

Hospital Building in the NHS

How hospitals are built

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A consultant chosen to represent his or her colleagues on a project team for a new hospital is thrown head first into a bewilderingly complex activity. It is multidisciplinary, including not just the familiar faces of nurses and administrators but also architects, engineers, and quantity surveyors, who come with their own languages—of on costs and abnormals, DCPs, and universal envelopes and with rolled up plans covered in incomprehensible symbols. Most consultants will not have planned a hospital before, nor are they likely to again, but they will probably have to live with what they build. Their colleagues certainly will, both immediately and for years to come. So they need to learn fast. Because the users get only one chance to build their hospital they invariably want it to be perfect, which it won't be. At best it will be a workable compromise among many conflicting claims.

The project team's job is to draw up the brief for a scheme, which describes the size, the site, the content, and the work of the hospital, so that the designers can translate it into a building. This article is about planning a major new development. The principles apply, on a smaller scale, to smaller developments.

If option appraisal works properly the need for a new building should have been identified through service planning. Option appraisal is the process of identifying a need, studying the costs and benefits of various ways of meeting that need, and selecting the best. Thus the project team itself should have a clear brief: know the aim of the hospital, know its content, and know the thinking behind the decisions. Although hospitals are built by regions, districts eventually have to run them, and the DHSS now insists that they should show that they can afford to before they start planning a hospital. In practice this might mean consulting on closures eight or nine years before hospitals are actually due to close.¹

If the chosen option is a nucleus hospital the project team still needs to know the reasons for the decision—whether it was a positive choice because of the advantages of using nucleus or whether the region was just bowing to the DHSS's "encouragement" to use nucleus. If the latter, the team may well have problems.

The project team

Project teams vary in composition from region to region (and also with the size of schemes) but broadly they bring together clients and designers from various disciplines. Because regions build hospitals and pay for them they run the team and provide a cadre of professional planners, but they also have to involve the users, so there will be medical, nursing, and administrative representatives from the district. The doctor on the team is there to represent all his medical colleagues, junior as well as senior. He will spend much more time outside team meetings than in them, and his job is as much explaining and selling as it is getting his colleagues' views

across. The atmosphere in which many hospitals are planned, with so many interests involved, is often one of obfuscation, with plenty of opportunities to attribute blame to others.

An enormous amount of guidance on building hospitals is available (see box), and the consultant should make sure that he has access to it—through the regional specialist in community medicine responsible for capital planning or through the regional library.

Keeping several balls in the air at once

The Medical Architecture Research Unit's capital planning manual (see box) breaks planning down into six stages: briefing, designing, production, construction, commissioning, and evaluation. These almost, but not quite, mesh with Capricode stages: approval in principle; budget cost approval; design, cost planning, and precontract control; tender, contract, and construction; commissioning; and evaluation. It is helpful to consider stages of a project in sequence, though the stages are interrelated, and earlier decisions often have to be rethought in the light of later ones.

The first stage of Capricode demands an approval in principle for the chosen scheme. If an appraisal has been done properly the option will have been identified before the project team is ever formed, though it often has to make the formal submission. In any case it should test the assumptions on site, cost, and functional content. This is not simply because events move on and revenue expectations change; it is also because schemes may not have been particularly well thought out. The problem is to strike a balance between changing what is ill thought out or no longer appropriate and resisting the temptation to change a scheme simply because another set of eyes is looking at it from a different angle.

Constraints

For the tiro planner it is easier to plan a standard hospital, such as nucleus. Even if he wants to change the standard brief or plans there is already something there he can change. The challenge of a blank sheet of paper is enormous, as is the potential for disaster. However, even with a one off development the paper is not completely blank. The options are limited by cost and space constraints inherent in DHSS cost allowances; by Capricode procedures; by regulations on fire and health and safety; by regional policies; by the building regulations, as well as by the constraints of ignorance. In the past regions have sometimes been guilty of fobbing off members of project teams with inadequate information and justifying their own diktats by blaming the DHSS. Although some regulations are mandatory, much of the guidance issued by the department is simply that—advice aimed at providing some sort of content for the blank sheet of paper. If there is a real case for ignoring the advice—and others on the team are convinced as well—it is worth persisting against the bureaucratic reflex of saying "no."

Cost is a major constraint. The initial cost of a development is worked out by adding together the cost allowances for each department and adding on a nominal figure—say 50%—for on costs. As the project team works it refines these costs. Once the site

has been identified and the layout of the hospital determined on costs (for work on site and for communications) can be calculated more accurately. They are invariably more than half of the costs of the departments. Although high on costs are usually accepted by the DHSS if the site warrants them, the region still has to pay for them and it might insist on the content being reduced. Within a department it is often possible to gain something extra if something else is given up to pay for it. It is much harder to do this sort of trade off between departments—to give up an operating theatre for extra x ray rooms, for example.

There are also difficulties peculiar to hospitals—changing service needs, new technologies, refinements in practice. The consultant is partly there to know what is on the horizon in medicine and make an educated guess about its role in 10 years' time.

Briefing

Briefing moves logically from the general to the specific—from whole hospital layouts to rooms and spaces. More time is usually spent getting bogged down in the detail than on general aspects, though in the long term getting the general relations within a hospital right will have far more influence on its overall success.

Once the content of a hospital has been settled the project team considers whole hospital policies—on supplies and distribution, catering, on the movement of people and goods through the hospital. Although unglamorous, the way traffic flows through a building is a major determinant of its design. These policies also have implications for revenue costs. If the relations are wrong and the distances long the hospital will cost more to run. If policies assume frequent topping up of laundry and other supplies they will prove expensive or they will not work.

If the hospital is to be a nucleus development then the team has to examine nucleus policies in relation to existing policies, particularly if a nucleus development is being added to an existing hospital. If the policies do not match then the team must consider changing the existing policies or changing the nucleus policies, which might have so many adverse consequences that the team considers abandoning nucleus altogether—which will probably demand new approval from the DHSS.

The development control plan is the outline plan showing how the whole hospital and its parts—wards, diagnostic and treatment departments, outpatients, and service departments—will fit together on the site. Ideally a team should look at many possible plans and assess different ways of meeting the many demands.

For a large hospital that is to be phased (and most are) the team has to sketch out a development control plan for the entire hospital (even though the hope of getting later phases might be remote) and then divide it into manageable phases. The requirements of phasing—the need to build a viable first phase (because the second might never be built)—themselves lead to compromise. The consultant will realise that everyone wants to be on the ground floor and that

everyone wants to be next to nearly everyone else. If the site is constricted then some of them will have to go to higher floors, but the users should satisfy themselves that there are enough lifts, bearing in mind that only 80% of lifts might be working at any one time.

The fire regulations also govern layout. High life risk departments must not be sited over high fire risk areas—the intensive care unit over the kitchen, for example—and the building has to be divided into compartments with horizontal routes of escape from one compartment to another. It is also preferable not to put the mortuary where its approach can be seen from the wards.

Once the development control plan has been drawn the team submits a request for budget cost approval. The budget cost, based on the content, the site, and the layout, governs the scheme from now on.

DHSS guidance encourages planners to plan for flexibility: to put growing departments such as radiology next to “soft” ones such as administration, so that the radiology department can easily take over an adaptable space; to adopt a horizontal layout because it is easier to plan, more flexible, and more economic to build than a vertical hospital; to use a “universal envelope,” a structural grid with standard spans and ceiling to floor heights that will accommodate a variety of activities without the need for structural alteration. Within the envelope, too, space should be used as fully as possible—by sharing it and by careful timetabling.

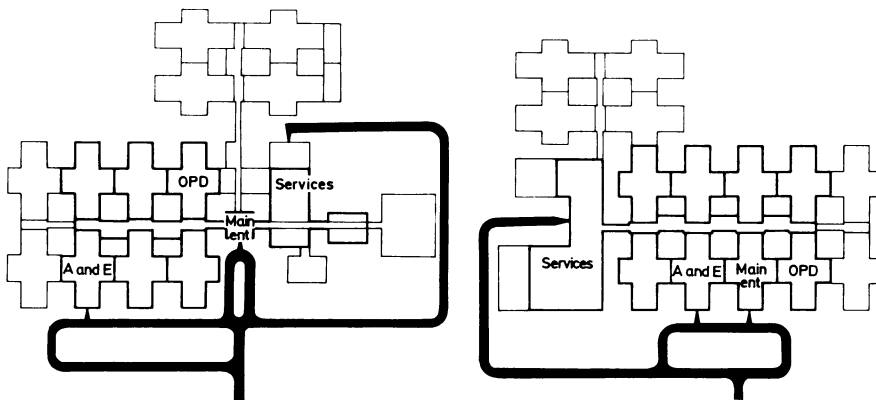
Departments and rooms

For some multidisciplinary departments, such as paediatrics, a wide variety of users need to be consulted and their desires reconciled. The user should not come armed with a diagram of his ideal department; that is not his job. He should instead (and it might be the first time he has ever really thought about it) provide a clear description of how his department works: how patients move through the department, how staff move, how records and specimens are transported and food provided. It is always useful to visit other hospitals and see how they work. If there are criticisms are they due to design faults or because the department is not being used as intended; if the latter, were the original intentions realistic?

When the team starts to draw up the room schedule for the hospital it can draw on the bank of activity data sheets issued by the DHSS. These cover areas like bed spaces, consulting rooms, toilets, utility rooms (see box): they describe the activity that goes on in the space, list the equipment needed, and give diagrams of how much space is needed. There are usually several options for each space—for example, with and without mechanical ventilation—and nucleus data sheets are simply a selection from the database. Regions may also have their own sheets, and some regions have standard departments—wards or pathology departments, for example.

Eventually, when the entire hospital has been considered, from the development control plan to the last broom cupboard, the brief and design are “frozen.” The designers then produce the production drawings, bills of quantities, and engineering drawings. They will, of course, have been producing drawings throughout the briefing, to test various solutions and gauge the response of the rest of the team. Ideally the brief should not be changed after it has been frozen, and regions try to see that any changes that do need to be made are done after the building has been completed. Inevitably, however, some changes will have to be made—for practical reasons on site or for some overriding clinical reasons. But the costs and consequences of these changes should always be known before they are agreed to.

If tenders come in at over the budget cost the team will probably have to reduce the cost—the quality of finishes invariably suffers in these exercises.



Possible development control plans for nucleus hospitals. The part outlined in bold would form the first phase (DHSS, Crown Copyright).

Information

There is an immense fund of information on planning and building hospitals available from the DHSS. It is embodied in health building notes, hospital design guides, health equipment notes, hospital building bulletins, hospital building procedure notes, health technical memoranda, cost intelligence service notes, *et al*, which are all listed in the annually updated *Works Guidance Index*. The index, produced by the DHSS, also lists publications from other organisations such as the King's Fund and the Medical Architecture Research Unit. The most immediately relevant of the DHSS documents are probably the health building notes, the activity database, and the design briefing system.

Building notes describe the purpose of the department, general and detailed design considerations, engineering requirements, relationships with other parts of the hospital, and cost data. The more recent notes also list all the relevant A and B sheets from the activity database. They are drawn up by multidisciplinary teams from the works group at the DHSS in consultation with relevant specialists nominated by the Joint Consultants Committee and others. The building note team always designs an exemplar department, which it never publishes, just to prove that the department can be designed to the building note standards of space and cost—for the cost allowances are based on building notes. Thirty notes are in print, though some date back to the '60s. Most have been revised, and further revisions and new notes are continually being produced.

The latest notes have been issued with a copy of the Design Briefing System (DBS). This is a check list of all the decisions that need to be made to compile the brief and it provides a written record of the decisions. In the DBS for accommodation for children, for example, these decisions range from the population of children to be served and the ratio of beds per population, through desirable locations in relation to other departments (in order of priority), to the number of beds per room, and the type of education and meals provided for the children. The check list also lists the appropriate A sheets from the activity database and provides a cross check of earlier, related decisions. It is an attempt to bridge the many failures in communication that can occur in hospital planning.

The A and B sheets mentioned in the Design Briefing System form part of the activity database. They cover "activity spaces" such as an assisted bathroom, a multibed bay, or a consulting room. The A

ISSUE RELATED TO NEW HIN'S		ACTIVITY SPACE DATA SHEET		DATE	PROJECT CODE
ADB		ADULT ACUTE/GERIATRIC MULTI BED, 5 BED ROOM, O ₂ and SUCTION, WARDROBE		FEB 1980	B0211
ACTIVITY SPACE NAME	ACTIVITY UNIT SELECTION	CLEANSING clinical handwashing BED/COT CARE bedside wardrobe 2 socket outlets BED/COT CARE bedside wardrobe, oxygen and suction 2 socket outlets CHAIR semi-erect high back MIRROR wall mounted 1500x400mm		A02AH A26BF A26BH C04CH C17CA	
FUNCTIONAL DESIGN REQUIREMENTS					
FACILITIES needed for the following activities					
Medical and nursing care for patients who may arrive at their bedside in a wheelchair, a stretcher trolley or in a bed.					
Patients to undress and dress in vicinity of bed, to receive therapeutic and clinical care in bed, or sitting in bed area, to receive therapeutic and recreational purposes, with team staff.					
view TV and use external telephone.					

sheets describe the activity and the environmental considerations. For example, in a multibed bay patients are treated, they get dressed and undressed, they sit in bed and read or listen to the radio and receive visitors; they need privacy and they need to store clothes, and doctors need facilities for clinical handwashing. The B sheets elaborate on these activities, with diagrams of equipment, descriptions of engineering terminals, and lists of equipment. Each region has a library of A and B sheets, often several options for the same space, and they are continually updated.

Of more general use to the tiro planner is the *Introduction to Capital Planning* manual, to be published by MARU (with DHSS support) next year. Together with an introductory video, it is designed to teach the basic procedures of capital project planning to those new to it. It covers, with admirable clarity, how capital planning fits into general NHS planning, the stages of planning, the role of the project team, Capricode procedures, and cost control, and it includes a section on understanding drawings as well as a glossary of terms. It is long overdue.



The comment in an appraisal of the William Harvey Hospital, Ashford, Kent, shortly after it was opened might serve both as an epitaph to much NHS hospital planning and as a reminder of the limits of planning: "The 120 bed units cannot function as designed, but thanks to ingenuity and tolerance they are working reasonably well."

At some stage during building the emphasis will gradually shift from the project team to the commissioning team. The commissioners cannot do their job properly unless they know the brief too.

A good commissioning manual should list not only the rooms but describe how the hospital and its departments work—and that goes back to the planners' original description.^{2,4} But the longer the gap between planning and building (over 10 years at Liverpool) the less easy is the commissioners' job. The chances are that the reasons for some decisions will have been forgotten, the actual design may not meet the original brief (because of cost, for example), and practices may have changed so much that the original brief is irrelevant.

As planning progresses the tiro will undoubtedly become more expert, but he should not forget that as the inexperienced user one of his jobs is to ask the simple questions: what will the hospital look like? Why? What will it be like in 15 years' time?

I thank the many people in the NHS, the DHSS, and outside who have helped me with this series by providing information and sharing their ideas.

References

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- 2 Stevens R, Miller J. *Opening a hospital is easy . . . isn't it?* Croydon: South East Thames Regional Health Authority, 1982.
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- 4 Millard G. *Commissioning hospital buildings*. 3rd ed. London: King Edward's Hospital Fund for London, 1981.