HealthManagement.org
The Journal
LEADERSHIP • CROSS-COLLABORATION • WINNING PRACTICES
VOLUME 20 • ISSUE 1 • 2020 • € 22
ISSN = 1377-7629

Cover Story:

Reimagined Hospitals

Healthcare Design With a Long-Term View

In the process of 'reimagining a hospital,' one cannot overestimate the importance of architecture and design. HealthManagement.org asked a prominent figure in healthcare design, Christopher Shaw, Member of the Royal Institute of British Architects, Chair of Architects for Health and founder of healthcare planning and architects practice Medical Architecture, to share his vision of how hospitals will be changing in the future and what can be done to meet the challenges.

Our cover story's theme is 'Reimagined Hospitals.' What is a reimagined hospital for you?
It's a very wide-ranging question. The idea of the hospital can be traced back to the middle ages, but the modern hospital – not an institution for the military or indigent – is a comparatively recent innovation. Social reforms and comparative wealth in urban Europe of the 19th century led to the development of the public hospitals we recognise today. Most of these institutions are less than a couple of centuries old.

These hospitals were a product of their age and have established a deep cultural identity with astonishing rapidity. One can now navigate cities by landmark hospitals, just as you could by churches and market places for millennia.

Reimagining hospitals requires a reconsideration of the social place of the health systems as much as the knowledge, medical systems and economics that underpin contemporary hospital design.

The future hospital will need to be a citadel, a central part of our cities where we turn to for help and healing in an era, which, on the one hand, will see an increasing importance of self-care. On the other hand, healthcare will become less certain with the prospect of diminished performance of antibiotics and likelihood of rapid global pandemics.

The reimagined hospital will be placed at the centre of the city rather than on the periphery. It will serve a larger population of around one million people with the social heft of a cathedral and the engine of an airport.

What lies at the centre of a healthcare design project?
Healthcare design projects generally start with a capital business case for investment. This articulates the planned objectives for the project and should have a number of important elements including the planned clinical outcomes, workforce and revenue costs, and often some expression of the visions and values for the project. This should form the basis of a design brief.

The balance of emphasis between patient, staff and the logistical efficiency will vary from project to project. Pathology Labs or Emergency Care are very driven by process. In- and outpatient accommodation may be driven by the patient experience, and there has been a general shift towards improving the workplace experience for scarce healthcare staff.

One of the challenges of being a designer is we start with a blank piece of paper. All of these themes are important; none is exclusive. A design process takes the brief as far as it can be determined and formulates this into an organisational concept. In simple terms this often means overlaying diagrams that represent multiple drivers and looking for commonalities and unique requirements.

Healthcare systems have inertia of 20–30 years in how they operate. Architecture projects are also long-term. What helps you to envision the future in the design process?
Envisioning is a loaded word pointing towards a single objective whereas the future is often uncertain.

Nonetheless, this is a very pertinent question. Over years of design, I'm struck by how bad managers and clinicians are at expressing a long-term view. It's simply not part of the training. So an architect must adopt strategies to help organisations change and embrace new possibilities without undue risk. Today this means 'benchmarking' and asking what 'good looks like' and may mean producing images, which illustrate a shared vision of the future.

We are starting to see better digital tools emerging. They allow for 3D simulation of operational processes, staffing models, and patient satisfaction models, which can be applied where design becomes integral to scenario testing. For example, move to a seven-day operating model and a simulation model could describe the impact on staffing or logistical systems.

The environment today is rapidly changing. How is this potential change embedded in an approach to design?
Growth and change are fundamental to health systems. This has been recognised in design strategies since the 1950's. Strategies can be seen in Zeidler's McMaster University Medical Centre (Hamilton, U.S.) from the 1960's through to the recent White Arkitekter/Tengbom Karolinska University Hospital Solna (Sweden).

There is a tension between the cost overhead of long-term value and sustainability of a flexible and adaptable environment, and the pressure to cut short-term capital cost. Designers adopt a number of strategies to accommodate change:

- Allowing space for future capacity expansion or allowing for residual use for contraction.
- Catering now for change we know is coming, for example, robotics or climate change.
- Adopting planning systems and disposition strategies for 'hard' and 'soft' activities that maximise the scope for change.

There is good evidence that illustrates long-term benefits to health systems of adopting strategies to accommodate change. However, there has been limited appetite in the market to take a long-term view in a culture of short-term 'capital cost benchmarking.' This may be evolving with the climate change achieving widespread currency.

Sustainability/Net Zero is another hype tendency now, and its importance will, most probably, continue to grow. What are the challenges for design here?
Let's be clear. This is demonstrable science, not hype tendency. Carbon neutrality is an absolute requirement for the persistence of life on this planet. A response in the Paris accord timescale (2050) will be difficult and very costly. The challenges are:

- Logistics – reducing the carbon cost of goods, materials and food. It will mean entirely new forms of procurement, recycling and reuse of materials.
- Building infrastructure – will need to be heavily insulated and shaded with more complex hybrid ventilation systems. Some medical and diagnostic equipment will continue to need high energy input. This will have to be either self-generated or offset. For example, the very large Erasmus MC in Rotterdam has constructed a wind farm and is expanding this to meet its longer term targets.
- Transport – roughly 15% of a nation's transport carbon can be attributed to movement to and from health facilities by patients, staff and goods. Reducing the energy impact of transport will mean much more careful planning of care pathways and infrastructure to reduce patient and staff journeys. The recent Aarhus University Hospital generates around 35,000 daily transport movements from patient and staff alone. Planning includes the extension of the urban light railway system to the hospital.

Hospitals are getting larger, but care would be needed closer to home delivered in smaller facilities. What effect will this tendency have on design practices?
The effect of the 'missing middle' has been evident in system planning for the last 20 years. There is a swathe of smaller local hospitals becoming redundant as care is pushed either to larger tertiary and quaternary medical centres or to primary and homecare.

The problem is (as noted above) that the public are very attached to the 'idea' of the hospital. That is often the familiar secondary care institution that now has a diminished role.

Design practices must consider this paradox and create new clinics that capitalise on public sentiment but are able to cater for a range of transformative health systems that provide more for complex and integrated care closer to home.

The reimagined hospital will serve a larger population with the social heft of a cathedral and the engine of an airport

Apps/telehealth is a major growing trend, which implies that the care is delivered outside of hospital facilities. What impact does it have on design?
A few years ago I presented on this topic at the Kings Fund in London. The image which received the strongest reaction was one of a model health 'Hub' concept (Figure 1).

In many ways it represents a design response to what is happening in system design. There are some key issues that don't get well aired:

- The impact and control of mass health data. This means there will need to be a network of secure and managed data centres.
- Complex care and algorithmic diagnosis. This means integrated teams working in an air traffic control type environment with individuals or cohorts managed though complex health and social care.
- Transport planning. The relationship between the individual and the health system will change. There will need to be local two-way physical interaction. Public or

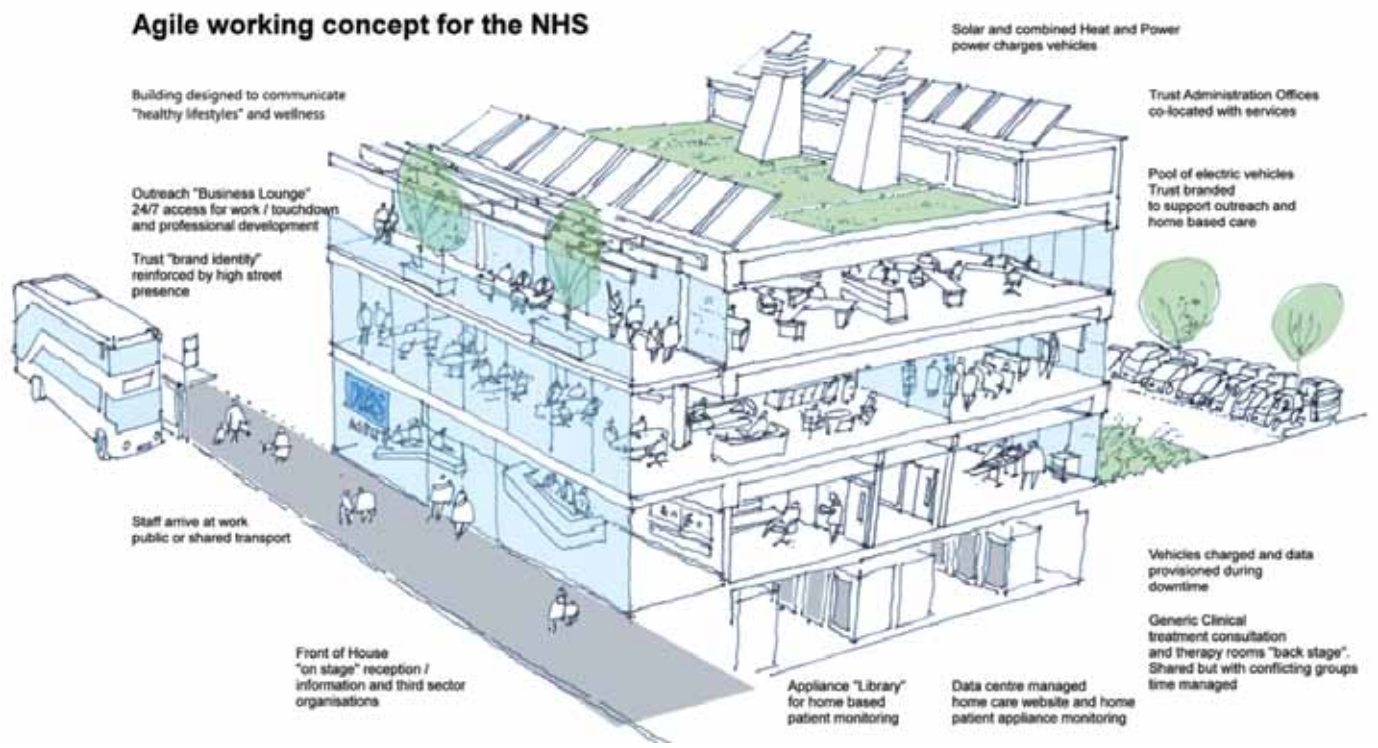

Figure 1. Concept Design for a Model Health 'Hub'

assisted transport is significant as will be the ownership and role of the homecare team transport.

Silver Tsunami is an undeniable reality. Meanwhile, hospitals are getting more technologically advanced. How can design help older, non-tech-savvy patients to feel comfortable in such advanced environment?

An increasingly aged group of patients (and workforce) means physical frailty and reduced cognitive function. Design should cater for both with improved physical aids for moving and handling materials, and better accessibility for people with degenerative cognitive diseases. Design for dementia is simply part of universal design.

Older people are increasingly able to manage communications technologies. They were the generation that invented most of this stuff. However, technology can get better at dealing with older people. Modified intelligent speaker systems like Amazon's Alexa are already starting to appear in hospital environments providing self-diagnosis and health navigation support in multiple languages. This will be common in two to three years.

Use of chatbots in mental healthcare talking therapies is developing fast.

At the moment robotics has a minor role in hospitals, usually in distribution of pharmaceuticals and goods or materials. In the next 15 years this will expand significantly. Domiciliary robots will take a more significant role in cleaning, making beds and providing meals.

Lean management is a popular concept, but some researches argue that traditional design of healthcare facilities is not aligned with its practices and principles. What is your take on this matter?

Ten years ago architects were inundated with Virginia Mason and lean process mapping. It was an entertaining mode of engagement and created vast patterns of Post-it notes. These days some of that discipline is still there, but there are countervailing pressures.

Focus on lean process created a 'tight fit' of the building environment with the activities being mapped. Clinical pathways change on a 10–20-year cycle, medical equipment changes on a 7–10-year cycle. In the medium and longer term a tight fit will create an inflexible building.

The cultural barriers and desire for professional territory has not gone away. Hospital 'departments' have been viewed as obsolete since the 1960's, yet there is a strong element of professional persistence, which probably comes from socialisation and the structure of training in medical schools.

The workforce costs have increased significantly, so process needs to be considered alongside the quality of the workforce experience.

How are increasing design and building costs combined with the growing financial pressure in the healthcare sector?

This is quite a difficult question to untangle. Inflation in the health sector globally has been rising faster than the

general economy (Figure 2). Demands on health systems has been increasing because of demographic pressures and changing consumer expectations. Since the banking crisis of 2008, governments have been able to throttle expenditure on health by limiting supply and in the UK by severely cutting capital expenditure. In market driven multi-buyer health systems the behaviour has been similar.

Construction cost inflation is being driven by the fragility of the construction sector generally with low margins and a cyclical market driving out skills. Hospitals are particularly vulnerable to increases in the cost of services engineering, which in a specialist hospital can account for over 50% of the cost. Advances in regulatory standards, control systems and consolidation in the supply chain have pushed the costs above general inflation.

In the UK there is particular nervousness over the collapse of two major public-private (PPP) constructors/developers over the last five years leaving major hospitals incomplete.

Because investment in health infrastructure tends to be cyclical in any region, design and planning skills need to adapt. Firms, which specialise in the sector, tend to work around the world as the demand changes. For example, Singapore became a magnet for design firms in the 2010's. Earlier there was a wave of investment in Scandinavia. Design skills tend to dissipate as key individuals follow the work.

There are a number of global standards for 'healthy' buildings (LEED, WELL, Fitwel, etc). Is there or should there be a global standard for healthcare facilities?

Over years of design, I'm struck by how bad managers and clinicians are at expressing a long-term view

There has been enormous convergence in health building standards over the last 50 years. A comparison of American, European and Australian health building standards shows significant commonality. It's not surprising. Clinical measures of success are widely published in a few journals of record. Equipment suppliers are largely global and have common requirements.

There is virtue in LEED, BREEAM, WELL, etc. Each provides a benchmark for a building, most extend to operational matters. I don't see any particular reason why there should be global standards specific to health. We simply want the highest quality and most sustainable setting for medical treatment and care within the bounds of affordability.

Consider the functions of a healthcare facility. There will be clinics and operating theatres and a variety of bed types – but also offices, biomedical industrial zones, sterile supplies, goods and material handling, pharmacies, laboratories, mental healthcare settings, end-of-life care, kitchens, restaurants, lecture theatres, gardens, libraries, etc. Hospitals are like cities; they have a multiplicity of functions and it would be very difficult to construct and maintain a set of valid standards.

I'm not sure it's worth the effort.

The most important driver will be the organisation as a whole having a clear idea of itself as a place that communicates health and wellbeing to patient, staff and the community it serves. A setting that communicates a professional ethos and an environment that is sustainable and responsible. Get that working and forget about the plaques.

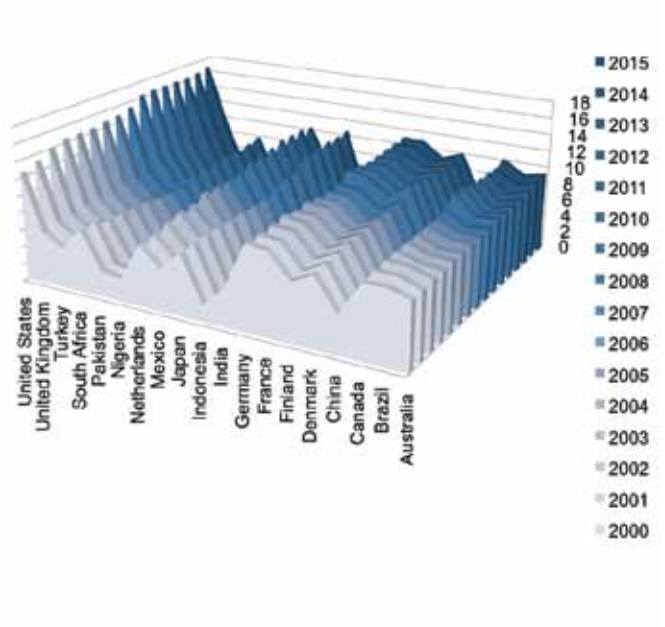

Figure 2. Health Expenditure (CHE) as Percentage of GDP (%). Data from World Bank, analysis by WHO.

Figure 3. Nyt Hospital Nordsjælland by VLA with Herzog & De Meuron Architects – Aerial.

Figure 4. Nyt Hospital Nordsjælland by VLA with Herzog & De Meuron Architects – Internal.

Necessary Elements of Quality Design

Christopher Shaw's Shortlist

- A reasoned objective
- Location that is appropriate to the aims
- Integration and alignment with the wider physical and social fabric
- Shared appreciation of growth and change
- Resources and funds sufficient for long-term aims
- Appreciation of place and cultural value
- Respect for evidence and experience
- Enjoyment of natural light, the passing day and fresh air
- Access to gardens, nature and flowing water
- Aesthetic consistency and beauty
- Planning that accommodates hard and soft activities/equipment
- Spatial, lighting and acoustic variation
- Circulation that helps orientation and fosters social interaction
- Desire for order, pattern and economy
- Well-proportioned structure that articulates the form
- An integral logistical chassis
- Pleasure in a well-tempered environment that feels right and comfortable
- Delight in material that looks or feels attractive
- Responsibility for whole system lifecycle

Architects for Health (AfH) has a global reach, and you yourself work globally. Today, where in the world is the most progressive environment in terms of healthcare design?

Architects for Health is a knowledge-sharing organisation. Its membership has grown to around 500 with individuals and companies predominantly from the UK, but a significant number are from around the world.

There is really interesting work in Scandinavia, not only beautiful architecture, but very interesting planning. For example, in Denmark the new Hillerød hospital is part of a national strategy for developing regional super-hospitals (Figures 3, 4).

Remarkable work is being done in Africa at the moment – great NGO work by Partners in Health (pih.org) who use great architects, and an astonishingly beautiful children's hospital in Uganda by Renzo Piano.

Perhaps more interesting is the emergence of local micro-payment-based health systems in Ghana and Kenya, which provide health information, alerts advice and payment with tiny overheads. This offers a bottom-up development of a new kind of smart low-cost health system that is growing without the institutions (or infrastructure) of historic systems.

Cross-discipline collaboration seems to be high on AfH's agenda. When designing a healthcare project, who should give their input and why?

AfH are interested in topics that are interesting, and there is plenty going on in healthcare and in the development of towns and cities. We enjoy exploring and drawing out unexpected correlation across the art of architecture and the science of medicine (or vice versa). This is a reflection on the body of pooled knowledge and the international nature of the medical and architectural professions. There is a rich mix of knowledge and culture at the intersection of these two greatest professions.

Health and public architecture matters to all of us. We shouldn't be surprised that health infrastructure planning is the subject of political and judicial interest. We should consider a wide range of project stakeholders and expect energetic input. However, it's not an endlessly open forum; a project needs direction and momentum.

A successful project will map stakeholder engagement as part of the process of brief development. This will categorise those providing input by scope and importance. There will also be those who will need to be informed as agents to the wider constituency. The process must be planned and choreographed for the design to be as well-informed as possible.

A secondary role in stakeholder engagement is an important element of organisational change management. ■

Author: **Christopher Shaw**
Founder and Senior Director, Medical Architecture | **London, UK** |
Executive Committee Chairman, Architects for Health | **London, UK** |
christopher@medicalarchitecture.com |
chair@architectsforhealth.com |
medicalarchitecture.com |
architectsforhealth.com | @Chris_MedArch