Designing a very different hospital

Author: Andy Black[A]

ABSTRACT

Hospital design has stagnated. New directions are possible, exploiting and extending 100% single rooms to provide total operational flexibility where any bed can be used for any patient. The provision of a truly therapeutic environment meets the test of getting a good night's sleep. The provision of an intelligent assistive environment brings data accuracy and real-time meta-management of all patients in the hospital. All clinicians can see how all patients are progressing clinically and feeling subjectively.

KEYWORDS: Hospital design, intelligent environment, therapeutic environment, sleep

Introduction

In 2014, the healthcare consultancy Durrow (www.durrow.org.uk) published a paper setting out a radical prospectus for the design of a very different hospital – looking beyond the traditional approach centred on clinical specialties to explore new possibilities for both the design of the hospital and the clinical management of its patients.[1] This innovative paper (available as online supplementary material to the current article) responds to several perceived weaknesses of our current hospital designs, recognising the difficulty of fitting today's patients into specialties and sub-specialties, the failure of information systems to work as well as we know they could, and the dominance of the 'industrial efficiency' paradigm.

The different hospital

Assuming we have made the leap forwards to 100% single rooms with bathrooms, we should not pause to congratulate ourselves for what is really just the cessation of barbarism, but push to exploit the enormous potential that this move opens up. First, we might recognise that the simple imperative to give each patient back their dignity and comfort also opens up a new way of managing their clinical care both individually and as a collective body of inpatients. A 'unified bed matrix' can effectively replace beds previously allocated to specific specialties. An array of single inpatient rooms, significantly larger than today's norm, incorporating double-door access, handling space at the bedhead and ceiling hoist tracking to the ensuite bathroom, allows many functions to be achieved in the room, reducing patient movement and labour costs.

Second, in their design, the rooms must meet the two imperatives of being both 'therapeutic' and 'intelligent' environments. The former is a well-established concept – at least at the level of rhetoric and self-deception – but is almost never actualised in a real hospital. It is usually honoured in a tokenist way through small gestures. A fundamental acid-test is the universal ease of obtaining a good night's sleep. The 'intelligent environment' (sometimes termed the 'intelligent assistive environment') is also well understood but is again virtually unrealised outside special projects and research units. The term refers to a technological grid encompassing the room that allows intelligence on what is happening within it to be registered through a series of sensors. Typically these will be located in the bed, the floor, the toilet and in other items of equipment, such as patient hoists. This technological infrastructure is critical to any new approach to bed management and must be secure and readily adaptable. Further, the two design imperatives must be realised in a way that is harmonious – which is much easier to say than to do!

Third, a paradigm shift in thought is required, such that beds are no longer associated with, or allocated to, specialties on a fixed basis. The daily and even hourly shifts in the inpatient population determine the allocation of any patient to any bed. At the level of the individual, the traditional process of diagnosis and treatment plan remains unaffected, but is distributed throughout the matrix rather than grouped in one geographical location. Initial clinician reaction is likely to be hostile as it looks as though this makes practice much more difficult. However, the dimension of meta-management then becomes important. As well as directly managing those patients for which they are personally responsible, each clinician can (and must) see the totality of patients in the hospital at all times. This opens up possibilities that were hitherto impossible. Intensive care beds are often under pressure and are conventionally limited to the fixed number 'in' the intensive care unit (ITU). If any (or all) of the available beds in the hospital could be configured as an 'ITU bed', the limitation on number is set by resource constraints (physical and human) but need not be a constant. The criteria for allocation of higher dependency status can be objectively set and every clinician can see the relationship of every patient to those criteria. Those staff members with ITU skills – medical, anaesthetic and nursing – can still constitute an intra-hospital community and function as a team, but will work in a more distributed way. A specific point of interest within this approach is the degree of

Author: [A]chairman, Durrow.

value added over time that 'ITU care' brings to the outcomes of the totality of patients. This will be both a function of the efficacy of the management of each critically ill patient and the matching of intensive care to the contemporary needs of the totality of patients who could potentially have benefited. One would hope for a significant gain to the patient body over the conventional method of negotiated physical transfer (or not) to the fixed unit.

This meta-management of the patient population needs further exploration in two directions: the technical details and the sociology of clinical behaviours. The intelligent environment ensures that each room can record and relay what is happening within it in real time. This is not the place to deal with the technical specifications of the software and engineering detail required, but it all exists already. Two streams of information are essential: what is the clinical status of the patient, and how is the patient's subjective feeling of wellbeing? First, the room can automatically capture the data needed to calculate the modified early warning score (MEWS): temperature, respiratory rate, heart rate, systolic blood pressure, urine output, and possibly neurological status. Manual inputs or machine-linked auto-recording extend this list and set it in the context of the patient's clinical record. Second, the technics also provide an interface for the patient to record their personal assessment of wellbeing as a one-touch update (see below). Thus, the intelligent environment synthesises objective data against algorithms that imply wellbeing or otherwise – remembering that this is done in series, not as a one-off event. An important element of this will be the assessment of the quality and extent of the patient's sleep; their use of entertainment and communication media, visits to the toilet, the amount they have eaten or drunk and so on can all be measured using relatively straightforward microtechnics and network engineering can collect and transmit the signals.

Note that the allocation of beds has not been changed using this approach; indeed there is no allocation of beds. If the entire bed matrix is run as a unity, then the orthopaedic patients (and every other specialty) are randomly distributed; clinical responsibility can no longer be linked to location. This will already be familiar to those in practice in busy hospitals where the physicians have to hunt down their patients in whatever other wards they have been admitted overnight. But the conventional hospital has not and cannot configure its systems for this reality. Although it happens all the time, it is still somehow seen as a deviation from the 'normality' of speciality allocation of beds in a specific location, in the hope that this status quo will one day be re-established.

In the new paradigm, the hospital is designed to provide optimal outcomes while constantly morphing across specialty and acuity distributions as determined by current patient need. It is no longer trapped in the earlier guesses of planners as to what they thought would be needed beyond their horizons of view and understanding. Their guesses are inevitably proved incorrect by the evolution of events.

Hayek triumphs over Marx

The concept of operational flexibility delivering a constant stream of information on the clinical status and sense of wellbeing of every patient at any instant and over time implies that significant change is needed in medical sociology as well as in physical design. Each clinician still has responsibility for specific patients but the 'unified bed matrix' enables a much stronger medical director function, focused on the corpus of patients and their collective outcomes against expectations (both clinical and experiential).

We need to say more about the patient experience. It is normal for all health strategies and policy documents to pay homage to the importance of the patient's subjective experience, but this is often ritual and does not reflect reality in today's hospitals. In 1859, Florence Nightingale pointed out the (blindingly) obvious fact that a good night's sleep was an important aid to recovery. The simple truth is that a good night's sleep has been and remains very difficult for most inpatients in the UK today. This disconnect between the rhetoric and reality is another (unintended) consequence of the endogenous hospital plan that begins (and ends) with a conventional image of what a hospital should be like. We say the patient should not be moved from pillar to post but then do precisely that. We say that some patients like being in a ward with others (strangers) but we do not wish it for ourselves. One could go on. To design a hospital that causes distress and stress to the patient is the antithesis to the creation of a therapeutic environment and yet it happens repeatedly.

It is a tricky concept to actualise a fixed design seeks that can encompass human diversity. However, some of the elements that the design team have to work with are becoming clear and are shown in Box 1.

The author finds many of the questionnaires used to get 'customer feedback' in different environments irritating due to their obvious design as inputs into a spreadsheet and the assumption that these are the questions he wishes to answer. Effective and intriguing systems for (in)patient feedback are available. As a by-product of routine tasks – such as ordering the next meal – the patient can be confronted with a facsimile of traffic lights and invited to press red, amber, or green, meaning 'worse', 'same' and 'better' respectively. The interrogation intervals could be varied but would be at least daily. The reason patient in room 138 is feeling 'worse' is can only be established if it is known that deterioration has occurred. For the non-sentient, relatives or friends can proxy.

Advances in communications and technology now make this approach easy to install. The difficulty would be in preventing management from embellishing it with so many details that it becomes a chore to complete and dissipates the basic message

Box 1. Elements influencing design.

- Access (or not) to fresh air, and control of temperature
- Control of what and when to eat and drink
- Access and interaction with nature, light, greenery and water
- Quiet when desired and a good night's sleep
- Something interesting to do and see
- Control and access to all the normal modes of electronic communication and leisure
- Information about what will happen next and what is happening
- Privacy or interaction with others, depending on patient preference at the time

from the patient to the hospital: worse, better or the same. Using such systems clinicians can see current clinical status and progress against plan for every patient. They will also highlight any patient that requires an input or action. Alongside this clinical information would be two simple additional items assessed automatically by the intelligent environment: how the patient is feeling and how they have slept.

Where do we go from here?

How do these new ideas relate to current hospital design practice in the UK? If it is the hospital community that is asked to judge, they will be influenced by how they perceive the architecture facilitates or frustrates current medical and technical processes – 'Does the patient flow or is there confusion?' and/or 'Do I/we have enough space? (Do others have more?)' It is often in this context that the lethal impact of the schedule of accommodation unfolds. The architect is bound hand and foot and provides a series of single-use spaces.

The ambience and human impact of the building is then judged by the collective daily experience of the citizenry and staff. Is it a marvellous building that is a joy to work in and does the building make you feel better, or alternatively, does it accentuate how ill you are?

Frequently, architecture is judged insofar as it meets the stated requirement of the client; quite often, the client does not have much of a clue what they do actually require. To get into the room where these issues are discussed usually implies a certain seniority; most clinicians will participate in one or two hospital planning projects during their working lives. They will be expected to do so in the gaps between their other duties. Most will have in-depth experience of only one or two hospital functions. The ward clerk in the maternity unit might know more about childbirth than a consultant neurosurgeon. Clinical training and a busy practice are scant preparation for planning a generational investment. Sadly, in the UK, many hospital boards are no better equipped and are steered by their estates professionals down 'safe' and traditional pathways, and possibly (in the view of the author) to mediocrity. At least part of the problem is that contemporary bureaucratic processes are short-termist and require the anomalies of budgetary separations to be honoured whatever the cost. NHS, social services, education and the Opera House budgets are in sealed containers. There is in the UK currently no 'civic client' of great stature with the power and ability to represent the future generations of citizens whose hospital this will become. Widening the pool of talent and opening up the process to the local university, city council, trade unions and chamber of commerce might assist the hospital grandees and staff in their decision making, which should take place in public.

Could it be worse? Could a new system take longer than our current in-house NHS planning procedures? The Royal University Hospital of Liverpool was built in the 1970s and was immediately a candidate for the (fiercely contested) title of ugliest hospital in Britain. Today it is being demolished and replaced in a second great failure of civic planning. The period of the latest generation of PFI contracts is typically around 30 years; this is now the planning horizon for hospital investment in Britain. Interestingly, the original Liverpool Royal Infirmary is a Victorian masterpiece by Waterhouse built in 1890; it managed a life cycle as a hospital that lasted three times longer than its successor. It is still in use today as part of the University of Liverpool. ■

Reference

1 Black A. *Notes on the design of hospitals and their clinical organisation.* Durrow, 2014.

Address for correspondence: Andy Black, PO Box 22, Machynlleth SY20 9AT.
Email: andy@durrow.org.uk