A Combined Medical and Surgical Unit for Cardiac Surgery

Report of the Joint Cardiology Committee

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The rapid advances in medicine and surgery for heart diseases have led to the need for Units for diagnosis, treatment, and research. A Joint Cardiology Committee of the Royal Colleges of Physicians and Surgeons was accordingly set up to prepare a memorandum on the requirements of such a Unit.

Diagnosis and treatment are so linked that facilities for both must be included in the same Unit, so that the closest possible liaison can be maintained between physicians, surgeons, anaesthetists, physiologists, radiologists, and pathologists. Optimum results will only be obtained when all the necessary disciplines are fully integrated, and the staff work as a team. Since cardiology is a part of general medicine and surgery, and requires the support of many other disciplines, the Unit should be in a general hospital, preferably within the orbit of a University.

This memorandum has been prepared in order to outline the broad requirements, concentrating on matters of principle rather than of detail. Assuming that the present rapid development of techniques in cardiovascular work continues, further expansion of facilities must be envisaged over the next 20 years. Thus the design of the Unit must be sufficiently flexible to allow for expansion. The staffing strength in all departments, including technicians and nurses, will vary with the changes in methods of diagnosis and of medical and surgical treatment.

The recommendations for staffing may appear lavish, but the assessment has taken into account the exacting nature of the work, the need for 24-hour

service, and the Committee's concern with the importance of the teaching and research responsibilities of such a Unit. The Committee recommends that consultant staff should work only in the hospital where the Unit is situated. At least one physician and one surgeon should be full time or maximum part time. Some of the other consultants might be part time in the Unit, while holding other posts in the same hospital. The undesirability of a consultant working in geographically separated areas cannot be overstressed, for such arrangements are incompatible with the intensive management which is required in modern cardiovascular work.

The care of the patients must be jointly between physicians and surgeons, and joint clinics for the pre- and post-operative assessment of patients are essential.

Units of this type must of necessity vary somewhat in size and situation, and teaching and research needs will be affected accordingly. Two main groups of patients require the services of such a Unit; infants on the one hand, and children and adults on the other. If all patients are to be considered together large Units will be needed.

This memorandum deals with Units which would admit both groups, and does not deal with Units for infants and children only which have been considered in the Memorandum of the British Paediatric Association on "Future of Paediatric Cardiology".

OBJECTIVE OF THE UNIT

The Unit should provide for the investigation of

TABLE

SUGGESTED SIZE OF UNITS RELATED TO POPULATION NEEDS ESTIMATED IN MAY 1967

Population/ million	No. of beds (including infants* and intensive care)			Special investigations per week	Operations per week	Cardiological staff			Surgical staff		
		Adults and childr. (1-15 yr.)	Infants under 1 yr.			Con- sultant physician	Senior registrar or equiva- lent†	Registrar or equiva- lent	Con- sultant surgeon	Senior registrar or equiva- lent†	Registrar or equiva- lent‡
1 to 2	30-50	30	15	8-15	8-12 (6 on bypass)	3	2	4	3	2	4
2 to 3	50-70	50	20	15-25	12-15 (8 on bypass)	4	2	4	4§	2	4

* Under 1 year.

† Committed to the speciality.

‡ Part of comprehensive training in general medicine or surgery.

§ Includes 1 paediatric cardiac surgeon.

patients whose cardiac disease may require surgical treatment, and facilities for such treatment and for research into heart disease must be available. Facilities for training medical students and graduates, nurses, and technicians in cardiac medicine and surgery should also be available.

SITING OF THE UNIT

The Unit should be in a general hospital, and linked to diagnostic, therapeutic, and research services in other branches of medicine and surgery. Experience has shown that where Units have developed in areas of low population outside large centres they have suffered from geographical and academic isolation. The lack of contact with other disciplines in medicine and surgery and the difficulties of readily obtaining the opinions of colleagues on clinical and research problems place the staff and patients of the Unit at a serious disadvantage. Furthermore, staffing difficulties, particularly at the nursing and technician level, may be experienced when the Unit is in an area of low population and geographical isolation. Units in geographical isolation are uneconomical, because of duplication of certain services.

SIZE OF THE UNIT AND WORK LOAD

The size of the Unit must be related to the population to be served, but it must also be of a size to allow physicians and surgeons sufficient opportunity to employ their clinical and research interests to the full, and to maintain the morale of the nursing and technical staff in the recovery ward. The Table shows the requirements for a large Unit of 50-70 beds

for all ages of patients including infants, serving a population of 2-3 millions. Such a Unit should be capable of performing 12-15 major cardiac surgical procedures weekly (of which at least 8 would be with extracorporeal circulation), and of doing up to 25 cardiological investigations, such as catheterization and angiocardiology, per week.

The Table also shows requirements estimated for a Unit designed to serve a smaller population. It takes into account the Memorandum of the British Paediatric Association on "The Future of Paediatric Cardiology in the United Kingdom", which recommends, for infants and children, 40 beds per 4½ million of population, and 20-25 beds for 3½ million of population. The recommendations in the Table refer to units accommodating all age-groups.

In considering the size of the smaller Unit, 8-12 operations per week, of which 4-6 should be with extracorporeal circulation, are deemed the reasonable number for an economic and efficient Unit.

A full-time consultant surgeon would ordinarily expect to do at least 3 open and 3 closed operations weekly in addition to ward rounds, clinics, research, and teaching. While the Committee appreciate that there are some smaller Units doing excellent work, the Committee recommend that no Unit smaller than the smaller Unit outlined in the Table should be opened in the future, and it also recommends that the smaller Units at present in existence should be encouraged to expand to the optimum size. The Committee also wish to draw attention to the waste of money involved in having expensive investigative equipment which is not used with

optimal frequency (see Fig.). It is clear from this graph that between 4–500 examinations per year should be carried out to make the best use of valuable equipment.

The larger Unit would need at least two operating theatre suites (see Royal College of Surgeons report on "The Design and Construction of Operating Theatre Suites"). Sufficient pump oxygenator units must be available to allow for maintenance, while flexibility and variation of design are essential to allow for special uses. In all Units facilities for post-operative intensive care near or adjacent to the operating theatre are essential, with a separate area for infants, who might require a third theatre suite if the numbers are large.

Laboratories capable of dealing with a total of 15–25 angiocardio-graphic and catheterization studies per week should be sited near the theatres and intensive care area. Facilities for high speed cine-angiography, and recording of angio-cardio-graphic and haemodynamic data are essential. Additional laboratory space for research will be required.

Other investigations require special facilities within the Unit area. Thus there should be adequate laboratory space for blood gas analyses, respiratory function tests, and for biochemical and haematological investigations, though routine haematological and biochemical tests will be done by the hospital department. Arrangements for electro-cardiography, apart from the routine hospital service, and for phonocardiography are needed.

The Unit requires outpatient arrangements with adequate secretarial, clerical, and nursing help. Modern methods of recording and storing data are essential.

Accommodation should include a conference room, library, secretaries' offices, waiting area for patients, and rooms for staff, including registrars and research assistants.

STAFF

Cardiac medicine and surgery involve 24-hour cover. Generous staffing at all levels and in all disciplines is vital. Thus representatives of medical, surgical, anaesthetic, radiological, technical, nursing, and physiotherapy staffs should be available for emergency duty at all times.

Since junior medical and surgical staff are in training, they must not be subjected to unremitting service work. A full day in the wards and operating theatres is at present often followed by long hours of duty on intensive care at night. This results in excessive and cumulative fatigue which in turn eventually prevents members of the staff profiting from their practical experience. Therefore, this experience must be supported by adequate time off duty for study, research, and relaxation. The staffing at registrar and house officer level must be more than adequate for service needs alone.

Medical. The Committee considers that four consultant cardiologists are needed to staff a Unit of 50–70 beds. These should be whole time or maximum part time and at least one cardiologist should be whole time in the Unit. All should be readily available on call as required. At least one of these cardiologists should have expertise in the problems of infants, and at least one other should have expert knowledge of electronic instrumentation. Their

responsibilities would probably cover some of the medical cardiology outside the Unit.

In addition, a medically qualified person, probably of consultant status, would be required to supervise extracorporeal circulation work, post-operative care, and physiological measurements appropriate to the Unit's special research interests.

There should be two senior cardiological registrars in training, one of whom might be from overseas, with appropriate registrars and senior house officers rotating through the department (see Table).

Surgical. Four whole-time or maximum part-time cardiac surgeons are needed for the larger Unit, one of whom should have a major interest in paediatric cardiac surgery, while others might be occupied with peripheral vascular surgery or thoracic surgery in addition to cardiac work. There should be two senior surgical registrars, one of whom might be from overseas, with appropriate registrars and house surgeons rotating through the department (see Table).

Radiological. The services of two consultant radiologists and appropriate junior staff should be available to the Unit, with an adequate number of radiographers and technicians to provide a 24-hour cover.

Pathological. The Unit will require the services of one pathologist and one biochemist of consultant or senior registrar status, with adequate technical assistance.

Anaesthesia. Three consultants with appropriate senior registrar and registrar appointments and junior rotating staff are needed. The consultants may work elsewhere within the hospital, but the importance of 24-hour cover is emphasized again.

Physics. The Unit should have ready access to, and close liaison with the Physics Department of the hospital for maintenance and development of electronic instruments and similar services.

Technical. The cardiac catheterization laboratories should be staffed by one chief and two senior technicians, with appropriate junior technical staff. Two more senior technicians, also with appropriate junior technical staff, are required for work on pump oxygenators.

Nursing. Nursing requirements are exceptionally heavy in view of the 24-hour service necessary. For intensive care a ratio of 5 nurses to 1 patient

over a 24-hour period with a high proportion of trained staff is necessary. An 8-hour shift system is to be recommended. The importance of adequate trained nursing staff in such cardiac Units cannot be too strongly emphasized.

Physiotherapy. Physiotherapy should be constantly available for post-operative patients, and also for pre-operative preparation.

RESEARCH AND TEACHING

In a rapidly expanding field such as cardiovascular disease advances can only be made against a background of research activity. Some of this activity must inevitably take the form of clinical research, such as the documentation of surgical results, pre- and post-operative haemodynamic and angiographic studies, and similar projects. But in addition it is vital that more basic research orientated towards such subjects as, for example, myocardial metabolism, cardiac biochemistry, the design of prosthetic valves, and new approaches to cardiopulmonary bypass also be undertaken. Much of this work will inevitably require facilities for animal experimentation. It is realized that in the smaller Units the more ambitious projects may not be possible; but if the best interests of the patients and staff are to be served and progress in the field maintained, research, even on a small scale, must be an integral part of the work of each Unit.

An active research programme must thus be envisaged in each Unit, and adequate space must be available. The contracts of the consultant staff should, where required, include research sessions.

The staff should participate in the teaching activities of the general hospital, and exchange programmes should be arranged with other centres. Regular discussions should be held, the emphasis being on small group teaching with clinical and physiological demonstrations.

SPECIAL POSITION OF LONDON TEACHING HOSPITALS

These recommendations describe what is thought could be a prototype of a combined unit for medical and surgical care of heart disease at all ages. A difficulty arises in applying them to the London Teaching Hospitals at present because of the competition from other disciplines for beds, accommodation, staff, and finance.

Three alternatives present themselves:

(1) Two or three hospitals may join to provide a Unit which will be sited at one of them, while a Unit covering another specialty, e.g. neurosurgery, could be sited at another.

(2) Teaching hospitals with more than 1200 beds should be able to support a complete Unit.

(3) If the Unit has to be sited at an associated regional hospital, it must maintain a small Unit at the parent teaching hospital especially for the selection and follow-up of patients. Undergraduates and resident staff of the teaching hospital must not be deprived of the exposure to the benefits of train-

ing in modern cardiac medicine and surgery. This compromise should if possible be avoided, and should only be accepted with regret.

(4) Some undergraduate teaching hospitals may develop a link with a central specialized hospital by means of shared staff appointments.

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