around the beds. An important point to observe is that the effect of porches, etc., is to reduce the lighting in the rooms below unless terraces or set-backs are introduced. They influence basically the general design and planning. Porches are not popular in America. In a number of hospitals the roof is much used as a solarium.

214. VISITORS' ROOM. The majority of American hospitals have a Visitors' Room generally in each unit. Situated near the stairs and lifts and under the supervision of the nurse-in-charge of the unit, it provides accommodation for the use of visitors who can rest in it while visiting dangerously-ill patients. A bed and couch are also provided, and in some hospitals toilet and lavatory facilities. A pay telephone service is available. In maternity hospitals, owing to the difficulty of restraining relatives from wandering about rooms and corridors in their anxiety, a prospective father's room has been found a distinct convenience. At one hospital a loud speaker in this room is connected with the delivery room and it is made known to relatives that if they wish to know the result they must go to the Fathers' Room to hear the announcement of the birth of the baby; at the same time they may actually hear the baby cry!

215. CONSULTING OR CONVERSATION ROOM. A conversation or consulting room for confidential conversations with relatives, doctors, priests, etc., is now deemed an essential. Patients are wheeled in and interviewed on their beds. I saw only one but I was told that a number of hospitals have such a room and that it has been found very useful.

216. SMOKING OR GENERAL ROOM. In this room walking patients may play cards, smoke and also have their meals. Generally they are nicely furnished with both comfortable arm and sit-up chairs. Separate rooms are provided for men and women.

217. CLEANERS' ROOM. These are plentifully supplied and keep much material out of the corridors. They are of ample size and well

arranged with low slop sink, cupboards for cleaning materials, and racks for mops and brooms. Various types of mop trucks are in use for cartage of equipment. They undoubtedly reduce the time, drudgery and labour necessary for this work. All were well ventilated by spaces below and above the door.

218. TROLLEY ROOM. The arrangements for storing trolleys varies but always some arrangement is made either in a room or an alcove in a corridor. At one hospital the nurses' station is arranged in such a way that the trolleys may be run under the counter. The space, however, was not large enough to accommodate all trolleys and wheel chairs. Cupboards and shelving should be installed for extra storage above the space for the trolleys, wheel chairs, etc. Now that the method is to wheel the patient almost everywhere on his bed there is much less need for trolleys and stretchers.

219. TREATMENT ROOM. In some hospitals each Nursing Unit has its own treatment room, the size varying with the nature of the work to be done. The doors are larger than usual, being 3 ft. 10 ins. to 4 ft. so that beds can easily be wheeled in. The room contains an examination table or couch, supply and instrument cupboards, dressing table, instrument steriliser and washing facilities using knee or elbow control of water. The actual supplies maintained in the room varies with the amount of service from the central supply. This room has been found of considerable advantage as against carrying out treatment, etc., in the wards.

220. DIET OR WARD KITCHEN. These vary considerably depending on the method of food distribution, whether centralised or decentralised, or a mixture of both. All types were seen. (See Dietary Department, pages 21–25). The great majority of ward kitchens were centrally placed with direct access to the dumb waiter and food lifts and, where the trayveyor system is in use, it has direct access to the ward kitchen. Double doors of the swing type are used for ease in taking through the food trolleys. Planning generally showed that much thought had been given to the provision of space for ease of serving from trolleys. In a few cases the trolley was taken to the bedside and the patients fed direct, the trays having previously been distributed. Some of the ward kitchens were noisy; in others there was little or no noise. Much depends on the type of staff. Noise is the greatest bugbear of a ward kitchen, and various suggestions for its prevention were discussed, *e.g.*, indirect entrance with buffering space between the kitchen and the patients' rooms; acoustic treatment; wise selection and arrangement of fixtures, leather covered hooks, etc.

221. ICE WATER. Iced water supplies are standard in American hospitals and water points were everywhere—in wards, corridors, offices, etc.: drinking can be either from a spout or paper cup.

Section D

MISCELLANEOUS POINTS

222. Acoustic Treatment. Acoustical treatment appears to be standard in both American and Canadian hospitals. All new hospitals are so treated and many old hospitals have been brought up-to-date in this connection.

223. The material used depends for its success on its porosity or on perforations and all walls, ceilings, etc., so treated cannot be painted.

224. Noise is best controlled at its source. Lifts, corridors, kitchens, utility rooms are all offenders. The use of acoustic treatment in the wards is not desirable. I stood in a bedroom which had been treated and felt that the reduction of sound was so great as to be depressing. It is generally conceded that the treatment of corridors should be sufficient for this purpose. Certain special wards such as maternity, children's, psychiatric, etc., are naturally exceptions and need treatment. Kitchens and utility rooms also require treatment.

225. Other methods of suppressing noise must not be overlooked—rubber plating of utensil racks in the utility room and diet kitchen, silence mats on hard surfaces such as sink bottoms, etc., resilient floor surfaces, and leather encased metal rings of ward curtains, or the use of plastic rings, etc.

226. Where the kitchen is on a floor other than the ground floor, a ceiling floor of five inches is introduced as a sound trap between it and the floor below. In the corridors pipes pass along a false chamber just beneath the ceiling and are screened off by corrugated asbestos and concrete plates. These are called " Eternit " and absorb sound both on account of their composition and of their corrugations. Because of its silence the visual method of paging the medical staff is superior to the auditory. The latter method can become most irritating. Acoustic treatment is now standard in nearly all corridors.

227. Corridors. The width of corridors shows much variation —6 to 8 ft. A good minimum width is 7 ft. 6 ins.—this permits a bed or trolley to be turned easily. A common fault is to see a corridor of about 6 ft. This means that a bed or trolley 6 ft. 6 ins. cannot be turned at all. Thus, to manœuvre a bed out of a bedroom it is necessary to have a much wider door. Moreover, with a narrow corridor and a low ceiling an impression of a long tube is given. Corridors of more than

7 ft. 6 ins. are too wide and cause much waste space, and unnecessary expense.

228. DOORS. As it is essential that beds can pass easily the minimum width should be 3 ft. 10 ins. If the corridor outside the doors be of less than 7 ft. 6 ins. then it may be necessary to have even wider doors to enable the beds or trolleys to pass out freely into the passage way. Anti-slamming devices are standard. Arm hooks pointing downwards are a great assistance to the nursing staff. Some form of clip to hold the name or names of the patients in each room is worth consideration.

229. Vision panels are most important in psychopathic room doors, all double action doors, and in isolation room doors. Whereas most doors open inwards those in psychiatric rooms, bath and toilet rooms should open outwards. A vision panel with means of opening the bathroom door in an emergency is an advantage. Doors may be solid or metal framed wood covered. The latter are lighter and cheaper.

230. EQUIPMENT. American hospital authorities are very definite in their views about equipment, more particularly as to labour saving equipment. They will not do anything by hand that can be done more effectively by a machine, but they will not buy useless equipment. They know exactly what they want the equipment to accomplish and if on a test it fails to prove its worth no purchase is made. While talking to the Director of one hospital, a trainee of hospital administration brought in a piece of equipment a salesman was endeavouring to sell to the hospital—a door spring and hold back. The cost was $10 and some hundreds would be required. After examination it was found that beyond a little better finish it was no better nor more efficient than those at present in use and it was not purchased.

231. Labour saving devices were seen everywhere and where possible to obtain them in stainless steel, the extra cost proves no obstacle. They want the best, and if it suits their purpose, they are prepared to pay for it. Specifications and all available information are obtained and examined and the equipment afterwards seen in action and thoroughly tested. In many cases the equipment is tested in the hospital by the staff who would be required to work it if purchased and installed.

232. I discussed this question with many directors and superintendents and all agreed that these methods were fairly general.

233. FLOORS. While there are many types of flooring material their uses vary with the type of service required. Perhaps it is most important to appreciate the need for moisture resisting surfaces in rooms

where wetting occurs. These include toilet, bath and utility rooms, cleaners' closets, kitchens, morgue, etc. A white glazed tile or terrazzo are commonly preferred, a red quarry tile having preference in the kitchens. Cement is found to absorb water and should not be used in these locations. It is found a lot in basement corridors and store rooms.

234. Marble, terrazzo, cement, mastic, asphalt, rubber tiles, linoleum (either in sheet or tile form), cork in the form of tiles, etc., were all seen in various hospitals and corridors and rooms in different hospitals. The great advantage of tiles over sheet rubber or linoleum is that should they show signs of wear they can easily be replaced locally.

235. In corridors and where traffic is heavy various coloured tiles are often preferred. They are decorative and can be replaced if damaged without removing the surrounding tiles. Asphalt tiles find most favour, but it must be appreciated that climatic conditions involving heat might be against their use. It is stated that they are sensitive to temperature, softening at high temperatures and becoming brittle at lower temperatures.

236. Sheet linoleum bedded on linoleum felt (on a concrete base) should be 3/16th of an inch thick for the best results. The floors are counter sunk to the required depth in the concrete to take the flooring materials which would then be flush with the borders. Linoleum is resilient and is much used in corridors, offices, patients' rooms, etc. The use of patterns on the various types of tiles used tends to make traffic marks less evident, while at the same time they make the appearance of the floors more attractive.

237. Terrazzo is also used in corridors, especially as borders, in public areas, operating theatres, etc. In an attempt to stop its tendency to crack it is invariably divided into squares with metal or vulcanite strips intervening. In operating and delivery rooms these strips are of brass, all connected and grounded in an attempt to overcome static electrical effects, with the possibility of anæsthetic explosions.

238. Rubber floors are difficult to keep clean and blemishes appear if the thickness is not adequate. The rubber should be 3/16th in. and not 1/8th in. as was found in some cases.

239. Cork was not often seen. Where used it was preserved by the use of a little wax. It tends to pit under heavy weights such as desks, chairs, etc.

240. LIFTS. The number of lifts required in a hospital is always a difficult problem to settle. The United States Public Health Service

has carried out a detailed inquiry into this question and it suggests that—in hospitals of up to 200 beds, three lifts are required, and in hospitals up to 125 beds, two lifts will be found sufficient. In its opinion also one lift should be reserved for patients and protected from traffic of visitors, etc., on each floor. In larger hospitals goods lifts are often installed in addition.

241. The size of lifts for patients is important. It is based on the space occupied by a loaded trolley and should be a minimum of 5 ft. 8 ins. by 8 ft. 4 ins. The door should allow free access and be not less than 3 ft. 10 ins. wide. A self-levelling device is most desirable to bring the lift floor exactly to the corridor level. Nearly all patients' lifts seen fulfilled these conditions.

242. A lift operator is always employed during the heavy traffic periods, but nearly all lifts had push button automatic control for other periods.

243. Sound absorption is most important. American lifts are almost silent running.

244. Lifts are costly to install, and the automatic devices and safeguards add to this outlay, as well as to maintenance costs, but in spite of this American hospitals are generally well supplied with good lifts.

245. LIGHTING. Fluorescent lighting is making rapid progress in American hospitals and, quite probably, will soon supersede the ordinary filament light. Its light is more diffuse, with less glare, and its cost is cheaper, by more than half it is said, than that of filament lighting. It is said to be very satisfactory.

246. As to wards and patients' rooms, one is convinced, after viewing many varieties of lighting, that the problem has yet to be solved. It is important that glare should be avoided. Thus, any ceiling or wall bracket light which either by glare or direct rays, affects the recumbent patient is wrongly constructed. Ceiling lights should be used only in the large wards and be of the semi-indirect type for general lighting. Plug-points for examination lights should be provided at each bedside. The reading lights should be shaded so as not to cause annoyance to the other patients in the room. Some room lights were inspected which permitted part of the illumination to pass upwards to the ceiling, giving a very cosy effect.

247. It goes without saying that corridor and other external lights must obey the same rules concerning glare and direct vision from the patients' rooms.

248. Night lights should have a low level of illumination ; they are essential in both rooms and corridors. They should be so placed that they do not worry the patients. At one hospital the night light had a shield which could be removed, giving the nurse sufficient light for any routine nursing during the night.

249. Operating and delivery rooms no longer depend on natural daylight. There are the usual operating shadowless lamps, but these are often reinforced by the pedestal lamps which can raise the illumination in the operating field when necessary. Many variations of lighting were inspected and amongst them were seen fluorescent shadowless lamps. These are still somewhat cumbersome. Many of the accessory portable lights seen had re-chargeable batteries at their bases and were thus part of the emergency lighting equipment.

250. Many cupboards and instrument cabinets in operating theatres and examination rooms lit up automatically when the doors were opened.

251. Power and Mechanical Plant. In small hospitals the boiler house was generally found in the basement. In the large ones it was generally in a separate building. As the service must be rendered uninterrupted a reserve boiler was found in all hospitals visited.

252. Water softeners are installed in some hospitals and mechanical stokers and other aids in relation to the supply of fuel to the furnaces were almost standard.

253. The piping throughout many hospitals is carried in chases and so are easily accessible and identifiable by marks or colours.

254. High pressure boilers require constant attention of the engineer in charge and are more expensive to install than low temperature boilers. In many hospitals visited I was informed that steam heating was considered inferior to hot water heating. While the cost of installation for hot water heating is more expensive, the operating costs are found to be more economical than for steam heating.

255. In large hospitals using steam more or less continuously, high pressure boilers may be maintained throughout the 24 hours, but where this is not necessary, as in smaller hospitals, the use of gas or electrically heated sterilisers is advantageous. The independence of these units compensates for their increased costs of installation, as they do not require to draw on the central plant at times when this may be required to supply other departments elsewhere.

256. Provision should always be made for the expansion of the boiler house.

257. WALLS. Protection of wall surfaces is very important and the protection varies in the different areas ; a small projection where the wall joins the floor ; a metal strip or hardened plaster along the walls, bumpers on various pieces of equipment, *e.g.*, food trolleys, beds, etc.

258. Areas subject to dampness should have a tile or terrazzo wainscot. Operating and delivery rooms, bath, toilet, and washrooms, utility and workrooms, and serving kitchens, etc., require glazed tile wainscots to a minimum height of 6 ft. Extra tiling is necessary with wash basins in the patients' rooms and elsewhere. Corners should be of hard cement.

259. WORKSHOPS. The maintenance workshops, *e.g.*, engineer, clerk of works, are invariably situated convenient to the boiler house even when the boilers are in a separate power house. Some of the shops visited were quite inadequate in size, and a number were having to be used as a clerk of works' stores because of the lack of proper stores accommodation. In small hospitals the shops constitute a single unit, but in large hospitals it is invariably divided into appropriate divisions, *e.g.*, machine, carpenters, painters, electricians, etc. Good workshops are essential and provision should always be made for future expansion. Easily removable internal walls will be found a great advantage in this connection. Wherever possible workshops should be separated from the works storerooms.

Section E

HOSPITAL SURVEY AND CONSTRUCTION ACT (PUBLIC LAW 725)

260. The acute need for additional hospital facilities in America has been apparent for many years to everyone engaged in hospital and health. The State is now taking a hand in helping to supply the need. The Hospital Survey and Construction Act passed in 1946 establishes a grant-in-aid programme to assist the States to plan and build additional hospital and health facilities where they are most needed. The essential purpose of the Act is not so much to aid existing hospitals to expand or replace existing buildings, as it is to aid and encourage the construction of adequate hospital and health facilities in areas now without them. For this reason the Act provides that the State agency shall give special consideration to hospitals serving persons in small rural areas and communities with small financial resources. It is estimated that within the next five years a sum of $1,125,000,000 will be spent on hospital construction and related facilities. These are to be built and supplied on the basis of need under programmes which will be drawn up within the States. The Federal Government will pay for one-third of the cost, the other two-thirds of the cost coming from sources within the State. The Act was endorsed and actively supported by the principal hospital Associations, and additional support was forthcoming from leaders in the public health field, labour and welfare groups.

261. The Act does not prevent hospital construction outside the Federal Government's programme, but the grant-in-aid provided by the Act will be used only for assistance in building hospitals in those areas which are shown by State-wide surveys to be in greatest need of additional facilities. The grants are specified for — (1) conducting State-wide surveys and planning for construction of needed hospitals, health centres, and related facilities; (2) constructing hospitals, health centres, and related facilities which are part of over-all State plans developed from surveys.

262. The administration of the programme is under the direction of the Surgeon General of the United States Public Health Service through the newly-created Division of Hospital Facilities, working in conjunction with a Federal Council. The members of this Council, drawn from interested groups, will assist and guide the Surgeon General in the formulation of policies and standards for the programme. Administration at State levels will be through a single State agency and

an Advisory Council. The State agency may be an existing agency or one established specially for the purpose of administering the Act.

263. Each State, in order to participate, will be required to enact an enabling law and a hospital licensing law, and the enabling law must provide for the proper organisation and administration of the State's programme. The Act does not authorise federal control over the operation of hospitals after construction is complete, but it does specifically require that each State must enact legislation before July 1/48, establishing minimum standards of operation of hospitals constructed with federal assistance under the Act. Work is proceeding on the drawing up of a model enabling Act and licensing law.

264. Three million dollars have been authorised to assist in surveys and planning, and $2,350,000 of this sum has already been appropriated to States whose plans have been approved. This section of the grants-in-aid is allotted on the basis of State population, and for each dollar put up by the Federal Government, the State will find two dollars.

265. Seventy-five million dollars annually for five years have been authorised for construction grants. So far no appropriation for construction has been made. These funds will be allotted according to population and the *per capita* income of the States weighted so that the States with lower *per capita* incomes are allotted higher amounts *per capita*. Here again, each dollar of federal funds will be matched by two dollars from the State concerned. The federal grant will be paid in instalments as the work progresses.

266. The application for participation must contain the following information and documents:—(1) A description of the site for the project; (2) reasonable assurance that the title to the site is or will be vested solely in the applicant; (3) plans and specifications which comply with federal regulations; (4) reasonable assurance that adequate financial support will be available for two-thirds of the cost of constructing the project, and for its maintenance and operation when completed; (5) reasonable assurance of the payment of prevailing wages for construction work; (6) assurance of compliance with requirements of the State plan and regulations concerning the availability of hospital services without discrimination on account of race, creed, or colour, and for persons unable to pay as well as an assurance of compliance with State minimum requirements for operation and maintenance.

267. This is not so much a federal programme as a federal co-ordination of State programmes. Leadership, authority and

responsibility are retained by the States, for the State programme will be centred in the designated State agency.

268. The general manner in which the State agency determines priority is to give special consideration to hospitals serving rural communities and areas with relatively small financial resources.

269. The United States Public Health Service, Division of Hospital Facilities, is an excellent organisation. It works in close co-operation with State agencies, hospital organisations, central funds, hospitals, etc., and it does not issue any publications on hospital subjects until they have been considered by these organisations. I spent two most instructive days in this Division, and I was much impressed by its activities and the results so far achieved by the Division in its continuous research into all the problems connected with the provision of hospital and health services.

APPENDIX

ORGANISATIONS, HOSPITALS, ETC., VISITED

1. Organisations, etc.

American Association of Medical Record Librarians.
American College of Hospital Administrators.
American College of Surgeons.
American Hospital Association, including the Bacon Library.
American Medical Association.
Boston City Health Department.
Canadian Association of Medical Record Librarians.
Canadian Hospital Council.
Chicago Hospital Council.
Chicago University School of Hospital Administration.
Columbia University School of Hospital Administration.
Committee on Hospital Care.
Committee on Purchasing, Standardisation and Simplification.
Committee on Research in Medical Economics.
Commonwealth Fund of New York.
Community Chests and Councils.
Hospital Bureau of Standards and Supplies.
Hospital Council of Greater New York.
Kellogg Foundation, The W. K.
New York Academy of Medicine.
Northwestern University School of Hospital Administration.
Philadelphia Associated Hospital Service.
Philadelphia Hospital Council.
Rockefeller Foundation.
Toronto Hospital Council.
United Hospital Fund of New York.
United States Public Health Service.
Washington Service Bureau.

2. Hospitals, etc.

Beth Israel Hospital (Boston).
Boston Health Department, Health Centres.
George Washington University Hospital.
Hospital for Sick Children (Toronto).
Massachusetts General Hospital.
Montreal General Hospital.
Neurological Institute (Montreal).

New York Hospital.
Presbyterian Hospital (New York).
Royal Victoria Hospital (Montreal).
Toronto General Hospital.
University of Chicago Clinics.
Wesley Memorial Hospital (Chicago).

3. ARCHITECTS AND CONSULTANTS, ETC.

Mr. Carl Erikson.
Mr. H. E. Hannaford.
Messrs. James Hamilton and Associates.
Mr. H. Hoenack.
Mr. C. Neergaard.
Mr. William Riley.
Mr. Marshall Shaffer.

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