Hospital building in the NHS

Ideas and designs I: from Greenwich to best buy

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British visitors abroad often admire the palatial modern buildings in which acute hospital care is provided for North Americans, Scandinavians, and other west Europeans. They envy the marble halls and the well cared for steel and concrete, but quail at the cost and have doubts about the size.

With the exception of some modern British teaching hospitals—which often imitate these high rise hospitals—English hospitals are not generally like that. That they are not is due not simply to very strong central control over costs but also to prevailing ideas about the way hospitals work and should be put together.

Since people first started thinking seriously about hospital building in England in the 1950s one ruling idea has been an emphasis on flexibility: a recognition that hospitals need to be able to accommodate change and growth as practices and technologies change. This emphasis has sometimes been more apparent in the rhetoric surrounding a design than in actual practice (one of the criticisms of nucleus), but it has, nevertheless, been an important influence. Another, often conflicting, emphasis has been on the importance of grouping interrelated departments so as to make easy traffic and communications between them. At their most extreme these two trends have produced two very different types of hospital. The emphasis on flexibility has led to loose limbed, extendable designs such as Northwick Park Hospital, while the emphasis on communications has led to tight, compact designs such as Greenwich Hospital and the “best buy” hospitals at Bury St Edmunds and Frimley.

A framework of control

Although regions are responsible for deciding where hospitals should be built and for building them, they do so within a framework of guidance and control set by the DHSS (and before that the Ministry of Health). Ever since the start of the hospital building programme in the early '60s the department has played a prominent part in setting standards of hospital provision and in promoting varying degrees of standardisation—a process that has now culminated in the nucleus hospital. It has done this partly through its research and development, often building departments and whole hospitals itself to test ideas about planning and design, and partly through its published guidance.

This guidance was produced initially to help the regions—which had virtually no experience—with their building programmes. It was aimed at controlling costs, ensuring standards throughout the NHS, and preventing different groups of planners around the country starting from scratch to solve essentially the same problems. The works group at the ministry (and the SHHD in Scotland) thus started to issue building notes, engineering notes, information on costs, studies on traffic flows and supply distribution—services which continue today. There are now notes on

Above: One of the development sketches for Northwick Park Hospital, showing the street, direction of growth for each department, and the “clustering” of related departments (Llewelyn-Davies Weeks). Right: Floor plan of Greenwich Hospital (*Hospital Research and Briefing Problems*²).

almost every hospital department, together with a wide range of other guidance, from fire safety to mechanical ventilation (see later article). The DHSS's guidance is widely used by the private sector and by architects working on projects abroad.

Designing a DGH

The pattern was set by the first three notes issued by the Ministry of Health in 1960-1. The first two dealt with drawing up a building programme, assessing needs and existing resources, drawing up a schedule of accommodation, and establishing the cost of a development. For each department of a hospital the ministry defined a functional unit so that the cost of the department could be related to its workload. Thus the cost of a ward could be established from the number of beds, of a kitchen from the number of meals served, and of an outpatient department from the number of doctor sessions worked. The cost of a hospital was thus—and is still—worked out from adding together the departmental costs and adding “on costs”—to cover communications and site works; on costs can vary from half of the departmental costs to over double.

The third note, the *District General Hospital*, emphasised the importance of considering the interrelations of the different

From hospital building note No 3, the *District General Hospital*, showing how zones of a hospital may relate to each other (DHSS, Crown Copyright).

departments of a hospital and their future needs for expansion. Thus it grouped different types of departments—wards; theatres and diagnostic and treatment facilities; and support services—and discussed their communication with each other and the need for an overall plan that would not inhibit growth in diagnostic departments and the outpatient department. It also warned that many hospital developments would have to be phased and that an overall plan should be drawn up at the outset so that future developments could be related to this overall plan. The points are still valid today.

The Nuffield report

Many of the ideas embodied in this third building note came from an influential study performed by the Nuffield Provincial Hospitals Trust and published in 1955.¹ The study team performed detailed examinations of the working and environment of hospitals and the implications these had for design. In wards, for example, it found that a high proportion of patients were up and about and that they therefore needed more bathrooms and toilets and more day space. In outpatient departments they discovered that, contrary to the myth, doctors were more often late than their patients, and they recommended careful scheduling of appointments to avoid the need for large waiting halls and combined examination/consulting rooms.

The members of the interdisciplinary team visited hospitals in the USA, Sweden, and Europe and came to some general conclusions about design that had a lot of influence. Many of the hospitals they saw overseas were high rise buildings with a central core of lifts and engineering services. The team recognised the limitations of this form: that departments had little room to expand and change and that they depended heavily on artificial ventilation and lighting.

The team emphasised the general architectural principles of ensuring enough light and protection from noise and fire. Most important, perhaps, it looked at the hospital in terms of zones and emphasised the importance of leaving those departments with the greatest need to expand with enough room to do so. The ideal form for a hospital was therefore a one storey development, which would allow maximum scope for natural light and ventilation, easy horizontal movement within the building, and room for growth. If a hospital did have to be built tall then the most appropriate form might be a multistorey ward block with theatres, treatment and diagnostic facilities, and the outpatient department grouped in low blocks around the base—because the wards were least likely to

change, one ward layout is much like another, and so stacking them one on top of another served by the same stack of lifts and services made sense.

The Nuffield report was responsible for the emphasis on an overall plan for a site, and also laid the foundations of a persisting scepticism about the benefits of building high.

But clearly green field sites with plenty of space for one storey developments were not always going to be possible: many hospitals had to be built on constricted urban sites, and the first major hospital project that the Ministry of Health produced was a hospital on just such a site at Greenwich.

Greenwich Hospital

The brief at Greenwich was for an 800 bed hospital with acute, geriatric, maternity, and psychiatric beds and supporting services, with easy communications and supply routes that had to be built on the

same site as the existing hospital while the hospital remained working.²

At first sight the conditions at Greenwich seemed to call for a tower block development; but the Ministry of Health decided to

Alternative building shapes for Greenwich Hospital. Apart from the compact layout actually chosen (bottom right), the alternatives were all variants of a tower and podium; these did not meet the need for convenience of movement between departments or allow for flexibility and growth (*Hospital Research and Briefing Problems*).²

try another building form. The ministry had doubts about the room for change in a multistorey block (several of which were being planned in Britain in any case). So it decided to try a deep plan design—a low, compact block with a lot of internal rooms and, of necessity, artificial ventilation and lighting. It wanted to study the effect of the layout on efficiency, the response to internal rooms and their effect on cross infection, the relation of departments to each other, and a way of integrating engineering services so that these too allowed for flexibility. The planners spent a lot of time studying patterns of communication and activities to build up an accurate brief.

The solution adopted for the engineering services was to give them interstitial floors of their own, so allowing users the possibility of “plugging in” to them at various points and keeping them out of the way so that maintenance did not affect the work of the hospital and so that they did not impede any restructuring on the main floors.

The hospital has four storeys (three and a basement) penetrated by three internal courtyards. The wards are all on the outside of the building, separated by an inner street from four inner zones. Within the inner zones departments were grouped by traffic considerations. Thus operating theatres, intensive care unit, the maternity unit and special care baby unit, and surgical wards were all grouped on the same floor. To further emphasise horizontal communication and minimise vertical journeys each floor had its own decentralised staff dining rooms.

The DHSS has always been coy about the costs of Greenwich, although the design did save on space. As the building programme progressed, however, architects had to get ever more ingenious about space because the permitted costs for various departments never kept pace with inflation and the only way to keep within the cost allowances was to build smaller spaces than the building notes allowed for.

Greenwich showed what could be done with a lot of time, effort, and ingenuity—and it produced valuable lessons; but it was essentially a one off building. What everyone was looking for was some degree of standardisation that would provide local planners with the groundwork of effort and ingenuity and save them having to supply it slowly, and often painfully, themselves. Thus the DHSS developed the best buy design. Again the department kept its emphasis on low rise, compact blocks. It selected two semirural areas and offered them both the same swift, low cost hospital.

Best buys

The best buy hospitals at Bury St Edmunds and Frimley were billed as two for the price of one. They were attempts at saving space, saving money, and saving time. They also, and perhaps more importantly, explored the possibility of saving on beds by

integrating the hospital more closely with community services and relying more heavily on outpatient treatment and day surgery. Both hospitals were built with 2 acute beds per 1000 population at a time when the DHSS norm was 3.3.

Frimley and Bury St Edmunds were chosen because both were thought to have catchment populations of about 170 000 (in fact Bury's was rather less and Frimley's was rather more and growing). The design was a compact, low rise building, partly to keep costs down and partly to allow horizontal communications among closely related departments. Following the example of Greenwich the wards are mainly on the first floor of the two storey building, in a band round the outside. In keeping with the idea of making the greatest possible use of resources beds were not allocated to specialties and there was a progression in the ward from high dependency beds to low dependency beds, which were less intensively serviced.

The wards are separated by a “ring main” corridor from the central core of highly serviced departments, including theatres, central treatment rooms, intensive therapy unit, and maternity delivery suite. This core is dotted with small courtyards providing natural light and ventilation.

One element that anticipated nucleus was the fact that the hospitals depend on supporting facilities elsewhere—not only in the community but also for laundry, sterile supply, and pharmacy services—and provide only limited holding and storage space. The kitchens were also designed to handle ready prepared foods—which were never used at Bury and so the kitchens were inadequate.

The hospitals are tight for space, but the main criticism of the best buy design is that it does not allow for change and expansion. Such a limitation may be a necessary price to pay on a constricted urban site, but the best buy designs are constricting on open sites because all the departments where growth might be expected are trapped in the middle of the building.

The two hospitals were cheaper than two separately designed hospitals would have been—by about a third; and they were carefully evaluated afterwards. Initially Bury St Edmunds worked better, partly because it already had an infrastructure of community services and had previously had totally inadequate hospital provision and partly because its population was stable, whereas Frimley's was growing fast. The evaluations also suggest that the planners got the overall relations of departments right. Both hospitals, however, are being used more intensively than planned and dealing with more acutely ill patients. There is pressure on space in outpatient departments, and engineering maintenance has proved expensive.

The savings were not as great as had been hoped. The final capital costs were higher than expected, and much of the planners' time went into selling the idea and organising the community support services—a hidden cost. East Anglia was the only region to

Mark 1 best buy at Bury St Edmunds.

take advantage of the initial investment and use the best buy standard again. Modified best buys—mark IIs—have been built at King's Lynn, Great Yarmouth, and Huntingdon. The original plans were converted from imperial measurements to metric ones and became more generous as a result, and the layout has been rearranged to allow departments such as pathology to be on the outside of the building, with room to expand. The original 36 bed wards had one eight bed bay for low dependency patients, but there are few low dependency patients these days, so this bay has become a six bed bay like the rest and more beds have piped "medical" gases. Using the standard design has saved time in planning, and the region has found great advantages in being able to take consultants and other users to see a working example of what they will get. It has cut down on "empire building," and,

more practically, future users know what it will cost to staff and run a best buy department and know what it will look like. Nevertheless, East Anglia has done its last best buy. Conceived in 1967, best buy is now 17 years old and rather out of date. The region is now looking at using nucleus data. That it is using nucleus data but not the whole package reflects a widespread concern with the actual designed solution that nucleus provides for its own brief. Nucleus is discussed in next week's article.

References

- 1 Nuffield Provincial Hospitals Trust. *Studies in the function and design of hospitals*. London: Oxford University Press, 1955.
- 2 Baynes K, ed. *Hospital research and briefing problems*. London: King Edward's Hospital Fund for London, 1971.

Communicable Diseases

Influenza surveillance: November 1983-June 1984

As in other recent winters, the prevalence of influenza remained fairly low throughout 1983-4. From January onwards sporadic outbreaks were reported from services establishments, schools,

factories, and geriatric units. During March the indices used in surveillance suggested an increase in influenza activity and for a time in April they became relatively high before subsiding again (fig). A similar pattern was noted in Scotland.

Influenza A subtype H_1N_1 (48%) and influenza B (42%) were much more commonly identified than influenza A subtype H_3N_2 (10%). The strains of influenza H_1N_1 and influenza B studied showed some antigenic changes, and appropriate strains are included in the vaccines for 1984-5. Most of the H_3N_2 viruses were found to resemble the A/Philippines/2/82 strain already included in the 1983-4 vaccine, so that no further change was indicated.

In the United States of America and several countries in Europe influenza activity was widespread, but elsewhere scattered outbreaks only were reported. As in Britain, influenza A viruses of the H_1N_1 subtype, mainly antigenically similar to A/Chile/1/83, predominated over the H_3N_2 subtype and caused many of the outbreaks. Influenza B virus infections were frequent, especially in March and April, and most of the viruses studied resembled B/USSR/100/83.

PHLS Communicable Disease Surveillance Centre

Indices used in monitoring influenza activity in England and Wales for the last epidemic winter (1975-76) and the last four winters.

WORDS **MENISCUS** Those of my generation whose first camera was a box Brownie will know that it had a single meniscus lens. A meniscus camera lens has concavo-convex surfaces and it is thicker at the centre than at the periphery. In section it resembles a crescent moon, whence its name, $G \mu\eta\nu\acute{\iota}\sigma\kappa\omicron\varsigma$, *meniskos*, diminutive of $\mu\eta\nu\eta$, *menē*, moon. As students we meet with another meniscus when measuring liquid volumes and we learn to take into account the curved upper surface of a column of mercury (convex) or aqueous fluid (concave) in a burette. Finally, we encounter the intra-articular meniscus of fibrocartilage, most clearly seen as such in the knee joint where it is notoriously prone to injury, but present also in the sternoclavicular, temporomandibular, and wrist joints. By contrast with the optical meniscus, the intra-articular meniscus is thicker at the periphery than at the centre; its name derives from its crescentic outline in the knee joint; hence it is also called the *SEMILUNAR* cartilage.

Any curved structure, like the arc of a circle, may be called a *CRESCENT*—for example, Park Crescent in London W1, home of the Medical Research Council. This derives from the resemblance to a crescent moon. But why is the crescent moon so called? Because it is the shape of a growing moon, between "new" moon and first quarter; *L cresco*, to grow, *crescens*, *crescent*-, growing.—B J FREEDMAN.