

RAISING THE GAME

Singapore's Khoo Teck Puat Hospital sets new standards in health promotion

ALSO:

World Congress 2012 launched in Kuala Lumpur

African HPLC Design Competition Winners

International Academy Award Winners 2011

Market reports: Asia



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Contributors

Dr Julio Frenk

The creation of healthy homes, schools, offices and public places as well as hospitals will shape how we tackle health challenges in the 21st century



Nadia Tobia

In the Middle East there is a long-standing tradition of supporting sustainability at the same time as promoting human health, both in city planning and hospital design



Jason Pomeroy

The sustainable approach in tropical environments is to reinterpret the essence of traditional, more passive design while enhancing the wellbeing of the community



Ed Matthews

A 'fit for purpose' new design for the emergency ambulance can support the delivery of more efficient and timely, high quality care in the community



John Cooper

In *24 Hours to Save the NHS*, Lord Nigel Crisp gives the chief executive's inside account of one of the greatest periods of investment and reform



Cover Image

The 2011 Academy Award winning, Khoo Teck Puat Hospital in Singapore, designed by CPG Consultants (see pp26-33, p47 and p57)



Connecting the dots

As the world grieved last month for one of the great creative geniuses of modern times, I recalled a speech given by the late Apple CEO Steve Jobs to an enthralled student audience at Stamford University when he attributed his career success to his ability to 'connect the dots'. Often, we do not know or understand how our past experiences, or the knowledge we have acquired will inform our future lives. But as designers, researchers, health professionals, scientists, journalists, bureaucrats or entrepreneurs, we are all inevitably, continuously and often subconsciously trying to 'connect the dots' in our lives to create better and better outcomes for the future. And when those dots do connect, the outcome can be as inspiring, intuitive and well-resolved as those Apple products so many of us have come to love. There are few hospitals that connect the dots as well as the double Academy award-winning Khoo Teck Puat Hospital in Singapore (see pp26-33, 47, 57). The challenge facing today's global society at every level, from city planning to the domestic home, is to maximise the opportunities existing at the intersection of health promotion and sustainability, improving human health whilst preserving the earth's resources. Health-promoting hospitals, such as the Khoo Teck Puat, and health-promoting lifestyle centres (HPLCs), such as the the winner of the Academy's International Competition to design a HPLC for Africa (pp11-15), can lead the way.

Marc Sansom
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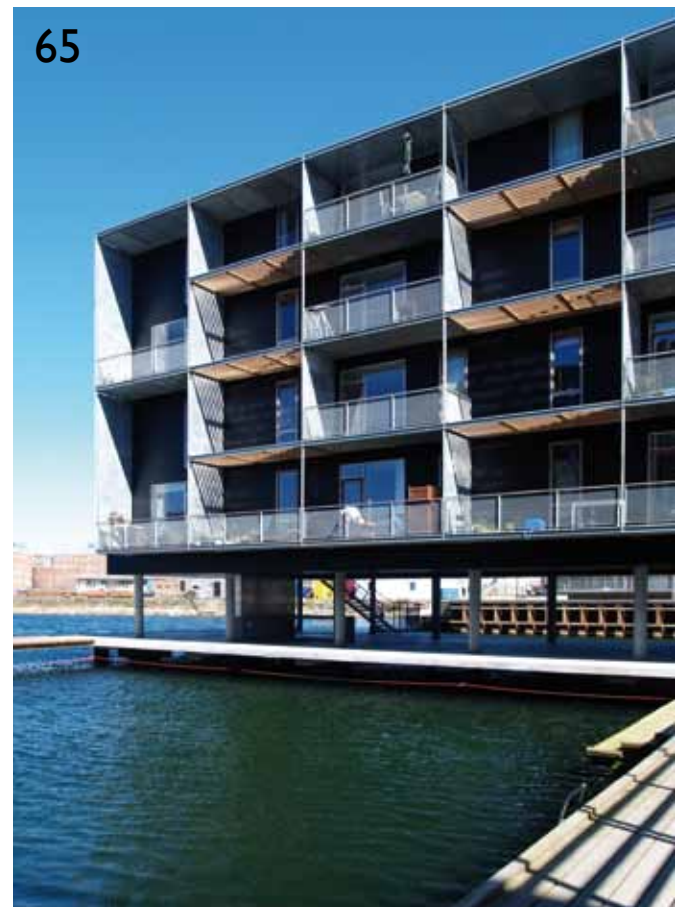
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Improving health by design



Kuala Lumpur's instantly recognisable Petronas Towers – symbol of a continent on the rise

The Scientific Programme and Call for Papers for the 8th Design & Health World Congress & Exhibition in Kuala Lumpur in 2012 has been published

To be held annually for the first time, the International Academy for Design & Health (IADH) will be organising the 8th Design & Health World Congress & Exhibition in Kuala Lumpur from 27 June-1 July in partnership with the Ministry of Health Malaysia. Following the acclaimed success of the 7th Design & Health World Congress & Exhibition in Boston, USA, the IADH has renewed its commitment to the Asian region.

Many Asian countries, including Malaysia, which is intending to become a developed nation by 2020, have recognised that progressive societies aiming to achieve strong and sustainable economic growth must also be healthy societies. The congress will develop this growing awareness in Asia of the importance of health promotion and the need to invest in healthy and sustainable public, social, institutional and domestic infrastructure.

IADH founder and director-general, Prof Alan Dilani commented: "During the 66th meeting of the General Assembly of the United Nations this year, the socio-economic challenge of non-communicable diseases facing the world was discussed for the first time. Believing strongly that the built environment has a significant impact on health, the IADH is committed to bringing this understanding to the design and health professions in an effort to reduce the prevalence of these lifestyle diseases."

International research demonstrates how the quality of our public and private spaces is closely linked to levels of community and individual's health; salutogenic approaches to the design of the built environment can make a significant contribution to the creation of a healthy society. It is this approach that will form the framework for the congress, with researchers and practitioners from interdisciplinary fields around the world invited to submit abstracts on the following themes:

- The future hospital: creating places and spaces for healing
- Case studies of successful healthy environments
- Salutogenic design for healthy communities and urban planning
- Improving health by design in emerging economies
- Developing international benchmarks in design and health
- Health policy, finance and planning: creating access to healthcare for all
- Indoor environmental quality to improve health and wellbeing
- New design paradigms influenced by medical technology
- The role of traditional and complementary medicine in modern healthcare

Authors are invited to submit abstracts of 400 words in English. The abstract should clearly state the objectives, methods used, results and conclusions. The paper will be presented to an audience with diverse interests and disciplines, so presentations should focus on the practical importance of environmental design qualities that promote health.

Abstracts will be comprehensively blind peer reviewed by the WCDH 2012 Scientific Committee and a select number will be chosen for oral presentation with a wider number presented as posters. Abstracts and enquiries should be submitted by e-mail to the WCDH2012 Secretariat at info@designandhealth.com by December 15 2011. For more information and to download the Call for Papers, visit www.designandhealth.com



Top: Harvard's John Spengler at this year's congress
Bottom: Meet industry leaders from around the world



A forum for knowledge sharing: world-class speakers and critical debate are features of every IADH World Congress & Exhibition

Timetable

October 2011

Publication of First Announcement and Call for Papers

15 December 2011

Deadline for Abstracts of Papers

15 January 2012

Authors notified of decision of Paper acceptance

15 February 2012

Preliminary Program and Registration

15 April 2012

Deadline for registration and payment of fees at a reduced rate

01 May 2012

Completed manuscripts are due to the WCDH2012 Congress Secretariat

01 June 2012

Final Program and Book of Abstracts published

July 2012-2013

Selected papers will be published in World Health Design

Congress dates and schedule

WCDH2012 is a five-day event, which will be held in Kuala Lumpur from 27 June-1 July 2012 at the Kuala Lumpur Convention Centre, Malaysia.

Wednesday 27 June: Registration and Welcome

Registration from 14.00-18.00; Opening Ceremony and Welcome Dinner from 19.30

Thursday 28 June: Congress & Exhibition

Late registration from 08.00-09.00; Congress and exhibition from 09.00-18.00; Social program to be advised

Friday 29 June: Congress & Exhibition

Congress and exhibition from 09.00-18.00; Advisory Board Meeting of the International Academy for Design & Health

Saturday 30 June: Congress, Exhibition & Academy Awards Gala Dinner

Congress and exhibition from 09.00-18.00; Academy Awards Gala Dinner from 19.30

Sunday 1 July: Architectural Study Tours

Site tours and visits to local landmarks and health facilities

Age of Asia

WCDH2012 offers a myriad of sponsorship and exhibition opportunities for international organisations to develop their presence in Malaysia and the Asian region

As North American and European economies struggle, opportunities for growth and investment in South East Asia, Central Asia and China continue to grow at impressive rates.

With 1,000 delegates expected to attend from all across the globe, the 8th Design & Health World Congress & Exhibition (WCDH2012), which will be held at the Kuala Lumpur Convention Centre from 27 June-1 July, provides an ideal gateway to the Asian markets.

Organised in partnership between the International Academy for Design & Health and Malaysia's Ministry of Health and Public Works Department (Jabatan Kerja Raya), WCDH2012 offers a knowledge-led platform for industry to network with leaders in the field, develop research collaborations and reach senior decision makers.

This global audience will comprise delegates from all continents of the world and from a variety of interdisciplinary backgrounds – architects, health planners, designers, health administrators, researchers, clinicians, estates & facilities managers, and from related industries, such as building/construction, medical equipment, furniture/furnishings and technology.

With further support from associate partners, the Malaysian Institute of Architects (PAM), the Academy of Medicine of Malaysia – College of Public Health Medicine, the Public Health Physician Association of Malaysia and the International Islamic University Malaysia, the congress provides a unique opportunity for corporate partners to grow their international business.

For more information on a full range sponsorship and exhibition opportunities available to suit all budgets, e-mail the WCDH sales team at info@designandhealth.com or contact: +44 (0) 1277 634176



Next year's congress will take place at Kuala Lumpur Convention Centre, at the heart of one of Asia's most exciting cities



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Deadline
for Abstracts
15 December
2011

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- The future hospital: creating places and spaces for healing
- Case studies of successful healthy environments
- Salutogenic design for healthy communities and urban planning
- Improving health by design in emerging economies
- Developing international benchmarks in design and health
- Health policy, finance & planning: creating access to healthcare for all levels of society
- Indoor environmental quality to improve health & well-being
- New design paradigms influenced by medical technology
- The role of traditional and complementary medicine in modern healthcare infrastructure

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Kuala Lumpur Convention Centre, Malaysia, 27 June – 1 July 2012

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Whether we are creating comfortable environments, flexible integrated building solutions or sustainable business packages, Arup adds value to our global healthcare clients while ensuring a high level of quality on which they can rely.

The launch of a new international competition to design a 'Health Promoting Lifestyle Centre' for South Africa has caught the imagination of entire Africa. Now, the three designs that have been shortlisted – and the overall winner – are announced here

A new paradigm for Africa

A healthy population is considered the foundation for social and economic development, so it is critical that Africa gets the health system it deserves. It is only with a strong focus on preventative care, wellness and early intervention that it will achieve its potential, however. With this in mind, South Africa's Ministry of Health and the International Academy for Design & Health jointly launched a competition this year to design a new kind of health centre – one with a preventative, rather than a curative, vision.

These community Health Promoting Lifestyle Centres (HPLCs) will focus mainly on primary healthcare, with an emphasis on health promotion, moving the focus away from risk factors and the treatment of disease towards a holistic understanding of a healthy society in the African context.

The design brief called for somewhere friendly and welcoming, empowering the community towards self-care. Entries were required to show an understanding of salutogenic health and how the physical environment can be a valuable tool for preventative medicine, as well as demonstrating environmentally supportive and innovative design. The HPLC's required features include health promotion and education facilities for the assessment of patients'

lifestyles; an outpatient area; counselling areas; and recreational infrastructure to support an active lifestyle. Shortlisted entrants were assessed anonymously by an international panel chaired by Dr Alan Dilani of the International Academy for Design & Health and Dr Massoud Shaker from the South African Ministry of Health. The winner was announced during Design and Health Africa 2011 International Symposium in Cape Town on 25-26 October.

All three shortlisted entrants (Nightingale Associates, HLM and a joint submission by Farrow Partnership Architects, Clark Nexsen and Nkonyama Okpanum & Associates) showed an understanding of the incredibly broad remit of the HPLCs while also responding to sensitivities of local climate and culture, and allowing for flexibility according to location and future need.

The winning submission will be recognised by the Ministry of Health in South Africa with funds set aside for the design, development and build of the HPLC. The winning entrant will also be awarded a prize of €40,000 with highly commended submissions receiving €20,000 each. Prize money will be distributed according to the international judging panel's decisions regarding the relative value of the HPLC designs in contributing to the fulfilment of the brief.

The South African Ministry of Health and the Academy both consider that the competition could change the health paradigm across the entire African continent, providing a model for both low and high income countries in the rest of the world.



WHO/AFRO



Above: diet and nutrition are a key feature of health promotion, and of HPLCs

Left: Dr Alan Dilani, founder IADH; Dr Aaron Motsoledi, Minister, of Health, South Africa; and Dr Massoud Shaker, advisor to Minister of Health, South Africa



Winner

Protea Health

A joint submission by Farrow Partnership Architects, Clark Nexsen and Ngonyama Okpanum & Associates puts the national flower of South Africa, the protea, at the heart of its scheme. Its form sits at the heart of the HPLC, open to the sky and acting as a beacon for users – the symbol of a safe and healthy gathering place, and a metaphor for healing and renewal.

Extensive outdoor features include sheltered waiting and circulation areas, gardens, worship/meditation areas, and a 'learning kitchen' where nutritional counselling and cooking practice takes

place. Indoors are outpatient clinics (including antenatal, dental, TB/HIV/AIDS and traditional healing); retail space (a pharmacy and optician), educational space (family planning, counselling), clinics, a library and a theatre. A strong emphasis is placed on learning, with classrooms provided for training in subjects as diverse as malaria net installation and sustainable farming; the HPLC will also train health workers.

The central flower-shaped opening in the building facilitates passive air circulation, while below-floor air circulation feeds passive air movement up through the roof vents. Further sustainable features include solar photovoltaics on the roof, composting and rainwater collection. The building is single storey, for ease of construction.

"Guided and inspired by nature, the HPLC will leverage salutogenic design principles to advance the physical, mental, social and spiritual dimensions of health," said the team's submission. "It will also be an exemplar facility for high performance, operational efficiency and environmental regeneration." Its vision is for a "Centre of Influence" equivalent to the hospital-based Centre of Excellence: "Whereas the well-established concept of the Centre of Excellence is recognised as the source for outstanding downstream illness care, this South African-centric innovation will change how people think about their lives. It will set an international standard for promoting the full range of upstream causes of health, which will be seen as appealing, understandable and accessible to everyone."

Design submission by Farrow Partnership Architects, Clark Nexsen and Ngonyama Okpanum & Associates





Highly Commended

Phila Kahle ('Live Well')

HLM's submission, named after the Zulu for 'Live Well', is based on the idea that the built environment can facilitate a sense of life's comprehensibility, manageability and meaning: restorative places can mitigate stress and strengthen immunity, providing positive psychosocial stimulation.

Its proposed HPLC consists of:

- A primary healthcare clinic
- Community space
- A landscaped garden and vegetable garden
- Transition housing (eg for patients who have travelled a long way and are awaiting transportation to other facilities)
- A crèche
- Support facilities such as staff and security accommodation.

With the philosophy that "ideas precede design", HLM was informed by research-based design, and guided by features that have multiple benefits. For example, daylight can boost immune strength as well as aiding patient safety and staff satisfaction, and is more energy efficient; natural ventilation not only reduces the spread of infectious diseases such as TB, it also reduces reliance on air conditioning. This translates into waiting areas that are situated in covered walkways or semi-enclosed spaces, for example, or the location of habitable and working spaces along the north axis for solar shading. Green spaces are also important, with pleasant outdoor areas accessible from the main waiting and circulation zones. Rainwater is collected from the roof, and stored for use in the gardens, while grey water is also stored and filtered to be reused where appropriate.

The Phila Kahle scheme uses a limited palette of materials and systems that are appropriate to Africa, including standing seam sheeting, which is lightweight and easy to transport, and insulated wall/partition panels.

HLM offered two site plans, one for rural and township settings where land costs will most likely allow similar-sized developments, and a more compact two-storey plan for tighter urban sites; a modular layout means the same concept can be implemented in different locations. Location is seen as paramount, with a proposed township site in Soweto chosen for its accessibility and co-location with a retail centre and open green space – with the idea that health promotion will follow more easily when health activities are placed closer to everyday activities.



Design submission by HLM Architects



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Farrow

Highly Commended

Triple Embrace

Nightingale Associates interpreted the salutogenic model as three interconnected spacial concepts:

- Hand (arrival, business exchange and social interaction)
- Mind (learning, knowledge-sharing and training)
- Heart (care, private retreat and reflection).

The 'Hand' function sees local entrepreneurs given opportunities to develop creative business ideas as a sustainable foundation for development. Job skills training and income-generation programmes would be part of the HPLC's remit.

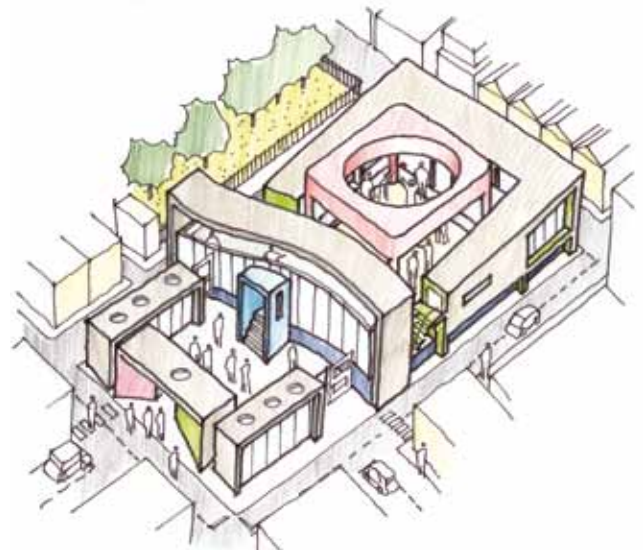
'Mind' learning space increases self-awareness of healthy lifestyle routines and is the cornerstone of preventative care. Suggested uses include programmes directly related to health – parenting, personal hygiene and diet – as well as indirect uses such as computer or language skills.

The 'Heart' environment is restorative, offering individuals experiencing stress a break from routine as well as effective health screening and assessment. It is envisioned as a place for screening and testing (cholesterol, blood pressure, eye tests) as well as physical activity (swimming, yoga and other sports, plus music and drama).

The educational remit of the HPLC goes further than traditional ideas of health promotion: Nightingale Associates sees the local community's participation in creating and building the centre as a learning opportunity in its own right. Accordingly it proposes a participatory design process to define and develop ideas, through a series of workshops with local people. This will make the outcome more relevant to its users, and establish a strong sense of ownership from the beginning.

The HPLC uses a courtyard design typology – a style of building that inherently provides a feeling of safety, shelter, retreat and focus. The 'Hand' entrepreneurial space would take place in an outer courtyard, with 'Heart' health assessment and recreational facilities in an inner courtyard, and 'Mind' educational space on the threshold between the two. This sequence of spaces remains the same, regardless of the building's setting (rural, urban or township) but would be configured to suit local requirements, as drawn out by the community consultation. This allows for a different focus according to where need is greatest. Transport is seen as a key facilitator in the development of the HPLC, with rural, urban and township centres connected together to allow the learning that has taken place regionally to be disseminated.

Design submission by Nightingale Associates





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* Modern healthcare survey of U.S. architecture firms

During the 66th meeting of the General Assembly of the United Nations in September 2011, the global challenge of lifestyle-related diseases was discussed for the first time, in recognition that non-communicable diseases are now a bigger killer than poverty – a tragedy of modern society, and one with social, economic and political consequences.

Awareness is growing of the importance of health promotion and the need to invest in healthy and sustainable public, social, institutional and domestic infrastructure. But much more needs to be done to improve the quality of the built environment, which ultimately provides the context and framework for social organisation, economic structure and civic function.

Governments must give priority to improving population health as the foundation for social and economic development but it will only be achieved through a strong focus on preventative care, wellness and interventions in the design of the built environment.

Embedded at the core of a preventative care strategy, salutogenic design has the power and potential to create a new paradigm for a global society. The creation of green spaces, public parks, cycling paths and places to walk that facilitate exercise, cultural activities and social interaction at the same time as reducing our reliance on the motor car are simple measures in the built environment that can have a positive impact on health.

As a modern, knowledge-based network, the Academy's mission is to be the leading global forum promoting research-based design in professional practice and advocating standards in the development of healthy environments. We have been successful in changing the state of the art through the development of the most powerful knowledge-based network in the history of healthcare design and establishing a benchmark for the rest of the world. The appointment of Dr Ray Pentecost as the new president of the International Academy for Design & Health now presents an opportunity to build on the knowledge and research developed in the field of healthcare design and apply it to other sectors, such as education and justice, the workplace, public and urban spaces, and the home.

And indeed, countries in the developing world may be the ones to seize the opportunity to be at the leading edge of change. This is the case in South Africa, which through the vision of health minister Dr Aaron Motsoaledi has partnered with the Academy to fund a design competition for the creation of "Health Promoting Lifestyle Centres" as an alternative to clinical healthcare facilities (see pp 11-15). Evidence of the opportunity for emerging economies to leap forward was evident at the 7th Design & Health World Congress in Boston, which saw experts from Harvard University, UCLA and other world leading universities explore how knowledge of the health sciences can inform the design of our environments.

The pathogenic orientation of some developed countries, reflected in the strength of the medical and pharmaceutical industries, has created perverse commercial incentives that focus attention on the symptoms and treatment of disease rather than the causes and promotion of health, leading to ever-higher costs without the appropriate attention to population and individual health. A shift in focus that equally values the salutogenic approach to design with an emphasis on global health presents an opportunity for low and high income countries to emerge as healthier societies in 21st century.

Under the new leadership of the Academy, we have an opportunity to extend our reach and influence. The world needs a new paradigm and the creation of a healthy global society is a vision we should all embrace. Exchanging knowledge to influence policy, change incentives and encourage people to lead healthier lifestyles through the design of the built environment is the path to a new future. We invite you to be a part of this mission.

Professor Alan Dilani PhD is director-general of the IADH and Dr Ray Pentecost III, DrPH, FAIA, FACHA is president

Countries in the developing world may seize the opportunity to be at the leading edge of change

A force for change

As the European debt crisis deepens, and the threat of a global economic depression returns, the world needs a new health paradigm for the 21st century, write *Ray Pentecost* and *Alan Dilani*



Pavilion in the woods

Arguably no organisation is doing more to disseminate to ordinary people the concept of a “healing architecture” than Maggie’s Cancer Caring Centres. Rem Koolhaas’ OMA is the latest high-profile practice to design a drop-in centre for the charity, in the grounds of Gartnavel Hospital, Glasgow, which opened its doors in October.

In common with other Maggie’s Centres, the building has an entirely non-institutional feel. It is a place for cancer patients and their loved ones to go for help, advice, learning and support, rather than a clinical environment – and freed from such clinical restrictions, OMA has designed something that makes sanctuary and respite its only rationale. Imagined as a “pavilion in the woods”, the single-storey building takes the form of a ragged ring of interconnected L-shaped spaces surrounding an internal landscaped courtyard. This creates clearly distinguished areas, an arrangement that minimises the need for corridors and hallways and allows the rooms to flow. A variety of spaces satisfy the need for both privacy (counselling rooms, and smaller built-in nooks), and social interaction (a large multi-purpose space). “The sequence of spaces is an interplay of openness, retreat and support to underpin the Maggie’s programme,” said OMA partner Ellen van Loon.

The warm, welcoming feel that defines all Maggie’s Centres is characterised here by a connection with nature – floor-to-ceiling windows accessing either the internal courtyard or the hospital grounds beyond, and a generous use of timber within. The rooms vary in height, with the more intimate areas programmed for private uses such as counselling, and more open and spacious zones designated for communal use.

“We were touched to be asked to design a Maggie’s Centre, and invigorated by the opportunity to work on a completely different scale, with different ambitions, and in a different environment,” commented Koolhaas.





**Maggie's Cancer Caring Centre,
Gartnavel, Glasgow, UK**

Project completion date: September 2011

Architect: OMA

Implementation architect: Keppie

Structure: Sinclair Knight Merz

Services: KJ Tait Engineers

Landscaping: Lily Jencks/Harrison Stevens



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- D Al Mafraq Hospital | Abu Dhabi, UAE



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Take the heat

Every local climate has its own design considerations, but hot and tropical environments pose particular challenges. Three eco-experts ask how can we build healthy, comfortable and energy efficient places that work with, rather than against, climactic extremes?



The advent of technology has seen social, cultural and technological ideals implanted from one place to another. The predominant culture or trend then becomes globalised through popular demand, and results in the gradual eradication of local culture or preceding traditional practices.

We see such implications in the built environment, and particularly in developing countries that seek to embrace western building typologies and practices as an expression of economic development. This often translates to over-serviced buildings that have a heavy reliance on artificial lighting and cooling to counteract the adverse effects of the tropical climate that often bears little resemblance from whence it came.

Similarly, the importing of materials or even cultural practices that are alien to the region collectively equate to unsustainable developments that compromise the natural and urban habitat for future generations. Such an approach does little to foster a sense of community, and in extreme cases can lead to social ills (eg vandalism) or socio-physiological disabilities (eg building sickness syndrome).

The more sustainable approach would be to pay respect to local socio-cultural traditions and to reinterpret the essence of traditional, more passive building design principles that go back to basics in order to create innovative architecture that is responsive to the climate and people of a region. The result is an architecture with an identity that can retain a modernity while resisting becoming homogenous or "Disneyfied". This is something that is core to the process of sustainable design.

Thankfully, the traditional, hermetically sealed air-conditioned box of the 20th century has given way to more hybrid forms in the 21st. Skycourts and skygardens feature heavily in my buildings, as they seek to replenish the loss of open space through urbanisation to provide opportunities for natural light and natural ventilation. When densely foliated they can enhance the socio-physiological wellbeing of the community, reduce temperatures (and therefore running costs) and enhance the asset value of the development. It acknowledges that space, just like fossil fuels, is a commodity worth preserving.

Jason Pomeroy is director of Broadway Malyan, Singapore

The sustainable approach would be to reinterpret the essence of traditional, more passive design



In the Middle East there is a longstanding tradition of design that naturally supports sustainability, while also promoting better health. The region is rich in health-enhancing solutions. Successful techniques and sources for city planning, urban and architectural design have been in place over many years, through various civilizations, working in concert with nature. Today they are able to offer numerous lessons that can be adapted for various building types.

A wealth of opportunities for applying health-promoting practices can spring from an in-depth understanding of local heritage solutions. These indigenous practices are currently forming a strong basis for breakthrough approaches, appropriate for this climate, which merge traditional design with emerging technical solutions. We see such solutions increasingly being used successfully by architects in the region.

However, each building type calls for different expectations. For example, by their nature healthcare facilities are more demanding than other building types in terms of impact on the environment. This reality makes it more challenging to achieve a balanced and practical solution that delivers results, rather than promises, in the name of health promotion and sustainability. A major challenge has been to demonstrate that the associated cost of each sustainability initiative achieves the intended impact for any building project. Therefore it is vital, based on experience in the Middle East, to use a dependable methodology for measuring overall cost, effectiveness from a health and environmental perspective.

Nadia Tobia is a partner with Farrow Partnership Architects, with special responsibility for projects in the Middle East and Africa

By their nature healthcare facilities are more demanding than other building types

Singapore has a tropical climate with uniform temperature, high humidity and abundant rainfall. Public hospitals boast private air-conditioned wards and naturally ventilated subsidised wards to meet the high demand for beds and keep healthcare affordable.

The increasing reliance on air-conditioned spaces for thermal comfort in hospitals is mitigated by employing an efficient system design and integration. But the more appropriate response to the tropical climate is the optimisation of natural ventilation in the multi-bed subsidised wards as the key to patient comfort. The new generation of hospitals in the tropics incorporate various strategies in their facade design for optimum occupant comfort and minimal heat penetration into the interior to minimise cooling requirements.

Naturally ventilated wards are orientated to "capture" the prevailing winds. Features such as aluminium fins along the building's walls are incorporated to channel the prevailing winds into the building by increasing the wind pressure build-up on the facade. Operable, modular louvres are also used to facilitate air flow into the wards. An optimal wind speed of at least 0.6m/s is achieved, providing adequate thermal comfort for the patients. This in turn reduces the requirement for turning on mechanical ventilation, thus saving energy consumption.

These devices have been proven to work well, as is evident in the enhanced air flow in the wards where they are employed. However, what serves well to bring in the wind also brings along with it the rain. The unpredictable nature of storms in the tropics does not help either. Besides managing user expectations, the key is to find the right balance between improving air flow in the ward and maintaining weather protection.

Jerry Ong is principal at CPG Consultants, Singapore



Naturally ventilated wards are orientated to "capture" the prevailing winds



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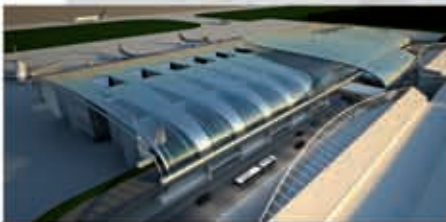
PRIVATE HEALTH CARE

PROJECT: BELLVILLE HOSPITAL
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INTERNATIONAL AIRPORT

PROJECT: ABUJA INTERNATIONAL AIRPORT
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PROJECT: ENUGU REGIONAL AIRPORT
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COMPLETED 2009



TERTIARY HEALTH CARE FACILITIES

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COMPLETED 2009

Raising the game

Asia is on the rise, with all eyes on its rapidly developing economy and a huge increase in demand for better healthcare, writes *Emily Brooks*

This January, *The Lancet* published its first-ever series of papers focusing on a specific region. It chose southeast Asia, a telling indication that there is a story to be told here, and significant problems to address as well as good news to report.

Hardly any other part of the globe is as fragmented – geographically, economically and culturally – and this splintered outlook is reflected in its divergent health outcomes. Singapore and Malaysia can boast some of the best healthcare in the world, so much so that visiting “health tourists” are now an important part of their economies, and are driving a building programme of upscale private facilities. Middle-income countries such as Indonesia and Vietnam are looking to replicate the success of Singapore, by reforming their healthcare systems and introducing social insurance schemes to reduce large out-of-pocket expenses. With rapidly increasing demand for better healthcare due to higher incomes, an ageing population, rural-urban migration and an increase in non-communicable diseases, they are viewed as prime investment opportunities. Meanwhile, Lao and Cambodia (average life expectancy 63 and 61 respectively, against a regional average of 77¹) remain critically underfunded, with no treatment outside of basic care available. Over all this, China looms large: with a healthcare reform policy worth \$124 billion, and restrictions

eased on foreign firms entering private healthcare, it is expected to become the second-largest healthcare market in the world by 2020². Southeast Asian architectural firms see themselves as perfectly placed to export to China the skills they’ve developed in assimilating the best western ideas with local climate and culture.

RTKL recently acquired a firm in Beijing as part of its wider strategy to expand in the region, and many international architectural practices have a presence in southeast Asia. Perth’s Sandover Pinder has two recent projects in Indonesia (see case study), and as its managing director David Karotkin explains, one of the most isolated cities in earth is now finding itself with a business edge: “We’ve got a quarter of the world’s population to the north of us; it’s in the same time zone, and we can get there quicker than we can get to Melbourne. It makes sense to strike up relationships there rather than looking east all the time. It’s a positive thing for Perth.” It is usual for firms outside southeast Asia that win contracts to work hand-in-hand with a local practice:

**Singapore is
always very
careful with
what it imports
from the US**



Khoo Teck Puat, acknowledged as a new benchmark for healthcare design



Nightingale Associates has partnered with Malaysia's M&R for KPJ Specialist International Hospital in Johor Bahru (see case study), and Broadway Malyan is working with Ong and Ong for Singapore's National Heart Centre.

"You have to have a local architect in these situations," says Nightingale Associates' Mike Nightingale. "They're very familiar with their own standards, and they can feed them in while you're designing." This flow of ideas and expertise goes two ways, however: Singapore's CPG pulled in HOK to learn more about US methods of space-planning and clinical adjacencies for Ng Teng Fong General Hospital and Jurong Community Hospital (see case study). "For example, we wanted to learn about clean core operating theatres, which economise on space by putting the surgical provision and supplies in a single corridor, so there's no separate provision for each theatre," says CPG's Lim Lip Chuan. "By bringing HOK in we can debate these issues. But Singapore is always very careful to adapt and fuse the ideas it imports from the US with Asian culture and local environmental conditions, avoiding static designs or too many boxes."

In recent years southeast Asia has mounted several inspiring and innovative healthcare building projects. CPG's Khoo Teck Puat, which was completed in July 2010, has been garnished with many awards for its incorporation of green spaces at every level, and its environmental sustainability and climate control. Broadway Malyan's National Heart Centre in Singapore, completed next year, presents a daring faceted facade and courtyard gardens integrated throughout the building; VK Group's Binh Chanh Pediatric Hospital in Ho Chi Minh City, winner of a recent competition, is a futuristic-looking series of ring-shaped buildings wrapped in vertical timber louvers. Nightingale Associates' KPJ Specialist International Hospital presents a "healing hand" design concept, with central services such

National University Hospital, Singapore

The first part of a wider upgrade of Singapore's National University Hospital, Broadway Malyan's project has delivered a remodelled east wing and the creation of a new hospital entrance and courtyard, with a new facade and striking red canopy, serving a new MRT station. The project was delivered while the hospital remained fully operational, and has also enabled the construction of three new operating theatres, a reconstructive microsurgery centre and specialist outpatient clinics. Ian Simpson of Broadway Malyan says the project has "enhanced the hospital's healthcare offering and environmental performance, in line with the drive for sustainable buildings." He describes some of the new features: "An open plaza that permits social interaction and an ease of movement is supported by a further series of semi-public open skygardens that create naturally lit and ventilated spaces where doctors, patients, workers and visitors alike can rest and recuperate."

Project completion date: September 2011

Client: National University Hospital Singapore

Cost: SGD \$43m (Phase I)

Architect: Broadway Malyan (in collaboration with RDC Architects)

Quantity surveyor: Davis Langdon & Seah Singapore

Civil & Structural Consultants: Aurecon Singapore

Mechanical & Engineering Consultants: Lincoln Scott Ng

as imaging, pharmacy and intensive care at its core, and the various Centres of Excellence, including oncology, cardiology and orthopaedics, occupying a finger each. "They were very keen on the symbolism of it all, but it's actually a really good solution – you can grow the fingers in future, so it chimes with our philosophy of always having expansion zones," explains Mike Nightingale. "So it was kind of a marriage between local wishes and philosophies, and international ones."

These striking buildings, full of natural light and green spaces, do not sacrifice functionality or sustainability.

A patient-centric approach has become the norm – as opposed to the 1990s' focus on efficiency and workflow processes – with clear intuitive wayfinding and consideration for patients' and visitors' wider wellbeing. Green building features such as the use of recycled/recyclable materials, reduced water usage and greater use of natural ventilation are becoming standard – although with a tropical, equatorial climate, air-conditioning is still the norm on private wards. Open space and greenery are becoming ever-more important tools to aid wellness. "Our design moves away from the object-driven masses of the 20th-century healthcare prevalent in post-colonial countries: the 21st century has brought about resurgence in the understanding that space is more important

Parkway Novena Hospital, Singapore

Project completion date: April 2012

Client: Parkway Health

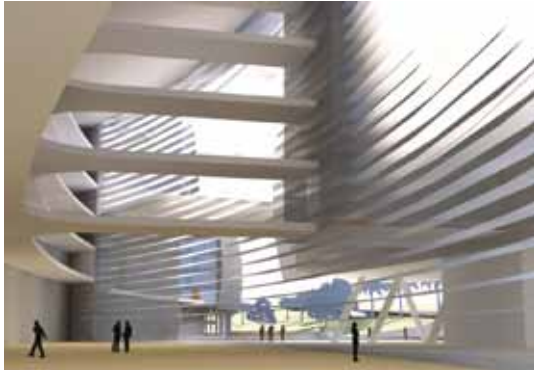
Number of beds: 333

Architect: HOK/CIAP

Main contractors: Penta Ocean Construction

Parkway operates 16 hospitals in southeast Asia, but this is the first one it has built, rather than acquired, and is seen as a flagship. The company envisions that the hospital will fill the niche for hospitality-style healthcare – it is light on emergency facilities, with a focus on heart and vascular, orthopaedics, neurology and general surgery. Parkway and HOK went to the extraordinary lengths of building a full-size mock-up of 23 rooms, off-site, from the reception counter to day wards and VIP rooms, to see how everything was working, and make changes where necessary. "It was incredibly useful, and especially meaningful for the users," says HOK's Kerry Clifford. "We had nursing staff come in, sit at the reception counter, tell us what was right and what was wrong – more storage, less storage, doors should open right, not left. All of which was already on the plans, but not everyone can understand the plans, and not everybody – especially in Asia, I've learned – will pipe up in a meeting to tell you something's not right. But once you have them in that forum and you're really soliciting opinion, it's different. And now we're building it, we know we've really got it right."





KPJ Specialist International Hospital, Johor Bahru, Malaysia
 This 400-bed private hospital's form is based upon the idea of a "healing hand", with central services in its palm and specialist centres of excellence in each finger; accessed from a central atrium. "They wanted something that looked very interesting – curvilinear, new for the area," says Nightingale Associates' founder Mike Nightingale. The hospital will include four-bed cruciform wards, something of a Nightingale Associates signature, as a result of KPJ representatives seeing the architecture firm's work at Peterborough Hospital in the UK. Nightingale Associates is currently working with co-designers M&R Architects to develop a double envelope for the building that will act as a filter to the equatorial sun, with the aim of greater energy efficiency.



Project completion date:
starts on site mid-2012
Client: KPJ Healthcare
Number of beds: 400
Architect: Nightingale Associates/M&R Architects

than the object as a means of reducing carbon footprints and creating more socially responsible environments," says Broadway Malyan's director Ian Simpson of firm's new National University Hospital in Singapore (see case study). "Open spaces, be they

planted sky terraces, atria or open plazas, can sustain the health and social wellbeing of not only the patient, doctor and visitor; but also the health and carbon wellbeing of our built environment."

There are many national and regional sensitivities – cultural, geographical and clinical – making it hard to generalise about design standards. Asia's populous urban environments make high-rise hospitals very common: in the megacity of Jakarta (population 9.5m, expected to rise to 24.9m by 2025), Sandover Pinder's 30-storey Mochtar Riady Cancer Centre is one of the ten tallest hospitals in the world. CPG's Lim Lip Chuan mentions the more family-orientated culture of Vietnam versus Singapore, and RTKL's Jong Jun Lee similarly pinpoints a more "people orientated" culture in China and Asia. Tropical climates bring with them a certain design typology (see p22), with deep eaves for solar shading and rain protection, while 2002-3's SARS epidemic has resulted in a greater focus on minimising cross infection: the forthcoming Ng Teng Fong General Hospital (see case study) is designed to enable swift lockdown, with selected wards specially equipped so that they may be quickly converted to negative pressure isolation rooms; a designated space between A&E and JCH will enable A&E to quickly screen and triage patients during a pandemic.

It is hard to overstate the importance of medical tourism to the region: the desire to attract overseas patients, whether from adjacent countries or further afield, is having an effect on where hospitals are built, and to what standard. "Medical tourism



Broadway Malyan's striking National Heart Centre, Singapore, opening in 2012



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Ng Teng Fong General Hospital and Jurong Community Hospital, Jurong, Singapore

Project completion date: end of 2014

Client: Jurong Health Services

Cost: SGD \$700m

Number of beds: 986 (General Hospital 700, Community Hospital 286)

Floor area: 169,000sqm

Architect: CPG (in collaboration with HOK and Studio 505)

Civil and Structural Engineer: CPG

is one of the key external drivers of growth of the healthcare sectors in many southeast Asian countries like Thailand, Singapore and India," says Broadway Malayan's Ian Simpson. According to the Singapore Tourism Board, in 2010 Singapore experienced a 19% increase in tourism receipts on medical expenses, to approximately SGD\$940m. Thailand is in the midst of a five-year plan to double revenue from foreign patients by 2014. Malaysia's Ministry of Health set up the Malaysia Healthcare Travel Council in 2009 to develop and promote the healthcare travel industry. Critics say that medical tourism creates dual standards of care, with medical staff attracted from the public to the private sector by better working environments, and often better pay.

Competition for overseas patients means that hospitality-type environments

and VIP suites are

more common: Malaysia's Sime Darby Medical Centre Park City, designed by CPG and opening in 2013, goes one better with a "VVIP" ward. HOK's Parkway Novena Hospital (see case study), designed in conjunction with Singapore firm CIAP, is an all-single-suite facility that has its sights firmly set on Singapore's high-earners and medical tourists. "I've never worked on anything as opulent," says Kerry Clifford, associate and senior medical planner at HOK. "In the VIP suites and super-suites, there is no indication at all that these are patient rooms." Rooms are same handed, and canted so that the patient's bed is angled towards floor-to-ceiling windows, with their head near the door so medical staff can check their welfare without coming in to disturb them. "There's no clutter in the corridors, or around the ORs, and very few alcoves: everything is nicely tucked away because Parkway wanted to have the appearance of a hotel," adds Clifford.

Although the expertise, will and funding undoubtedly exists to build world-class hospitals, there is a much broader problem of a lack of staff

Singapore's next major public hospital project is actually a general and community hospital side-by-side, but with some integrated services such as parking, catering, imaging, laundry and pharmacy. "The idea is to create a more efficient bed-management system," says CPG's Lim Lip Chuan. "The acute hospital will have patients stay three to five days, and should the patient need further care in the step-down environment, they can be pushed on to the community hospital.

There is one admission, and one discharge." The General Hospital will give "a window for every patient": six-bed, fan-shaped wards with views of greenery and outdoor sky gardens will, according to Jurong Health Services CEO Foo Hee Jug, "improve ventilation and maximise natural lighting, improve infection control, create more privacy and comfort for patients and make a conducive working environment for staff. This is especially important in the subsidised wards which rely on natural ventilation."



VK Group's proposed Binh Chanh Pediatric Hospital for Ho Chi Minh City

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and hospital management experience. "Governments and private investors are approaching the concept of 'building the hospitals', not 'designing the healthcare system'," says Jong Jun Lee, principal at RTKL. "The real issue is finding good doctors and nurses; it takes ten years to educate and produce them, but there are no schools. So the first step to building a healthcare system is building an education system – medical schools." This accords with Lim Lip Chuan of CPG's experience at Hanh Phuc International Women and Children's Hospital in Vietnam. Built by Singaporean company Thomson Medical it proudly touts itself as a "Singapore standard" hospital, but as he explains, "I worked with Vietnamese doctors, bringing them to Singapore to see what we do, including how to go about resourcing and manpower. The developers said they wanted a 1,000-bed hospital – but really, they didn't know what they wanted. I told them to start small, with 200 beds, and grow slowly as they learn to operate and function as a hospital." One of CPG's conditions of taking on the project was that the developer also built a training facility for medical staff.

It is significant that architectural practices are beginning to drive these wider improvements, something that is beyond their traditional remit, and that could have far-reaching consequences. If they are applied alongside a focus on prevention – wellness, people and the capacity to deliver services directly into people's homes – and a determination not to leave behind the poorer tiers

of society during the economic boom, they will have the power to reshape healthcare systems to fulfil the region's great potential.

Emily Brooks is an architectural writer

1. World Health Organisation country health profiles, <http://www.who.int/countries>, accessed 26 September 2011

2. *Life Sciences and Health Care in China: Opportunities, Challenges and Implications*. Deloitte Global Services 2010



Mochtar Riady Comprehensive Cancer Care Centre, Jakarta, Indonesia

Indonesia's largest privately owned cancer hospital demonstrates the reality of building in Asia's densely constructed megacities: on a tight urban plot, the 30-storey building is the southern hemisphere's tallest hospital. This creates its own difficulties, not least with future flexibility: its Australian architect Sandover Pinder has built in some empty floors next to certain clinical areas in anticipation of growth. The hospital is one of the first in Indonesia to run an integrated computerised and digital information system linking imaging, laboratory, pharmacy and hospital IT services.

Mochtar Riady Comprehensive Cancer Care Centre, Jakarta, Indonesia

Project completion date: July 2011

Client: Siloam Hospitals Group

Cost: US \$138.8m

Number of beds: 375 (first phase 100 beds)

Architect: Sandover Pinder



In the decade since Flight 93 crash-landed in Pennsylvania's Somerset County, locals have created a living memorial that acts as a healing thread, stitching the community back together, as landscape architect *David Kamp* explains

A growing legacy

Environmental psychologists Rachel and Stephen Kaplan have written eloquently about the value of and intrinsic need for “everyday nature” in order to build and maintain personal health. That same everyday nature is also the vehicle to provide social health: places to gather, places to stop and appreciate nature in the village, the town and the city. This everyday nature in everyday places promotes sociability: healthy communities create the environmental and social infrastructure that can ignite a sense of hope, opportunity and aspiration.

It is in times of crisis that we are most vulnerable and isolated, and in need of everyday nature

It is in times of crisis that we are most vulnerable and isolated, and therefore in need of everyday nature. Whether this crisis is the result of a sudden event or the result of years of neglect, the weight of isolation pulls at the fabric of a community. One such community that faced an unexpected and horrific crisis is Somerset County, Pennsylvania, with the crash of Flight 93 on 11 September 2001.

The events of that day affected not only the victims of terrorism and their families, but also the immediate communities of those directly involved. The United States Forest Service recognised this need and have subsequently sponsored the Living Memorials Project. This project affirms the principle that nurturing other living things in nature has the effect of restoring and offering solace to the human spirit. Its central focus is simple: planting trees is a reminder of the continuity of life; of nature's ability

to provide perspective in our individual lives and in the life of our communities; and thus, of the bond formed by communities on 11 September.

Woven into the community

Pennsylvania's Somerset County is where Flight 93 crashed. Its living memorial, The Legacy Groves of Somerset County, honours “first responders”: firefighters, emergency personnel and all other volunteer community groups. Family members of the Flight 93 victims, attending the dedication of the first Legacy Groves, said that it was time to move forward by creating special places that honour community spirit.

The concept behind the project creates a memorial grove of trees that originates at a place valued by the community and extends across the entire county connecting schools, community facilities, scenic vistas and historic landmarks. The unusual idea here is not to create a single isolated memorial visited perhaps once or twice a year, but rather to create a living memorial integral to and woven into the everyday life of the community. Casually experienced as one passes by or the site of special events, these groves are part

Above: Planting and enjoying the Legacy Groves, places of “everyday nature” that unite the community

of the ordinary and extraordinary moments in the life of the community – and a subtle reminder of what it means to be part of a community.

Sugar maples were selected for the groves because they are readily identifiable with the region and historically and economically important to Somerset County. Rather than a uniform composition of similarly sized trees, each grove incorporates a variety of sizes and ages, symbolically celebrating the idea of community and diversity. The living memorial organically builds upon this familiar, vernacular landscape presence through a design gesture easily adapted to locations throughout the county.

The initial grove was planted at the Volunteer Fireman's Training Center on 11 September 11 2003. This site honours the first responders and volunteers in general, both of which played vital roles in the days immediately following the crash. As county commissioner Pamela Tocker-Ickes said, the Training Center's grove is a good first step towards "paying tribute to the community spirit that carried Somerset County through its greatest crisis".

An Advisory Committee composed of community groups was organised to expand the original concept, building partnerships with local foundations to create a stronger regional connection. To enhance educational/community outreach opportunities, a key partnership was formed with local schools, including the Somerset County Technology Center (SCTC). A 4,000-tree nursery was established at SCTC to become a sustainable local source of trees for future groves. Management of the nursery and installation of the groves is the responsibility of the forestry and horticulture students, forming an integral part of the school's educational curriculum. And since a majority of these students stay and work in the area, they help sustain memories for generations of families. In this way, the Legacy Groves also create a thread of continuity, contribution and belonging.

Ten years and counting

The groves continue to thrive, expanding to dozens of locales throughout the county, including schools, parks, libraries, heritage centres and walking trails. Early proposals extended these groves to the crash site where trees are to frame a glade within which a ring of names – the passengers and crew of Flight 93 – are etched in glass. The ring represents strength, unity, their collective act and the bond of sacrifice. In this way the Legacy Groves link the local community of Somerset County to the nation.

From a quiet concept – the simple act of planting trees – comes a powerful symbol of the strength of community, the continuity of life, and hope for the future.

David Kamp, FASLA, LF, NA Elect, is founder and president of Dirtworks Landscape Architecture. He is also principal in charge of design for the Legacy Groves of Somerset County



Planting trees is a reminder of the continuity of life; an early proposal for a memorial at the crash site, with names of the deceased etched in glass



Steve Boxall

Sibling playroom

Cornish design studio Boex has unveiled a room especially for young patients' siblings at the Dyson Centre for Neonatal Care, part of the Royal United Hospital Bath. The playroom aims to provide a fun and exciting space for younger visitors, taking away some of the stress and difficulty of having sick siblings being cared for in hospital. It has been designed to ensure a safe play environment, with slices of colour to define play, and seating areas for both children and parents. Fixtures are either hidden away or kept to minimum, and rounded edges are used to prevent injury. A vibrant colour palette ties in with other alcove and ceiling surfaces, to unify the building's visual identity. The Dyson Centre opened in July and was designed by Feilden Clegg Bradley Studios: it provides state-of-the-art clinical space for premature and sick babies, including intensive care and special care rooms.

Nature = culture

PageSoutherlandPage's brief to design a hospital on Native American tribal lands has resulted in a building with an unusually strong relationship with its surroundings. The 33,000sqm Chickasaw Nation Medical Center in Ada, Oklahoma, responds to the Native American concept of nature as something requiring respect and appreciation: its long thin footprint runs parallel to an existing meadow of mature trees, and all patient rooms are given generous landscape views, uncluttered by roads, cars or other intrusions. There is no explicit "healing garden" but rather a whole series of landscape spaces for rejuvenation; public spaces open directly onto the meadow with trails and paths that lead throughout the larger site. The medical centre is the largest public facility supported by the Chickasaw government, so the building also has a strong civic component, including a core space described as a "town centre" that acts as a meeting area and a place to source of information about health.



Great Dane

Aart architects has won an international competition to design a new hospital near Aherning in Denmark. At 135,000sqm, DNV-Gødstrup is one of the largest healthcare building projects in Europe. Aart's bid was as part of a consortium, CuraVita, which includes fellow architects Arkitema, consulting engineers Moe &

Brødsgaard, and Arup. The competition jury's brief was for a hospital that "will be the leading learning and research hospital in Denmark, where innovation, quality development, research and education will go hand in hand with the medical treatment". There will be close contact between the wards and professional specialties, to improve workflow and ensure a quick and accurate diagnosis, with space for the doctor to come to the patient instead of vice versa. The building's surrounding Jutlandic landscape has inspired a sensual use of space and materials, with the aim of providing a homely, rather than clinical, atmosphere.

Extension for Midwest hospital



A new ambulatory care facility will help streamline outpatient services at one of the US Midwest's major referral hospitals. HDR has been selected to design the nine-storey, \$202m addition to the Advocate Christ Medical Center in Oak Lawn, Illinois, which will consolidate existing specialist facilities including paediatrics, cardiac and neuroscience. The new centre will be linked to the existing hospital buildings by a number of corridor connections to provide discrete flows for staff/materials and patient/public circulation. The extension is expected to be completed by 2014.

Bench to bedside

With outpatient care, groundbreaking scientific research and top-notch graduate and professional education all under one roof, HOK's Cedars-Sinai Advanced Health Science Pavilion is designed to speed up the time it takes to get from scientific discovery to patient benefit. Because so many Cedars-Sinai clinicians are also research scientists (and vice-versa), the co-location of the building's new laboratories and outpatient care areas "will allow medical researchers and practitioners to work closely with one another in a collaborative environment where patients will be the ultimate beneficiary," says HOK's design director Ernest Cirangle. Recently honoured with two Los Angeles Business Council Architectural Awards, the 40,000sqm, 11-storey pavilion is set to open in 2013. It will tie into existing campus buildings via bridges on two levels, and will meet requirements to be a LEED Gold Certified building.



Healing hand

Medical Architecture's Ferndene marks a new leaf for children's mental healthcare in the north-east of England. The 40-bedroom residential and day centre in Northumberland, which accommodates children aged 10 to 18, consolidates a number of local services. Its broad range of users gave the architects plenty of challenges – the need to separate vulnerable children from young people with difficult behaviour, for example, as well as the need to provide a feeling of safety without a sense of incarceration. The resulting design is conceived as a hand, with fingers of bedroom accommodation spanning out from a central activity space, and living/day space at the fingertips offering countryside views. Member of staff Eddy Wilkinson praises the building, saying that "it doesn't feel like a hospital... fellow staff and young people have literally drawn gasps when visiting, and that confirms how well it was designed and conceived."



Jill Tate

Shaping the future

The way we design our environment shapes our health, our wealth and our future was the resounding message of the 7th Design & Health World Congress in Boston in July.

Marc Sansom reports

The increasing costs and impact on human health of the rising incidence of non-communicable diseases is the biggest health challenge facing developed world countries and increasingly poorer nations too.

Gathering together in Boston at the 7th Design & Health World Congress & Exhibition, from 6-10th July, researchers and practitioners from more than 35 different countries concluded that only by rethinking the way we design our environments to help people make healthier lifestyle choices can the challenge be met.

Organised by the International Academy for Design & Health in partnership with the American Institute of Architects, Academy of Architecture for Health (AIA-AAH), the event brought together leading physicians, public health and allied health professionals, health and hospital administrators, architectural and engineering practitioners, consultants, researchers and industry involved in public health and hospital facilities planning and design.

Prof George Mann, The Skaggs-Sprague Endowed Chair of Health Facilities Design at the College of Architecture, Texas A&M University, USA commented: "The event drew an impressive collective of leaders and key decision makers from a variety of health perspectives, geographic locations, population densities, climates, language and cultural contexts, and economies, to present their ideas, challenges and projects as a way of learning from one another."

With the cost of healthcare in the USA forecast to rise to 19.5% of GDP by 2017, researchers agreed that increasing investment in medical interventions and disease-based approaches to healthcare are not addressing the problem, with more attention needed on environmental issues.

In one of many powerful presentations, Dr Richard J Jackson, professor and chair of environmental sciences in the School of Public Health, UCLA presented some stark statistics of the scale of the problem in the USA, where male life expectancy levels has seen the country drop to 49th in the world, despite in some cases the USA spending almost double the level that other high income countries spend on healthcare.

As rates of obesity rise exponentially, tripling amongst 12-19 year olds and quadrupling among 6-11 year olds in the last three decades, Dr Jackson suggests a clear relationship to the way we build our homes, workplaces, parks, towns and cities. "Our health is determined in large part by our environment – what we eat, drink and breathe, and where we work, live and socialise."

According to the Center for Disease Control and Prevention, from 1974-2000, the percentage of children who walk or bike to school has dropped from 66% to 13%. Suggesting that we have been building our cities for the car and not for people, Dr Jackson says: "Obesity gets worse when we build places where it is hard to walk." In the US, he adds, the average car-owning household has more cars than working adults, with an average of 2.28 cars versus 1.147 full time wage earners.



Panel discussion featuring world Ministers of Health and their advisors



An exhibition of design solutions and innovations



Delegates networking at the Gala dinner



The new president, Dr Ray Pentecost



Keynote speakers and change agents: (from left) Prof Mohsen Mostafavi, Dr Julio Frenk, Dr Alan Dilani, Lord Nigel Crisp and Dr Richard Jackson



Deputy Health Minister Malaysia, Mrs Datuk Rosnah binti Haji Abd Rashid Shirlin



Dato Dr Rahim (left) with the Malaysian Deputy Health Minister



Dr Jacqueline Vischer



Asian delegates networking



Developing business opportunities in the exhibition



World leading architect HDR

Despite the tremendous impact of medical advances over the last hundred years, the emphasis on medical intervention and disease management as the foundation for healthcare fails to give due credit to the basic improvements in public health, such as clean water supply, sanitation, better nutrition and lower poverty levels that have had a greater impact on human health. "Even in the most optimistic estimates," said Dr Jackson, "of the 30 years of increased life expectancy achieved between the 1890s and 1990s, only five years can be attributed to medical care."

This view was endorsed by Lord Nigel Crisp, an independent crossbench member of the UK's House of Lords and the former chief executive of the NHS in the UK. He explained how

in an era of global health, the 20th Century paradigm which had built a success story in healthcare around greater professionalism, scientific discovery, commercial development and growing funding was a model that was now a part of the problem. New diseases and chronic conditions, growing patient and public awareness, the rapid advancement of science and technology and the increasingly global context for health were changes that had disrupted the previous models.

Lord Crisp called for new ideas from other industries, young people, disability and rights groups and low

and middle income countries to be brought to the fore around an agenda that sees the world in terms of our lives as human beings and not our services. He expressed the need for a new paradigm of co-development, of systems thinking and quality improvement that recognises the world's interdependence and allows communities to shape their future together.

Dr Julio Frenk, Dean of the Faculty, Harvard School of Public Health, emphasised this point in his paper, 'From Health Centers to Healthy Spaces', which is published in full on pp 65-59, suggesting that the dominant health paradigm of the 20th century, which was based on the provision of healthcare, has reached its limits, demonstrated by the fact that despite ever larger percentages of GDP being invested in healthcare, health outcomes are no longer improving.

Our health is determined by what we eat, drink and breathe, and where we work, live and socialise



The Longwood Symphony Orchestra



Dr Julio Frenk prescribes healthy living



Craig Dixon showcases Capita



Lifetime leadership award winners Derek Parker, 2011 (left) Eb Zeidler, 2010 (right) enjoying the Academy Awards Gala Dinner



Dr Richard Jackson



Time to relax and reflect on the congress

Calling for greater attention to health prerequisites, such as income, food, social interaction and housing, Dr Frenk stressed the importance of not only “creating healthy spaces in health centers and hospitals but looking beyond these walls to the community as a whole and the creation of spaces which favour physical and social activities which improve health and enhance social cohesion.”

The role of the design professions

In his paper, 'Salutogenic Design for Public Health Promotion & Prevention', Dr Dilani suggested that such a new paradigm would need to highlight the impact of wellness factors in the promotion of health and wellbeing that also helps to prevent diseases at all levels of society. It is an approach to health promotion and preventative care, says Prof Mann that is attracting governments and decision makers keen both to create a healthier and more economically productive society at the same time as reducing the increased burden of cost of global health systems.

But what is the role of the architectural and design professions and where do their responsibilities to focus their work on improving human health start and end. In his presentation, 'Healthy Design: Setting the Course', the Academy's newly appointed president, Dr Ray Pentecost III, challenged the profession to embed “the use of salutogenic design principles as a standard to create spaces that reach beyond simply doing no harm and which actually contribute positively to human health?”

The clear message of the World Congress was that whilst the US, which has been at the epicenter of medical advancement in the 20th Century and is now arguably also faced with the most serious health challenges of the higher income countries, this is a global health crisis and only a global perspective and togetherness that recognises the interdependence of richer and poorer countries will shape a new and healthier future. As Lord Crisp suggested, “Everyone has something to teach and everyone has something to learn.”

Marc Sansom is editorial director of World Health Design



Enjoying the showcase speakers during lunch



Dr Rohaizan, Ministry of Health Malaysia



Prof Mohsen Mostafavi



Prof Clayton Christensen

Global standard-bearers

Healthcare facilities in Asia and Australia scooped the top prizes at the Design & Health International Academy Awards announced in Boston in July

Health facility projects in Singapore and Australia demonstrated that Europe and North America can no longer claim to be the standard-bearers for healthcare design at this year's International Academy Awards, announced during a prestigious ceremony during the 7th Design & Health World Congress in Boston in July.

As the inspiring new Khoo Teck Puat Hospital in Singapore was awarded a double prize, winning the Health Project (over 40,000 sqm) and the Sustainable Design awards, with the Ballarat Acute Mental Health Facility in Australia winning the Mental Health Design Award, high commendations were also awarded to the National Heart Centre in Singapore and the Brain and Mind Research Institute – Youth Mental Health Building in Sydney. Presented by Dr Ray Pentecost, the newly appointed president of the International Academy for Design & Health, the successful recipients travelled from across the world to receive 26 awards made across 10 categories, including:

- Lifetime Leadership Award
- International Research Project
- International Health Project (over 40,000 sqm)
- International Health Project (under 40,000 sqm)
- International Future Health Project
- Mental Health Design
- Interior Design
- Sustainable Design
- Use of Art in the Patient Environment
- Product Design for Healthcare Application



The attractive glass trophies presented to the award winners

Knowledge driven

By setting standards and benchmarks, the Design & Health awards programme has a significant influence on the global design and development of physical environments that support health, wellbeing and quality of life. The recipients of this year's awards are those who, through outstanding efforts, have contributed to the progress of knowledge, and demonstrated vision and leadership in exemplary initiatives and projects.

Chaired by John Wells-Thorpe, writer, architect, historian and international advisor to the International Academy for Design & Health, the awards are open to international organisations and individuals in both the private and public sectors participating in either research or practice, including the planning, procurement, design, construction and management of healthy built environments.

Health-promoting

Constructed from a group of independent experts from Europe, Asia, Africa, Oceania and the Americas, the judging panel comprised specialists in their field from multidisciplinary backgrounds, bringing with them a breadth of experience.

While each award category had its own criteria, judges were also asked to consider the following key aspects of any built project: concept, fitness for purpose, originality, application of research findings, benefit to the community, life cycle costs, client satisfaction, value for money, building performance, procurement, and the quality of design and construction.

The academy's director general, Professor Alan Dilani says: "Each year new projects come to the fore that push the envelope. Inevitably, these projects tend to be led by visionary healthcare CEOs or architects who understand the importance of embedding the latest knowledge from around the world in the design of their facilities. We are honoured at the academy to be able to recognise innovation and the leaders who are inspiring a new generation of health-promoting hospitals and healthy environments."

Turn to the following pages to view the criteria, finalists and winners for each award.



Dr Ray Pentecost, president of the International Academy for Design & Health, announces the award winners at this year's ceremony in Boston

Lifetime Leadership Award



Chair of judging panel

John Wells-Thorpe, International Advisor, International Academy for Design & Health (UK)

Criteria

Awarded to a healthcare leader and visionary who has shown an ongoing, lifelong commitment to enhancing the health, wellbeing and quality of people's lives through their dedication to healthcare design. The award recognises the human and personal qualities needed to push back the boundaries of progress and inspire future generations.

Winner

Derek Parker FAIA, RIBA

Felicia Cleper-Borkovi's Nomination

"Having worked with Derek for 29 of the 50 years he has dedicated to Anshen+Allen, I know I represent one of the many architects, engineers, clients, design consultants, along with doctors, nurses, technicians, patients and families around the world, touched by Derek's 'magic', who are in awe of his aspirations and achievements, entrepreneurship and gravitas.

At the helm of the firm – both in the US and in the UK – for 39 out of his 50 years with Anshen+Allen, Derek offered meaning and pride to many who, like me, spend our professional lives designing and building hospitals with a purpose and with a heart. He is among a group of architects who have inspired an industry to innovate, elevate and revolutionise. As such, he has significantly impacted healthcare design. His accomplishments include the creation of breakthrough innovations in healthcare projects, the cultivation of a practice to grow from the local level to an international entity, and the leadership to spur healthcare designers to respond to changes in the healthcare industry.

In 1964, when Bob Anshen died unexpectedly, Derek stepped into a leadership role, expanding and elevating the size, scale and breadth of Anshen+Allen's work and placing it on the international stage. His strong conviction that health and education are the foundation of civilization led the firm to focus on healthcare and academic design.

Derek approaches each project as an opportunity not only to further the goals of a healthcare organisation, but also to advance the state of healthcare design. Known for introducing unconventional design elements that are now commonplace and replicated by others, he is a strong advocate of evidence-based design, a field of research documenting the ability of design to improve patients' healing, reduce medical errors, enhance efficiency, and increase the satisfaction of patients, staff, and physicians.

He co-founded the Center for Health Design, one of the leading organisations dedicated to improving healthcare practices through evidence-based design research and implementation. He also co-created the 'Fable Hospital' (an ideal facility that integrates evidence-based design), which is commonly used as a model for estimating design cost impacts against operating healthcare benefits.

Over his 45-year career, Derek has given hundreds of presentations, written more than 18 transformative works, and founded, been a member of, or advised more than 25 organisations dedicated to improving healthcare, including: The Institute for Healthcare Improvement (IHI); The Robert Wood Johnson Foundation (RWJF); The Board on Infrastructure and the Constructed Environment (BICE), National Academies; and the Institute of Medicine of the National Academies. Derek is also a recipient of the California Council of the AIA's Distinguished Practice Award.

Moreover, with the understanding of socialised healthcare, as provided in post-war Britain, he became a messenger of democracy and access to healthcare in California where he decided to practice architecture.

Derek's ideas, commitment to healthcare design and above all, hard work, continue to send ripples through ponds and oceans alike, via an entire generation of new hospitals worldwide, including in the UK, the country of his birth."



Derek Parker (centre) receiving the Lifetime Leadership Award 2011 from Prof Alan Dilani of the International Academy for Design & Health (left), and Eb Zeidler, Lifetime Leadership Award winner 2010 (right)

International Research Project



Lead judge

Dr Paul Barach, Australia

Panel

Dr Eve A Edelstein, MArch, PhD (neuroscience), Assoc AIA, F-AAA, Visiting Scholar, University of California, San Diego, New School of Architecture & Design, San Diego Academy of Neuroscience for Architecture
Mungo Smith, director, MAAP Architects

Criteria

Awarded for a completed, innovative, independently assessed piece of research focused on a particular aspect of the design, function, construction, financing or maintenance of a healthcare facility or addressing a relevant topic concerning public health in the context of the working environment.

Finalists

Impact of Visual Art on Patient Behavior in the ED Waiting Room (USA)

Upali Nanda PhD, Assoc AIA, EDAC

From Pre-design Research to Post-Occupancy Evaluation of Cancer Treatment Environments (USA)

Zhe Wang, PhD, RA, LEED AP, EDAC; Michael Puksza, AIA; Natalie R Petzoldt, AIA, LEED AP, EDAC; Jennifer Hendrich Cayton, LEED AP

Estimating Design Impact on Waste Reduction: Examining Decentralization (USA)

Dr Debajyoti Pati, PhD, FIIA, LEED AP; Kristin Whitehead, RN, MSN, MBA; Terry Thurston, RN, BSN, MBA; Richard Ruckdashel, MArch, AIA

Kids in the Atrium: Comparing Architectural Intentions and Children's Experience in a Pediatric Hospital Lobby (Canada)

Annamarie Adams BA, MArch, PhD; David Theodore, BA, MArch; Ellie Goldenberg, MPH; Coralee McLaren, PhD; Patricia McKeever, BN, MSc(A)

Stay Connected in Decentralized Nurse Stations: The Impact of Nurse Station Typology on Nurses' Informal Communication and Learning (USA)

Hui Cai, PhD Candidate, MA (Arch); Craig Zimring, PhD, Professor, College of Architecture, Georgia Institute of Technology

Architectural Design and Reducing Waiting Times in the Emergency Department (Canada)

Basel Abdulaal, Intern Architect, AAA, MRAIC, LEED AP, MSc Student; Mohamed Al-Hussein PhD, PEng; Saad Al-Jibouri, PhD, MPhil, BEng

Sponsored by
MAAP Architects

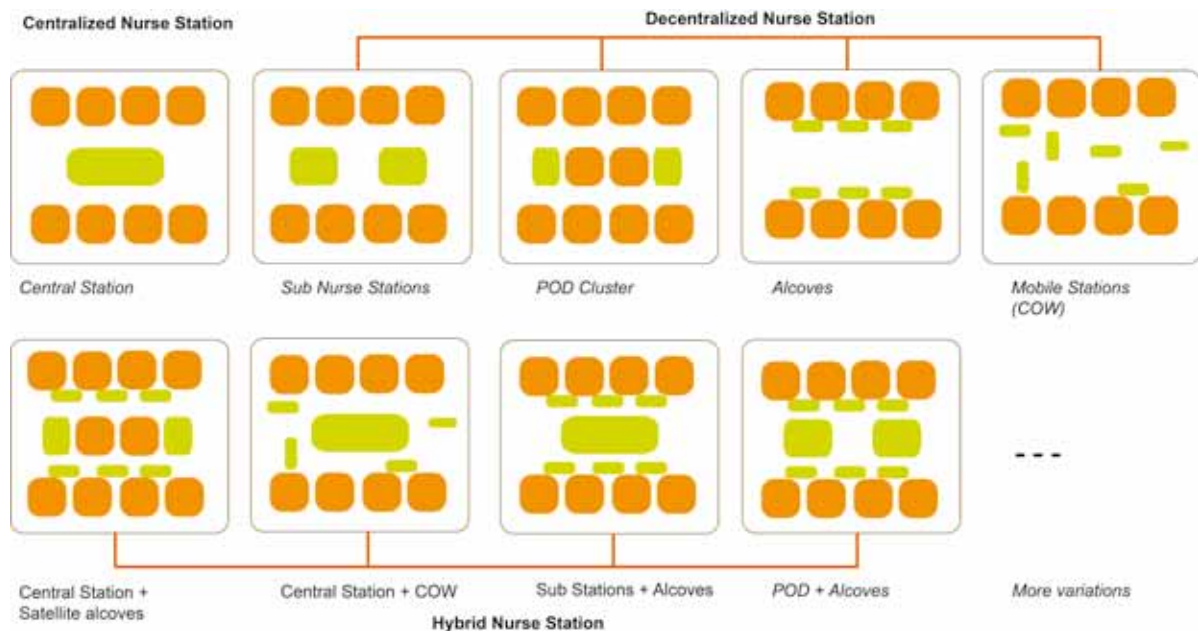


Zhe Wang (right) and the Cannon Design team receiving their award from Chris Shaw of sponsors MAAP Architects

Highly Commended

From Pre-design Research to Post-Occupancy Evaluation of Cancer Treatment Environments (USA)

Zhe Wang, PhD, RA, LEED AP, EDAC; Michael Puksza, AIA; Natalie R Petzoldt, AIA, LEED AP, EDAC; Jennifer Hendrich Cayton, LEED AP



Winner

Stay Connected in Decentralized Nurse Stations: The Impact of Nurse Station Typology on Nurses' Informal Communication and Learning (USA)

Hui Cai, PhD Candidate, MA (Arch); Craig Zimring, PhD, Professor, College of Architecture, Georgia Institute of Technology



Hui Cai receiving her award from lead judge Dr Paul Barach and Chris Shaw of sponsors MAAP Architects

Nominator's Citation

The contexts in which the healthcare organisations operate have changed dramatically in the recent decades. As a result, the typology of the nurses' station has experienced a lot of transformations. The traditional centralised nurse station has been gradually replaced by decentralised or mobile work stations to provide better bed-side patient care and reduce nurses' fatigue due to walking. However there is little systematic research examining the usage of the new typologies and their impact on nurses' behaviour pattern, especially communication and learning.

Given the paucity of existing information, this study aims to rethink the implications of the decentralised nurse station as an evidence-based design feature, especially on nurses' interaction and learning. The typologies of nurse station is hypothesised to impact the way in which caregivers interact with each other, share information and accumulate tacit knowledge in practice.

Our research is based on an extensive literature review on nurse learning and nurse station design. We discover that nurses' learning has multiple levels and should be situated in the context where the knowledge can be retrieved and applied later. The design of nurses' stations should support multiple types of learning activities and better visibility to both patient rooms and staff work areas. The space should provide optimised spatial relationships to increase opportunities for random encounter. Design with the described features will allow for better awareness of peers' work and the sharing of information and knowledge.

We develop a comparative study on two wings of the newly designed Neuron Intensive Care Unit (2D ICU) in Emory University Hospital in Atlanta, Georgia, to test the hypothesis. By developing a long term non-

intrusive observation, behaviour mapping and spatial analysis in the two wings, we reveal different communication and learning patterns related to the different spatial organisations of nurse station design. This research will provide an in-depth understanding of the correlation of nurse station typologies and nurses' communication and learning patterns. It can also contribute to future designs of medical units to enhance communication, share knowledge, reduce stress and increase job satisfaction, help attraction and retention of nurses, hence improving team collaboration and quality of patient care. The proposed matrix of nurse station typology study points to new directions on holistic methodologies for future research.

For the full paper, see *Nursing Culture and Performance. World Health Design, 4:3:60-67*

Health Project (Over 40,000 sqm)



Lead judge

Susan Black, founding partner, Perkins Eastman Black Architects, Canada

Panel

Prof Ian Forbes, adjunct professor, University of Technology Sydney, Australia

Craig Dixon, director – health practice, Capita, UK

Criteria

An award for an outstanding acute or non-acute healthcare building where patient-centred considerations are as evident as clinical and managerial priorities. The project must demonstrate an understanding of the therapeutic effect of a 'healing' environment, and show how innovative design permits ongoing flexibility of use, addresses issues of sustainability and which recognises the broader civic context.

Sponsored by
Ngonyama Okpanum & Associates



The finalists

Chaum Anti-Aging Life Center (South Korea), designed by KMD Architects

Smilow Cancer Hospital at Yale-New Haven (USA), designed by Shepley Bulfinch

Central Manchester Hospitals PFI (UK), designed by Anshen+Allen, part of Stantec Architecture

Juravinski Hospital (Canada), designed by Zeidler Partnership Architects

Khoo Teck Puat Hospital (Singapore), designed by CPG Architects with RMJM Hillier

Liverpool Hospital Clinical Services Block 2 (Australia), designed by Rice Daubney Health + Research

New Surgery Centre 'Pietro Confortini' for the City of Verona (Italy), designed by Studio Altieri

Pinderfields General Hospital (UK), designed by BDP

Massachusetts General Hospital, Lunder Building, Boston (USA), designed by NBBJ

Forth Valley Royal Hospital (UK), designed and built by Laing O'Rourke/Keppie Design



Highly Commended

Central Manchester Hospitals PFI, UK
Commissioned by Central Manchester
University Hospitals Foundation Trust
Designed by Anshen+Allen, part of
Stantec Architecture



Highly Commended

Massachusetts General Hospital, Lunder
Building, Boston, USA
Commissioned by Massachusetts
General Hospital
Designed by NBBJ



Highly Commended

Forth Valley Royal Hospital, Scotland, UK
Commissioned by NHS Forth Valley
Designed and built by Laing O'Rourke
Designed by Keppie Design



Winner

Khoo Teck Puat Hospital, Singapore
Commissioned by Ministry of Health Singapore/Alexandra Health
Designed by CPG Architects in collaboration with RMJM Hillier



CPG Consultants and the project team for Khoo Teck Puat Hospital receiving the award from judge Susan Black (far right) and sponsors NOA (far left)



Health Project (under 40,000 sqm)



Lead judge

John Cooper, principal, John Cooper Architecture, UK

Panel

Robin Geunther, principal, Perkins + Will, USA

Gunther de Graeve, Director, Destravis Group, Australia

Criteria

An award for an outstanding acute or non-acute healthcare building where patient-centred considerations are as evident as clinical and managerial priorities. The project must demonstrate an understanding of the therapeutic effect of a 'healing' environment, and show how innovative design permits ongoing flexibility of use, addresses issues of sustainability and recognises the broader civic context.

Sponsored by
HDR Architecture



The finalists

Seattle Children's Bellevue Clinic and Surgery Center (USA), designed by NBBJ

Ysbyty Aneurin Bevan (UK), designed by Nightingale Associates

Jubilee Gardens Health Centre and Library (UK), designed by Penoyre & Prasad

Critical Care Complex, Ulster Hospital (UK), designed by Todd Architects

Brain and Mind Research Institute / Youth Mental Health Building (Australia), designed by BVN Architecture

University Hospitals Ahuja Medical Center (USA) by Array Healthcare Facilities Solutions (Associate Architect and Interior Designer) and HKS (Design Architect and Architect of Record)

The Waldron Health Centre (UK), designed by Henley Halebrown Rorrison

Portadown Health and Care Centre (UK) designed by Avanti Architects

Trillium Health Centre, West Toronto / Ambulatory Site (Canada), designed by Perkins Eastman Black Architects

University of Minnesota Amplatz Children's Hospital (USA), designed by Tsoi/Kobus & Associates



Highly Commended

Brain and Mind Research Institute – Youth Mental Health Building, Australia

Commissioned by Brain and Mind Research Institute, University of Sydney

Designed by BVN Architecture



Highly Commended

Seattle Children's Bellevue Clinic and Surgery Center, USA

Commissioned by Seattle Children's Hospital, Bellevue, USA

Designed by NBBJ



Winner

The Waldron Health Centre, UK
Commissioned by Building Better Health
Designed by Henley Halebrown Rorrison



Simon Henley (right) of Henley Halebrown Rorrison receiving the award from sponsors HDR Architects



Mental Health Project



Lead judge

Chris Liddle, chairman, HLM Architects (UK)

Panel

Dr Ray Pentecost III, director, Clark Nexsen, USA

Criteria

Awarded for a mental health facility where an effective reconciliation between issues of security and perceived 'openness' are evident and where the operational need for supervision does not overwhelm the imperative to provide a civilising and humane setting to support therapeutic intervention. The project should appear community-friendly. Evidence of safe landscaping is important, as are levels of construction specification to meet informed standards of sustainability.

Sponsored by
HLM Architects



The finalists

William Wake House (UK), designed by Oxford Architects

Rose Lodge Assessment and Treatment Centre Park (UK), designed by Medical Architecture

Brain and Mind Research Institute / Youth Mental Health Building (Australia), designed by BVN Architecture

Ballarat Acute Mental Health Facility (Australia), designed by Billard Leece Partnership

Sister Margaret Smith Addictions Treatment Centre (Canada), designed by Montgomery Sisam/
architect of record Form Architecture



Highly Commended

Sister Margaret Smith Addictions Treatment Centre, Canada

Commissioned by St Joseph's Care Group Mental Health

Designed by Montgomery Sisam

Architect of Record: Form Architecture



Highly Commended

Rose Lodge Assessment and Treatment Centre Park, UK

Commissioned by Northumberland, Tyne & Wear NHS Foundation Trust, UK

Designed by Medical Architecture



Winner

Ballarat Acute Mental Health Facility, Australia
Commissioned by Ballarat Health Services, Victoria, Australia
Designed by Billard Leece Partnership



Ron Billard (right) of Billard Leece Partnership receives the award from Lord Nigel Crisp on behalf of sponsors HLM Architects



Future Health Project



Lead judge

Blair Sadler, USA

Panel

Mike Nightingale, founder; Nightingale Associates, UK

Dr Liz Paslawsky, International Health Business Consultant, Australia

Criteria

An award for the design of an unbuilt acute or non-acute healthcare building that recognises the changing role of the hospital within the wider healthcare system. The project must demonstrate a 'salutogenic' vision for healthy environments that addresses anticipated socio-economic challenges of the future.

Sponsored by
Farrow Partnership Architects



The finalists

The New QEII Hospital (UK), designed by Penoyre & Prasad

The Children's Hospital, Kurdistan (Iraq), designed by Make Architects

Fu Jen Catholic University Hospital (Taiwan), designed by HKS

The LEEMAC Clinic (UK), designed by ORMS Architecture Design

Seattle Children's Hospital, Building Hope (USA), designed by ZGF Architects

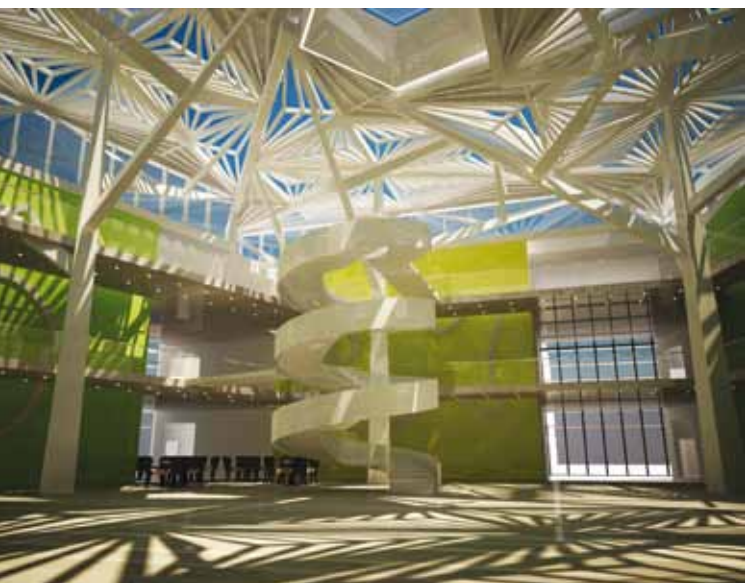
Glenside Campus Redevelopment Health Facilities Precinct 1 (Australia), designed by Medical Architecture and Swanbury Penglase

Jurong General Hospital (Singapore), designed by Silver Thomas Hanley International

Women's College Hospital Hospital (Canada), designed by Perkins Eastman Black Architects

National Heart Centre (Singapore), designed by Broadway Malyan in collaboration with Ong & Ong

South Australian Health & Medical Research Institute (Australia), designed by Woods Bagot



Highly Commended

The Children's Hospital, Kurdistan, Iraq

Commissioned by the Kurdistan Regional Government

Designed by Make Architects



Highly Commended

National Heart Centre, Singapore
Commissioned by Ministry of Health Singapore
Designed by Broadway Malyan in collaboration with Ong & Ong



Highly Commended

Seattle Children's Hospital, Building Hope, USA
Commissioned by Seattle Children's Hospital
Designed by ZGF Architects



Highly Commended

Glenside Campus Redevelopment Health Facilities
Precinct 1, Australia
Commissioned by South Australia Department of Health
Designed by Medical Architecture and Swanbury Penglas



Interior Design Project



Lead judge

Colum Lowe, founder, Being Design, UK

Panel

Susan Francis, programme director, Architects for Health, UK

Kate Bishop, researcher and design consultant, Australia

Criteria

An award to recognise a therapeutic space that enhances the health, wellbeing and quality of life of the patients, staff and visitors. Preference will be shown to projects, which respect the privacy and dignity of patients, and illustrate originality in the design approach and environmental sustainability.

Sponsored by
The American Institute of
Architects - Academy of
Architecture for Health



**THE AMERICAN
INSTITUTE
OF ARCHITECTS**

The finalists

Rady Children's Hospital (Canada), by Aesthetics, Inc

Tenth People's Hospital Renovation (China), by edg Creatives

Department of Psychosocial Oncology and Palliative Care (Canada), designed by ARK Canada

University Hospitals Ahuja Medical Center (USA) by Array Healthcare Facilities Solutions (Associate Architect and Interior Designer) and HKS (Design Architect and Architect of Record)

Hospital for Sick Children, Toronto (Canada), designed by Stantec Architecture





The team from Stantec Architecture receiving the award from Ron Smith (far left) of sponsors AIA Academy of Architecture for Health



Highly Commended

Department of Psychosocial Oncology and Palliative Care, Canada
 Commissioned by Princess Margaret Hospital/University Health Network, Canada
 Designed by ARK Canada



Highly Commended

Hospital for Sick Children, Toronto, Canada
 Commissioned by Hospital for Sick Children, Canada
 Designed by Stantec Architecture



The team from ARK Canada receiving their award from Ron Smith (left) of sponsors AIA Academy of Architecture for Health

Sustainable Design Project



Lead judge

Phi Nedin, Global Healthcare Business Leader, Arup, UK

Panel

David Gilbert, principal, Woodhead, Australia

Criteria

Awarded for a completed healthcare project where issues of sustainability are achieved at a level conspicuously above the present mandatory norm and which set a new standard of attainment to satisfy legislative, technical, financial and moral imperatives. The award will only be made for exceptional solutions which must have been in full operation for a minimum of one year.

The finalists

Hillside Primary Care Centre (UK), designed by Edward Cullinan Architects

Brigham and Women's Shapiro Cardiovascular Center, (USA) designed by Cannon Design

Portadown Health and Care Centre, Northern Ireland (UK), designed by Avanti Architects

Forth Valley Royal Hospital (UK), designed and built by Laing O'Rourke/Keppie Design

Advocate Lutheran General Hospital and Advocate Lutheran General Children's Hospital – Patient Care Tower (USA), designed by Cannon Design

Khoo Teck Puat Hospital (Singapore), designed by CPG Architects with RMJM Hillier

Sponsored by
Arup

ARUP



Highly Commended

Portadown Health and Care Centre, Northern Ireland, UK

Commissioned by Southern Health and Social Care Trust,
Northern Ireland, UK

Designed by Avanti Architects



Highly Commended

Forth Valley Royal Hospital, Scotland, UK

Commissioned by NHS Forth Valley, Scotland, UK

Designed and built by Laing O'Rourke

Designed by Keppie Design



Winner

Khoo Teck Puat Hospital, Singapore
Commissioned by Ministry of Health Singapore/Alexandra Health
Designed by CPG Consultants in collaboration with RMJM Hillier



CPG Consultants and the project team from the Khoo Teck Puat Hospital receive their award from Arup's Phil Nedin (second left)



Use of Art in the Patient Environment



Lead judge

Annette Ridenour, president and founder, Aesthetics, Inc, USA

Panel

Deborah Roundtree, president, Roundtree Visuals, USA

Margret Meagher, Arts in Health, Australia

Criteria

An award that recognises the effective application of creative endeavour (of any type or in any medium) which further advances knowledge of the potential of the arts to assist significantly in the therapeutic process. Preference will be given to conspicuous success in new approaches, stretching still further the boundaries of possibility in the wide creative field.

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The finalists

Art & Diversity in an Addiction Setting (Canada), submitted by the Centre for Addiction and Mental Health (CAMH)

Khoo Teck Puat Hospital (Singapore), designed by CPG Consultants

Acute Ward Block 2010, Chesterfield Royal Hospital (UK), designed by Artinsite

Variety Children's Hospital, King's College Hospital, designed by Artinsite

University Hospitals Ahuja Medical Center, Ohio (USA), designed by Array Healthcare Facilities Solutions (associate architect and interior designer) and HKS (design architect and architect of record)

Department of Psychosocial Oncology and Palliative Care (Canada), designed by ARK Canada



Highly Commended

University Hospitals Ahuja Medical Center, Ohio, USA

Commissioned by University Hospitals Ahuja, Ohio, USA

Designed by Array Healthcare Facilities Solutions (associate architect and interior designer) and HKS (design architect and architect of record)



Highly Commended

Acute Ward Block 2010, Chesterfield Royal Hospital, UK

Commissioned by Chesterfield Royal Hospital NHS Foundation Trust, UK

Designed by Artinsite



Winner

Department of Psychosocial Oncology and Palliative Care, Canada
Commissioned by Princess Margaret Hospital/University
Health Network
Designed by ARK Canada



ARK Canada receiving the award from judge Annette Ridenour (left) and Susan Black (right) from sponsors Perkins Eastman Black



Product Design for Healthcare Application



Lead judge

Luigi Ferrara, director, School of Design, George Brown College, Canada

Panel

Alice Liang, Montgomery Sisam, Canada

Criteria

Awarded for a manufactured product or item of equipment that adheres to human factor principles and which is integrally installed in a healthcare environment, advances levels of technical performance and integrates satisfactorily with the setting designed to accommodate it.

The finalists

Serenity Listening System (USA), designed by Aesthetic Audio Systems

Compass System, designed by Continuum Innovation, manufactured by Herman Miller Healthcare

ENDOALPHA Technical Panels, designed by Held + Team, manufactured by Olympus Surgical Technologies Europe

PR3 Secondary Barricade Override, designed and manufactured by Primera

Health Zone Ultima + Optima (USA), designed by Armstrong World Industries

Sponsored by
World Health Design



Highly Commended

PR3 Secondary Barricade Override

Designed and manufactured by Primera



Highly Commended

ENDOALPHA Technical Panels

Designed by Held + Team

Manufactured by Olympus Surgical Technologies Europe



Winner

Compass System
 Designed by Continuum Innovation
 Manufactured by Herman Miller Healthcare



Jill Joseph (centre) and Roger Call (right) of Herman Miller Healthcare receiving their award from judge Alice Liang of Montgomery Sisam Architects





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Design & Health Scientific Review

Homage to the concept of “fit”



Dr John Zeisel is chair of the international advisory board of the International Academy for Design & Health and president of Hearststone Alzheimer Care

In 1964 architect, innovator, mathematician, teacher and author Christopher Alexander in his classic *Notes on the Synthesis of Form* identified “fit” between a designed object and its uses – social, physical, perceptual and psychological – as the ultimate goal of design. This issue’s two articles take different approaches to the question of “design fit,” striking both in the differences in scale of environment they address and in their similar systemic approach.

Dean Frenk’s primarily conceptual essay suggests we broaden the realm of healthcare from enclosed health centers to the entire physical environment in which we live, work and play. As we live longer and societies age, he argues, we no longer live healthy lives between acute health episodes from which we either recover or die, but rather live longer lives in a less than healthy state in which chronic non-communicable health conditions – illness – always “accompanies us.” Frenk argues that if healthcare environments are to “fit” this new reality, this shift in how health is defined and experienced, every place we inhabit – our entire environment must be designed to be healthy and support health. Examples include mobile technology networks that can support pregnant women far from a hospital as well as parks and open space designed to support an active and healthy life.

Matthews and his team at the Royal College of Art’s Helen Hamlyn Centre employed an intense participatory co-design process with ambulance staff and both real and simulated patients to examine, respond to and design a totally systemic “fit for purpose” emergency ambulance vehicle. Using an iterative design process, an increasingly hands-on and experiential series of image-present-test cycles lead to an environment that responds both effectively and efficiently to the complex and interactive needs of emergency technicians and their patients. One critical design decision was to anchor the patient’s stretcher in the middle of the ambulance instead of to one wall, enabling 360 degree access to the patient and direct access to a wall on which pre-packaged sets of instruments are easily available for various situations.

The two articles converge around “fit.” Both the cities Frenk promotes we live in and the Ed Matthews and Helen Hamlyn Centre designed ambulance interior are described and treated as integrated systems, all the components of which must coherently “fit” the complex systemic uses they support – one during an acute emergency health event and the other the continual health event we call life.

Chris should be proud at how his pioneering work nearly half a century ago has permeated quality design thinking and practice today.



65-69

**Healthy Environments:
Designing Healthy Living
Communities**

Julio Frenk, MD, PhD



70-75

**Emergency Care:
Redesigning the Emergency
Ambulance**

Ed Matthews

Where does medical care end, city life begin?



Just as a work by Walter Yarwood may suggest an interwoven fabric with overlapping fields, seams and strands both large and small, straight and irregular, perhaps this is a way to present the fabric of a healthcare campus to the city that surrounds it. The boundaries are ambiguous and blurred. Where does medical care end, city life begin?

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Healthy environments: Designing healthy living communities

It is the creation of healthy homes, schools, offices and public places, as well as clinics and hospitals, that will shape how we tackle the health challenges of the 21st century

Julio Frenk, MD, PhD

More than building ambulatory units and hospitals to treat diseases, the challenge for health infrastructure in the 21st century is to extend the reach of health services to the community and create

spaces that promote health. Given the nature of the new public health challenges, strongly related to harmful lifestyles, we need to move beyond the idea of health centres, which by definition concentrate human and technological resources to treat the sick, into healthy environments, which

promote healthy living in homes, schools, workplaces and public spaces.

A key element in the discussion is a concept that emerged in the 1980s and came into widespread use the following decade. This is the concept of "built environment"¹. This term refers to the human-made surroundings, material and cultural, which provide the setting for human activity, ranging in scale from tools and buildings to neighbourhoods, landscapes and cities². An important characteristic of built environments is that all individual elements in them contribute, in one way or another, to the overall quality of the whole. These impacts are experienced mostly at the local scale, but they are increasingly becoming regional and global.

Built environments are created to fulfill our needs and express our values. The needs we tend to fulfill are basically physiological, psychological and social. According to Maslow's classical hierarchy of needs, human beings initially concentrate their efforts in meeting the needs related to subsistence and reproduction³. Once physiological needs are solved, we move to those needs which are not essential to body function and survival, such as protection from social dysfunction. We finally look for some level of self-realisation and self-gratification.

We have known for a long time that health is part of our physiological and psychological needs, and that adequate health facilities are needed to achieve reasonable levels of physical and psychological wellbeing. Healthcare facilities are even playing a major cultural role in the modern world. According to the America's Health and Well-Being Report 2010, people rank access to hospitals as the most important factor related to wellbeing after safety and crime rate⁴. What we have recently rediscovered, though, is that the satisfaction of various social needs is also crucial for the adequate function of our bodies and our



Our everyday environment has a major role to play in determining health: Copenhagen's Teglværkshavnen harbour housing, by Vandkunsten architects, is built close to the water to encourage swimming and kayaking directly from the apartments, as well as reflecting daylight inside. Half the properties are social housing

minds. According to a paper published in *The Lancet*, green spaces, defined as “open, undeveloped land with natural vegetation”, encourage people to walk and be more active, and thus reduce blood pressure and stress levels⁵.

But the environment can also act in the opposite direction. The rifts in the social fabric, particularly frequent in socially excluded populations, constitute a fertile soil for the development of mental problems, addictions and violence. Johann Gottfried von Herder, an 18th-century German philosopher, stated that belonging to a community was an essential need; deprived of the sense of belonging, people feel lonely, diminished, nostalgic and unhappy⁶. In many middle-income countries, two of the main causes of ill-health are depression in women and alcohol consumption in men. To this we should add the growing scourge represented by violence of all types, including domestic violence.

In the complex web of causation defined by the social determinants of health we should not neglect the influence of political organisation. The Nobel laureate Amartya Sen has argued that political freedoms can help prevent social disasters, such as famines and epidemics⁷. Free press draws attention to social needs and allows governments to be evaluated openly, while democratic elections forces parties in power to justify their policies or reform them in accordance with the demands of their constituencies⁸.

On the contrary, authoritarian regimes tend to show little concern for the needs of their people, including those related to human development. Indeed, a study published in the *British Medical Journal* that used information from 170 countries showed a positive effect of democracy on health, which remained even after adjusting for factors such as wealth, inequity and magnitude of the public sector⁹.

So when thinking about the design of physical infrastructure and urban planning, we need to remember that health is a basic need, the satisfaction of which requires adequate facilities, but also a domain affected by nearly all social endeavours. Clearly, the built environment also includes those places that are specifically designed to provide healthcare services. Health facilities themselves differ in the degree to which they are “salutogenic”. History tells us that until very recently healthcare providers were not bound to particular settings or buildings: they tended to see the sick in their own surroundings, mostly at home. In fact, hospitals were, more than healing places, shelters for the pilgrims, the destitute and the abandoned poor affected with terminal diseases. They were usually attached to churches and monasteries, and operated by priests, nuns and monks.

However, as medical procedures developed, specialised spaces were needed to perform them. It was in the 18th century that hospitals in Europe began to provide

only health services, staffed mostly with physicians, surgeons and nurses. Eventually they were also turned into places for clinical teaching and medical research.

The 19th century witnessed major improvements in the design of these healing places. Salient among them was the introduction of the pavilion structure, which improved access and ventilation; the creation of wards for different specialties; and the introduction by Florence Nightingale and her nursing colleagues of the concepts of cleanliness and antiseptics¹⁰.

The 20th-century trend that advocated the fusion of architecture with the natural environment, with its emphasis on access to natural light, fresh air, and natural surroundings, had an important impact on the construction of medical facilities, especially tuberculosis sanatoria. In contrast to these sanatoria, which were frequently established in semi-rural and rural areas, the urban hospital of the 20th century became increasingly influenced by efficiency concerns in the use both of space and of financial resources.

The end of the 20th century saw the emergence of a new model of hospital influenced by the consumer culture, conscious of the importance of the context and responsive to scientific evidence related to patient safety and recovery. Hospital spaces began to be designed to avoid falls, minimise infections and reduce medical errors. Windows have also become a major concern since several studies have demonstrated the positive impact of natural light and visual access to green spaces in patient recovery^{11,12}.

However, the design of healthcare spaces has also suffered from a number of problems. Salient among them are the disregard of healthcare organisations for the change in the nature of health challenges and the persistent concentration of resources in facilities. The most fundamental change in health challenges in the 20th century refers to the shift in the dominant patterns of disease. Since the beginning of the past century, the relative weight of disease and death has been moving towards higher age groups and towards chronic conditions.

With the gains made against infectious diseases and increases in child survival beyond age 5, populations began to live long enough to experience the effects of the exposure to health risks related to



Modern hospitals, such as the Khoo Teck Puat Hospital in Singapore, are reconnecting with the idea that access to natural surroundings can be beneficial for the health of patients, visitors and staff



Above: The £2.6m refurbishment of Ian Mikardo High School in one of London's most deprived areas is designed to be health-promoting as well as offering an inclusive learning environment
 Right: Freiburg in Germany is a much-studied model for the healthy city: it has more than 400km of cycle paths, and a pedestrian-only city centre

modern living such as lack of physical activity, consumption of unhealthy diets, stress and social isolation, which increased the prevalence of chronic, non-communicable diseases. These diseases are now responsible for 60% of all deaths worldwide and almost 50% of the global burden of disease¹³. The proportion of deaths attributed to chronic ailments will increase to 75% by 2020.

In fact, the whole meaning of illness has been transformed. Previously, the experience of disease was marked by a succession of acute episodes, from which one either recovered or died. Now, people spend substantial parts of their lives in less than perfect health, coping with a chronic condition. Illness may not always kill us, but it always accompanies us. To use Susan Sontag's image, we all now have dual citizenship, both in the kingdom of the healthy and in the kingdom of the sick¹⁴.

In sum, we are in the midst of a health transition characterised by a quantitative



reduction in the levels of mortality and by a qualitative increase in the complexity of the dominant patterns of disease. And this is true not only for developed countries, but also for low- and middle-income nations: problems only of the poor, like malaria or maternal mortality, are no longer the only problems of the poor¹⁵.

The chronic nature of the prevailing public health challenges has created a new type of health service demand that is not

being adequately met, and has turned homes, schools, offices and public places into environments where health events are continually taking place and where comprehensive responses to them are increasingly needed. The solution to these problems lies in the creation, not of new facilities, but of networks that guarantee the continuity of care, especially for those suffering from chronic conditions, and the integration of formal and informal healthcare

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spaces through the extension of the supply of healthcare and health promotion activities to homes, schools, workplaces, and public areas. We should be able to launch a fundamental shift from the rigid pyramidal structures that have prevailed in the health sector to adaptable networks that improve access to all levels of care. The efforts to reinvent such care can benefit from developments in telecommunications. Nowadays a patient can be diagnosed and treated in the first level of care in a rural community by a provider working in a high-specialty urban hospital.

The new, integrated model for the delivery of healthcare services should also make extensive use of mobile phones, which are becoming the communication technology of choice even in poor nations¹⁶. There are 2.2 billion mobile phones in the developing world and by 2012 half of all individuals living in remote areas of the planet will have regular access to this technology¹⁷. Mobile technology has been increasingly used to offer general health and healthcare information to pregnant women. It has also been used to monitor blood sugar levels among diabetics and adjust their drug intake¹⁸.

The use of mobile technology for public health purposes is also expanding. In China,



The aftermath of Sichuan's earthquake in 2008. In its wake, Chinese health authorities developed an emergency system that relied on mobile phones, rather than the internet, to report the spread of infectious diseases

WHO/China

mobile phones were used in an emergency reporting system for infectious diseases after the Sichuan earthquake, which paralysed internet access¹⁹. The influenza pandemic also prompted the design of an iPhone application that contains a questionnaire that helps to identify if someone has the H1N1 virus²⁰. In Peru, alerts of disease outbreaks are being sent through text messages, voice mail and email.

But these innovations are not enough. We will not be able to cope with current and emerging challenges without a renewed emphasis on health promotion. This means designing not healthcare facilities but healing facilities. These must be safe and functional, but also adapted to the cultural needs of patients who are increasingly demanding open, clear and soothing spaces. It also means creating living, teaching, working and public places that are safe, and that favour physical activity, contact with nature and social interaction.

At critical moments of the world, health has consistently remained one of the few truly universal aspirations because it involves domains that unite all human beings. It is there, in birth, in sickness, in recovery, and ultimately in death that we can all find our common humanity. Health, in fact, has become, more than a specialised field, a social objective. As a universally shared value, it has turned into an indicator of the general progress of a social order and a reflection of its success in securing equal opportunities for all its members.

For this reason we can reasonably think that the global society in the 21st century will be willing to support the creation of healthcare facilities that are truly healing spaces, and living places that are truly healthy environments.

Author

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Emergency care: **Redesigning the emergency ambulance**

Treating patients in the community has evolved as a safer and more efficient way of delivering higher quality emergency care. New research from the Helen Hamlyn Centre has produced an alternative ambulance design that meets with today's needs

Ed Matthews, Helen Hamlyn Centre for Design, Royal College of Art, London

Frontline ambulances in current use trace their origins back to the horse-drawn carts used during the Crimean War to transport wounded soldiers back from the battlefield to the primitive hospital facilities available at the time.

In recent years, instead of simply transporting the patient as quickly as possible to a hospital Accident and Emergency department for treatment (the so-called "swoop and scoop"), paramedics and ambulance staff now have the skills to better manage the complex needs of patients and treat them where possible in the community rather than at hospital.

In the UK, of all the emergency phone calls asking for an ambulance and crew to attend an incident, 60% have been shown not to require admission to an A&E department. One third of these have been resolved without a trip to hospital, but the only clinical option open to the ambulance crew, unless the patient refuses to come to hospital, is to drive them to the Emergency Department and admit them. Analysis shows that £7m

could be saved annually in London alone, or £30m across the UK, if the number of unnecessary admissions were reduced even by a conservative 5%. Effective mobile healthcare in the community would provide a significant building block in a system that improves care and reduces cost.

The problem is that the equipment and vehicles at the disposal of the crews have evolved piecemeal; any potential creative developments in ambulance design seem to have been mired by a desire to use existing design and construction regulations as a starting point, rather than taking an analytical look at the work that clinicians need to carry out in a treatment space. A fit-for-purpose treatment space will allow non-life threatening complaints to be treated, yet avoid unnecessary and expensive hospital admissions while improving the healthcare experience for patients.

Since 2005, the Helen Hamlyn Centre for Design at the Royal College of Art has been working collaboratively with other institutions, including the London Ambulance Service and the University of the West of England, to improve ambulance design. This report describes an innovative

approach to the design and development of the emergency ambulance, building on previous successes to produce an ambulance interior that provides better treatment to all patients, matched to their specific healthcare needs, and improves efficiency by transporting only those that require hospital care to the centre best suited to their condition.

From 2010 to 2011, our latest project, Redesigning the Emergency Ambulance, collected input from patients, the public, frontline clinical staff, healthcare managers, operational managers, commissioners and purchasers, for an intensive co-design and development programme to produce a redesigned A&E ambulance fit for purpose in the 21st century, tackling ten previously identified design challenges (see below). It used a process of co-design, in which the Helen Hamlyn Centre for Design worked closely with clinicians from London Ambulance Service and patient representatives, through an iterative process of design, evaluation and modification.

During three cycles of testing, ideas were proposed, developed and evaluated. These ideas were then implemented, refined or discarded. Funded initially by the Helen Hamlyn Centre, additional funding was granted through NHS London's Regional Innovation Funding programme, enabling us to approach ambulance redesign from a unique multidisciplinary perspective. Staff from London Ambulance Service have been central to the design process.

Project aims

The overall aim of this project was to build on previous work, using the structured input of stakeholders (ambulance staff, patients and emergency medicine clinicians) to redesign the interior of the emergency ambulance. The new design is intended to improve patient care and avoid costly and unnecessary journeys to hospital. It will also



A computer simulation showing the proposed new layout, including the "working wall" and central stretcher

Features and benefits of the new interior design

- 1) A centrally positioned stretcher, to allow the clinician all-round access to the patient to give safer, more efficient treatment. In existing ambulances, only one side of the patient is easily accessible because the stretcher is clamped to the wall. A large stretcher is used to manage bigger patients and the trend towards increasing obesity.
- 2) All of the equipment and supplies are located on one side of the vehicle on a simple, carefully designed, "working wall" to position everything ergonomically, following evidence from user-research. A simple but effective addition is a small fold-out table for the attendant to use as a lay-down space for items in use, instead of having to rest them on the patient.
- 3) Modular treatment packs are loaded into the vehicle before each shift by the "make ready" team, containing everything needed for particular jobs – for example, dressings, cannulas, airways and oxygen kit, burns and a maternity pack. This way the crew can be confident that the vehicle is fully stocked for the shift, and they don't need to overload it "just in case".
- 4) A major innovation is to bring together existing technologies that are used daily in our phones and cars to revolutionise the ambulance. The digital

communications and monitoring system provides enhanced road navigation, enables video links, discussion with hospital colleagues and specialists, and remote access to patient records. It also sends vital signs and handover information directly to the hospital while en route. This is more efficient and less prone to error than transcribing notes scribbled onto a surgical glove or a paper form to be processed later into the NHS system.

- 5) An easy-clean interior has been designed to avoid corners and crevices where dirt can collect. The evaluations

have demonstrated significant improvements in infection control as a result. The interior is also better lit, has a better ambience and is less intimidating.

- 6) Some simple features have been added, including the provision of hand-cleaning facilities, which contradictory to patient safety advice are not currently available. Similarly, facilities are provided for storing personal belongings and a cooler box to reduce food poisoning among staff, who had reported their sandwiches going off during a 12-hour shift in hot weather.



A computer-generated rendering of the proposed ambulance interior, with the stretcher repositioned to the middle of the treatment space

improve safety by reducing the frequency of untoward incidents that result in either injury or ill health. We targeted 10 "design challenge" areas, identified by previous work, for improvement:

- 1) Hygiene and cleanliness. Improved design will lead to fewer healthcare-acquired infections. Ambulances are prone to getting dirty and contaminated in use. To avoid dirt traps and to simplify the cleaning process, we need to design the interior with the minimum of joints, corners and seams between panels. This has the added benefit of making surfaces quicker to clean, reducing the time spent off the road, cleaning vehicles. It also reduces the likelihood of infection through contamination.
- 2) Patient experience. Patient journeys are often stressful events for both the patient and relatives. By addressing issues

of privacy, dignity and comfort during the patient journey, the overall patient experience can be greatly improved, through the introduction of variable lighting, better temperature control systems, reliable and standardised charging points and equipment mounting systems. This also improves the staff working environment and reduces the risk of violence and aggression.

- 3) Stock control. Improved stock control, using treatment packs tailored for specific clinical procedures, helps to reduce operational costs and enhance patient care. Presently ambulances are often overstocked by crews – the "just in case" scenario. Modular treatment packs, loaded for the start of the shift by "make ready" staff will reduce off-the-road-time for restocking. Practitioners will be more aware of stock levels and

equipment availability, and the waste caused by carrying unnecessary stock will be reduced, freeing up more space inside the ambulance for the effective delivery of clinical care.

- 4) Technology integration. This will provide better access to patient records and specialist clinician input. It will also improve communication by establishing robust links to receiving hospitals, through a standard interface used to send patient data as it is gathered. This system will not only improve patient care but also reduce medical errors. This does not require new technology developments, simply the integration of what is now available on an off-the-shelf basis, embedded in the mobile phones, laptop computers and cars in everyday use, with an element of future-proofing through design and procurement.

- 5) Standardisation of equipment. Often equipment is missing, batteries discharged or spares unavailable. Some equipment is vehicle-specific and not transferable across the range of vehicles in service. Standardisation will reduce the number of adverse incidents and equipment failures, as well as instances of missing or unserviceable equipment. Overall maintenance costs will be reduced and vehicle downtime minimised.
- 6) Diagnostics. Diagnostics and treatment technologies, electronic equipment and user interfaces/displays are currently not standardised. Technology integration will help to improve communications and the overall efficiency of clinical care provided. Incorporating modern diagnostic technologies, standard interfaces and a single keyboard and screen for data input into each ambulance will reduce medical errors and improve patient care. Ambulance availability will be increased as a result of fewer journeys to A&E.
- 7) Future proofing. The design needs to accommodate any future changes in patient care processes and equipment updates. By producing a modular interior, with sections that can be removed and modified as required, standardisation is achieved for box-body and vehicle chassis.
- 8) Longevity and carbon footprint. Both will be enhanced through reduced journeys to A&E. By reducing weight, using a single, moulded interior and by designing for disassembly, and adopting a smaller number of modular treatment packs, significant fuel reductions can be achieved. Other benefits in terms of sustainability include the ability to recycle parts and materials at the end of the vehicle's lifetime.
- 9) Treatment processes. These will be facilitated by interior design changes, such as repositioning of the trolley bed for 360° access to the patient. By reconfiguring the interior according to practitioner needs and treatment types, more effective treatment will be delivered on-scene and during transport to specialist centres, leading to earlier interventions. This in turn will reduce patient journeys and hospital admissions, creating a safer environment for both patients and staff.
- 10) Functionality. By providing 360° access



Building a cardboard model of the existing rig was an initial step towards better understanding ergonomics

to the patient, installing a lay-down space for equipment and creating easy access to wall-mounted, modular treatment packs and other facilities, the improved design will produce an efficient mobile treatment space and reduce the incidence of healthcare-acquired infections. It will also ensure that treatment is delivered as fast as possible, while minimising the risk of adverse incidents and staff or patient injuries.

The Design Process

The design team accompanied working ambulance crews on “ride-outs”, so that they could experience first hand some of the events that occur during a 12-hour shift.

A basic full-sized test rig was constructed from wood and cardboard, initially to represent the interior of the current frontline ambulance.

NHS paramedics and ambulance technicians were recruited, interviewed and observed within the workspace of the test rig. Typical clinical procedures were described and operational protocols were listed, alongside potential problems. By working with the clinicians to itemise the equipment and consumables used, the designers could start to understand the constraints that applied to the design challenge. Insight was gained into the different approaches required to treat conditions ranging from simple to complex, and robust “kit-list” definitions created for each. Link analysis (mapping locations and movements to analysis of a task) was used to establish a logical ergonomic layout for

the equipment, consumables, seating and lay-down spaces. Groupings of consumables were also determined, to enable modular treatment packs to be designed.

A key objective within all of this thinking was to define robustly the actual items required within a shift and their associated volumes and optimum locations. This was done in order to improve the efficiency of their storage and use, to liberate the maximum amount of space for safe, efficient and dignified treatment of the patient within the available vehicle volume.

Plan and elevation analysis and sketch techniques, both manual and computer-based, were used to explore layout options, with clinicians and designers working together. As the ideas progressed, the team developed a three-dimensional computer-generated design, starting with relatively simple geometry representations and gradually evolving them until sophisticated models were used for visualisations of the potential solution. The “working wall” philosophy was established, placing all of the equipment on one side wall of the treatment space, leaving the other wall clear and liberating the floor-space necessary to allow clear access around all sides of the patient trolley, and achieving the goal of providing 360° clinical access to the whole of the patient.

The 3D data were also used to create “fly through” simulations, and to drive machine tools to create a full-scale foam model that was used to show the first design iteration at an exhibition at the Royal College of Art.

Illustrations of the relative scenario performance of the current emergency ambulance and the new design

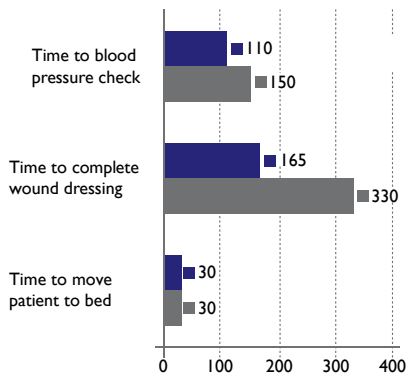


Figure 1: Median number of seconds taken to complete task in wound dressing scenario

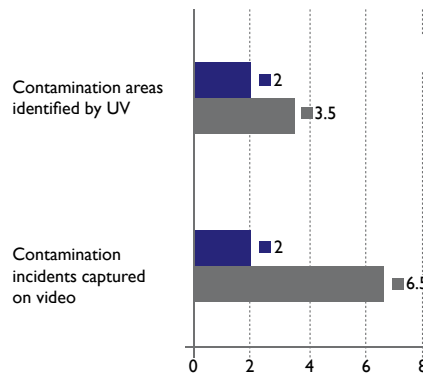


Figure 2: Median number of contamination episodes in wound dressing scenario

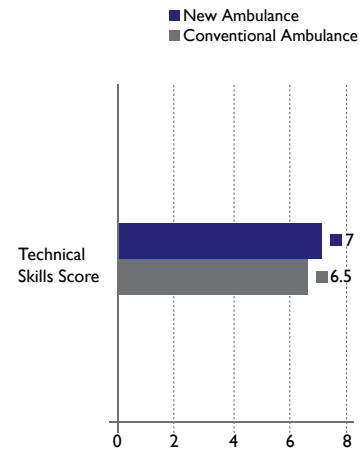


Figure 3: Median technical skills score for performance of cardiac arrest scenario (RCUK guidelines – a higher number indicates better care: maximum score 8)

Methodology

The process of co-design is characterised by collaboration between designers and the diverse users that will eventually interact with the resulting design intervention. The nature of the collaboration evolves as the process continues: broadly speaking in the initial research-driven work, the designers tend to be asking questions and using their listening skills, their ability to transition between abstract and targeted thinking, and their appetite for being in a position of uncertainty while knowing that they need to deliver a better solution. At the Helen Hamlyn Centre for Design we have distilled our own ideas, and those of colleagues worldwide to create a resource of Inclusive Design research tools (see some of the methods used at <http://designingwithpeople.rca.ac.uk>).

The research insights gathered are then analysed to enable the development of an evidence base; initially, the evidence may not be entirely robust, but the whole process is based on focused iteration, and eventually clear themes start to emerge. While the “heavy-lifting” of this analysis, and formulation of embryonic theories may necessarily fall to the designer, along with some initial ideas creation and visualisation, little time elapses before the users become able to contribute important observations and sometimes highly creative design ideas. The designer’s “people skills” are again important, along with the facility for rapid sketching to capture, interpret and progress the creative opportunities emerging from

the group work; again, classic creative-thinking techniques can be called upon in the facilitation of the process.

The final stage is evaluation, although it’s important to stress that design is a continuous process and further iterations are always necessary. Some form of visualisation needs to be made, criticised, redesigned and potentially remade to improve it, and then evaluated again.

So our basic cardboard and wood test rig was updated to enable the clinical procedures and related activities, equipment and consumables to be used in simulation to test the first ideas for the redesigned ambulance interior. Twenty ambulance staff and four patient representatives took part in this first stage of the co-design process, participating in simulated scenarios and walk-through evaluations.

In addition to physical mocking-up within the test-rig, a 3D virtual immersion space was used to review as many variations of interior layouts as needed, but without the need to physically build them.

In order to enable quantitative measures of the success of this project, a number of evaluation outcomes were specified:

- Potential to reduce the number of desirable healthcare-acquired infections (HAIs), measured by a reduction in contamination incidents during scenario-based testing
- Fewer adverse incidents and equipment failures, measured by a reduction in treatment time and mitigated clinical incidents during scenario-based testing

- Improved patient experience – measured by increased patient ratings.

Simulated scenarios have been rigorously shown to be capable of providing a suitable environment for measuring performance in the dynamic surroundings of pre-hospital emergency care. Our aim was to investigate the impact of different ambulance environments on the clinical performance of current ambulance staff.

Testing the design

Sixteen ambulance staff (eight double crews, each crew including at least one paramedic), were rated by two independent observers using video-recording and checklists. They were asked to manage two simulated standardised emergency scenarios:

Scenario 1 The management of a cardiac arrest, using a “Sim Man” high-fidelity patient simulator (manufacturer: Laerdal)

Scenario 2 A contamination scenario, using a trained patient/actor with simulated



In testing, a patient’s cardiac arrest was simulated in both a conventional ambulance and one with the new layout: results were also filmed



The purpose-built demonstrator model that was built for the final round of testing by ambulance crews

bleeding leg ulcer infected with MRSA.

Each group took part in these simulation exercises on different days, using both the existing front-line ambulance and the mocked-up ambulance.

Again, these simulated sessions were videotaped, using remote-control cameras, with two independent observers assessing both technical and non-technical skills, using predefined checklists and rating scales.

The cardiac scenario was rated on technical skills using the Resuscitation Council (UK) Guidelines. In the contamination scenario the team used an invisible contaminant, only detectable under ultraviolet light, to trace the potential and actual spread of contamination after each scenario had been performed.

Scenario testing

There was a substantial difference in the time taken to complete the wound dressing between the conventional ambulance and the new design. The average (median) time required was five minutes 30 seconds to complete the wound dressing in the conventional ambulance, compared to 2 minutes 45 seconds in the new design. This difference is largely due to the time taken to access treatment consumables in the conventional ambulance, compared to the treatment packs in the new design. Staff comments, for example, indicated that in the conventional ambulance there is a sense of frustration with layout and ease of access to equipment: "Too many different layouts in the different ambulances, making treatment more difficult than is necessary.

The equipment is in the wrong place; everything we need to do means bending over the patient – bending over the patient to dispose of soiled items in the bins and things dropping out of the cupboards onto the patient."

Other differences, such as time taken to move the patient to the bed and to measure blood pressure, were not significant on statistical testing.

There were some significant differences in contamination incidents between the two designs. Potential contamination incidents captured on video were much higher in the conventional ambulance compared to the new design (6.5 versus 2.0). There were smaller differences in the actual areas of contamination identified using a UV light in both designs. This indicates that improved design has minimised the potential for contamination. However, staff still need to ensure that they follow good infection control procedures (eg hand cleansing and safe disposal of waste) to prevent the spread of contamination and the risk of healthcare-acquired infection. The addition of a hand-cleansing area next to the head of the patient stretcher, coupled with an awareness of infection control, will lead to fewer contamination incidents in future.

Feedback, changes and testing

Ambulance staff and patients were also asked to evaluate both the old and the new treatment environments, using a Likert scale with ratings from 1 (worst) to 5 (best) and an additional "no opinion" option.

The first feasibility study conducted in

October 2010 gave a baseline for studies later in the project. The new design differed significantly from the conventional emergency ambulance in 11 key areas. Additions to the ambulance included:

- Hand washing facilities
- Fold-away work surface
- Resuscitation drawer
- Modular treatment packs
- Integrated technology
- Mobile monitoring
- Removal/repositioning of the front passenger seat
- Access to carry chair from outside the vehicle
- Repositioning of passenger seats
- Introduction of a side-loading option.

Patients' representatives were asked similar questions to the ambulance crews but, in addition, they were asked a slightly modified set of questions, addressing issues such as overall atmosphere, seating comfort, tidiness and privacy.

The most popular change, with a 100% positive response, was the repositioning of the stretcher into the middle of the vehicle. Evaluation comments ranged from "Excellent to have all-round access to the patient for cannulation and general patient care" to "After dealing with the patient in the centre I can't imagine doing it any other way." Most felt that it gave much greater flexibility when treating patients.

Eight design changes resulted from this first set of feasibility tests as a result of feedback from both staff and patients and by studying the data collected during scenario testing.

- Side-loading abandoned – return to normal rear doors offering wider access for accommodation of bariatric stretcher and wheelchairs
- Addition of bariatric stretcher
- Lay-down surface repositioned and widened
- Passenger seats repositioned to accommodate redesign of tail lift
- Treatment packs changed from soft to hard case material
- Sink removed and hand cleansing station added
- Work station/monitor moved to the opposite side of the ambulance
- All patient handling and moving equipment placed in one cupboard, along with the carry chair, and made accessible

from the outside as well as the inside of the vehicle.

In December 2010 a second evaluation was conducted on the new vehicle design, incorporating the eight modifications. The design team was unable to scenario test certain design features until a later stage, (such as the rear tail lift and the moving of the workstation), when the more sophisticated, fully working demonstrator would become available. However, patients and staff were asked to assess all design features, both already realised and proposed.

The third and final round of iterative evaluation took place in May 2011 in a purpose-built mobile demonstrator model. This was the final stage of testing and feedback, before engaging NHS and industry partners with a view to building and road testing a working prototype of the new ambulance.

The design team analysed the results from the second evaluation and addressed the issues that both the patients and paramedics had raised. Most of the work was aimed towards refining the ideas already tested during December and finalising the design details.

Dissemination

During the co-design process, and having brought together a project steering group with practical, procurement and commissioning knowledge, a solid buy-in to the design and the underlying process behind its evolution has been established, from grass-roots level upwards.

However, there would be little likelihood of adoption and commercialisation of the principles without top-down support. Existing ambulance manufacturers have not yet undertaken any first-principles approaches to designing a new fit for purpose emergency ambulance or embraced the opportunity to become involved with this design research project.

The benefits, therefore, of the new design needed to be communicated to UK Government and senior healthcare professionals with sufficient strategic understanding and influence to bring together the 11 regional Ambulance Services to evaluate the proposition more widely. In turn, this has required a further programme of prototyping work to progress the Demonstrator Unit beyond

the basic level necessary to acquire robust design validation.

It would be hard for the general public to visualise the level of detailing, construction and finishing work required to make the demonstrator realistic, and robust enough, to be convincing to its intended audience. Following an intense period of complex design and project management, the trailer-mounted, Mobile Demonstrator Unit was ready to be launched in September 2011. Lord Ara Darzi of Denham brought together at the Royal College of Art many of the key personalities in UK healthcare to whom he outlined the shortcomings of current ambulances, the historical legacies that underlie their current design form and the healthcare needs and opportunities that have progressed far beyond that earlier landscape. The hope and belief is that the evidence emerging from the evaluations, and the enthusiasm shown by the clinicians for the proposed design now that their input has actually been sought, will convince government and NHS that there is value in progressing along a new path.

The next steps

The design team will now continue its work to develop the Integrated Mobile Healthcare System through several initiatives. The improved ambulance interior is only an element of the system, albeit a significant building block. It needs to proceed to clinical trials, through a pilot scheme whereby a small number of working ambulances built to the new design will work with real patients, interfacing with an NHS hospital to verify and further quantify benefits delivered, as a step towards widespread implementation. This will further demonstrate the clinical and cost-effectiveness of the new ambulance

design, and its potential to substantially improve the delivery of urgent and emergency healthcare.

With the ongoing support of our project sponsors, the steering group, healthcare and industry partners, we look forward to making the newly designed, extensively tested and innovative ambulance interior a reality in the modern NHS.

Project partners

- Royal College of Art: Vehicle Design (www.rca.ac.uk) and Helen Hamlyn Centre for Design, London (www.hhc.rca.ac.uk)
- Imperial College Healthcare NHS Trust (www.imperial.nhs.uk)
- University of the West of England, Bristol (www.uwe.ac.uk)
- London Ambulance Service NHS Trust (www.londonambulance.nhs.uk)
- NHS London (www.london.nhs.uk)

Author

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Members of the public also acted as testers

Further reading

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24 Hours to Save the NHS: The Chief Executive's Account of Reform 2000-2006

Nigel Crisp

Oxford University Press 2011

£14.99

For the traveller there are few more depressing experiences than visiting a country in which the public services do not work; where government has failed and the gap between what is promised and what is provided is so great that the social contract between citizen and state is corrupted and trust in the competence of government is dreadfully damaged.

At the time of Labour's 1997 election victory, any survey of the physical fabric of our schools and health facilities and any analysis of the service that the NHS provided would have revealed such a breakdown.

Nigel Crisp was the chief executive of the NHS from 2000 to 2006 and presided over the greatest period of investment since its birth in 1948. This book is his personal record of leading the programme of reform and investment that was initiated months before his arrival, saved the NHS and implemented major service and system reforms. It remains an immense achievement – one of the many successes of a reforming government whose record will unfortunately always be obscured by the Iraq War and the 2008 financial crisis. Lord Crisp is candid in admitting that the NHS Plan failed to achieve the level of service transformation that had been planned. It remains a vast and highly politicised institution, in which change still appears to be driven down from the top and the component parts follow directives or advice rather than instigating service improvements. In his defence this seems to be an almost intractable problem.

Written at a much more seemly distance from power than the current crop of "kiss and tell" political biographies, Lord Crisp recounts the sequence of events with the tact and restraint one might expect from a civil service mandarin, leaving this reader pruriently wishing for a few more insights into the clashes between personalities and policies which we know took place. It is a first-hand account of what can be legitimately described as a great adventure – the transformation of what Lord Crisp describes as being a "nationalised industry" into a national health service. The breadth and speed of change that was demanded (and in many cases achieved) was enormous. The narrative conveys with a rather English understatement the author's excitement at being at the helm in those first three years of this enterprise. I gained the impression that he has enormous respect for Alan Milburn, the Secretary of State who initiated the NHS Plan, but perhaps holds his various successors in diminishing esteem.

The book's tone is strangely reminiscent of one of those wartime biographies, in which a small and highly intelligent team with the backing and encouragement of a government is galvanised by the acute circumstances in which they find themselves to attack and resolve a host of problems. There is a palpable sense of urgency and purpose – boards, plans, agencies, frameworks, targets and, of course, acronyms – the whole panoply, in fact, of a centralised command structure. The irony is that this centralised control was necessary in order to bring about the system reform that would enable bottom-up change to happen.

The nub of the problem is set out when Lord Crisp describes the redefinition of the NHS: "We were starting to think of the NHS as more like a guarantee or a promise of care", not "bound by old restrictions as to who may offer a service or how" – in this context allowing private providers to become a part of the service. This need not be threatening – the BBC commissions many programmes from commercial companies and has maintained its reputation and its public service identity. Lord Crisp is clear that such a change should be tightly bound by the vision and values of the NHS. He goes on to state that the NHS is a "social contract not a commercial one". This is an excellently succinct way of redefining the NHS and on reading it, it is clear that the service was safe in his hands.



Lord Crisp, speaking at Design & Health's World Congress



The breadth and speed of change that was demanded (and in many cases achieved) was enormous

Crisp had to deal with healthcare professions that were, in the main, uninterested in process change and a public which was highly suspicious of deregulation and privatisation. Since 1992 decentralisation and de-politicisation had been recognised by politicians and the NHS leadership as essential yet they still prove to be elusive targets and the changes described above have yet to be achieved. The contractual agreement between the citizen and the state that treatment is free at the point of delivery has become a birthright that it would appear the electorate

His legacy is an NHS that has been transformed and survives in good health to experience another round of reform

place beyond political challenge. Unfortunately, when the notion of healthcare as a basic human right provided by government through taxation is accepted and then budgeted, its provision becomes an intensely political issue, and the scale of the service required is hugely problematic.

The NHS is responsible for looking after 52 million people and requires a budget of £100 billion per year, greater than the GDP of all but the richest 50 nations in the world. It is very difficult to float off a service of this scale as an independent institution,

similar to the BBC, outside direct governmental control with a hypothecated budget within which it must operate.

The first three years of the NHS Plan were immensely successful. Lord Crisp acknowledges that the NHS had sufficient capacity by 2003 to deal with demand, which proved to be an almost unwelcome achievement to his political masters. Top-down, target-led improvements were achieved and waiting times cut to virtually nothing. Huge investment was made in buildings, equipment and IT; 75,000 nurses and 45,000 doctors were added in a decade and the country is now apparently educating sufficient numbers of doctors and nurses.

It all happened too fast. We were aware in 2002 that capital investment should have been directed towards primary and community services and facilities before a major hospital rebuilding programme, but it was difficult to organise and too diffuse a target for instant political gratification. Some of the hospital rebuilding programme was poorly briefed and wrongly directed. The renegotiation of GPs' contracts erred on the side of generosity. The NHS IT programme proved to be something of a disaster, but the oft-reported figures pale into insignificance when placed against the losses made by the financial sector.

By 2005, the NHS had ceased to be as important to the government in 2005 as it had been five years earlier. The battle between liberalising reform, represented by Blair, and centralised control, championed by Brown and the Treasury, was moving in favour of the latter. Power and responsibility had been devolved to Foundation Trusts and PCTs. Trusts had to balance their books but the centre did not relinquish control of budget or policy. Lord Crisp resigned after five and a half years. His legacy is an NHS that has been transformed and survives in good health to experience another round of reform.

If developing nations are to learn from our experience the most important lesson may be to concentrate on public health and on building the health pyramid from the bottom – primary care and community wellbeing – which will encourage the service to be shaped and owned by health professions from an early stage and not shaped entirely from above.



John Cooper is principal of John Cooper Architecture

Nigel Crisp's first book, *Turning the World Upside Down: The Search for Global Health in the 21st Century* (Hodder Education, £14.99) was acclaimed by critics and health experts worldwide. According to Crisp, "The most striking thing about health in the 21st century is the way that the whole world is now so interconnected and interdependent.



This interdependence is changing the way we see health, creating a new global perspective and will affect the way we need to act."

The book offers three unique features. It:

- Describes what rich countries can learn from poorer ones, as well as the other way round
- Deals with health in rich and poor countries in the same way, not treating them as totally different, and suggests that instead of talking about international development we should talk about co-development
- Sets out a new vision for global health, based on our interdependence, our desire for independence and our rights and accountabilities as citizens of the world.

Turning the World Upside Down is a search for understanding that helps readers to see how Western scientific medicine needs to adapt and evolve to cope with the demands of the 21st century. It sets out a new vision and describes the actions we need to take to accelerate the change.

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