WORLD HEALTH DESIGN
ARCHITECTURE | CULTURE | TECHNOLOGY
APRIL 2014

SENSE OF DIGNITY

The Chris O'Brien Lifehouse in Sydney responds to the nature of the cancer patient journey

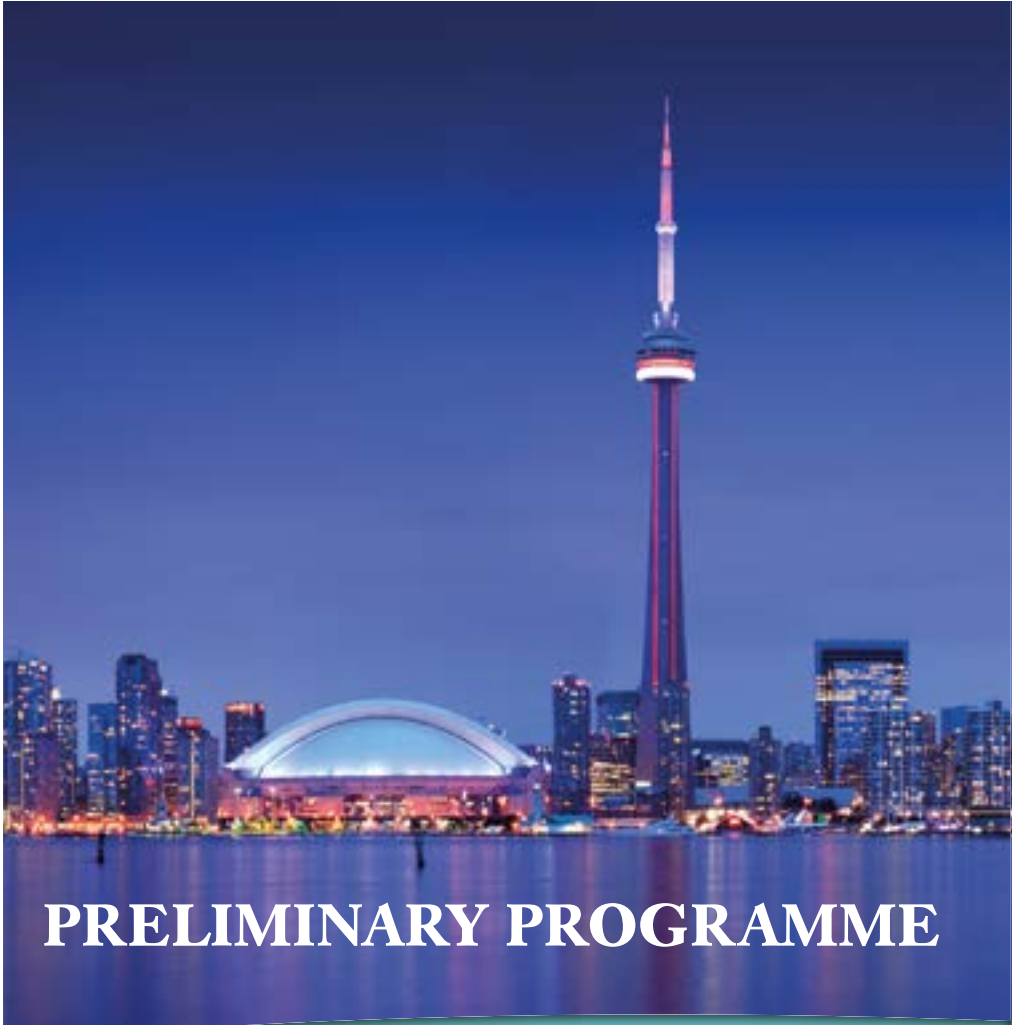
ALSO:

Design & Health World Congress 2014 preview
Scientific Review: Designing for Autism
Market reports: Europe and South America
Project report: Mental Health

www.worldhealthdesign.com

Design & Health
International Academy for Design and Health

Volume 7 Issue 2



PRELIMINARY PROGRAMME

Keynote Speakers and Session Chairs

Alan Dilani, Sweden

Ray Pentecost, USA

Dr Reza Moridi, Canada

Richard Jackson, USA

Dr Aaron Motsoaledi, South Africa

John Zeisel, USA

Ken Yeang, Malaysia/UK

Alice Liang, Canada

Micheal Moxam, Canada

Abd Rahim Mohamad, Malaysia

Ron Hicks, Australia

Cliff Harvey, Canada

Mark Henderson, USA

James Grose, Australia

Tarek El-Khatib, Canada

Innocent Okpanum, South Africa

Gunther De-Graeve, Australia

Guela Solow-Ruda, Canada

Ihab Elzeyadi, USA

Oliver Harrison, UK

Peter Jones, Canada

Stephen Verderber, Canada

Design &Health
International Academy for Design and Health

In partnership with

UNIVERSITY OF TORONTO
JOHN H. DANIELS FACULTY OF ARCHITECTURE, LANDSCAPE, AND DESIGN

Association Partners

RAIC | IRAC
Architecture Canada

Media Partners

& CALL FOR REGISTRATION

Early Bird Discount 15 May 2014

Fairmont Royal York Hotel, Toronto, 9-13 July 2014

Design & Health

10TH WORLD CONGRESS & EXHIBITION

View the Preliminary Programme at:
www.designandhealth.com
info@designandhealth.com

An international forum for continuous dialogue between researchers and practitioners

Diamond Partners: AECOM, HDR, zeidler, Farrow

Sapphire Partners: ARUP, Stantec, HermanMiller

Emerald Partners: britplas, MontgomerySisam, ARK, DESTRAVIS GROUP, nbbj, PERKINS+WILL, BVN

PERFORMANCE DRIVEN DESIGN

ARCHITECTURE . URBAN PLANNING . PREDICTIVE ANALYTICS . INTERIOR DESIGN . EQUIPMENT PLANNING

rtkl.com
888.337.4685

RTKL
AN ARCADIS COMPANY

Changwon Gyeongsang National University Hospital, Seoul, South Korea
in conjunction with Heerim Architects & Planners

WORLD HEALTH DESIGN
ARCHITECTURE | CULTURE | TECHNOLOGY

Contributors

Tye Farrow
A paradigm change is needed that embraces the potential of design to 'cause health' as a new framework for evaluating the basic elements of our daily lives

Katie Gaudion
A better understanding of the needs and aspirations of adults with autism spectrum disorders (ASD) can inform the design of their living environments

Michael Ridge
This UK study evaluates the impact of design solutions in reducing hostile and aggressive acts in two NHS Accident & Emergency departments

Debajyoti Pati
An exploration of how the underlying neural mechanism in our brains helps to explain the positive impact that nature stimuli has on our health and wellbeing

Stephen Verderber
A review of the second edition of *Sustainable Healthcare Architecture*, authored by leading US architect Robin Guenther and economist Gail Vittori

Cover Image
The Chris O'Brien Lifehouse, designed by HDR | Rice Daubney, see pp 14-15

Round the world ticket

We are always very proud at *World Health Design* when you, our readers, tell us how much you particularly enjoy the unique 'round the world' tour we provide every issue, comparing and contrasting the various stages of health policy and infrastructure development of different global regions within a social, economic and political perspective combined with the latest research findings. This month's tour takes you from austerity-bitten Europe (pp 24-33) as it slowly recovers and restructures, linking public health investment to healthcare outcomes and integrating health and social care, to the emerging economic powerhouses of South America (pp16-23) as they struggle to keep up with rising public expectations for universal healthcare coverage and social reforms. Few challenges are unique, however, and the opportunity to learn from the design and architecture innovations that are helping to solve or provide direction for the world's common health challenges, such as ageing, chronic disease and mental health, is often encapsulated in this journal, and to an even greater extent at the Design & Health World Congress & Exhibition, which this July is being held in downtown Toronto at the Fairmont Royal York Hotel (pp 2-3; 8-9). Join the world's leading researchers and practitioners in the field for a celebration of how the science of health and the art of design are combining to meet the health challenges of modern society.

Marc Sansom
Editorial director

Contents

Editorial Director
Marc Sansom MBA
T: +44 (0) 1277 634 176
E: marc@designandhealth.com

Associate Editor
Andrew Sansom

Design Communications Associate
Helen Fisher

Contributing writer
Emily Brooks

President
Ray Pentecost III, DrPH, FAIA, FACHA
T: +1 757 961 7881
E: pentecost@designandhealth.com

Cheif Executive and Founder
Alan Dilani PhD
T: +46 70 453 90 70
E: dilani@designandhealth.com

Editorial Advisory Board:
Dr John Zeisel PhD, USA
Dr Ray Pentecost DrPH, AIA, USA
Dr Alan Dilani PhD, Sweden
Prof Jacqueline Vischer PhD Canada
Dr Innocent Okpanum PhD, South Africa
Dato Dr Abd Rahim bin Mohamad, Malaysia
Prof Anthony Capon PhD, Australia
Prof Ihab Elzeyadi PhD USA
Prof David Allison, USA
Prof Ian Forbes, Australia
John Wells-Thorpe, UK
Mark Johnson, USA
Mike Nightingale, UK

Subscriptions
Nicki Roessler
T: +44 (0) 1277 634 176
E: WHD@designandhealth.com

Published by:
The International Academy for Design and Health
PO Box 7196, 103 88 Stockholm, Sweden
T: +46 70 453 90 70
F: +46 8 745 00 02
E: academy@designandhealth.com
www.designandhealth.com

International Academy for Design and Health UK
West Suite, Westgate Court, 17 Western Road, Billericay
Essex CM12 9DY UK
T: +44 (0) 1277 634 176
F: +44 (0) 1277 634 041
E: WHD@designandhealth.com

WORLD HEALTH DESIGN
Volume 7 Number 2
ISSN 1654-9694

Subscriptions:
To receive regular copies of World Health Design please telephone +44 (0) 1277 634 176 to place your order, or email WHD@designandhealth.com

Yearly subscription rates:
1 year £80; 2 years £130; Single Issue £30
World Health Design is published four times a year by the International Academy for Design and Health

Printed in the UK by
The Magazine Printing Company
using only paper from FSC/PEFC suppliers
www.magprint.co.uk

BRIEFING

OPINION

PROJECTS

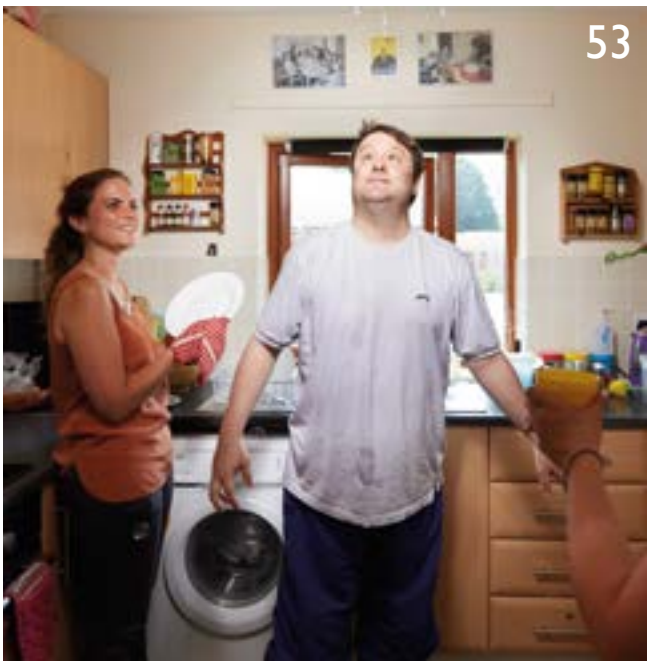
EVENTS

MARKET REPORTS

SCIENTIFIC REVIEW

SOLUTIONS

ARTS & CULTURE



In pursuit of a **Salutogenic Society**

Participants can now register for the 10th Design & Health World Congress & Exhibition in Toronto in July following the launch of the preliminary programme, writes ***Alan Dilani***

Partnering with the Ontario Ministry of Research and Innovation, and supported by world-renowned academic institutions and healthcare industries, the International Academy for Design & Health (IADH) has created a leading-edge scientific programme that will underpin a salutogenic society by design. Scheduled to be held at the Fairmont Royal York Hotel, from 9-13 July, the 10th Design & Health World Congress & Exhibition will focus on how government and private investment can support the creation of healthy and sustainable urban infrastructure through the application of ecological and salutogenic design principles.

Consisting of a mixture of the latest global research findings and case studies of innovative projects, the WCDH2014 scientific programme will explore how infrastructure investment can be applied to better connect communities and urban life to health systems in a way that encourages healthier lifestyles and prevents the onset of disease.

Participants will enjoy a diverse mix of stimulating topics with plenary sessions, technical showcases, posters and an exhibition of the latest innovations in the field. Sessions will include presentations by architects, designers, health planners, engineers, public health scientists, physicians, health administrators, psychologists, economists, artists and many other disciplines to bring together as wide a range of perspectives as possible.

Topics addressed at the congress will include: the salutogenic design approach; innovation in procurement and delivery: new models of P3/PPP; case studies of successful healthy built environments; city life, culture and health; stimulating built environments; healthy communities and urban planning; international benchmarks in design and health; and promoting active living and healthy lifestyles to prevent NCDs.

Fairmont Royal York Hotel, Toronto, Canada

In addition, the socio-economic and technological trends and influences on design and health will be considered in a pre-congress symposium programmed by our partners the Canadian Urban Institute and entitled 'Healthy Cities 2030: Reshaping the Supply Chain to Improve Health and Quality of Life'. The interactive and participatory framework for the pre-congress symposium will enable delegates to explore ideas and visions for a healthy city of the future.

On the final evening of the congress, the Design & Health International Academy Awards 2014 will be presented at a prestigious ceremony and gala dinner at the Fairmont Royal York Hotel. Enhanced to incorporate 12 award categories and judged by leading international researchers and practitioners in the field, the awards perform a vital advocacy role globally, rewarding excellence and helping to benchmark design quality.

The congress will conclude with the choice of a range of impressive study tours around Ontario of recently completed state-of-the-art healthcare facilities and other innovative examples of Canadian architecture.

The high quality of scientific research presented, along with powerful case studies, a design exhibition displaying the latest innovations, and a varied social and cultural programme, will ensure participants enjoy a unique knowledge-enhancing experience in the city of Toronto.

Keynote Speakers and Session Chairs:

Alan Dilani, Sweden

Ray Pentecost, USA

Dr Reza Moridi, Canada

Richard Jackson, USA

Dr Aaron Motsoaledi, South Africa

John Zeisel, USA

Peter Jones, Canada

Ken Yeang, Malaysia/UK

Alice Liang, Canada

Michael Moxam, Canada

Breakfast Seminars

Three breakfast seminars are currently being planned to complement the main plenary programme at the 10th Design & Health World Congress & Exhibition. Successfully organised for the first time at the World Congress in Brisbane last year, these more informal hour-long sponsored seminars on a focused issue or topic are provided with a healthy breakfast for those delegates keen to engage in a more interactive session. With the potential for three more sponsored seminars, the current programme is as follows:

07.30-08.30 Thursday 10 July, 2014
Embracing the future: Integrating innovation and disruptive technology into healthcare infrastructure

ARUP

Generally, healthcare lags behind other sectors in adopting technical innovations that can vastly improve safety and quality, efficiency, and the patient experience. Why is this? What can those involved in the design and development of healthcare facilities do to improve this? Panellists with wide global experience of the roles of owner, architect and IT advisor will each present their views on the opportunities and barriers to the adoption and integration of service innovation and new technologies into healthcare infrastructure. This will be followed by a facilitated discussion in which audience participation is encouraged. The panel will consist of Cliff Harvey, vice-president, planning, facilities & support services at North York General Hospital in Toronto, Ontario; Tom Harvey, president and managing principal, HKS' Center for Advanced Design Research & Evaluation (CADRE); Justin Trevan, a senior consultant for Arup Canada, specialising in IT, AV, communications systems, and security systems design; and Katie Wood, healthcare lead for Arup Canada.

07.30-08.30 Friday 11 July, 2014
Planning technology into healthcare: Can we do it better?

AECOM

Too often, medical equipment and technology are treated as a mere bolt-on to facilities planning. Yet it is equipment that can take up to half of the capital budget, from the briefing and design to the implementation, maintenance and refresh. Whether it is technology-rich acute facilities to care in the community, delivery is dependent on the quality of equipment and technology. By planning properly and in good time, users, designers, constructors and administrators can maximise the benefit from their investment and reduce the risk of wasting money; while sub-optimised and failing processes in our healthcare environments can mean investment fails to provide the desired outcomes. Presenters to be confirmed shortly at http://events.designandhealth.com/events/wcdh

07.30-08.30 Friday 11 July, 2014
Future of Work: Scenarios 2018

HermanMiller Healthcare

The future is profoundly unpredictable. One of the tools Herman Miller uses to explore the future is through scenario thinking. We will share our 2018 scenarios and resulting conclusions about how work will change through 2018, all of which is grounded in rigorous research. The scenarios are not predictions; they are hypothetical ways the future of work might unfold. They are intended to provoke broader and deeper thinking, reflection, learning, conversation and create a shared understanding of possible implications for healthcare design. Presenters to be confirmed shortly at http://events.designandhealth.com/events/wcdh


Tarek El-Khatib, Canada


Innocent Okpanum, South Africa


Gunther De Graeve, Australia


Guela Solow-Ruda, Canada


Ihab Elzeyadi, USA


Oliver Harrison, UK


Abd Rahim Mohamad, Malaysia


Ron Hicks, Australia


Cliff Harvey, Canada


Mark Henderson, USA


James Grose, Australia


Stephen Verderber, Canada

Congress Dates and Schedule

The WCDH 2014 is a five-day event, which will be held from 9-13 July, 2014 at the Fairmont Royal York Hotel, Toronto, Canada.

Wednesday 9 July
08.00-18.00 Registration
10.00-17.00 Pre-congress Symposium
19.00-22.30 Welcome Reception & Drinks

Thursday 10 July Congress & Exhibition
08.00-08.45 Late Registration
08.50-18.00 Conference, Posters, Showcases & Exhibition
19.00-22.00 Social Programme to be advised

Friday 11 July Congress & Exhibition
08.00-08.30 Late Registration
08.30-18.00 Congress, Posters, Showcases & Exhibition
19.30-22.00 Advisory Board Meeting of the International Academy for Design & Health

Saturday 12 July Congress, Exhibition & Academy Awards Gala Dinner
08.00-08.30 Late Registration
08.30-18.00 Congress, Posters, Showcases & Exhibition
19.30-23.00 Academy Awards Gala Dinner

Sunday 13 July Architectural Study Tours
Site tours and visits to local architectural landmarks and health and research facilities

Diamond Sponsors

AECOM HDR zeidler Farrow BVN ROBARTS GRESHAM SMITH AND PARTNERS


Beijing International Medical Center, designed by HDR Architecture


Gualv New City General Hospital, Zengcheng, Guangzhou, by RTKL

30 October - 1 November 2014

Design & Health China 2014

Design & Health
International Academy for Design and Health

In Partnership with
Beijing University of Civil Engineering and Architecture

Global Perspectives. Local Identities.

International Symposium & Exhibition

Venue: China Science and Technology Museum, National Olympic Park, Beijing, China

www.designandhealth.com | info@designandhealth.com


Children's Hospital of Soochow University, by HDR Architecture


Robarts Interiors and Architecture, Beijing

United Family Hospital New Hope Oncology Center, Beijing, by Robarts Interiors and Architecture

Media Partner WORLD HEALTH DESIGN

Ruby Sponsor HANSGROHE RTKL AN ARCADIS COMPANY

Emerald Sponsor ARK

Children's Hospital of Soochow University, by HDR Architecture

Traditional meets the **modern**

Influenced by western notions of disease treatment but with it medical roots in health preservation, Design and Health China 2014 offers a fascinating opportunity to discuss and develop a new salutogenic vision for our changing world

Design & Health China 2014

Global Perspectives. Local Identities.
International Symposium & Exhibition
30 October to 1 November, 2014
China Science and Technology Museum,
National Olympic Park, Beijing, China
www.designandhealth.com

Prof Gelun
Beijing University of Civil Engineering and Architecture

Prof Liu Linan
Dean, School of Architecture and Urban Planning, Beijing University of Architecture

Sean Chiao
Chief executive, Buildings + Places, Asia-Pacific, AECOM

Brian Kowalchuk
Director of design, HDR Architecture, USA

In the last century, China has been increasingly exposed to western medical practice based on the pathogenic model of disease diagnosis and treatment. But its historic medical roots can be traced back more than 2,000 years to the methods and concepts applied in Traditional Chinese Medicine (TCM) – a system built on an holistic approach to health preservation that complements today's salutogenic ambition.

As the disease profile of global societies shifts away from a focus on communicable diseases to non-communicable and lifestyle diseases, TCM and its holistic approaches – which promote the need to correct imbalances and create harmony between mind, body and spirit through healthy living and natural remedies – are seeing a revival in interest. With rapid economic development resulting in ever-larger urban surroundings, the health status of the Chinese people is now integrally linked to the quality of the country's urban infrastructure and access to clean air, water and soil. By integrating salutogenic design methodologies that promote health and wellbeing with ecological design approaches, architects and developers have a vital role to play in helping China become a more healthy and productive nation.

China's ability to develop a strong scientific research base, support innovation and enhance productivity through the exploitation of new knowledge will be key to its prosperity. Organised by the International Academy for Design & Health and hosted in Beijing, Design and Health China 2014 will bring together interdisciplinary world experts to share their knowledge in how to create a new salutogenic vision for China.

For the full programme, details of the speakers, and to register, please visit www.designandhealth.com

AECOM

UNDERSTANDING CHANGE

Good healthcare design needs crystal clear thinking and, like good health, starts with getting the basics right. AECOM sees health and healing in the round: find out how from john.hicks@aecom.com

Believe in **better**

The true test of design is whether or not it causes health, says ***Tye Farrow***, but the public must be persuaded to demand better

There is no such thing as neutral space. What we build either enhances or erodes our health. Yet few people recognise how places make them feel, so they tolerate boring, dismal and stressful environments. Such places affect our state of mind and our ability to contribute to a better world. How can we engender a sea change in what the public expects from the design of their cities, communities, workplaces and homes?

What's needed is a simple, universal question that compels people everywhere to cast a critical eye on their habitat from a health perspective. This question would become the ultimate test for design: does it cause health?

Why is a massive public awareness campaign so important now? Why should people see the gap between places that cause disease and those that cause health? Why pay so much attention to how places make us feel? Past generations struggled simply to cope with disease and prevent illness. But we have reached a point at which we can move beyond mere coping and prevention, and begin to build places where we can truly thrive.

The movement to *cause* health is a new way of thinking in a world that has been fixated on real and imagined symptoms, chronic illness and escalating medical costs. While the quest to learn and understand more about what causes disease should not be neglected, there's obviously much more to life than avoiding illness, coping with deficiencies, and enduring uninspiring places.

When we shine a light on opportunities to actively cause health, we can see a bigger picture of unlimited opportunities. Major leaps toward realising a truly thriving population will not happen until we pay equal attention to determining the causes of health.

The term ' to cause health' is not simply a new spin on conventional wellness programmes; it frames health as a resource for society. Adopting this assets-based approach to causing health would mean establishing the right social, physical and psychological conditions for people to make the most of their strengths. Progress in implementing this bigger vision will require us to look beyond positive thinking and wellness programmes that focus on prevention. Everyone must see how individual and community assets can be mobilised to create a new norm. This magnitude of change can be compared to a generation ago, when there was a shift in attitudes toward smoking on airplanes and in offices. Today we naturally expect our built environment to do no obvious harm, yet rarely do we ask "How healthy is this place?"

Today's deficits model of health promotion is self-limiting. The problems of social and economic inequality seem overwhelming if we concentrate on fixing what's wrong. But if we find ways to enhance and develop what is strong (in terms of health and human assets), we can begin to turn things around.

What if the potential to cause health became the basis for evaluating the elements of our daily lives? Discussions about architectural and urban design, for example, are typically limited to issues of style and personal likes or dislikes. What if the public understood the health-causing potential of every building, every public space and every home? Dreary design and merely functional places would become unacceptable from the standpoint of actively causing health. Instead, people would expect optimistic design that encourages social interaction, pride in community identity, and connections with nature, while creating a positive legacy.

The answer to global healthcare woes can be found by pursuing a more ambitious agenda for health and social change. Public policy, community and individual choices must now be guided by a strengths-based approach. The persistent question "How does this cause health?" will accelerate a much-needed shift in thinking by bringing awareness into our everyday lives.

What if the potential to cause health became the basis for evaluating the elements of our daily lives?

Tye Farrow is a senior partner at Farrow Partnership Architects

Chris O'Brien Lifehouse
Architects: HDR | Rice Daubney
Cost: AU$250m
Completed: November 2013

Sense of **dignity**

Lifehouse represents the realization of the vision of the late Prof Chris O Brien, an acclaimed medical oncologist, to create an integrated cancer care facility on the RPA Hospital campus in Sydney. It aims to redefine the cancer patient experience across a broad continuum of care supporting the vision of a patient-focused facility, with broad-based holistic treatment programmes and a world-class clinical environment, linked with integrated research programmes. Designed by HDR | Rice Daubney, the building responds to the nature of the cancer patient journey, and provides a unique environment for them to deal with this experience. The building is conceptually enclosing and protective without being introverted. This degree of transparency and the quality of the filtered natural light are defining architectural elements and a direct response to the vision of care to be provided. The design emphasises patient dignity, and brings a genuinely salutogenic approach to the patient experience. The commitment to the overall wellbeing of the patient is demonstrated through the provision of carefully designed waiting spaces; reflection zones; The Living Room – a patient space with no access for clinicians; the Wellness Centre, which focuses on parallel therapies; as well as the dignified design of the patient room the clinical spaces.

The promise of parity

While the shadow of political corruption still exerts an inimical influence over many parts of South America, the region's economic growth and long-standing promise of social fairness are key to the development of new healthcare infrastructure. ***Andrew Sansom*** reports

Life in Latin America today seems a far cry from the dark days of political and macroeconomic fragilities that marked much of the late 20th century. Fiscal consolidation and trade liberalisation have not only fueled economic growth but have also brought the promise of much-needed social reforms within closer reach.

With its hosting of the football World Cup this summer, and the Olympics in two years time, Brazil – the region's powerhouse – is pulling out all the stops to prove that it can deliver sports and entertainment events on a global scale. But as an increasingly demanding public sees the Brazilian government pour money into the infrastructure required to stage such behemoth spectacles, there is anger over the 'interruption' of efforts to provide more and better quality schools and hospitals. "There is a clear perception that there was misuse of funds invested in an area that represents a priority for Brazilian society," remarks Fábio Bitencourt, president of ABDEH – a multidisciplinary association dedicated to promoting hospital construction in Brazil. "Health and healthcare cannot be neglected while we are building football stadiums to FIFA standard."

The Brazilian constitution promises the right to healthcare provided free by the state. But, according to *The Economist*, two-fifths of citizens are not covered by local primary care, and are dependent on treatment in emergency departments. Says Bitencourt: "We currently have a large number of buildings for health services that, in principle, reasonably meets the needs of healthcare in Brazil, but, at the same time, we demand better distribution of healthcare geographically. Another important point is that we have poor distribution of professionals and health services in buildings for the various regions of Brazil."

According to Brazil's Ministry of Health, in 2010 there were 468,785 beds in Brazil, equivalent to 2.45 beds/1,000 inhabitants. The Ministry states that 2.5 beds/1,000 people would reasonably meet the country's healthcare needs, but Bitencourt points out that the World Health Organization sets an even higher parameter of 4 beds/1,000 people. To meet this target, Brazil would need to increase capacity by more than 296,139 beds – equivalent to about 1,974 new hospitals.

The lobby of the Hospital Pro Criança Cardiaca, Rio de Janeiro

Healthcare cannot be neglected while Brazil is building football stadiums to FIFA standard

Investment opportunities

Elsewhere, other South American countries are investing heavily. Architect Mario Corea, who was born in Argentina but set up his design practice in Spain, says: "Many countries in the region have implemented investment programmes, mainly using public funds, in order to build different types of facilities. I have actively participated in a large-scale public programme in the province of Santa Fe, Argentina where I was involved in the design for eight hospitals and some 80 primary healthcare centres, which have recently been built or are in construction."

He adds that countries are also following Brazil's lead by concentrating more on quality: "More recently, other countries such as Argentina, Chile and Peru have also shown themselves to be very committed to quality, choosing to build new modern facilities rather than spending time and money on reforming outdated structures that are very difficult to refurbish, especially in terms of adaptation to new medical technologies and urban conditions." He highlights his work with the Clemente Álvarez Emergency Hospital as typical of this "new way of thinking about healthcare, which is as a service that must respond to the needs of the citizens".

Client: Ministry of Public Works and Housing, Government of Santa Fe
Chief architect: Mario Corea
Cost: US$ 14,700,000
Size: 11,500sqm
Completed: 2014

CEMAFE, Santa Fe, Argentina

One of the central tenets of the Santa Fe government's new public health template is that healthcare facilities must be located at strategic locations to make them accessible to the people. CEMAFE follows this principle, located as it is in a well-connected urban area.

In order to reduce reliance on the use of elevators, the project was approached as a horizontal two-tier structure. The main design challenge was to address the need for natural light inside the building, which was resolved by a series of interior courtyards. One of the main construction challenges was how to deal with the foundations of the building. The solution adopted was a structural system comprising 'hanging slabs' of a grid of tensors, which transfer their loads through a network of roof beams to four large columns, each of which is composed of a dozen piles anchored at 35m deep.

The centre's medical departments include gynaecology, urology, ophthalmology, audiology, dentistry, and otolaryngology. Other services include facilities for radiology, ultrasound and endoscopy; and oncological and chronic dialysis care. There are also four outpatient operating rooms, a laboratory, and a gym.

Finochietto Sanatorium, Buenos Aires, Argentina

Epitomising South America's growing appreciation that its healthcare infrastructure should afford respect for the environment, the Finochietto Sanatorium began operating in October last year. The new 10-storey building encompasses sun-protection systems as eaves and sunshades, ventilated facades and thermal-break aluminum-framed windows.

A public-technical circulatory network provides operational efficiency in harmony with patient comfort. At the design stage, the configuration of all functional spaces and equipment was provided by an interdisciplinary team composed of AFS Arquitectos, its specialised consultants, and representatives of the medical, nursing, technical and maintenance staff responsible for the future operation of the institution.

Innovations include: centralised, automated control of the entire facility; an electric co-generation system; a water-condensed VRV (variable refrigerant volume) air-conditioning system; an energy-recovery heat-exchange system; intelligent lighting control; reuse of condensate water and rainwater; and use of green vegetated roofs to reduce heat island effect.

Client: Private Healthcare Insurance
Architect: AFS Arquitectos
Size: 16,700sqm
Cost: Undisclosed
Completion: 2013

But despite large pockets of healthcare expansion in Argentina, the country doesn't attract foreign private investment, says Corea, owing to restrictions on foreign exchange. Luciano Monza, a partner at ArquiSalud, adds: "There is a lot of different construction projects in healthcare financed by the World Bank, Inter-American Development Bank, etc. But external private investment is not common in healthcare because the national and provincial governments are usually financial agents and the local private healthcare groups are quite strong economically and finance their own buildings."

Its reputation for bureaucracy and abundance of native healthcare design and policy leaders notwithstanding, Brazil is more open to outside assistance, but there are many other parts of South America, too, where it is common for design projects to involve the active contribution of foreign architectural and planning experts.

In particular, Corea points to Chile, "which has programmed a number of hospitals to be built over the next five years". American architects Shepley Bulfinch helped Alemparte Barreda and Associates on the design of Chile's new University Clinic of the Andes, which has the ability to connect with remote surgeries for educational purposes. Rising interest in telemedicine is also noted by Alvaro Prieto Lindholm, an architect at Chile's Ministry of Health, who comments: "There is growth in this area, linking hospitals that are of low and medium complexity, or that are far apart, with hospitals of great complexity." He highlights the new hospital for Easter Island, which opened in 2012, as another example of this trend.

Hospital Pro Criança Cardíaca, Rio de Janeiro, Brazil

Founded by Dra Rosa Celia Barbosa, the Pro Child Heart Foundation in Rio aims to help children who require cardiac care. A mix of private and public, the hospital's wealthier patients help subsidise the care of the poorer children.

Above two basements are six clinical floors providing emergency referrals, image diagnostics, surgery, haemodynamics, an intensive-care unit, and inpatient wards. Located close to a cemetery, the hospital's compact site posed a challenge, requiring RAF Arquitetura to protect the north façade from the sun with an aluminium composite resembling copper; for the cemetery-facing south side, design elements were incorporated to allow for outward views.

"The height of the ceilings needed to be lower than is ideal for a hospital," comments the project's architect Flávio Kelner. "Above the ceilings there isn't much space, so the lighting designers had to install the fixtures while avoiding ductwork and air-conditioning systems."

Furniture is playful while each floor has its own colour identity. Materials such as Corian, granite, Formica laminate, vinyl covers, and acoustic liners provide durability without compromising aesthetics. Water is heated via solar panels, and louvres and solar-control glazing help moderate the internal environment. The project has been honoured by the Brazilian Institute of Architects (IAB).

Architects: RAF Arquitetura
Client: Pro Criança Cardíaca
Size: 8000sqm
Cost: BRL50m
Completed: 2013

The toy room at the Hospital Pro Criança Cardiaca, Rio de Janeiro

Stalling programmes

Political corruption and opportunism, however, still persist in some parts of South America and remain a threat to the derailment of reforms. Venezuela's Barrio Adentro is a case in point. In operation since 2003, the government-funded programme comprises four phases: primary care; diagnosis and rehabilitation; upgrading existing hospitals; and new hospital construction. According to Sonia Cédros de Bello, an architect at the Experimental Development Institute in the Faculty of Architecture at the Central University of Venezuela, remodeling and renovation work has stalled, with hospitals closing and equipment sitting in boxes.

"Phase four involves plans for building 16 new hospitals, but only four have been started using a prefabricated system," she says, adding that hospitals are reliant on government funding as local private investors are deterred from funding projects as there is no security for private property. Consequently, some projects are in chaos; the Ana Francisca Pérez de León II Hospital, for example, opened in 2012, having been under construction for more than a decade. It began as an emergency hospital for both adults and children, before all the facilities for children were removed. Yet children's health is an area of medicine that Cédros de Bello is adamant still needs much investment.

We still have a long road ahead to improve the quality of life for our children

Children in care

Even in Brazil, where improvements have been impressive, dedicated children's hospitals are rare. Fábio Bitencourt says: "In 1990, we had an infant mortality rate of 62 deaths/1,000 live births, which, in 2000, fell to 29.7 deaths/1,000 births. In 2012, this was further reduced to fewer than 14 deaths/1,000 births. Brazil has exceeded the UN Millennium Development Goal of a two-thirds reduction in infant mortality between 1990 and 2015. But we still have a long road ahead in this important work to improve the quality of life for our children."

An example of the innovative work in this area can be seen in Rio de Janeiro, where the Hospital Pro Criança Cardíaca aims to help disadvantaged children in need of cardiac care. Designed by RAF Arquitetura, the hospital adopts unusual but upbeat themes to create a high-spirited environment (see case study, above).

Some of Brazil's neighbours still suffer from high maternal and neonatal mortality rates. Health reforms in Peru were passed in 2010, with the country's Universal Health Insurance law aiming to increase access to timely and quality healthcare, and provide the poor with financial protection from illness. This promises to be a vital support lever for children's health, in a country where disabled children can find themselves excluded from society. Professor Bas Molenaar, whose firm EGM architecten has helped build a children's hospital in Peru for free, says many projects progress at a slow pace. But, he insists, there is no shortage of enthusiasm to deliver better healthcare and close the gap between rich and poor. Speaking about the Tony Molleapaza Rojas Children's Hospital in Arequipa, he describes it as "a private initiative, privately funded but one that is very idealistic – people do work for free".

He sees the project, marked by its small pavilions and focus on family and community support, as a humble reminder that it may even be possible to develop high-quality healthcare infrastructure in developed countries on a more human scale and to a more basic form.

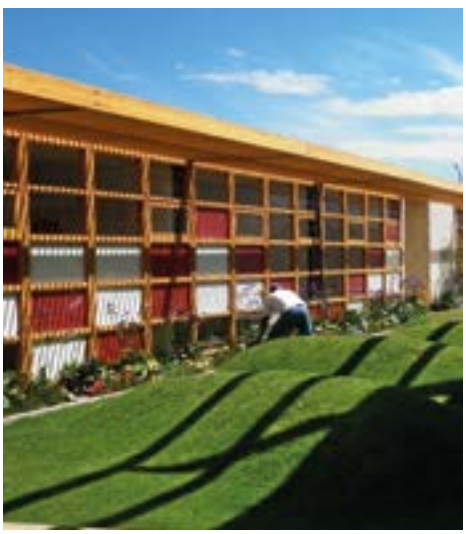
Tony Molleapaza Rojas Children's Hospital, Arequipa, Peru

EGM architects constructed the Tony Molleapaza Rojas Children's Hospital using its own funding, following a request from Marjan van Mourik, director of the PAZ-Holandesa Foundation. Her ongoing aim is to improve the circumstances of disadvantaged children by offering affordable medical care.

Built from local materials, the hospital consists of ten small pavilions – a flexible topology that offers greater resilience against earthquakes – connected via an outside area. The small-scale solutions in the outpatient clinic and wards are combined with 'hi-tech' logistics in the operating theatre. This pragmatism is also highlighted in the delivery of services for patients of both the poor and middle classes, but at different rates. Private rooms for wealthier patients come at extra cost but help subsidise the care of poorer patients.

The hospital provides ad hoc operations, as well as speech therapy, psychological counseling and physiotherapy. Benefiting from a separate family house, the hospital also heavily involves parents in their child's re-integration process. Explains Professor Bas Molenaar of EGM architecten: "There is also simple preventative work, such as teaching the children to brush their teeth properly. Family support is very important. When you help people at a very young age, they can take part in society, but they need a lot of local support from their families."

Architects: EGM architecten
Client: PAZ Holandesa
Cost: Provided free
Size: 5000sqm
Completion: 2012



Chile is trying to encourage its people to lead more healthy lifestyles

Lifestyle improvements

In common with North America and Europe, many countries in South America are coming to terms with rising obesity among their populations. Chile is one such country at the forefront of the movement to encourage people to lead more healthy lifestyles – a focus evident in the design of Clínica Los Condes, by Mobil Arquitectos and US-based firm RTKL Associates (see below).

Promotion of sustainability is also becoming a core objective, perhaps unsurprising in a country so in tune with its environment. Says Alvaro Prieto Lindholm: "This issue has been addressed in recent years and today many hospitals are built occupying solar energy, geothermal energy, thermal insulation of walls and windows, greywater, asbestos-free materials, equipment of low power consumption and, in some cases, green roofs."

Clínica Las Condes, Santiago, Chile

Johns Hopkins Medicine International asked RTKL to work alongside local architect Mobil Arquitectos on the masterplan for the 220-bed Clínica Las Condes. The challenge was to double the hospital's capacity on a dense, urban site and integrate the new facility into the existing hospital.

Without compromising the patients' medical needs, which included a new state-of-the-art intensive-care unit and surgical suite, the hospital also wanted to serve the community's need for education and health, while acknowledging the city's pedestrian-centric ethos. The design concept involved filling the site on levels three and above, but pulling the first two levels back in order to widen the pedestrian path. Level one of the expansion is 'public' in nature, providing community education, outpatient testing, a café and artwork.

Patient units are broken into three fingers to reduce the building face and allow more sunlight to the south. Public movement is concentrated at the southern edge of the expansion, while staff and materials circulate in the middle along a staff support core between the existing medical centre and the extension.

Architects: Mobil Arquitectos and RTKL Associates
Client: Clínica Los Condes
Construction: Moller y Perez Cotapos
Cost: Undisclosed
Size: 116,700m²
Completed: 2013

Book your place/table
Deadline: 15 May

MIKE NIGHTINGALE FELLOWSHIP

Changing lives through sustainable development

Gala Dinner & Charity Auction 2014 | 6 JUNE 2014

The Mike Nightingale Fellowship was established in 2012 to support the development of more sustainable communities in low to middle income countries. Initially focusing on South Africa, the charity is a catalyst for innovative projects through a mixture of charitable funds, skills development, education, knowledge and expertise. Join the Fellowship at its inaugural fundraising **Gala Dinner & Charity Auction** to help change lives and create a more sustainable world.

How can I help?

On 6 June, the Fellowship will be organising a Gala Dinner & Charity Auction at the Crystal in Royal Victoria Docks in London, UK. Keynote speakers will include Lord Nigel Crisp, former chief executive of the NHS and now working in global health in low-middle income countries. The event, which will have a South African theme, aims to raise funds to support the charity's various initiatives and the development of its operations.

Sponsor Opportunities

We have a range of event sponsorship packages and auction prizes. The packages are flexible to accommodate event sponsorships and auction prizes from different bands upon request.

The Venue

The Crystal is a sustainable cities initiative by Siemens exploring the future of cities. Home to the world's largest exhibition focused on urban sustainability and a world-class center for dialogue, discovery and learning, the Crystal is one of the world's greenest buildings. The exhibition at the heart of the Crystal showcases global trends in urban development, as well as existing technological solutions to build environmentally sustainable, livable and prosperous cities and communities.

To book a table, sponsor the event or join the auction, please visit www.mikenightingalefellowship.org
For more information, please contact info@mikenightingalefellowship.org

Chile's capital Santiago has shown interest in an innovative pollution-cutting material that has already been used on a healthcare installation in Mexico City to impressive effect. The Torre de Especialidades, an addition to the Hospital Manuel Gea Gonzales, features a facade comprised of a tile called proSolve370e, which is said to eliminate the pollution from about 1000 cars in the Mexican capital every day. The key to the façade's smog-reducing powers lies in its titanium dioxide-coated architectural modules, which are activated by ambient daylight. Its German manufacturer Elegant Embellishments suggests the hospital's 2500m^2 screen could be the world's largest urban air purifier.

But, like elsewhere, green initiatives can succumb to other shorter-term pressures, as ArquiSalud's Luciano Monza explains: "Sustainability is being discussed a lot in academic circles, but it is not so easy to apply in new projects. This is because construction costs are higher if you apply sustainability concepts, while the legal standards on this issue are not too severe. Plus, energy is still very cheap in Argentina."

The key to the facade's smog-reducing powers lies in its titanium dioxide-coated modules

Conclusion

The diversity of South America is startling; while Brazil can rub shoulders with the world's economic elite, other nations in the region are still hampered by a lack of access to basic healthcare, political cronyism, or financial insularity. In some areas of healthcare design, South America is playing considerable catch-up, while in other fields, such as sustainability, it can be more respectful than most. Joining everything together so that its populations receive the healthcare they deserve represents a formidable but intriguing challenge.

Andrew Sansom is associate editor of World Health Design

The Torre de Especialidades and possibly the world's largest urban air purifier

Appetite for reconstruction

In a structural sense, the more advanced European healthcare economies are being pulled in opposing directions, but with flexibility key to progress, and even survival, the manifestation of architecture as the art of middle-ground compromise is as strong as ever, says ***Andrew Sansom***

Vienna North Hospital, piazza

Austerity economics have dominated the fiscal landscape of Europe in recent years, and they are set to do so for the foreseeable future. Nevertheless, tangible signs of recovery in many Northern European economies are, at least, re-engaging governments and healthcare providers with the appetite to tackle much-needed reforms through infrastructure initiatives and streamlining efforts.

Countries in Scandinavia and the Nordic region, many of which came out relatively unscathed from the deep recession, are in suitable shape to make good on the 'health is wealth' promise. And, while the trend to build smaller ambulatory care and day-surgery facilities closer to local communities is unlikely to see any dwindling in the near future, there are other forces at work, with a realisation that locating testing and treatment services close to associated academic and research facilities can not only provide a faster and more efficient acute-care service but might provide more opportunity for career progression and aid staff retention, while acting as hubs to connect local GPs to specialists.

Nowhere is this more evident than in Denmark, a country which, according to Christopher Shaw, senior director at Medical Architecture, is "powering ahead in restructuring its acute and psychiatric infrastructure with eight new super-hospitals, each serving a population of around 700,000, which combine academic and biotechnology research – a major plank in the country's planned economy".

He continues: "The UK, Denmark, Sweden and parts of Spain are particularly interesting in that they are all, in different ways, linking public health investment with tariff-based health." Broadly, this manifests itself in healthcare design by "elevating public health benefits within the planning systems, as in Denmark; greater integration of health maintenance and intermediate care facilities with social infrastructure, as in Sweden; and concentration of, and removal of tiers in, secondary and tertiary-care facilities into much larger acute academic hospitals Europe-wide".

Supersizing strategy

BDP has won the masterplanning project for the design of a new hospital complex in the Bispebjerg suburb of Copenhagen. Due to be complete in 2025, it will feature 94,000sqm of new buildings and the renovation of a further 64,000sqm on a 26-hectare plot. Stantec's Jonathan Wilson questions the extent to which this vast campus is embracing integration across the various tranches of the 'care pyramid', suggesting that it appears to be "focused exclusively on acute care". But, in deliberating that it may be tailored to the needs of Denmark's relatively small and dispersed population, he points out that it could be imitating Northern Ireland, which has established a distributed network of local hospitals and community or primary-care centres.

Indeed, he praises the UK as a country that "has got this right, despite being dogged by procurement straitjackets, which are expensive and/or inflexible". Adopting a more 'glass half-empty' stance, John Cole CBE, former chief estates officer in the Department of Health, Northern Ireland, says: "In the UK there is very much a need for regional planning to develop the chains of hospitals collaborating in a way to ensure they are delivering an integrated and comprehensive range of services."

In the UK there is a need for regional planning to develop chains of hospitals

The Francis Crick Institute, staff entrance

Schwarzwald-Baar Kinikum, Villigen-Schwenningen, Germany

The Schwarzwald-Baar Klinikum illustrates how the context of a country's healthcare system can determine the design of space. Germany follows a universal multi-payer system, and most new hospitals include a mixture of both double and single rooms. Schwarzwald-Baar Klinikum includes three room types: double-bed patient rooms with modest finishes are given to patients with public insurance; double-rooms with high-quality finishes are for patients with private insurance; and single-bed rooms with luxury finishes are given to patients paying in cash.

Local design influences drove the design aesthetic of the hospital. The exterior of the hospital stays true to German modernism, featuring simple forms, cubic shapes, and a white façade with yellow, red and orange accents. Art in healthcare environments typically leans toward landscapes and realism, but this hospital celebrates Germany's influence on contemporary art: the exterior features two large steel-rod installations; an interior corridor boasts a 650-feet-long mural comprising abstract scenes, cartoon strips, and bold colour applications; and 10 individual neon-light nodes, intended to be experienced as clouds of colourful molecules, are suspended in the atrium.

Client: Schwarzwald-Baar-Klinikum Villingen-Schwenningen Gmbh
Architects: HDR TMK
Size: 45,000sqm
Cost: €263m
Completion: 2013

Stephen Herbert, senior project architect at HOK, is confident that the Danish supersizing approach is the other side of the same coin that is seeing the delivery of care brought closer to local communities. "It goes beyond the provision of large, acute hospitals and is filtering down to ambulatory and community care," he says. "It's helpful if you have policy-makers who are more joined-up in their thinking and are rethinking their overarching strategy, rather than tinkering around the edges."

And Kirsten Ziemer, a medical planner at HOK, says Scandinavian countries are leading in their approach to preventative healthcare, by teaching healthy lifestyles in schools. "In Finland," she says, "what they have seen is children going home to their parents with information about healthy lifestyles and healthy eating that the adults weren't knowledgeable about. So there is this filtering up of education as well."

This peer pressure in reverse may be a happy coincidence, but it could form a vital cog in the transition to healthier living, with European nations faced with ageing populations burdened with multiple chronic diseases. Highlighting the progress made by the Finnish in this regard, Ziemer recalls her experience of visiting a social centre where elderly people, some of whom are in their nineties, participate in group activities.

For Guido Messthaler, managing director of HDR TMK, the key word is 'sustainability'. In order to maintain an active lifestyle into old age, the patient's situation must be strengthened," he explains. "The magic word is self-reliance."

Highlighting the example of one of his firm's projects, an outpatient clinic for naturopathic medicine in Essen, Germany, he adds: "By visiting the outpatient clinic, patients stabilise their own health sustainably for the long term. The Clinic for Naturopathic Medicine, which belongs to the Essen-Mitte Clinics, is the first hospital in Germany to offer its patients such comprehensive day-clinic care."

Function and flexibility

Christopher Shaw points out that Norway's vast sovereign wealth fund provides it with the freedom to continue to develop. Arguably, the country still boasts the most modern hospital in Europe: St Olavs Hospital in Trondheim. The project, which began in the mid-1990s, has now come to an end with the completion last year of the Knowledge Centre. Designed by Ratio arkitekter, Nordic Office of Architecture and COWI, with a strong emphasis on functionality and usability, the Knowledge Centre will provide facilities for both St Olav's Hospital and the Norwegian University of Science and Technology. Among the building services are outpatient rooms, laboratories, isolated bedposts, a ward, a library and auditoriums. It has been calculated that the centre's average energy consumption will be a staggering 45-per-cent lower than the official required standard.

The main hospital provided a watershed moment in healthcare design in Scandinavia, with its notion of 'sengetun' or single-bed rooms grouped into mini courtyards, with direct observation from decentralised workstations. The benefits have been wide-ranging, including a less noisy environment; the ability for physicians, health professionals and students to communicate more easily and carry out examinations in the patient room; quicker patient access to staff; improved privacy; a sense of safety and empowerment; and less anxiety among patients with dementia.

St Olavs Hospital Knowledge Centre, Norway

Hospitals will be forced to think about how to use diagnostic areas in flexible ways

Marte Lauvsnes, a researcher in Norway's health department, explains: "This concept, which is very flexible, is what many projects are looking for to accommodate future change. It combines both the flexibility of the building for the future and also the human touch of patient-centred care."

Meanwhile, at the acute level, the acknowledgement that as people age they are more likely to suffer from multiple conditions is conspicuous in a move to combine related areas of medicine. "Hospitals will be forced to think about how to use diagnostic areas in flexible ways," says Lauvsnes. "Radiology and surgery facilities, for example, are beginning to merge now, and we are seeing more hybrid theatres."

Nordic – Office of Architecture/Erik Börseth

St Olavs Hospital, Knowledge Centre, Norway

Link in a chain

John Cole takes it a stage further by suggesting that, as much as technology, the flexibility to cater for an ageing population at a much lower cost base is driving the concept of 'the hospital without walls', and, for this reason, there will be a need in the future for "a much closer relationship between hospital specialists and people working in the community".

Realistic that it may be necessary for the hospital to become more dehumanised in one sense, he says: "The future is going to be about more and more computer-driven surgery, which allows more interventions in and out in a day. We need to plan for expansion and flexibility, and the hospital as a factory is going to involve faster throughputs, highly specialised services, and it may not be a particularly enjoyable environment for doctors."

But there is still room for utopian visions and, in the UK, several recent projects in the field of cancer treatment could be an indication of a new era of humanising care. New patient-focused havens for the famous Maggie's charity are in development – including one in Cardiff and another in Forth Valley, Scotland – while, at an urban level, there is the ongoing development of highly advanced centres that not only marry related diagnostic units and treatment services but also integrate core research facilities.

One such project is the London-based Francis Crick Institute, which will be complete next year. Designed by HOK in partnership with PLP Architecture, this inter-disciplinary medical research institute will explore how disease develops and find new ways to

Hospital gardens at Kings Healthcare Partners Cancer Centre at Guy's Hospital, London

treat, diagnose and prevent illnesses such as cancer, heart disease and stroke, as well as infections and neurodegenerative conditions.

Another major London project is Kings Healthcare Partners Cancer Centre for Guy's Hospital that is due to open in 2016. Three heavyweight firms in construction and architecture – Laing O'Rourke, clinical design specialist Stantec, and the world-renowned Rogers, Stirk, Harbour + Partners are collaborating on the project, having been appointed last year following a contractor-led RIBA design competition.

"The client's brief was fundamentally to bring all cancer care and treatment services together in one building," says Ivan Harbour. "Our response to that brief in terms of floor area was to go up quite a long way. But with 15 floors, we were concerned that wayfinding in the building would be dependent on signage and there would be a disconnect floor by floor. Our proposal was to break the tall building down into a series of small buildings based on procedures."

Within the building there are three areas arranged as 'care villages' on a human scale: a radiotherapy village, a one-stop village, and a chemotherapy village. Each village is entered via a 'village square', with accommodation arranged on mezzanine levels, so visitors can look up and see where they need to go.

Each village will also have a distinct identity incorporating landscaped balcony gardens. This approach not only allows greater flexibility within what might be considered a restrictive patient tower building, but it allows each village to function at both an individual and joined-up level. Jonathan Wilson points out that the villages embody the warm and relaxed character of a Maggie Centre. "This kind of approach requires a shift of attitude to spatial planning, interior design and furniture selection – in other words, a completely different type of interior space," he says. "Stantec has taken this philosophy right into the treatment zone, rethinking, for example, the layout of a standard consulting-examination room to foster more equal relations between patients and clinicians."

Kings Healthcare Partners Cancer Centre for Guy's Hospital, London

There is a feeling that wherever you are, you are at the bottom of the building

Harbour adds: "There is a feeling that wherever you are, you are at the bottom of the building rather than the top. This allows the spaces to establish themselves independently. We knew we were reacting against the conventional and against the traditional institutional environment that relies on corridors and corridors, and lots of signage. We wanted to rely more on space and light."

AZ Zeno hospital of Knokke-Heist, Belgium

At this hospital currently being built on the Belgian coast, architecture has been elevated to foster positive psychophysical experiences and forms an integral part of the healing process. Sustainability is a major driver in the design of this hospital for the non-profit association AZ Zeno. All rooms will be designed for optimal visual comfort and will oversee a golf course.

Indoor-climate comfort class B will be achieved by cooling and heating ceilings, via a borehole heat-exchanger system. The building's outer shell is a high-performing double skin façade, while the large windows will be shaded by internal adjustable blinds, providing a high solar factor in summer and a high level of light transmission during winter. Central heating production involves a biomass boiler, cogeneration and a fluid-fluid heat pump exchanging the simultaneous flow of heat and cold. Air-handling units with a double heat-exchanger system help control the air quality, while on the roof, sustainable electricity is produced by use of photovoltaic cells.

Consortium: TA Aaprog – Boeckx
Architects: BURO II & ARCHI+I
Sustainability advisors: Ingenium nv
Structural engineers: Greisch nv; SCES nv
Size: 48,811sqm
Cost: €100m
Completion: 2017

Suspending and sustaining

This departure from the hospital as an institution is really starting to gather momentum in other parts of Europe, too. Sitting close to the Belgian coast, a new hospital at Knokke-Heist is under construction that appears to be suspended over the countryside, with natural light penetrating all the way into the technical rooms.

Led by design firm BURO II & ARCHI+I in partnership with a temporary association of architects, the vision for the hospital is one of allowing the landscape to flow beneath the building. The effect of this is to provide a virtually seamless link between indoors and outdoors, and between care facilities and public areas (see case study).

Other hospital projects are formalising their response to green planning and sustainability by considering criteria early on in the design process and applying life-cycle costing. At the outset of the project to build the new Vienna North Hospital, a Sustainability Charter was developed, drawing upon a workshop held with experts and the project team, and a number of established green building standards. The Sustainability Charter will be extended to cover the operational phase of the hospital and will also serve as a checklist during the planning and construction phases (see case study, right).

East and south

While such objectives are commonplace throughout Europe, Christopher Shaw contends: "The degree of design leadership largely depends on the level of investment in change, and [currently] that is very constrained in Eastern and Southern Europe". The appetite for building capacity is high in Eastern Europe at present, says John Cole: "In countries like Poland and Hungary, for example, they are going to need significant investment, even though they don't have the funding at the moment. I think European structural funds will come in to support that."

Vienna North Hospital, Vienna, Austria

The design for this high-tech building in the Austrian capital combines the advantages of a pavilion-type facility with those of a central hospital. The foyer area features a spacious piazza connecting the hospital with the urban space while, at the same time, providing protection against noise.

Coming from Brünner Straße, visitors first reach an urban square, the boundary of which is marked by the two buildings 'Mars' and 'Venus' and the service provision wing to the north. The 800-bed hospital, which features single and twin rooms, is horizontally and vertically structured into three parts. Horizontally, it comprises the service provision wing, the core hospital, and a park with therapeutic gardens; vertically, the inpatient wings are located above the promenade deck, which is built on top of the core hospital.

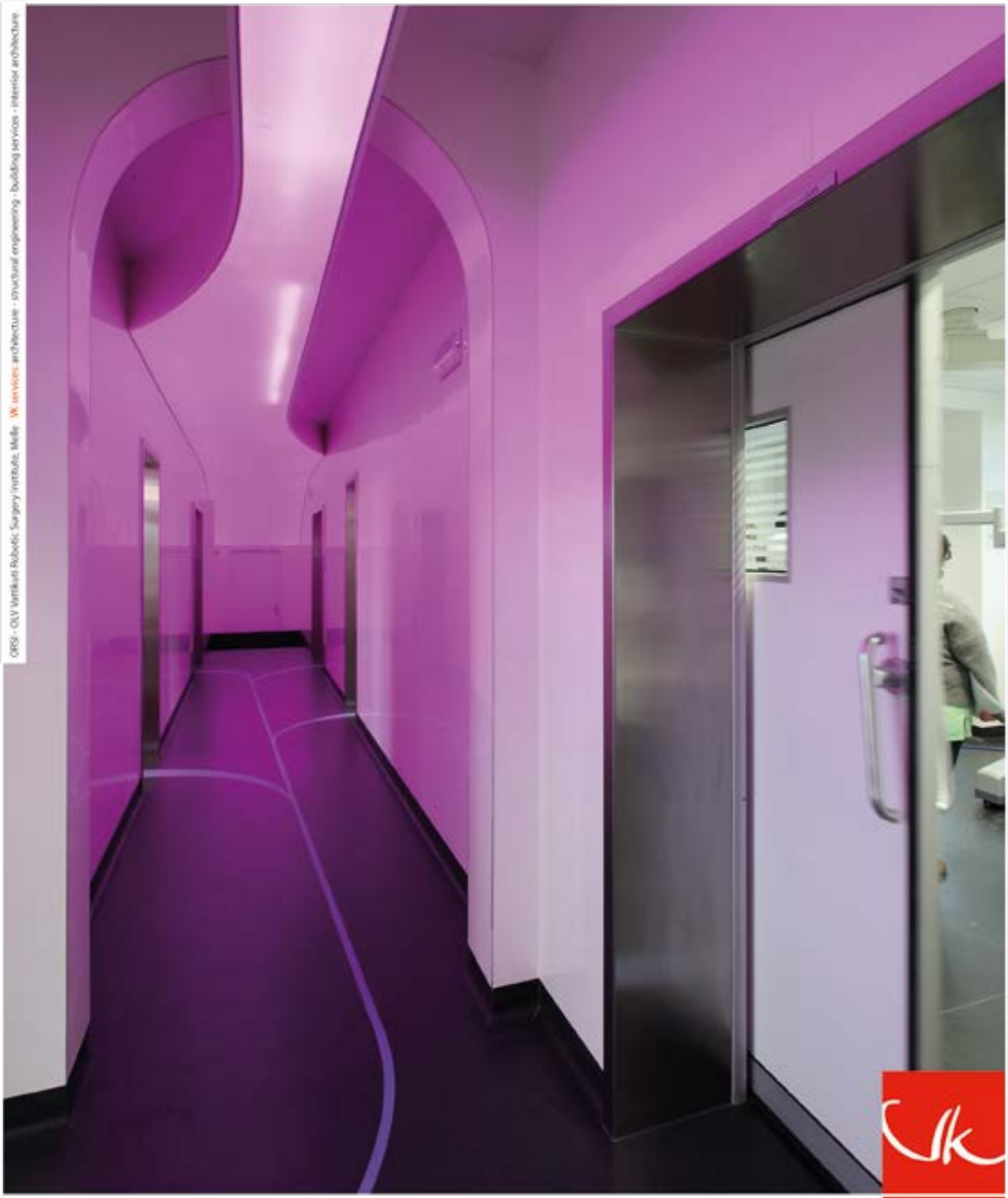
Light-flooded atriums, roof gardens and the overall landscape design unite the ideas of well-being, healing, growth and recovery. The overall concept provides clarity, optimal functional processes, a clear organisation, short distances for the nursing staff to get to the patients, and complex networks.

Client: Vienna Hospital Association
Architects: Albert Wimmer Associates and KHN Health Team
Size: 111,579m²
Cost: €85m
Completion: 2016

Guido Messthaler concurs, saying: "Further potential for growth can be found in the healthcare markets in Eastern Europe. In the Lithuanian capital Vilnius, for example, we built a medical diagnostic center. But I also see a lot of movement in Poland right now."

The differences in approaches being taken in Eastern Europe compared with the West stretch further than at a mere quantity level, not least in relation to elderly care. Allison Wagner, HOK's regional

Health Team KHN/Albert Wimmer ZT



VK delivers fully integrated architecture and engineering services for demanding healthcare clients worldwide who want to invest in healing environments in a constantly evolving society where our quality of life is under stress. www.vkgroup.be

Want to help build tomorrow's world? Check out how you can realize your possibilities on **www.vkgroup.be/careers**.

ARCHITECTS & ENGINEERS

Schwarzwald-Baar Klinikum, Villigen-Schwenningen, Germany

director of healthcare, says: "In Russia, they are asking for additional beds than are needed, because elderly patients are going into hospital for two or three weeks a year as they want to socialise."

Southern Europe, meanwhile, remains bogged down in debt and austerity, although Stephen Herbert believes it may re-emerge in time. "In Southern Europe there is currently less investment. Partly, that is because a lot was built in the early 2000s, and there is a level of slack that needs to be taken up. They have overprovided to some extent, but once that slack is taken up we could start to see healthcare provision requirements surface again."

The German market for hospitals is changing and competitive pressure is growing

Procurement plight

As for procurement, while there is uptake for PPP in Ireland and new EU member states such as Poland, the UK is experiencing something of a backlash. Christopher Shaw summarises: "The fundamental problem with a PPP hospital is the lack of risk transfer and consequential rigidity."

John Cole is vehement, at times, in his criticism of the PFI approach, arguing that it has led to a transfer of influence into the hands of an artificial client, namely the contractor, who has little incentive to focus on the long-term efficiency, operation and adaptability of healthcare structures during the design and build process.

But other commentators believe more PPP projects will come on board because of the intense pressure on costs and need to generate earnings. Says Guido Messthaler: "In Bad Homburg and Usingen, we just celebrated the opening of two new hospitals – the Hochtaunus Clinics are the first PPP project in Germany. According to a feasibility study for the Hochtaunus Clinics, there is a potential for municipalities and states to save costs in eight-figure amounts spread over the entire contract period of 25 years. Those are considerable amounts for municipalities, should they in fact materialise over the years.

"The German market for hospitals is changing; competitive pressure is growing. Closures, takeovers, privatisation, and the establishment of for-profit service-provider chains and network solutions for independent non-profit and municipal providers are the order of the day."

Commenting on the lessons learned from 20 years of PPP in the UK, Jonathan Wilson says the model's commercial incentives are not conducive to design quality seen in terms of the built environment's positive impact on health. "It is an open question as to whether enlightened clients will continue to adopt PPP as a procurement method for this reason," he remarks. "It is telling that major city-centre NHS trusts, particularly those in London, which can raise finance in alternative ways, avoid PFI."

He adds: "Project agreements must allow providers to devise and implement changes to their estate in a natural and flexible manner as needs arise, and certainly without the concessionaire imposing unreasonable costs. If PF2, the new generation of PFI currently being rolled out in the UK, cannot do this, it will not survive."

Andrew Sansom is associate editor of World Health Design

Open dialogue

Mental health facilities now aspire to be sanctuaries conducive to recovery, with high-quality design and finishes a treatment tool in themselves, writes ***Emily Brooks***

The UK's best-known high-security psychiatric hospital, Broadmoor in west London, is being redeveloped. Remarkably, much of Broadmoor's built infrastructure is the same as that used for the very first patients when the facility opened in the 1860s as the Broadmoor Criminal Lunatic Asylum. The buildings' Victorian layout no longer supports a recently introduced model of care that is centred around therapeutic activities, aimed at motivating and engaging patients, while providing them with intense treatment.

Oxford Architects' new proposal for the site includes three U-shaped ward blocks fanning out in a horseshoe, with a therapy building at its heart. Having several discrete structures as opposed to a singular monolithic one immediately gives the impression of a more human-scale complex – yet some things have not changed, with one of the Victorian asylums' original principles (views of nature, and access to gardens and hands-on work in the outdoors) preserved.

Peter Brinch

The Psychiatric Clinic in Lund, Sweden, by White

Broadmoor's transformation – the first patients will move in at the end of 2016 – follows a pattern of redevelopment where architecture provides both the catalyst and the cradle for organisational change. "When you're making a new building, you're often making a new organisation at the same time," confirms Stefan Lundin of Swedish practice White, which has just completed a 30,000sqm psychiatric clinic carved from unlikely raw materials, a brutalist local government building (see case study, right). New models of care, coupled with emerging theories about how design can reduce stress and aggression, are driving change.

New models of care, coupled with emerging theories about how design can reduce stress and aggression, are driving change

Driven by research

Lundin says that research is increasingly feeding into design insight. In 2006, his practice completed a psychiatry building at Östra Hospital in Gothenberg, which was pioneering in its free and open atmosphere, and the use of a succession of spaces that slowly progress from the private to the public – a spacial arrangement that is intended as a means for recovery in itself. But a decade ago "it was much more about intuition. After that we met with environmental psychologists and became much more aware of research. It meant we could have discussions on a higher level."

In 2012, Lundin co-authored a paper with Roger Ulrich and Lennart Bogren entitled 'Towards a Design Theory for Reducing Aggression in Psychiatric Facilities',[1] which used data about use of restraint in three Swedish hospitals to support the theory that certain stress-reducing environmental features can have an impact on behaviour. It stated that "psychiatric hospital environments will reduce aggression if they are designed to: minimise stressors such as crowding and noise; foster privacy, control, and other stress-coping resources; and provide exposure to stress-reducing features such as nature".

Communicating new ways of thinking about how design can provide respite,

Psychiatric Clinic, Lund, Sweden

Converted from a brutalist regional government building designed in the late-1960s by Swedish architect Klas Anselm, this new psychiatric clinic is leased to Region Skåne Psykiatri. At first glance it was not an obvious candidate for stress-relieving, healing architecture, says White's Paula Block Philipsen, who led the project, "but getting to know the building, it has several qualities highly suitable for mental health: the complex is beautifully integrated in the landscape of soft green hills. It contained three courtyards with interesting diverted characters, one around a fantastic ancient oak tree. Light, delicate materials, glimpses of the surroundings and a hallway along the courtyards existed already as themes to develop further."

White created a more central entrance, enclosing one of the courtyards to make a light-filled reception area. Outpatients, in-patients and daycare patients are all treated here, which is, in part, intended to "break down the walls between different forms of care. You will be able to meet and be treated by the same staff in all situations." Rooms are all single-bedded and, outside of these, a succession of spaces of different sizes and varying levels of privacy are provided, so that all patients can find a comfortable place. A public restaurant, conference hall and public courtyards ensure that the clinic is far from shut off from everyday life, encouraging integration with the local community.


Peter Brinch

Client: Wihlborgs Fastigheter
Architect: White
Size: 30,000sqm
Completion: 2013


House of Psychiatrics in Borås, Sweden, by White

reduce stress and improve mental health outcomes is a challenge. In the UK, architectural practice IBI Nightingale has recently set up CHAT, a multidisciplinary network of people interested in mental health design. CHAT runs workshops to review current issues, and help define a better understanding of how design impacts on service users.

Francis Pitts of Architecture+, who has been working in mental health design, for 30 years, says: "My experience is that we've changed the dialogue, and increasingly I'm finding clients and colleagues who are understanding what we're bringing to the table and how we can help. But there are still loads of people who are doing it the old way.

"In part it's because there are not nearly as many psychiatric hospitals as there are somatic ones, and somatic hospitals are better funded and more frequently renovated. Most people in a somatic hospital have experience of doing a capital programme and they might have brushed up against ideas about the relationship between the environment and health outcomes. Folks in psychiatric hospitals may not have done a project in 20 years, so you can't expect it to be front of mind."

Grangewood Mental Health Crisis Unit, Derry Londonderry, Northern Ireland

This short-stay unit supports a new model of care for mental health service users in the west of Northern Ireland – a mix of acute care and daycare, working alongside a 24-hour crisis response service and home treatment. It has 30 beds, 25% fewer than the facility it replaces, but it is more flexible, with the ability to increase or decrease beds between the male and female wards, and between intensive-care beds and the rest of each ward; Avanti Architects' Duncan Finch says that this requirement for adaptability was the most challenging part of the brief.

The high-quality finish of the building – curved timber cladding, slate floors and floor-to-ceiling windows to let in bountiful amounts of light – are a material expression of the sense of worth that Grangewood wishes to instill in its users. Landscaping complements the building via a series of private and semi-private garden spaces around the periphery, with sections of fence and glazed slots within the boundary wall offering longer views across the landscape. "Integrated canopies and curved built-in seating help create the feeling of 'places' that are protected and welcoming, rather than the unappealing left-over spaces that secure gardens around the edges of mental health buildings often become," says Finch.


Tom de Gay


Tom de Gay

Client: Western Health & Social Care Trust
Architect: Avanti Architects and Kennedy Fitzgerald
Size: 3,700sqm
Cost: £10.4m
Completion: 2013
Landscape Architect: Gillespies

Lean but legible

Despite the rise in mental illness, new facilities that replace old ones tend to be leaner, with less emphasis on long-term residential care. Health authorities are seeking to reduce long-term stays, both for economic reasons and clinical ones. "The change to a greater emphasis on community care reflects clinical opinion that residential care is, in most cases, best used for short-term, targeted treatment, rather than as a long-term solution," says Duncan Finch, associate director at Avanti Architects.

The practice has just completed a mental-health crisis unit in Derry Londonderry (see case study, above), which, although it has fewer beds than the facility it replaces, is more flexible. Standalone psychiatric units, such as this one and Woods Bagot's Wagga Wagga Mental Health Unit in New South Wales, Australia (see case study, right), help take pressure off general hospitals while also giving architects a certain freedom to pursue a less

institutional model, although it is accepted that creating somewhere 'homely' in look is less important than creating somewhere legible. Woods Bagot's principal Domenic Alvaro adds that technology is "enabling the use of materials such as ceramic wood tiles, which create a sense of tactility and warmth previously so difficult to achieve. Lighting technology is also key to improving the quality of indoor environments."

Much emphasis is now placed on giving privacy, choice and control to patients. Visual connectivity between spaces, so that patients can clearly see what's coming next, is important, as is the use of internal courtyards, which can offer contact with nature in a secure environment. Single beds are the norm, a major factor in reducing stress, with en-suites becoming more common, too.


Peter Bennetts

Eucalyptus-inspired greens and greys are used inside the Wagga Wagga Mental Health Unit

Developments in anti-ligature design – 'softer' design that is aimed at mental health facilities rather than correctional facilities – make patient rooms safer. Avanti's Duncan Finch says anti-ligature design is afforded less importance in northern Europe than in the UK and North America: "There will be differences of opinion as to whether this is a more enlightened approach – self-harm and suicide in mental health facilities has a huge impact on other residents, staff and families, and attempts to prevent it through design and specification should not be dismissed as risk-averse and backward-looking." White's Stefan Lundin talks instead of "dynamic safety": if staff have an intimate understanding of individual patients' needs and behavioural tipping points, then surveillance can be selectively less intense.

Much emphasis is now placed on giving privacy, choice and control to patients

Wagga Wagga Mental Health Unit, New South Wales, Australia

Woods Bagot's new mental health unit for Wagga Wagga is for high-dependency, acute and sub-acute short-stay patients. It has a harder, more 'urban' exterior, but its earthy brickwork and rust-toned patchwork facade are a nod to its rural setting, fostering a sense of place. Inside the palette is calmer, with eucalyptus-inspired greens and greys evocative of the Australian bush and the hills of the Riverina district.

"The design creates a sense of belonging by making a residential typology of what was historically an 'institutional-type' facility," says Woods Bagot principal Domenic Alvaro. "Ownership and a sense of humanity are enabled via indoor-outdoor connections to promote patient wellbeing – for example, social settings permeate indoor and outdoor spaces, creating purposeful locations for interaction and community living." Internal courtyards help connect with nature and bring a sense of freedom and ownership, while still being safe and secure. This clinic is one of a number of new mental health facilities built by Woods Bagot for NSW Health, all of which aim to create less institutional environments, while at the same time taking pressure off general hospitals.

Client: NSW Health Infrastructure
Architect: Woods Bagot
Size: 5,200sqm
Completion: 2013
Builder: Hansen Yuncken


Peter Bennetts

architecture that promotes health

MontgomerySisam
ARCHITECTS INC.

PROJECTS FROM THE TOP CLOCKWISE: Island Yacht Club, Amica Windsor Retirement Community, Arts & Administration Building, University of Toronto Scarborough, Southdown Institute

CONTACT: Montgomery Sisam Architects Inc. T 1.416.364.8070 F 1.416.364.7223 www.montgomerysisam.com

White's ideas about creating a succession of increasingly public, social spaces, with nurses' stations and treatment areas a little more disseminated throughout, have propagated. They are used on a scale much larger than most European facilities in Architecture+'s Worcester Recovery Center in Massachusetts (see case study, right), which is conceived as a 'village' of smaller neighbourhoods. This is quite an achievement since many ideas about how to create a successful mental health facility rely on small scale – not just because smaller buildings are less intimidating, but as Avanti's Duncan Finch says, "a legible and compact building is also, generally, an easy-to-observe building". At Grangewood, passive measures such as eliminating hidden corners in bedrooms, and using daytime public seating areas as ward observation areas at night, reduce the need for CCTV surveillance or a more overt staff presence.

Client: Massachusetts Department of Mental Health
Architect: Ellenzweig and Architecture+
Size: 40,000sqm
Cost: US$250m
Completion: 2012
Construction manager: Gilbane Building Company

Worcester Recovery Center, Worcester, Massachusetts, USA

Creating a readable, human-scale space within a 320-bed chronic-care facility was the challenge for architects Ellenzweig and Architecture+. The solution was to break down the plan into manageable, distinct clusters to create a village-like setting that is intended to promote and support recovery.

Houses of eight to ten private bedrooms, along with 'active' and 'quiet' living rooms sit at the outer extremities of a fan-shaped footprint; a 'neighbourhood' makes up three of these houses, sharing a dining room and therapeutic treatment facilities; while the 'downtown' is common to all (available to patients on a privilege basis) and has an indoor main street containing a library, bank, salon, social centre and café, leading to a secure outdoor 'village green'. In this way, social relationships are easier to manage – patients have a choice of places to go, making it easier to avoid potentially stressful contact with other patients, for example – and the boundaries between private and treatment areas are smaller and therefore less intimidating than if the building was more decisively split between living and treatment spaces.

The fan-shaped footprint is ideal for letting light and air into each cluster of homes, and allows for an intimate outdoor area to be slotted in between.

CREATE STIMULATING, SAFE & SECURE HEALTHCARE ENVIRONMENTS FROM TRIED & TESTED FENESTRATION

britplas

+ Specialist Healthcare Windows + Anti-Ligature Innovation + International Award Winners + Worldwide Distributors

Market leading innovators and pioneers in healthcare fenestration

Providing pioneering solutions for the healthcare market, from bespoke design and guaranteed manufacturing quality through to timely, reliable and professional installations and ongoing maintenance and after care services.

Britplas have gained a reputation for excellence within this testing environment.

☎ +44 (0) 1925 824317 ✉ sales@britplas.com www.britplas.com

Wagga Wagga's rustic patchwork facade

A place of work

Reduced patient stress has obvious positives benefits for staff. The World Health Organization estimates that there is an estimated shortage of 1.18 million mental health practitioners – many of them in low and middle-income countries, but it is a problem that affects every country – and creating a more inviting environment for staff has become part of a client's brief when specifying a new facility.

"As much as it is a facility for patient recovery, it is also a workplace," says Woods Bagot's Domenic Alvaro about Wagga Wagga Mental Health Unit. "The building seeks to improve productivity, reduce staff fatigue and enhance their sense of belonging. We've had great feedback that the staff love it – in particular, they like the natural light that floods the building, especially in the large open areas. It is a stark contrast to the facility they were used to working in."

Mental health buildings are also becoming more integrated with the wider community, helping to 'normalise' mental illness for patients and visitors alike: White's new Lund project has an auditorium and public restaurant, for example.

Buildings with high design aspirations and high-quality finishes have a positive effect on all. Mental health design is reaching some great heights, especially in northern Europe: facilities such as White's proposed design for a new House of Psychiatrics in Borås, Sweden, with its private balconies opening on to views of nature, is palpably curative. In the case of Grangewood, Avanti's Duncan Finch says his team "worked hard to create a building that felt crafted, so that all users would feel that care had been taken in its creation. Many new healthcare buildings can feel rather temporary and insubstantial, owing to the internal and external finishes employed – I feel that Grangewood is very different in this respect and that this characteristic is highly beneficial to the therapeutic nature of the environment created."

Mental health design is reaching some great heights

There is an argument that every building, and every built environment, should be stress-reducing, but nowhere is this more important than in mental healthcare. The human dimension is as ever the most important one of all.

"Almost everyone associated with the enterprise [of building a new facility] has a tendency to see the mental illness first and foremost, and to think about security, and hard things like locks and systems. They think about the things that are visible," says Architecture+'s Francis Pitts. "But these are human beings who are going through a really stressful circumstance, and who want a normal human experience as soon as possible. The whole recovery movement is really about that."

House of Psychiatrics in Borås, Sweden, by White

Emily Brooks is an architectural writer

Reference

1. Ulrich, RS, Bogren, L, and Lundin, S. Towards a Design Theory for Reducing Aggression in Psychiatric Facilities. Paper presented at ARCH 12: Architecture/Research/Care/Health. Chalmers Institute of Technology; 2012.

Winning formula for women

IBI Nightingale has won the £75 million VITA project – a whole service transformation to redevelop the Birmingham Women's Hospital site in the UK and create a National Centre of Excellence for Birmingham Women's Hospital NHS Trust (BWHT). Over the coming months, the architectural design practice will be working with the trust to deliver its outline business case to be submitted for approval.

"The design of the VITA project will enable BWHT to build on its excellent reputation and grow and deliver services, including: maternity, neonatal, genetics, laboratory, gynaecology and fertility," said BWHT chief executive Professor Ros Keeton. "Working in partnership with IBI Nightingale we will design a hospital that delivers excellent healthcare, education, training and research, contributing to the health and wellbeing of the people of the West Midlands and beyond."

The VITA project will redevelop the Birmingham Women's Hospital site to allow all services to adopt new clinical practices, respond to increasing projected demand, and enable replacement of unsuitable accommodation with high-quality healthcare facilities. The trust went out to market for a full design team in September. IBI Nightingale's response was to seamlessly combine its in-house healthcare planning service with its architectural offering, a proposal the trust saw as a winning formula.

Barnstorming renovation

Integrated property services and project delivery company Styles&Wood has completed a £1.7m refurbishment project at Barnsley Hospital, England. The 44-week scheme included the complete demolition, strip-out and reconfiguration of the 500-bed South Yorkshire hospital's emergency observation and resuscitation wards.

Styles&Wood's specialist health-service team was appointed to handle the refurbishment following a competitive tender process, after it had demonstrated its expertise in working in live clinical environments. The team worked alongside the Barnsley Hospital NHS Foundation Trust's estates department to plan an appropriate schedule for works to take place while other wards stayed open and operational. This included implementing a specialist infection-control system to ensure work areas were fully segregated, preventing the spread of dust and debris across the site.

Paul Lonsdale, operations director at Styles&Wood, said: "This is the second project we've completed for Barnsley Hospital NHS Foundation Trust and, working closely with their estates team, we've created an attractive environment for staff and patients in the most efficient and safe manner."

Fuss-free and flexible foresight

The Advanced Health Sciences Pavilion in Los Angeles, USA consists of eight storeys of programme space located over a six-storey parking structure. The Cedars-Sinai hospital wanted the pavilion to help bring about transformational change through increased collaboration, and the new building succeeds in integrating outpatient care, research and teaching in a single facility.

HOK designed high-tech laboratories, clinical areas and contiguous spaces that encourage interaction, with every doctor an active researcher and practising physician. The building includes the outpatient facilities (waiting rooms, clinics and support space, imaging suites and pharmacy), the Cedars Sinai Heart and NeuroSciences Institutes, translational research laboratories, an education centre with a simulation lab, and two levels of procedural space. HOK planned the pavilion to enable Cedars-Sinai's programmes to grow and change over time with minimal disruption. The design team developed a universal module based on 60 sq ft units that can be expanded and customised accordingly, including staff workstations, exam and treatment rooms, and procedure rooms. The modular design creates a structural flexibility that allows clinical volumes to flex and flow throughout the day. It also enables the dedicated procedural platform to incorporate future technological changes.

Creations from six of the best

Bristol's new Southmead Hospital will integrate a major public art project featuring the work of six British and internationally recognised artists. The building and surrounding grounds will feature the work of artists Peter Randall Page, Laura Ford, Tobias Rehberger, Jaime Hayón, Jacqui Poncelet and Ally Wallace. Led by arts and healthcare specialist Willis Newson, the programme has been commissioned by the developers of the new site, Carillion. Underpinning the project is a close collaboration between both organisations, as well as North Bristol NHS Trust and its arts programme Fresh Arts, architects Building Design Partnership (BDP), and the commissioned artists themselves.

The £1.1m arts programme is a small part of North Bristol NHS Trust's £430m Private Finance Initiative development for the new Southmead Hospital. It builds on research demonstrating the direct benefits for patients of incorporating visual and performing arts into the hospital environment. The public art commissions are part of a wider programme, which also includes participatory arts activities to engage the local community, hospital staff and patients.

Installation of the artists' work began in September last year. The building will be in use from May this year and will be officially opened in October 2015.

Ceramics connection

Inspired by Ohio's tradition of art pottery production, the Mercy Health – West Hospital, a new 250-bed, 625,000 sq ft facility, has opened to offer expanded medical services to Cincinnati's west side. Designed by AECOM and Mic Johnson, with Cincinnati-based Champlin Architecture, the hospital balances beauty, culture and function. Connections between architecture, natural light and landscape promote healing, while the hospital's functional planning is focused on maximising safety, efficiency, energy conservation and flexibility for the future.

Situated on a 60-acre, wooded site, the hospital's large diagnostic and treatment base is designed to co-locate surgery, imaging, the emergency department and cardiovascular ICU on one level for greater efficiency. Two bed towers sit on this interventional platform, which features a living roof.

The building features an exterior wall system comprising 11 colours and 19 shapes of glazed brick tiles. The blue-to-green colour palette of the building skin pays homage to traditional ceramics glazes, as well as the landform and colour of the valleys and hills of the region. Ease of wayfinding reinforces the healing process through the presence of natural light and landscape. All patient rooms are private, and a combination of centralised and decentralised nursing helps keep nurses closer to patients.

Open and inviting

Singapore's National Heart Centre is now complete and promises to become a new centre of excellence for patients.

Building on traditional hospital design, the structure's patient-focused environment allows light to penetrate, while open spaces with a mixture of green courtyards, sky gardens, and landscape views help create a calm environment conducive to the healing process. This sense of openness carries through to the external finish, with the façade stripped back to reveal the gardens and courtyards

Broadway Malyan acted as lead design consultant on the 48,000sqm 12-storey building, with support from local consultancy Ong & Ong.

To improve the patient experience, the design team organised the complex and diverse range of clinical functions in a way that satisfies vital clinical needs, while minimising travel distances and creating efficient circulation.

The £175m project forms part of Singapore's general-hospital redevelopment masterplan – the largest of its kind in the country – with the Broadway Malyan-designed 17-hectare healthcare city recently launched in Singapore.

thinkglobalcare

The Hamilton West 5th Campus embodies St.Joseph's vision to pioneer innovative models of care that will radically reduce stigmas and barriers associated with mental illness and addiction. GLOBALcare is a partner in providing cost-effective and user-centric furniture solutions to healthcare facilities across Canada and the United States.

Nautical but nice construction

The Naval Hospital at Marine Corps Base Camp Pendleton, California has received two Alliant Build America honours from the Associated General Contractors (AGC) of America: the Best New Building Project and the Marvin M Black Excellence in Partnering awards. A joint venture of Clark Construction Group – California and McCarthy Building Companies delivered the design-build project six months ahead of schedule and more than $100 million below the Navy's original budget. HDR Architecture and HKS led the design team. Situated on a 70-acre site, the hospital provides emergency, primary, intensive, and specialty care. The facility has 96 outpatient rooms, 205 exam rooms, ancillary departments, support spaces, and 54 patient rooms accommodating up to 60 beds for non-ambulatory patients who require stays in excess of 24 hours.

In addition to leading the project's design and construction, Clark/McCarthy took on responsibility for planning, procuring, and installing all medical equipment, furniture and artwork, as well as training hospital staff. This was the first time the Naval Facilities Engineering Command Southwest had relied on this contracting method.

The AGC Alliant Build America Awards recognise the most significant construction projects in the US.

Primary response

By transforming a 1990s office block into the new Wokingham Medical Centre, Barbara Weiss Architects (BWA) has created what is believed to be the largest single-site GP practice in the UK. The 1,600sqm building in Berkshire provides new facilities for up to 16 GPs and five nurses, along with a new pharmacy and medical suite. Stripping out the existing steel frame and cavity-wall office building, BWA remodeled the space to include additional floorspace for new services and clinics, and additional consulting and treatment rooms.

The new building also needed to allow for the siting of a pharmacy, physiotherapy and other services, while catering for up to 10,000 new patients from newly built homes in the area. A sliding gate aids flexibility, separating the surgery reception from the pharmacy entrance to enable out-of-hours use. Roof lights allow natural light to flow into all rooms on the second floor, which houses further consulting rooms, waiting areas, nurse and treatment rooms. A new third floor was also designed to accommodate a pavilion, housing a meeting and conference space.

Smart glass alternates between opacity and transparency, permitting doctors to offer their patients both privacy and daylight, while bespoke joinery is another design highlight.

Link with the outdoors

Cancer support charity Maggie's has applied for planning permission for a new centre in Cardiff, Wales to be built alongside the Velindre Cancer Centre – the largest cancer centre in the UK. Designed by Dow Jones Architects, the new Maggie's Centre, will offer patients access to the huge range of support services that the charity offers, including psychological support, benefits advice, nutrition workshops, relaxation and stress management, art therapy, tai chi and yoga.

Laura Lee, chief executive of Maggie's, said: "The emotional and practical impact on people with a cancer diagnosis and their families and friends is devastating as they face one of life's biggest challenges. Applying for planning permission brings us a step closer to Maggie's South East Wales becoming a reality."

Located in a mature garden and built from the same sandstone as the nearby hills, the centre will be warm, welcoming and full of light and open space. The interior will be lined with fragrant cedarwood, creating a range of spaces reflecting traditional Welsh architecture. The different rooms of the building will be grouped around a central courtyard that opens into woodland gardens, which will be designed by Royal Horticultural Society award winner Cleve West.

Ngonyama Okpanum & Associates

ARCHITECTS | PROJECT MANAGERS | URBAN DESIGNERS | INTERIOR DESIGNERS | TOWN PLANNERS

Salutogenesis

Member of: GREEN BUILDING COUNCIL SA

"Space design, functional suitability and good spatial relationship of buildings improves the experience and quality of life of dwellers"

Our Design Approach

HUMAN HEALTH, WELL-BEING AND EXPERIENCE

Ngonyama Okpanum & Associates

ARCHITECTS | PROJECT MANAGERS | URBAN DESIGNERS | INTERIOR DESIGNERS | TOWN PLANNERS


ARK
Architects + Research + Knowledge Inc.
www.arkinc.ca

Design &Health
International Academy for Design and Health

Design & Health Scientific Review
The design & health value proposition

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

Employing research to develop an evidence-based value proposition for design is an intriguing idea, whose time is long overdue. Of course it is not a new idea at all. In 1973 Thomas Watson, Jr, the 2nd President of IBM, declared at a conference at the University of Pennsylvania: Design is Good Business. He had been developing this thesis for at least 20 years since the early 1950's when he first saw the elegant design of Olivetti typewriters when walking on New York's 5th Avenue. Watson put his implicit value proposition into action by repeatedly hiring famous and skilled designers to create the IBM logo and products like the original Selectric typewriter (Eliot Noyes), IBM buildings (Eero Saarinen), and the IBM pavilion at the 1964 New York World's Fair (Charles and Ray Eames). Most everyone thought Watson's "good business" referred to market value – being able to sell more products – like Steve Jobs and all the Apple products. Maybe we did not give Watson and Jobs enough credit. Maybe their value proposition goes beyond mere market advantage to the types of benefits described in this issue's articles. The team of Ridge, Gaw, and Hopper, with a solid base in economics, argues that for every £1 of design and program investment made in Emergency Rooms, a £3 benefit results. Whether the figures are precise or the benefits easily measurable, the principle is robust. If we believe that design interventions can improve individual, societal, and organisational health we ought to invest the time to prove our point – to employ social research and economics to establish the value proposition of our efforts. Jobs at Apple added a significant dimension to this discussion by promoting the value proposition for a particular approach to design – namely the value of small changes leading to great increases in user engagement and usability. This approach, mirrored in Katie Gaudion's work on design of objects for use by people living with autism, speaks to the nature and value of design elegance. Adding a bubble maker to a vacuum cleaner and a spinny disk to a washing machine are such simple design innovations that totally change the experience people with autism have of those objects. Instead of noise and movement generating fear and anxiety, they generate interest and fun. What a wonderful value proposition this work implies! And careful neuroscience experiments and analysis like those Pati describes will go a long way towards establishing the value proposition for contact with nature for which there is already so much evidence. Our brains mediate our experiences with the natural, built, and object environment around us. The more we understand through the neurosciences how this is accomplished, the better prepared we will be to establish the value proposition for design in the health arena. The first step, however, is to establish the value proposition that developing and sharing such value propositions is worth it.

Designing for Autism:
Designing Everyday Activities: Living Environments for Adults with Autism

This UK research study aims to improve living environments for adults with autism spectrum disorders (ASD) through better understanding of their needs, aspirations and the surroundings they experience

Katie Gaudion

Autism can be defined as a lifelong and highly complex neurodevelopmental disorder that affects the way a person communicates and relates to other people and the world around them. As a spectrum disorder it affects people in different ways: some people with the condition may enjoy rigid routines and special interests; individuals can be sociable or find social relations difficult; and some have learning disabilities while others have high levels of intellectual ability.

People with autism might also experience hyper-sensitivity (over sensitive) and/or hypo-sensitivity (under sensitive) to the sensory elements of the environment. Everyday activities are important to enable autistic adults to lead more independent and fulfilled lives. But how they might perceive those activities – and the domestic objects associated with them – can be a challenge. Can a design-based approach encourage greater engagement in daily activities?

Everyday activities and autism

Taking part in any activity is important. Participation in everyday activities benefits quality of life both directly, through performing tasks that are useful and interesting in themselves, and indirectly, by promoting health gains and increasing the range of possibilities for social interaction.

This research project focuses on activities of daily living in the home, something that can be usefully divided into two levels of activity, first defined by Lawton and Brody.[1] 'Activities of Daily Living' (ADL) includes the basic tasks of dressing, bathing, grooming, using the toilet, eating, walking, and getting in and out of bed. 'Instrumental Activities of Daily Living' (IADL) delineates more complex tasks, such as cooking and cleaning, which require skills that are important for independent living. It is at this level that this latest research is focused. Everyday activities such as doing laundry, cleaning, cooking a meal, or operating electrical appliances help us develop life skills to live independently and keep our homes clean and pleasant to live in. Most of us take this for granted even though performing these activities demands a substantial amount of body co-ordination, motivation and adaptive skills, such as physical dexterity, motor skills, planning, organisational abilities, and social communication skills.

Research has found that such everyday activities may present challenges for people with autism.[2,3,4] Further difficulties in organising, planning and sustaining attention while performing an activity may also present challenges. Unusual sensory sensitivities may impact a person's experience with both everyday objects and the physical environment in which the activity is to be performed.[5] A person with autism may also perceive and conceptualise people, objects, the physical environment, and activities to be performed very differently from the way neuro-typical people might.

There is a wealth of research that explores a person's idiosyncratic relationships with objects;[6-13] for example, we vacuum our floors to keep them clean by removing dirt and dust particles. But what if we did not understand the concept of dirt and dust? Would we still want to vacuum our floors? What would the presumed purpose and motivation be, and how would we even understand what a vacuum cleaner was for? Some research studies suggest that daily living skills improve with age,[14,15] but the rate of skills development slows down as a child enters adolescence. The presence of a learning disability may further decelerate skills development.[14,15,16]

A recent ten-year longitudinal study[17] took a sample of people with autism aged between 10 and 52 years and explored the effect age may have on their levels of daily living skills. This study concluded that such skills improve during adolescence but

Figure 1: Would we still want to vacuum floors if we didn't understand the concept of dirt and dust?

Figure 2: Washing clothes

Figure 3: Peeling vegetables

begin to plateau for people in their early 20s and then decline.

Leann et al concluded that "future research needs to explore what environmental factors may be associated with continued gains of daily living skills for adults with ASD, as well as the best practices for teaching these skills". This project addresses those future research needs.

Research methods

When designing for people with autism, it is important to have an understanding of their individual sensory preferences and special interests. People can be motivated to participate in activities they like, but they may not be able to communicate their likes and dislikes verbally. Consequently, participatory observation – where a person's observed behaviours may provide valuable clues – formed an important part of this latest study. Research methods helped shed light on how a person with autism perceives and conceptualises everyday activities around the home. Observing how people with autism participate in and perform these activities, as well as how they relate to objects provided to assist them, supported this understanding.

Having identified those domestic activities that individuals like or dislike, patterns and correlations between those likes and dislikes were then assessed. This, in turn, led to the identification of underlying reasons for those preferences. Collaboration with Kingwood staff and observation of how they currently engage with those they support helped in understanding better how to structure, participate and communicate in activity sessions. Co-design workshops with Kingwood staff generated dialogue and ideas on how to adapt everyday activities to individual interests and sensory preferences. An extensive literature review and interviews with experts in the field also informed an audit of existing interventions for the development of life skills among adults with autism.

This research study built on the design methods developed during two earlier related projects. These methods include: the Kingwood sensory preference cards that were developed during the project 'Exploring sensory preferences: living environments for adults with autism'[18] and the 'Tree of opportunity' special interests visual questionnaire developed during the project 'Green spaces: outdoor environments for adults with autism'.[19]

Through understanding an individual's sensory profile, we can begin to map out what everyday activities (or parts thereof) they might enjoy and how best to structure the environment to encourage participation. Someone who is hypo-sensitive to sound, for example, might enjoy activities that involve noisy objects – vacuum cleaning, mowing the lawn, or washing clothes. Conversely, someone who is hyper-sensitive is likely to prefer quieter activities, such as pegging clothes on a line, polishing objects, or compiling a shopping list.

In summary, the research aims to evaluate and understand a person's ability, level of independence and limitations when performing certain activities, combined with their sensory preferences and special interests. The findings will help develop guidelines and prototypes for the future, both in terms of planned interventions and the monitoring of individuals' progress. Priorities during the research study included participatory observation, interviews with support staff, and encouraging them to record their own observations.

Objects of everyday use

Many daily tasks involve the use of an object. Designed objects usually have characteristics that either imply how a given object might be used, or that prompt an inference about its usage that may or may not be correct. Even if a person understands the implied affordance accurately, using an object still demands some or all of a range of human skills: motivation, physical dexterity, motor skills, planning, and organisational and social communication skills.

Most of us have acquired these skills and use them without thinking in our daily lives. However, we all have different needs, abilities, cultural values, interests and sensory preferences that influence our decisions about what objects we choose to use and which activities we prefer. We might decide to use a mechanical lawnmower rather than an electrical one because we prefer the sound; or we might decide to purchase a red Henry vacuum cleaner rather than a visually more sophisticated model because we like the colour and smiley face.

A simple activity like boiling an egg requires the support of objects or mediating artefacts. Taking the egg from its protective box, pouring water into a saucepan, turning on the hob, waiting for the water to boil, and, finally, peeling a hard-boiled egg are all actions that stimulate sight, sound, touch, smell and, eventually, taste. Every designed object in that domestic process engages a sensory response. In other words, designed objects stimulate our reaction to them.

A key aspect of the research was the

use of self-reported questionnaires and performance-based assessment commonly used by healthcare practitioners to help determine a person's ability and level of independence in performing everyday activities. These include Katz's Index of Independence in Activities of Daily Living (1970) and The Lawton Instrumental Activities of Daily Living (IADL) scale.[1] These questionnaires help create an understanding of the limitations involved with everyday activities and can aid the development of guidelines for interventions in planning for someone's future and monitoring their progress.

But the use of such questionnaires immediately excludes anyone who finds it difficult to read and write, while the use of tick boxes leaves no room for more shaded responses. Furthermore, such questionnaires fail to take into account the diverse nature of autism and the variable effect of the physical environment on an autistic person's ability to perform everyday activities; for example, a person with autism may score low on their performance when using a telephone, not because of the task itself but because a particular instrument's design may inhibit its use in their case. Someone who is hyper-sensitive to sound may be able to cook a meal only if the kitchen is quiet. If the kitchen is noisy and full of people, this may prevent them from cooking altogether, thereby resulting in a negative answer on a questionnaire that does not allow for such shades of feedback.

In response, the research team used the activities featured in these daily living questionnaires as a basis for designing a set of 43 visual cards, called 'Objects of everyday use'. Each card featured a photographic image, which acted as a visual prompt for each everyday activity. The cards were held together with a pivotal screw that made it easy to concentrate on one card/activity at a time, while the pivoting design also created a playful and tactile object in itself.

The images helped the participants conceptualise what the activity might be and express preferences. On the reverse side of each card were three simple questions about each activity. There was also space for responders to expand their answers and convey a little more about why they enjoyed certain activities.

Figure 4: Doing things with things – Washing clothes

Doing things with things

Someone with autism may simultaneously encounter difficulties with 'executive function' – an umbrella term traditionally used to describe functions such as planning, working memory, impulse control, inhibition, and the initiation and monitoring of action.[20,21] Difficulty with executive function can make organising and remembering the steps involved in carrying out an everyday activity very challenging. Those steps therefore need to be given close consideration.

Difficult as it may be, mastering steps may also represent an educational process in itself; for example, developing language awareness by looking at clothes tags, washing-powder instructions or cake recipes; or grasping the rudiments of maths when measuring detergent and reading dials.

Physical and mental ability also influences how a person does things and chooses what to do. Everyday activities are composed of a sequence of steps that require different levels of motivation, coordination, physical dexterity, motor skills, planning and organisation. When boiling an egg, for example, concentration is needed to monitor the length of time it takes for the water to boil; then strength in lifting the heavy saucepan to drain the water; and, lastly, good motor skills to peel a hard-boiled egg.

The steps within an activity can therefore have varied levels of complexity, some of which may be prohibitive. In the previous example, a person may decide not to hard-boil an egg because they do not like the final step of peeling it. An individual may decide not to mow the lawn because they find emptying the cuttings difficult, or they may avoid ironing shirts because they find the sleeves too awkward. By understanding these preferences, insights into what people with autism encounter can be identified and addressed, thereby turning activities into valuable educational experiences.

Kingwood staff chart the activities of each person they support on a weekly basis. This method does not reveal whether the whole

Figure 5: Washing up was found to be a particularly enjoyable activity among the research group, owing largely to the bubbles created during the activity

task was completed or only part of it. It was proposed that breaking the activity down into steps would create more achievable and manageable goals, while it also enabled the participant to see how different parts of the activity are connected to create the whole task

With this in mind, the research team designed the 'Doing things with things' booklets, which focus on the whole activity process, not just the final outcome. Based on the data gained from the 'Objects of everyday use' cards, the activities of vacuum cleaning, washing clothes, and toasting bread were selected for closer investigation. These were the activities that most participants liked to do, as well as the ones that required the most support.

Three people with autism and their Kingwood support staff were invited to participate over a two-week period. The participants were invited to mark on the booklet the steps within a task they were able to complete. Then, on the facing page, they expressed what they liked or disliked, or found easy or hard, about each step. This self-evaluation identified progress through various activity steps and, in so doing, suggested opportunities for further support.

Key findings

The research identified four key findings from the 'Objects of everyday use' cards and the 'Doing things with things' booklets, which support an initial hypothesis as described below.

Sensory preferences

Everyday environments are furnished with myriad items that stimulate an assortment of sensations. For people who find it difficult to filter, adjust and process stimuli, these can trigger either enjoyment or anxiety.

The design methods revealed that a person's choice of everyday activity could be influenced by such sensory preferences. Understanding an individual's particular sensitivities can help support staff in anticipating how an autistic adult may respond to new activities.

Special interests

The design methods revealed that special interests could influence someone's choice of everyday activities. Understanding an individual's interests may help support staff to anticipate or introduce new related activities that motivate the autistic adults they support, as well as promoting an activity's extension into the community. If someone enjoys helping around the kitchen, for example, they might also be interested in taking a cooking class. If they like watering plants, they might enjoy a trip to a park or garden centre. If they enjoy feeding their pets, they might enjoy a trip to the zoo.

Affordances

The physical environment generates opportunities for action[22] that create shared dialogues, meanings and understanding in which to interact and connect with other people. Playing football, cooking and reading all facilitate social interaction and communication. But how inclusive are these activities for someone who avoids social interaction and who may perceive these things very differently – a football as an object to bite, for example, or a book as an object to flick and tear?

The research revealed how some of the people that Kingwood Trust supports are interested in the unintended affordance of everyday objects.

Support staff

The support staff at Kingwood Trust encourage adults with autism to learn new skills and take part in different everyday activities. Planning, developing a structure, and smoothing transitions from one activity to the next are key factors in facilitating an activity and helping a person anticipate what is about to happen.

Design outputs

The findings of the research led to a series of design experiments to explore ways in which tailoring everyday activities to someone's sensory preferences and special interests might encourage participation. A design guide, divided into four sections, was produced. Each section offers simple ideas on how people with autism, their families and support staff can extend, tailor, embrace and create new everyday activities that relate to the sensory preferences and special interests of the person they support.

Activity: Vacuum cleaning

Most people understand the purpose of a vacuum cleaner. But what if we did not understand the concept of dust and dirt and the importance of keeping floors clean? What if we did not understand the intended affordance of a vacuum cleaner?

This can be the case for people with autism whose individual experiences and perceptions of vacuum cleaning can be unique. The 'Objects of everyday use' cards

Cause Health

Farrow Partnership is leading the way to lift the burden of chronic disease. We are dedicated to cause health by healing the built environment.

www.farrowpartnership.com

Farrow

St. Mary's Hospital | Sechelt, British Columbia
Farrow Partnership Architects in association with Perkins+Will Architects
Photograph: Latreisa Delage Photography

revealed that many of those registering an opinion disliked vacuum cleaning and found it difficult to do. They did not understand what a vacuum cleaner was used for in the first place, or how to interact with it, and they were hyper-sensitive to its sound during operation. The design team therefore began to explore ways in which vacuum cleaning could become a more meaningful and enjoyable experience while simultaneously learning important life skills.

The research began by reflecting back on to the 'Objects of everyday use' cards look for patterns and correlations around the everyday activities the participants liked to do and the reasons given. The cards revealed that washing up is a particularly popular activity, owing largely to the bubbles produced. In response, the design team explored ways to incorporate bubbles into other activities, such as vacuum cleaning, thereby making the pleasurable element – the bubbles – intrinsic to more than one activity.

Figure 6: Doing things with things – Vacuum cleaning

Figure 7: The Hubble Bubble vacuum cleaner

Concept: Hubble Bubble vacuum cleaner

A Henry vacuum cleaner was selected for the first Hubble Bubble prototype, owing to its simple design, wind-up cord, expressive face, and the range of colours available. The Hubble Bubble vacuum cleaner is being piloted at Kingwood to evaluate how, by changing its affordance to incorporate an individual's specific focus of interest, the individual may become more motivated to use it. Observation will also reveal whether the visual appeal of the bubbles offsets the negative effect of the noise for those hyper-sensitive to the sound.

Activity: Washing clothes

For a person with autism the experience of a washing machine in action can stimulate very specific responses. Research revealed that some people might particularly enjoy the by-products of operating a washing machine; for example, they may enjoy listening to the washing machine, particularly when the pitch changes during the last spin, or they may get pleasure from pouring in the washing powder because of the smell. The 'Objects of everyday use' cards also revealed that many people also enjoy watching the washing machine as it spins around.

The research team used these insights to explore whether the unintended affordance of everyday objects, once identified, can inspire new design ideas that are meaningful and enjoyable to someone with autism. This prompted the idea that it might be possible to enrich the washing-clothes experience for everyone, inviting people to perceive and experience activities in the same way a person with autism might.

Concept: Spinny Disc

Wanting to accentuate the feature of being able to watch clothes spinning inside a washing machine, the design team came up with the Spinny Disc concept. Once clothes have been put into the machine ready for washing, a person can choose a spinny disc and attach it accordingly. They can then switch the machine on and watch the different patterns on the disc spin around; individuals can even make their own patterns.

The Spinny Disc prototype is under trial at Kingwood. The task analysis for washing clothes contained in the 'Doings things with things' workbooks revealed that step 1 (sorting coloured clothes), step 14 (hang to dry) and step 8 (add washing powder) proved the most difficult for the participants to follow.

It is hoped that the creation of a new step based on something identified as enjoyable may encourage those with autism

Figure 8: Doing things with things – Washing clothes

Figure 9: The Spinny Disc


Stantec
Creating healthy, active, and engaging environments
George Brown College
Waterfront Health Sciences Campus
Stantec Architecture/KPMB Architects in Joint Venture
Design with community in mind
stantec.com

to try to master more difficult steps within this particular activity.

'Ready, steady, make' workshops

The workshops invited 12 of Kingwood's support staff to design and make decorations that reflect the sensory preferences and special interests of the person they support. To begin with, participating staff were asked to write down the sensory preferences and special interests of the person they support into a 'Guess Who' game frame.

Using this as a reference point, each participant was then given a tree and asked to make decorations for it. Each participant then described their tree and why certain design decisions were made, while everyone else had to try and guess for whom the tree had been decorated.

During this process, participants began to exchange ideas and draw connections between the interests and sensory preferences of the people they support.

Conclusion

This research project set out to expand our understanding of the important role played by everyday activities for adults with autism. It also sought to explore ways in which design might be used to help make those activities – and the domestic objects associated with them – more enjoyable and educational in terms of personal development.

By focusing on the special interests and sensory preferences of people with autism, the study suggests that design-based initiatives can avert or minimise negative reactions to particular activities while beneficially exploiting the more positive reactions on an individual basis.

The research built on three major assets: the day-to-day experiences of the Kingwood support staff; a comprehensive review of past research that relates to the subject, and to which the research team was able to bring a fresh and more specific focus; and three previous research publications in the present Kingwood series that address other aspects of how people with autism experience their environment.

A central focus of the research was the role of designed objects – kettles, washing machines, vacuum cleaners, and so on – in daily activities, and the way they are perceived by people with autism. Thus, a key part of the study was to observe and document individuals' relationships with everyday objects. Simple design probes were devised to tease out personal responses to designed objects and their related activities, in order to gain insights that might encourage support staff, family members and designers to consider ways of extending, tailoring or otherwise modifying the appeal, function and experience of everyday objects.

The majority of the participants in this study are not typical of most people with autism; they have limited verbal communication and learning difficulties, so their support staff played an important role in mediating the contact between the researchers and the participants. Much of the data gathered during the project did not derive first-hand from the people who Kingwood support but were largely interpreted by the support staff through direct observation.

The diverse nature of autism as a spectrum disorder makes it impossible to create a generic set of guidelines and design outputs. The outcome is therefore not intended to be a 'how to' publication. Instead, it seeks to share experiences and approaches in the interest of engaging with support staff, service professionals, family members, and adults with autism themselves, aiming to make everyday activities become more meaningful and enjoyable.

Further information

This design research project won the 2014 Autism Professionals Award, for Best New Technological Innovation.

Author

Katie Gaudion MPhil RCA is a research associate and PhD candidate in the Helen Hamlyn Centre for Design at the Royal College of Art.

References

1. Lawton, MP, and Brody, EM. Assessment of older people: Self-maintaining and instrumental activities of daily living. The Gerontologist; 9(3), 179-186; 1969.
2. Liss M, et al. Sensory and attention abnormalities in autistic spectrum disorders. Autism; 10(2), 155-172; 2006.
3. Perry, A, Flanagan, HE, Dunn Geier, J, and Freeman, NL. Brief report: The Vineland Adaptive Behavior Scales in young children with autism spectrum disorders at different cognitive levels. Journal of Autism and Developmental Disorders; 39, 1066-1078; 2009.
4. Stone, WL, Ousley, OY, Hepburn, SL, Hogan, KL, and Brown, CS. Patterns of adaptive behavior in very young children with autism. American Journal of Mental Retardation; 104, 187-199; 1999.
5. Bagby, MS, Dickie, VA, and Baranek, GT. How sensory experiences of children with and without autism affect family occupations. American Journal of Occupational Therapy; 66, 78-86; 2012.
6. Charlop-Christy, MH, and Haymes, LK. Using objects of obsession as token reinforcers for children with autism. Journal of Autism and Developmental Disorders; 28, 189-198; 1998.
7. Ungerer, JA and Sigman, M. Symbolic play and language comprehension in autistic children. Journal of the American Academy of Childs Psychiatry; 20, 318-37; 1981.
8. Baron-Cohen, S. Autism and symbolic play. British Journal of Developmental Psychology; 5, 139-148; 1987.
9. Williams, E, and Kendell-Scott, L. 'Autism and object use: The mutuality of the social and material in children's developing understanding and use of everyday objects', in Costall, A, and Dreier, O, (ed). Doing things with things. The design and use of everyday objects. Ashgate USA; (3), 51-47; 2006.
10. Williams, E, Costall, A, and Reddy, V. Children with autism experience problems with both objects and people. Journal of Autism and Developmental Disorders; 29(5), 367-78; 1999.
11. Williams, E, Kendell-Scott, L, and Costall, A. Parents' experiences of introducing everyday object use to their children with autism. Autism; 9(5), 495-514; 2005.
12. Loveland, KA. Social affordances and interaction II: Autism and the affordances of the human environment, Ecological Psychology; 3(2), 104; 1991.
13. Loveland, KA. 'Autism, affordances and the self', in Neissser, U (ed). The perceived self, ecological and interpersonal sources of self knowledge. Cambridge University Press; 237-253; 1994.
14. Freeman, BJ, Del'Homme, M, Guthrie, D, and Zhang, F. Vineland adaptive behavior-scale scores as a function of age and initial IQ in 210 autistic children. Journal of Autism Developmental Disorders; 29(5), 379-384; 1999.
15. Green, SA, and Carter, AS. Predictors and course of daily living skills development in toddlers with autism spectrum disorders. Journal of Autism and Developmental Disorders; May, 2011.
16. Szatmari, P, Bryson, S, Duku, E, et al. Similar developmental trajectories in autism and Asperger Syndrome: From early childhood to adolescence. Journal of child psychiatry allied disciplines; 50(12), 1459-1467; 2009.
17. Leann, ES, Maenner, MJ, Seltzer, MM. Developmental trajectories in adolescents and adults with autism: The case of daily living skills. Journal of the American Academy of Child & Adolescent Psychiatry; 51(6), 622-631; 2012.
18. Brand, A, and Gaudion, K. Exploring sensory preference; living environments for adults with autism. The Helen Hamlyn Centre for Design, The Royal College of Art. London; 2012.
19. Gaudion, K, and McGinley, C. Green Spaces; Outdoor environments for adults with autism. The Helen Hamlyn Centre for Design, The Royal College of Art London; 2012.
20. Rabbitt, P. 'Methodologies and models in the study of executive function', in Rabbitt, P (ed). Methodology of frontal and executive function (1-38). East Sussex, UK: Psychology Press Publishers; 1997.
21. Roberts, AC, Robbins, TW, and Weiskrantz, L. The pre-frontal cortex. Executive and cognitive functions. Oxford: Oxford University Press; 1998.
22. Gibson, JJ. The ecological approach to visual perception. Boston: Houghton Mifflin; 1979.

Emergency Care:
Reducing violence and aggression in A&E: Through a better experience

This article is a summary of a study that evaluated the impact of design solutions in reducing hostile and aggressive acts in two Accident and Emergency (A&E) departments in England. The study is based on research undertaken by Frontier Economics and ESRO[1]

Michael Ridge, Kendal Gaw, Robbie Hopper

Hostile and aggressive acts pose significant costs to the National Health Service (NHS) in England in terms of staff absences, lost productivity and security. It is, however, the physical and psychological damage of such acts, and their impact on staff retention, that pose the greatest human and financial costs.[2] Single acts of harassment can cause distress and ill health: 14% of NHS staff who are assaulted in the course of their work are estimated to suffer from severe symptoms of post-traumatic stress disorder,[3] and when these acts occur more frequently they are strongly associated with severe long-term health problems.[4]

Ethnographic research has highlighted that A&E departments present complex, high-pressured and unpredictable environments, in which tensions and frustrations can easily arise and escalate, making A&E staff particularly vulnerable to hostile behaviour.[5,6]

There is a growing body of evidence to suggest that the physical environment of healthcare facilities affects patient safety and quality of care,[7] and, in particular, that factors such as layout and queue management in acute-care settings have a significant impact on stress and aggression.[8,9] Inhospitable environments, perceived inefficiencies, and a lack of understanding about process or operational pressures are all major triggers of hostility and aggression in A&E, with patients often feeling neglected.[5,6] As aggression is often the consequence of accumulating frustrations, improvements in patient experience can not only help reduce tensions and non-physical hostility but also help prevent their potential escalation.[10]

ESRO/Andy Smith

Figure 1: Southampton A&E before the design solutions were implemented

Recognising the value of a design-led approach, the Department of Health partnered with the Design Council to deliver 'Reducing violence and aggression in A&E: Through a better experience'. This design-led innovation programme sought to uncover design solutions to reduce the human and financial costs of violence and aggression in A&E.

The Design Council and Department of Health ran a nationwide design challenge competition, calling for design solutions that would alleviate tensions and hostility in A&E, with an emphasis on improving patients' understanding of the A&E process, creating a culture of mutual respect between patients and staff, and reinforcing positive behaviours. The programme aimed to improve patient experience through the provision of well-targeted information and staff engagement, and thereby reduce the levels of aggressive behaviour in A&E.

The winning multi-disciplinary design team, led by PearsonLloyd, was supported by an independent advisory board comprising health, education and industry stakeholders, and it worked closely with a number of NHS trusts to develop the proposed design changes.

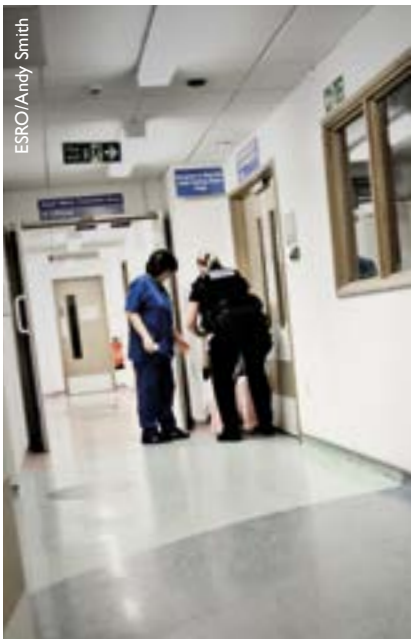
The design solutions developed through this programme comprise two components: the 'Guidance solution' and the 'People solution'. These solutions were subsequently installed in the A&E departments of Southampton General Hospital (University Hospital Southampton NHS Foundation Trust) and St George's Hospital, London (St George's Healthcare NHS Trust) for testing and formal impact evaluation.

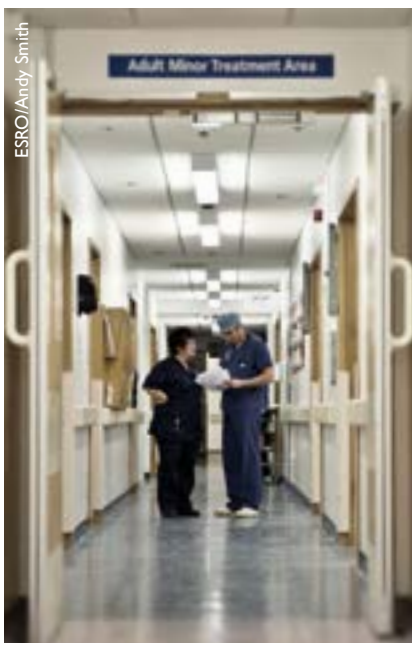
This report outlines the design solutions deployed and, in the case of both pilot sites, assesses their impact in relation to: patient experience; hostile, aggressive and violent incidents in A&E departments; and value for money.

Preliminary research

Extensive desk-based and ethnographic research was undertaken to uncover common characteristics and triggers of violence and aggression, with the identified escalators of violence and aggression grouped into nine trigger categories (see table 1 below) so they could be targeted by the design solutions. By addressing these triggers, the design team sought to create preventative solutions to violence and aggression. With the identified triggers in mind, the design team separated the typical patient journey into four key stages (Arrival, Wait, Treatment, Outcome) to create an 'ideal' patient experience that would help inform the eventual design solutions. From arrival through to outcome, the design team recognised the importance of interaction and clarity. The concept of an ideal patient experience underpinned the whole design process, with emphasis placed on accessible information and positive engagement throughout the development and testing of the design solutions.

Following various workshops, interviews, prototypes and testing, the team arrived at a number of design solutions that were delivered through two distinct outputs: the Guidance project and the People project.





Figures 2 and 3: Southampton A&E before the design solutions were implemented

Triggers of violence and aggression

Clash of people:
Many areas in A&E departments are crowded with a range of different people, forced together by difficult circumstances, each undergoing their own stresses and dealing with their own complex mix of clinical and non-clinical needs.

Lack of progression:
While all trusts aim to treat 95% of patients within four hours, waiting for any length of time can be a difficult experience. There are few situations in our lives when we are forced to wait for such lengths of time without any sense of progression.

Inhospitable environments:
Many people dislike hospitals, partly because they are full of sick people! But beyond patients, hospitals can be uncomfortable, unpleasant places in which to spend time.

Dehumanising environments:
When arriving at A&E people can feel 'out of sorts' for a large number of reasons. Sometimes the way in which patients are managed can also lead to a loss of perspective.

Intense emotions:
A&E is a place where people may be experiencing extreme life events, suffering with pain or stress, or having to witness how other people are coping (or not) with their own stressful experiences.

Unsafe environments:
A&E is typically a very busy environment, with considerable amounts of equipment and large numbers of people using the space. Sometimes these factors can help trigger or worsen violence and aggression.

Perceived inefficiency:
From a patient's perspective it can sometimes feel as if staff in A&E environments are disorganised and lacking focus. Patients observe themselves and others seemingly waiting for hours, while staff 'busy themselves' with perceived non-essential tasks.

Inconsistent response:
Hospital environments are often tightly controlled by policies, guidance, and rules and regulations, much of which are difficult to decipher, inconsistently applied, and can run contrary to what happens in practice.

Staff fatigue:
Working in an A&E department is highly demanding on staff, many of whom work 12-hour shifts. Over time, staff can become both physically and emotionally tired, struggling to find the energy to deal with the constant flow of patients.

Table 1: Nine triggers of violence and aggression in A&E

The Guidance project

The Guidance solution comprises a communication package across a range of mediums, principally centred on a process map, retrofittable signage, patient leaflets, and live digital information. The solution provides key information for patients and visitors as they move through the system, thereby curbing many of the associated frustrations and anxieties identified previously as triggers to violence and aggression in A&E.

Central to this communication package is a large process map (see figure 4), which is placed at the entrance of A&E. The map enables every patient entering the emergency department to understand what their journey through A&E might look like and involve, with accompanying 'slices' of signage throughout the process referring back to the relevant section of the map. It is intended that a 'slice' should be present in every area of the department in which patients might find themselves.

While print information is ideal for communicating department-specific information, a digital information stream is necessary to communicate live changes in the various departments and to provide patients with an understanding of the context and operational status of each department. Information, such as the number of patients within each area of the department, can improve patient experience by diminishing anxiety and offering patients a better understanding of the reasons why they may be asked to wait. Screens within the waiting area integrate existing departmental data into a digital information display.

The People project

While clear guidance can greatly enhance patient experience, the complexity of A&E means that the best way to assist a patient is often through human contact. Staff engagement can have a significant impact on the experiences of patients and visitors to A&E, and if staff can encompass the active management of patients' needs beyond clinical aspects, the department can function more efficiently.[5] The People project aims to support staff in maintaining high levels of compassion and empathy while working under pressure, and to develop the necessary techniques to enable them to best deal with potentially aggressive and violent patients.

Implementing the design solutions

The design solutions were publicly showcased in November 2011. Two pilot hospitals were identified as the first A&E departments to trial the solutions as part of an impact evaluation. The Guidance and People solutions were further refined in collaboration with Southampton General Hospital and St George's Hospital, London, in order to tailor them for their respective A&E operations.

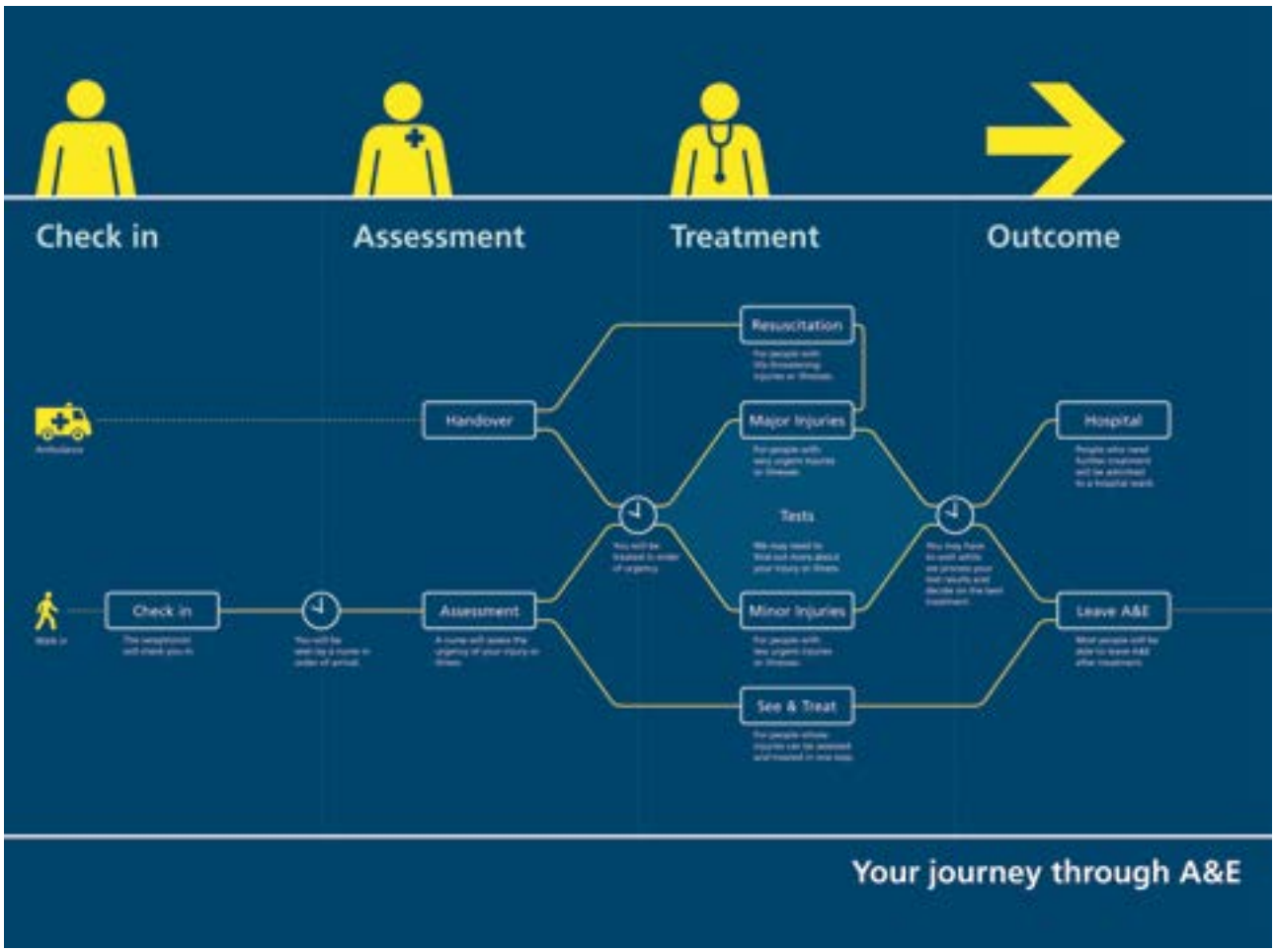


Figure 4: The large process map facilitates understanding among patients of their likely journey through A&E

Both pilot sites implemented the Guidance solution in autumn 2012. This comprised the process map, a full set of guidance panels ('slices') for each area of A&E, and information leaflets for patients and visitors. But although both sites intended to display the digital information systems as part of the project, neither site has, to date, consistently displayed the digital information as planned.

For the People solution, each site appointed staff 'facilitators' from their A&E team who undertook two days of facilitator training. Each trust adapted the People solution and its schedule to reflect their needs. Consequently, the content and format of the project were delivered differently at each site.

At St George's, the People solution began in March last year and ran for four months until June. In order to create a programme that was manageable within the context of an extremely busy department, the trust held sessions that were more open and flexible than originally outlined in the design package – both in terms of the number of people attending and the frequency of the sessions. The programme began by discussing staff's personal experiences of workplace violence and aggression. As sessions progressed, the employees were able to identify and define typical perpetrators of hostility as well as categorising the nature of incidents, including when incidents were most likely to happen. Tally charts helped identify which areas of the department were experiencing the highest levels of violent and aggressive incidents, leading to insightful discussions about how these could be better managed.

The People solution also began in March last year at Southampton, but here regular sessions were held with one group of eight participants, who were chosen to represent a cross-section of staff.

Over the course of eight sessions, the group explored the issues that caused the most frustration and impacted the ability to deliver care. This led to a number of unexpected findings, and empowered staff to begin conversations with management. Ultimately, the People solution provided the trust with an opportunity to engage with staff, emphasising that their needs were heard and considered important. Southampton also used the People solution to open a dialogue about key operational issues affecting staff as a way of relieving pressure and deflecting some of the challenges they were facing.

Figure 5: The People project involved initial discussion, tally charts to record incidents, and further reflection

Evaluation approach

To assess the full impact of the design solutions on patient and staff experience, the following overarching research questions were identified.

Have the design solutions:

1. Improved patents' experience of A&E?
2. Reduced the amount of hostility, aggression and violence experienced by staff and patients?
3. Provided good value for money?

To answer these questions, primary, secondary, and qualitative data were collected. ESRO conducted surveys for both staff and patients at each pilot site and control site pre-implementation (summer 2012) and post-implementation (2013). Ethnographic research was also carried out.

Frontier Economics conducted 'management' interviews with key members of A&E operations at both pilot sites and control sites prior to implementation and, again, one year after the interventions had been introduced.

To assess the value for money of the study, a range of management information – including data of monthly A&E attendances, staff numbers, information on Patient Liaison Service (PALS) complaints, and incident-reporting system data on acts of violence and aggression – covering a period of one year prior to and one year following the implementation of the design solutions,[11] was collected. In addition, Frontier Economics collected information from the pilot sites regarding the costs of the design solutions: equipment, installation and maintenance.

Primary staff data and secondary management data were taken from the two control sites: Oxford John Radcliffe and King's College Hospital, London.[12] The data collected at the pilot sites pre- and post-implementation were then compared with the control sites' data, as a means of eliminating extraneous factors that may have influenced the study. Table 2 (see page 62) summarises the timescale and sample sizes of both the staff and patient surveys.

Results

The results of this evaluation study illustrate the following:

- Improved patients' experiences of A&E through clarification of the A&E process and improvement of the physical environment: 88% of patients surveyed felt the Guidance solution clarified the A&E process, while 75% of patients said they found the waiting experience less frustrating, owing to the improved signage. This was further emphasised by reductions in complaints relating to communication and waiting.
- Reduced non-physical aggression experienced by both staff and patients: the largest decreases in aggressive incidents experienced by staff came from a reduction in 'threatening body language and aggressive behaviour', which fell by 50%. Qualitatively, staff also reported that the People solution had positive impacts in catalysing a cultural change for A&E staff, in terms of prioritising and formalising initiatives from which to learn, and in improving staff experience; and, also, by empowering staff to challenge aggressive behaviour.
- Good value for money: the benefits of the solutions far outweighed their costs by a ratio of 3:1. In other words, for every £1 spent on the design solutions, £3 was generated in benefits.

Patient experience

Patients were asked about their experiences throughout the key aspects of their journey in A&E. By comparing data of patients' experiences pre- and post- implementation, a direct comparison between each site could be made.

The results presented below show the average change across both trusts by combining the outcomes of the patient surveys at both pilot sites.

- Satisfaction with overall experience improved post-implementation, with a 5% increase in patients reporting their general experiences to be 'very good' or 'excellent'.
- Patient satisfaction improved with key aspects of their visit, including perceived staff efficiency.
- Satisfaction with waiting times improved overall, with the percentage of patients rating their waiting experience as 'poor' falling by 8%, while those reporting their experience to be 'very good' or 'excellent' increased by 5%.
- Patients' perceptions of department efficiency improved: 77% of patients reported this aspect to be 'very good' or 'excellent' post-implementation, as opposed to 66% pre-implementation.
- Emotions and atmosphere were reported to have improved in the departments across both sites, with a 5% drop in patients reporting observed frustration or anxiety in other patients.
- Patients' understanding of the A&E process improved post-implementation, with 73% of patients reporting they had understood the A&E process 'very well' after the design solutions were introduced, in comparison to 62% before implementation.

In addition, patients' reactions to the Guidance solution were overwhelmingly positive: 88% of patients reported that the Guidance solution clarified the A&E process, while 75% said the new signs made the wait less frustrating.

	Sites	Staff survey	Patient survey	Ethnographic observations
Pre-implementation	Pilot sites (Aug-Sept 2012)	Sample size: 120 across both sites 3 x 9-hour shifts per site	Sample size: 593 across both sites 14 x 6-hour shifts per site	✓
	Control sites (Sept and Dec 2012)	Sample size: 93 across both sites 1 x 6-hour shift per site	X	✓
Post-implementation	Pilot sites (July 2013)	Sample size: 143 across both sites 3 x 9-hour shifts per site	Sample size: 553 across both sites 3 x 9-hour shifts per site	✓
	Control sites (July 2013)	Sample size: 107 across both sites 1 x 6-hour shift per site	X	✓

Table 2: Timescale and sample sizes for staff and patient surveys. Source: ESRO and Frontier Economics

While staff quickly became used to the presence of the signage, they felt it served as an important reminder that patients are not always familiar with A&E processes, as well as proving useful in helping staff explain the A&E process to patients.

The PALS records formal complaints made by patients regarding their care.[13] The number of complaints relating to communication and waiting times fell dramatically after the introduction of the design solutions. Across both pilot sites, complaints relating to communication and information in A&E fell by 57% – from 49 to 21 complaints between April and September 2012 and April and September 2013. Complaints relating to patient wait or delay fell by 21% – from 14 complaints to 11 over the same period.[14]

Violent and aggressive behaviour

While severe acts of aggression and violence can be extremely detrimental, the number of reported incidents of major aggression and violence was low in both the pre- and post-implementation data.

Research conducted by the 'Reducing violence and aggression in A&E: Through a better experience' programme highlighted the frequency of non-physical aggression. Acknowledging that hostility and aggression are often precursors to violence, the design briefs and solutions focused intentionally on reducing non-physical aggression. This approach has maximised the potential for design while respecting the need for complementary approaches of policing and security to maintain staff safety and respond to violent incidents.

Prior to implementation, 4% of patients across the pilot hospitals reported

Figures 6, 7 and 8: Information 'slices' at various points in the patient's journey remind them of the treatment process and help put them at ease

witnessing aggression or hostility involving a member of staff. This fell to 2% post-implementation, showing a significant drop in reported aggression of 50%.[15] Reported reductions in aggression and hostility from patients were supported by similar reductions in non-physical aggression revealed by the staff survey.

At both the pre- and post-implementation stages staff were asked how many times they were directly subjected to non-physical aggression, according to four categories of aggressive behaviour. Staff indicated that at the pre-implementation stage they were exposed to, on average, between three and four incidents of 'threatening behaviour' a week. While reductions were recorded in all categories of non-physical aggression across the pilot sites, they were particularly significant in 'threatening body language or behaviour', which fell by 50% across the pilot sites.

Value for money

The design solutions have successfully reduced hostility and aggression, but it is only by comparing these benefits with the costs of implementing and maintaining the solutions that their value for money can accurately be assessed. To assess the social and economic returns associated with the design solutions, a value for money (VFM) framework was applied.

Actual implementation costs at the two pilot sites were very similar in the first year: £65,000 and £61,000 for University Hospital Southampton and St George's, respectively. The Guidance project was the more costly element of the solutions in the first year, with the production and implementation of the panels, leaflets and visual displays equating to approximately £20,000 at each hospital. Furthermore, the development time required to tailor guidance to the specifics of each site was significant at approximately £12,500 for each hospital.

In future years, the costs associated with the Guidance project are assumed to be limited to the replacement costs of exhausted solutions. These costs will vary across sites, but the estimated costs and lifespans for each solution are shown below (see table 3).

The People project cost approximately £16,500 in the first year, excluding staff time required for training. While the development costs associated with the customisation and design of the People project are assumed to be zero in future years, staff participation is expected to be far greater, with all A&E staff expected to undertake full training every six months in line with the design team's desired training.[16]

The major benefits from the introduction of the design solutions are reduced aggression, increased staff wellbeing, improved patient experience and increased productivity. By calculating the value of an aggressive incident and applying this to the reported data on changes in aggressive acts (pre- to post- implementation), a monetary value for the reductions in aggressive behaviour can be calculated. While indicators of improvements in patient experience, staff wellbeing and productivity among A&E staff have been captured by the surveys and PALS records, these improvements have not been incorporated into the VFM framework, as they may overlap with reductions in aggression and lead to an overvaluation of the benefits.

By comparing the monetised benefits of the design solutions over a 10-year period with their associated costs, the value for money of the design solutions has been determined.

The results of the evaluation showed that the benefits of the solutions outweighed the costs of the programme by three to one. This outcome is extremely positive – for every £1 spent on the design solutions, £3 was generated in benefits. As such, installing the design solutions represents considerable value for money. These benefits, however, are conservative: the diminishing marginal effects of aggression are assumed to be large and the benefits measured are limited to their impact on causing a psychological stress disorder. Improvements in staff wellbeing and patients' experiences captured by the surveys were not incorporated in the analysis.

Equipment	Lifespan (years)	Cost (£)
Signage	2	£15,000
Digital equipment (indicator of activity)	3	£2,000
Leaflets	1	£3,000

Table 3: Guidance project equipment costs

AUSTRALIAN
HEALTHCARE DESIGN
2000–2015

A CRITICAL REVIEW OF THE DESIGN AND BUILD OF HEALTHCARE INFRASTRUCTURE IN AUSTRALIA

GET YOUR COPY **NOW!**

www.designandhealth.com

info@designandhealth.com

Australian Healthcare Design 2000–2015 is a review of past, current and future projects and trends in healthcare design in Australia. It is a unique reference publication for researchers and practitioners working in the field of healthcare design, both within the region and internationally. Fronted by a collection of essays from prominent Australian academics and practitioners, it also contains a comprehensive catalogue of projects delivered during the most remarkable period of capital investment in health infrastructure ever seen in the region.

Published by the International Academy for Design & Health Edited by Kate Copeland with Marc Sansom, Kathleen Armstrong and Emily Brooks

Design & Health
International Academy for Design and Health

Conclusions and recommendations

This evaluation set out to assess the impact and associated value for money of the design solutions at two A&E departments through evidence drawn from primary and secondary data. The evaluation focused on whether the solutions had: improved patient experience; reduced levels of staff and patient experience of hostility; and provided good value for money. The findings show clear evidence that the design solutions have had positive results in all three of these areas.

In particular, some of the most positive results from the patient surveys were focused around the environmental signage of the Guidance solution. Both quantitatively and qualitatively, patients demonstrated that clear and consistent information about the A&E process, as provided by the environmental signage, helped 'professionalise' A&Es and served to reassure and inform patients, as well as provide a welcome visual distraction during the waiting process. Staff at the pilot sites also reported that, while they themselves soon got used to the signage, it did help 'streamline' and improve the appearance of the department, and acted as a reminder to them that patients need to be informed about processes to prevent them getting anxious or frustrated.

It is also notable that for the pilot sites the signage proved to be the most straightforward and easy-to-implement component of the design solution package. Indeed, this type of signage can be tailored and retrofitted in any A&E department or other healthcare environment, and even beyond into other public settings.

The People solution was designed in recognition of the importance of creating a culture shift towards nurturing mutual respect between patients and staff. Despite the challenges and long-term nature of achieving this kind of cultural shift, maintaining a focus on this goal remains essential if sustainable reductions in violence and aggression are to be realised. While it is more difficult to quantify the impacts of the People solution, and this study has highlighted that it may need to be adapted for different A&Es, it is clear from the staff management teams interviewed in this evaluation that the emphasis on staff engagement and support facilitated through the People project have helped catalyse a perceptible positive shift in the A&E environment. This should be monitored and built upon to achieve a lasting impact.

The overall results presented here are a conservative estimate of the potential benefits that could be realised from design solutions in A&E departments, and it is suggested that a broader and longer-running study be undertaken to capture the potential wider, indirect benefits – such as operational efficiency gains – that were outside the scope of this project.

The results send a strong message to A&E departments that by implementing these design solutions they could see tangible benefits in both patient and employee experiences at a relatively low investment cost.

It is recommended that other A&E departments in England should now consider implementing these design solutions to realise similar benefits. Additionally, other healthcare or comparable public-service providers may also want to consider the application of similar design solutions to improve the experience of both users and providers in public-service settings.

Authors

Michael Ridge is a board director and chief operating officer at Frontier Economics, leading its public policy team. Kendal Gaw, who has more than 10 years' experience delivering high-quality research and written outputs for a wide variety of clients, currently works across Frontier's infrastructure and public policy practices. Robbie Hopper is an expert economics and policy researcher with extensive experience working on a wide range of public policy issues.

Figure 9: Design solutions at a later pilot site

References and further information

1. Frontier carried out the cost-benefits analysis for the pilot and led the conceptual framework for the study. ESRO was responsible for the primary-data collection, while Frontier Economics undertook semi-structured management interviews and collected secondary data. Frontier Economics also conducted the data analysis and value for money study presented in this report.

2. National Audit Office. A Safer Place to Work: Protecting NHS Hospital and Ambulance Staff from Violence and Aggression. The Stationery Office; 2003.

3. Needham, I, Abderhalden, C, Halfens, RJ, Fischer, JE, and Dassen, T. Non-somatic effects of patient aggression on nurses: a systematic review. Journal of Advanced Nursing, 49(3): 283-296; 2005.

4. Einarsen, S and Raknes, BI. Harassment in the workplace and the victimisation of men. Violence and Victims, 12, 247-263; 1997.

5. Design Council. Reducing violence and aggression in A&E by design: Designing out the human and financial costs of violence and aggression towards NHS staff. Design Council; 2011.

6. ESRO. Understanding Violence and Aggression in Accident and Emergency Department; 2011.

7. Joseph, A, Keller, A, Gowri, BG. Improving the Patient Experience: Best Practices for Safety-Net Clinic Redesign. California Healthcare Foundation; 2009.

8. Ulrich, RS, Quan, X, Zimring, C, Joseph, A, Choudary, R. The role of the physical environment in the hospital of the 21st century: A once-in-a-lifetime opportunity. Report to the Center for Health Design; 2004.

9. The Lewin Group. Evaluation of the California Healthcare Foundation's Ambulatory Care Redesign Collaborative. Report for the California HealthCare Foundation; 2006.

10. Morrison, JL, Lantos, JD, et al. Aggression and violence directed toward physicians. J Gen Intern Med 13(8): 556-61; 1998.

11. From August 2011 to August 2013.

12. ESRO conducted staff surveys at the control sites during the same period as the pilot sites. Frontier Economics collected secondary data from the control sites during the same period. Control sites were chosen based on their similarities with the pilot sites in areas such as hospital type, size of A&E department, average waiting time, and distance to central business district. Oxford John Radcliffe was used as the control site for Southampton General Hospital, and King's College Hospital was the control for St George's Hospital.

13. Includes PALS and other formal complaints.

14. These differences are recorded by comparing the number of complaints from April 2012 to September 2012 to the number of complaints in the same period one year later, April 2013 to September 2013.

15. This data does not account for any changes in hostility and aggression in the control sites, as patient surveys were limited to the pilot sites.

16. Training will consist of between one and two hours a week over an eight-week programme, and repeated twice a year.

Neuroscience:
Unique neural correlates of nature stimuli

Does nature activate the human brain in unique ways? This study aimed to identify the natural correlates of the salutogenic effects of nature

Debajyoti Pati PhD, FIIA, IDEC, LEED AP

The notion that most forms of nature exposure have positive effects on humans is well documented in published literature.[1,2] The academic community has explained these benefits in terms of various theoretical frameworks, including restoration theory,[3] biophilic/ evolutionary theory,[4] and emotional congruence theory.[5]

Traditionally, psychological, behavioural and physiological measures have guided studies on the topic and the development of salutogenic strategies for environmental design. Advances in neural imaging technology and methods are offering novel ways of capturing brain activation when exposed to different types of visual stimuli. These type of methods promise greater granularity in our understanding of the effects of different design responses, thereby enabling a stronger foundation, as well as a new set of data for triangulation, for comparative effectiveness studies involving physical design.

The study involved mapping brain activities in healthy adults while they were exposed to positive, negative and neutral images. The positive images included two classes: nature images and other general positive images people come across in their everyday experience. This paper focuses exclusively on comparisons between the two sets of positive images, and between the nature image and one type of neutral image. A complete and expanded version of the entire study is published elsewhere.[6]

Aims

There are a number of ways in which humans encounter nature. The class of nature images adopted for this study involved compositions of the sky along with layers of foliage (henceforth referred to as sky compositions). Sky compositions were adopted because the programme constituted a two-step research project focused on an inpatient room setting. Even in inpatient settings there are numerous ways to provide nature exposure to patients: direct physical access; direct visual access through windows; wall-hung artwork and nature imagery; and ceiling-hung fixtures depicting sky and foliage.

In contemporary hospital design direct physical access is, at best, generally provided in only a few patient areas. While designers attempt to provide a good nature view through windows in all inpatient rooms, it can be a challenging proposition in a number of situations including outboard bathroom locations and urban settings. Numerous spaces in hospitals do not have any windows at all. Dictated by the second phase of the study, where patients are typically in a supine position in hospital, the sky compositions were adopted as the nature stimulus for use in the study.

The findings contained within this article address two main questions:

1. Are there any differences in neural activations when subjects are exposed to nature images as opposed to general positive images?
2. Are there any differences in neural activations when subjects are exposed to nature images as opposed to a view of a typical inpatient-room acoustic ceiling?

Methodology

The study adopted a within-subject experimental design involving 10 healthy adult subjects. While in an fMRI scanner, the subjects were exposed to sets of sky composition, and positive, negative, and neutral images presented in a random order. Each set contained eight images; an industry manufacturer of simulated ceiling products provided high-resolution sky compositions, while the other three classes of images were purchased from online image libraries.

In the first step, an image bank comprising 15 images for each class (positive, negative and neutral) was created. Images were initially selected based on the judgement of the research team. One of the objectives was to match, as far as possible, images across the three categories (positive, negative, and neutral) in valence, and arousal. Conceptual definitions of valence and arousal used by Lang, Bradley and Cuthbert[7] in the development of the International Affective Picture System (IAPS) were adopted for selecting images. Valence is defined as emotional response associated with pleasantness (pleasant to unpleasant) and arousal is defined in terms of excitement (calming to exciting).

A key factor in image selection was to ensure that the pool of images was representative of things that people come across during their daily lives. Among the selected images were: pictures of a bird, flower, and pet, for positive valence; images of a burning vehicle, storm, and waste, for negative valence; and pictures of a blank wall, wood grain, and a white plate, for neutral valence. Among the positive and negative valences, one of the deciding factors was to choose images that represent equally exciting as well as calming emotional responses; the neutral images were expected to be neutral in valence and arousal.

The initial pool of images was subjected to valence assessment (i.e. the degree to which they were regarded as positive, neutral or negative) by 30 students in a university setting. An 11-point scale was used for assessment (-5 to +5), with the lower limit representing very negative and the upper limit representing very positive. Examples of the four types of images are shown in figure 1. The valence assessment was used to select the extreme positive, extreme negative, and neutral images for the study.

Image type constituted the only independent variable in the study (sky composition, positive, negative, and neutral).

Figure 1: Examples of (left to right) sky composition, positive, negative, and neutral images used in the study.

There were two primary dependent variables: behavioural response of subjects according to a seven-point valence (pleasantness) scale while viewing the images inside the fMRI scanner; and neural activations in response to the images being viewed. The mean of the pleasantness rating among all subjects was used as the dependent measure. The activated brain regions were examined using tools from the Functional MRI of the Brain (FMRIB) software library (FSL).[8]

Subjects were selected through a purposive quota sampling strategy. Information regarding the study was provided via the university newsletter, as well as flyers posted on community boards across the city where the study was conducted. Qualifying subjects were recruited on a first-come basis. Exclusion criteria included: physical health condition – all subjects were healthy for their age; mental health – none of the subjects had neurological or cognitive challenges; metal parts in or on the body; handedness – all subjects were right-handed; and pregnancy status – pregnant women were excluded from the study. The final subject pool included one male and one female volunteer in each of five age groups: 20s, 30s, 40s, 50s and 60s.

Brain scanning was conducted using a Siemens 3.0 Tesla Skyra magnet, at the neuroimaging institute of the author's organisation. Images were projected inside the fMRI scanner from a computer in the control room. Subjects rated each image on the seven-point valence scale by pressing a fibre-optic button provided inside the scanner. Details of the brain-mapping procedure have been reported elsewhere[6] and, owing to space limitations, are therefore not reproduced in this article. Data were collected between May and June 2012.

Two types of functional scans were conducted: 'short exposure' and 'long exposure'. The short-exposure scans projected all 32 images (eight in each class), in a random order and each for 25 seconds. The long-exposure scans involved only two images: one sky composition and one image of a typical inpatient acoustic ceiling. The two images were presented twice in random order for three minutes each, for a total of 12 minutes. The total time a given participant spent in the scanner was about 40 minutes. Table 1 presents the key steps in the fMRI data collection.

Data analysis

Functional magnetic resonance imaging (fMRI) is a technique that measures brain activity. It measures the haemodynamic changes via tissue perfusion, blood-volume changes, or changes in the concentration of oxygen. Blood-Oxygen-Level Dependent (BOLD) contrast was used as the technique in this study.[6] Neural data analysis was carried out using the fMRI Expert Analysis Tool (FEAT) in the FSL.[9] Behavioural data were analysed primarily using descriptive statistics. It was also intended to assess the appropriateness of the images used.

Short-exposure scan analysis followed three steps: firstly, brain maps from all subjects were combined to generate composite images for each category; secondly, a series of subtractions were made between pairs of images; and, thirdly, close examination of the subtracted maps and interpretive analyses was undertaken based on existing knowledge on brain regions and associated functions. The second step (subtraction) involved taking

1. Short exposure (randomly ordered images)			
8 Positive	8 Negative	8 Neutral	8 Sky composition
25 seconds each; followed by rating page	25 seconds each; followed by rating page	25 seconds each; followed by rating page	25 seconds each; followed by rating page
2. Long exposure (images in following order)			
1 Sky composition	1 Neutral (ceiling tiles)	1 Sky composition	1 Neutral (ceiling tiles)
3 minutes	3 minutes	3 minutes	3 minutes

Table 1: Procedure that subjects went through during the functional scan.


Wellness in architecture:
mapping the circadian rhythm
ASB North Wharf
Auckland
www.bvn.com.au
BVN
Donovan Hill

pairs of images (such as the composite sky composition and the composite positive) and, in a step-wise manner, removing all activated regions in one from the other. The result of the subtraction showed brain regions that were uniquely activated by a class of image.

Table 2 shows the subtractions performed and their interpretations. The long-exposure scans were specifically included to identify differences between exposure to a conventional hospital ceiling and to a nature view (the sky composition). The analytical steps involved were identical to those described for short-exposure scans. The data-analyses team was also kept out of the loop regarding the objectives of the study, in order to eliminate any potential investigator bias in the data analyses.

Findings

Two specific sets of comparisons are reported in this article: comparison of the sky composition composites with the positive image composites; and findings from the long-exposure scan analysis. Behavioural data analyses confirmed that: the subjects' valence ratings matched closely with those of the investigators and students; the mean ratings were distinct, exhibiting little overlap between the classes of images; the mean ratings of the positive images and sky compositions were close, suggesting equally positive valence for both; and the ratings were not different

Notation used in this article	Subtraction (all in the context of composite maps)	Interpretation
Sky – Positive	Brain areas activated by positive images subtracted from brain areas activated by sky images	Brain areas uniquely activated by sky images, in comparison with positive images
Positive – Sky	Brain areas activated by sky images subtracted from brain areas activated by positive images	Brain areas uniquely activated by positive images, in comparison with sky images
Sky – Negative	Brain areas activated by negative images subtracted from brain areas activated by sky images	Brain areas uniquely activated by sky images, in comparison with negative images
Negative – Sky	Brain areas activated by sky images subtracted from brain areas activated by negative images	Brain areas uniquely activated by negative images, in comparison with sky images
Sky – Neutral	Brain areas activated by neutral images subtracted from brain areas activated by sky images	Brain areas uniquely activated by sky images, in comparison with neutral images
Neutral – Sky	Brain areas activated by sky images subtracted from brain areas activated by neutral images	Brain areas uniquely activated by neutral images, in comparison with sky images

Table 2: Brain-map subtractions and corresponding interpretations.

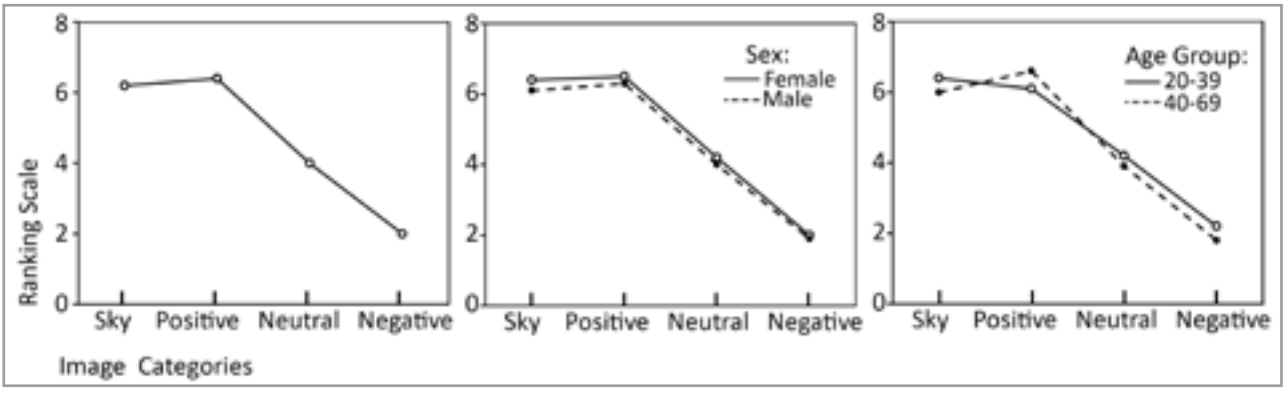


Figure 2: Ratings of pleasantness (left to right) for all subjects, male and female, and across two age groups.

GRESHAM SMITH AND PARTNERS

Healing Design

47 years of healthcare design experience

ARCHITECTURE
INTERIOR DESIGN
ENGINEERING
PLANNING

greshamsmith.com

either across age groups or sex. Figure 2 provides a visual illustration of the findings from the exploratory, descriptive analyses of behavioural data.

Subtracting the sky composition map from the positive map (Positive – Sky) resulted in a map that showed brain areas uniquely activated by positive images in comparison with sky compositions (nature images). The resulting map showed an empty brain, which implies that all brain regions activated by positive images are also activated by sky compositions (nature images). There were no neural activations unique to the positive stimulus in comparison with sky compositions.

Subtracting the positive map from the sky composition map (Sky – Positive) resulted in a map that showed brain areas uniquely activated by sky composition in comparison with positive images. In contrast to the previous subtraction, several brain regions remained in the subtracted map. These include: cerebellar tonsil; tuber grey matter; and pyramid grey matter.

Brain regions are associated with multiple functions. One of the functions of cerebellar tonsil is the processing of emotions or emotional monitoring.[10] Tuber cinereum (grey matter), through the tuber memory nucleus, is responsible for the release of the sole source of histamine – the regulator of the body's circadian rhythm. Pyramid grey matter has responsibility for complex motor patterns such as locomotion and emotional arousal. Figure 3 shows the brain areas uniquely activated by sky composition as compared with positive images.

In the long-exposure scans, subtracting the hospital ceiling image map from the sky composition map (Sky – Ceiling) generated an image showing brain areas uniquely activated by the sky compositions in comparison with the former. The sky composition uniquely activated two brain regions: lingual gyrus, and cuneus. Among other functions, lingual gyrus is associated with dreaming and vision, especially in relation to the recognition of words. Cuneus is associated with basic visual processing. Figure 4 illustrates the brain areas uniquely activated by sky composition in comparison with a conventional hospital ceiling.

Subtracting the sky composition map from the ceiling map (Ceiling – Sky) also showed unique activations associated with the traditional hospital ceiling image. One key area activated was the fusiform gyrus. While there is still some debate regarding the functions associated with this brain region, there is a general acceptance that the fusiform gyrus, among other roles, is important in the processing of colour information, and face and body recognition. Figure 5 (see page 73) shows the brain areas uniquely activated by the ceiling in comparison to sky composition.

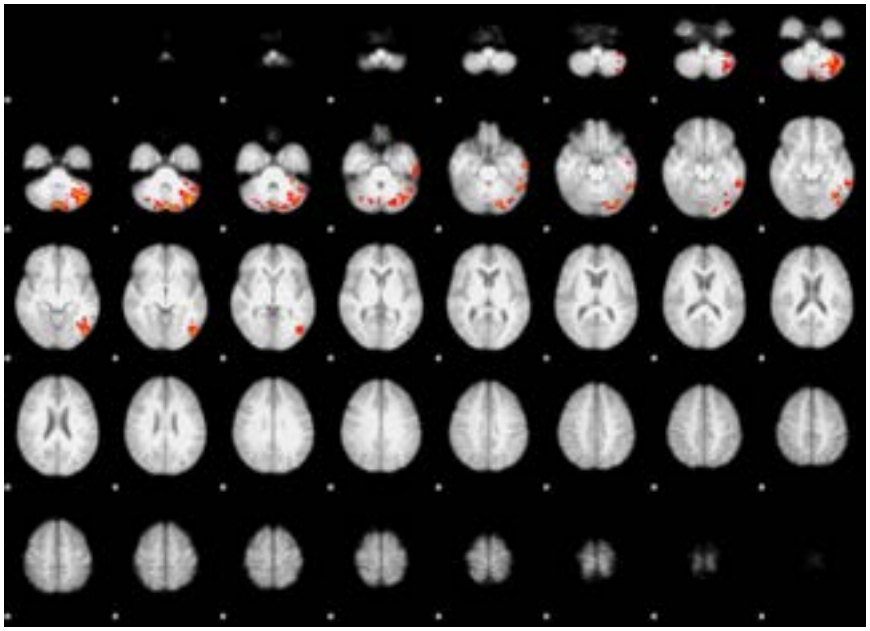


Figure 3: Brain regions uniquely activated by exposure to sky compositions, as compared with positive images in short-exposure scans.

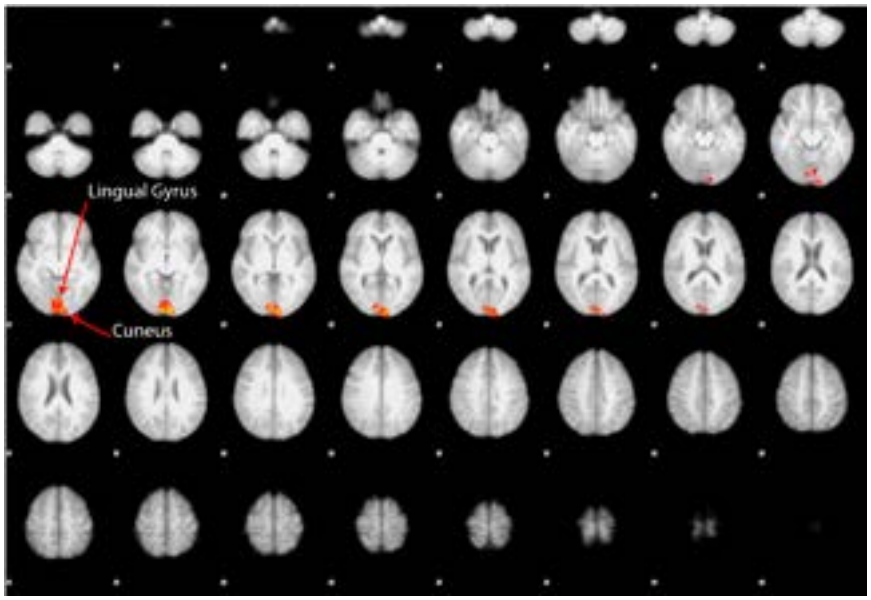


Figure 4: Brain regions uniquely activated by exposure to sky composition, as compared with an image of a traditional acoustic ceiling, in long-exposure scans.

Limitations

Discussing the implications of these findings warrants an assessment of the limitations of this study. There are three areas of limitations: firstly, the study was based on a small sample size; secondly, all study subjects belonged to one region – Texas; and, thirdly, the study used images of nature and other visual stimuli rather than exposure of subjects to actual situations –

WORLD HEALTH DESIGN

ARCHITECTURE | CULTURE | TECHNOLOGY

Reporting globally on developments in healthcare's built environment, WORLD HEALTH DESIGN is the only journal to bridge the gap between research and practice. Uniting opinion in architecture, design and clinical disciplines, each quarterly issue provides essential knowledge and insight for:

- Leading architects and designers
- National and local government officials
- Health planners and capital project consultants
- Public and private healthcare providers
- Senior estates and facilities managers
- Building construction and healthcare industries
- Universities and academic researchers

Save £40 off the cover price when you subscribe

> "The one magazine that I can't wait to get as soon as it is available!"
>
> **Kurt Wege**, Architect, Canada

"Absolutely fabulous! The articles are all of high substance, the projects are interesting and well-designed, the art direction and layout is superb and there are lots of colour photos."

Jain Malkin, Jain Malkin Co, USA

"World Health Design has been warmly received by all my colleagues. Keeping health planners and architects happy with the same publication – you must be doing a lot right!"

Craig Dixon, Tribal Consulting, UK

"WHD is the missing platform for all who share the same vision for healthcare design."

Dr Ruzica Bozovic-Stamenovic, School of Design and Environment, National University of Singapore, Singapore

Design & Health
International Academy for Design and Health

Four times a year there's nothing like WORLD HEALTH DESIGN with..

- The latest scientific research
- Incisive comment and analysis
- Thought leadership interviews
- Health policy briefings
- Architectural project reviews
- International market reports
- Global technology updates
- Arts and culture reviews

Don't miss out!

SUBSCRIBE TODAY and SAVE £40 off the cover price!

12 month subscription – JUST £80.00
(single copy price: £30.00 per issue)

Subscribe online at
www.worldhealthdesign.com
or call: +44 (0) 1277 634176

Subscription rates: Cover price: £30; Annual Individual: £80; Annual Team (5 copies): £260; Two Years Individual: £130; Two Years Team (5 copies): £435

whether positive, negative or neutral. Since sky conditions and ambient vegetation change from region to region, there may be limitations to the extent to which the findings can be generalised. Furthermore, brain activation may change with exposure to actual visual stimuli as compared with images of visual conditions.

Discussion

The contents covered in this article include objective data and subjective interpretations of the findings based on the latest knowledge from neuroscience on brain region and associated functions. It is intuitive that the subjects rated both the sky compositions (nature images) and the set of positive images as high on the valence scale – both sets of images were judged as pleasant. It is, however, also noteworthy that there are unique activations associated with sky compositions not exhibited by positive images. Subtraction showed that all areas activated by positive images were also activated by sky compositions. However, the sky compositions also activated additional regions, which were not activated by positive images – cerebellar tonsil, tuber grey matter, and pyramid grey matter.

What could it mean? Interpreting activated brain regions is still at a nascent stage. Thus, while the unique activation areas are easy to identify objectively, the implications of these findings can be discussed as subjective opinions or hypotheses at the very best, considering the current state of knowledge in neuroscience.

Based on existing understanding in the field, cerebellar tonsil and pyramid grey matter are associated with the notion of expansion of space (spatial cognition) and motion/motor balance (internal sense of motion). One may posit that exposure to nature results in some form of feeling of expanded space, thereby diverting human attention to an imaginary space. In a hospital this could mean diversion of attention away from the immediate ambient environment, along with associated levels of pain, stress and anxiety. But we do not yet know the answer. While we may debate on what this could mean, the fact that sky compositions constitute more than general positive stimuli is significant and meaningful. Furthermore, the tuber cinereum is responsible for the release of histamine, which regulates the body's circadian rhythm. Could it mean that exposure to nature results in enhanced physiological functions?

The long-exposure scan data also provides important differences to consider. In the comparison between the hospital ceiling image and sky composition images, unique areas of the brain activated by the latter included lingual gyrus and cuneus. These are areas associated with dreaming and visual processing (both positive from a patient's perspective). On the other hand, unique areas activated by the ceiling image included fusiform gyrus – a region associated with face processing and the hallucination of faces. From certain perspectives these may be viewed as undesirable phenomena in healthcare settings.

The study reported in this article was preliminary, exploratory and small. However, the series of meaningful variations observed in the comparisons suggest a potential true and significant difference between sky compositions (representing nature stimuli) and other forms of positive stimuli. The possibility that nature stimuli have a unique effect on humans constitutes an intriguing proposition and could considerably impact designing for health and salutogenesis.

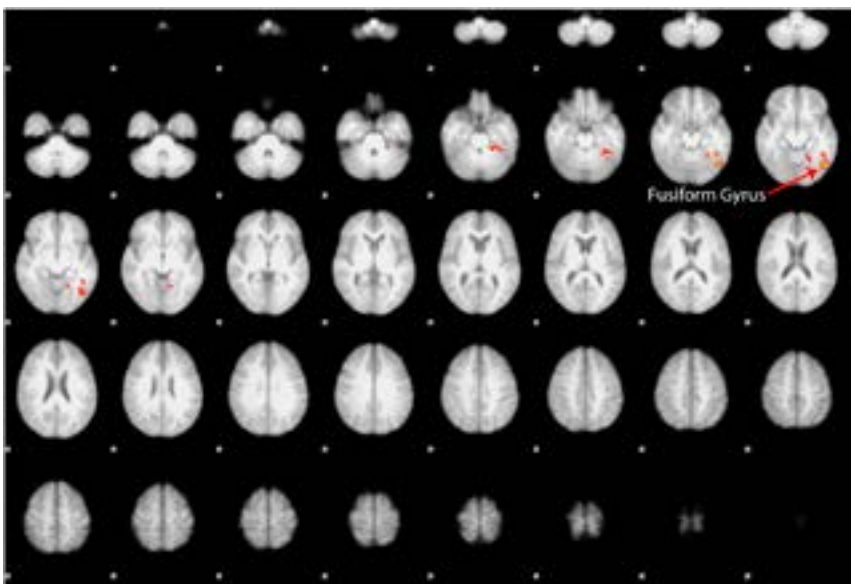


Figure 5: Brain regions uniquely activated by exposure to an image of an acoustic ceiling, as compared with sky composition, in long-exposure scans.

Acknowledgement

This study was supported in part by a monetary grant from the Sky Factory Foundation.

Author

Debajyoti Pati is Rockwell Professor at Texas Tech University, College of Human Sciences.

References

1 Diette, GB, Lechtzin, N, Haponik, E, Devrotes, A, and Rubin, H. Distraction therapy with nature sights and sounds reduces pain during flexible bronchoscopy: a complementary approach to routine analgesia. *Chest,* 123(3), 941-948; 2003.

2 Ulrich, RS. View through a window may influence recovery from surgery. *Science*, 224(4647), 420-421; 1984.

3 Kaplan, R, and Kaplan, S. *The experience of nature: A psychological perspective*, New York: Cambridge University Press; 1989.

4 Ulrich, RS, and Gilpin, L. 'Healing Arts: Nutrition for the Soul', in Frampton, SB, Gilpin, L, and Charmel, PA (Eds.), *Putting Patients First: Designing and Practicing Patient-Centered Care*. San Francisco, CA: John Wiley & Sons; 2003.

5 Bower, GH. Mood and Memory. *American Psychology*, 36(2), 129-148; 1981.

6 Pati, D, O'Boyle, M, Amor, C, Hou, J, Valipoor, S, and Fang, D. Neural Correlates of Nature Stimuli: A fMRI Study. *Health Environments Research and Design Journal,* 7(2): 9-28; 2014.

7 Lang, PJ, Bradley, MM, and Cuthbert, BN. International Affective Picture System (IAPS): Technical manual and affective ratings. Gainesville, FL: NIMH Center for the Study of Emotion and Attention, University of Florida; 1997.

8 www.fmrib.ox.ac.uk/fsl

9 http://fsl.fmrib.ox.ac.uk/fsl/fslwiki

10 Parsons, LM, Denton, D, Egan, G, McKinley, M, Shade, R, Lancaster, J, and Fox, P. Neuroimaging evidence implicating cerebellum in support of sensory cognitive processes associated with thirst. Proceedings of the National Academy of Sciences, 97(5), 2332-2336; 2000.

Sustainable Healthcare Architecture

Robin Guenther and Gail Vittori
Second Edition. New York: John Wiley & Sons, 2013
Price: £57.50 / €68.00
Pages: 480
ISBN: 978-1-118-08682-7

How do you improve on something that is already quite good? What would you do differently as a music artist if your label afforded you the chance to re-record your most popular or critically acclaimed album? Different instrumentation? Alternative arrangements?

In 2012, the Rolling Stones reissued their landmark 1972 album Exile on Main Street, and all they could do was add nine new songs from the original recording sessions – which is not too unlike what Robin Guenther and Gail Vittori have done in the second edition of ***Sustainable Healthcare Architecture***. Graphically, the first edition sprawled a bit but, in terms of content, many appreciated its ambition. It was a strategy that proved compelling, as it became a primary reference work on this subject.

The second edition has allowed the authors an opportunity to revisit, update, and restructure their narrative. Differences between the first and second editions include: a number of new case studies among the total of 55; an updated geographic map that indicates where each case-study project is located; comparative assessments of general and specialty hospitals, sub-acute and ambulatory-care facilities, and mix-use facilities; numerous updated contributor essays; and recent evidence-based research findings that dovetail with sustainability precepts. A side-by-side perusal of both editions also reveals that the second is more visually inviting and hierarchical in structure – an improvement attributed in no small part to a shift to extensive colour reproduction, which has resulted in a more engaging appearance and texture.

Profiles are included of leading healthcare systems, such as the UK's National Health Service, Kaiser Permanente, Partners HealthCare, and Providence Health & Services. These sections describe how each system is striving to proactively entwine its core mission with the need to build and operate ecologically sensitive, environmentally supportive facilities.

One particularly illuminating section sees the authors compare and contrast a number of healthcare-facility green-building rating systems currently being adopted with rapidity around the globe. There is also now a section on the need for facilities and landscapes that are therapeutic while simultaneously resilient. This entails the reflexive properties and capacity to remain functionally operative, or, at least, restorable to relative functionality. Faced with global climate change and its myriad deleterious ramifications, this is of crucial importance with regard to the provision of healthcare for victims of human-induced and natural disasters. In the coming decade, developing nations such as India and China will be engaged in expanding their healthcare infrastructures to an extent equal to or greater than the current total US healthcare system. To what extent will they embrace carbon neutrality, elimination of polluting materials, and zero waste?

In the chapter on 'Measuring value', additional attention is now devoted to clarifying the relationship between evidence-based healthcare research and design, and LEED, and what each can contribute to the sustainability equation. The new edition takes a more direct approach to addressing the transactional virtues of sustainability in relation to resiliency. This discourse frames the final chapter, 'Creating the 21st-century hospital', in which discussion is devoted to four pivotal principles that are transforming the status quo in the planning and design of healthcare environments from resource-depleting to resource-generative entities: prevention and health promotion; community connectivity; transparency; and resilience.

The new edition takes a more direct approach to addressing the transactional virtues of sustainability in relation to resiliency

For this reason, as well as for its aforementioned attributes, this book remains unchallenged as a key resource for practitioners and others within the ascendant discipline of architecture, design and health – an area that, in general, remains under-published. Books such as this remain inadequate in number, when considered in relation to the tens of billions spent annually around the globe on the planning, design, construction, and operation of healthcare facilities.

Disciplinary advancement cannot be built on the making of buildings alone: concise yet reflective assessment is essential. With that said, anyone whose professional practice, research, and/or scholarship remains uninformed by books such as the second edition of ***Sustainable Healthcare Architecture*** is proceeding at their own peril.

Stephen Verderber is professor at the John H Daniels Faculty of Architecture, Landscape and Design, and the Dalla Lana School of Public Health at the University of Toronto, Canada

ZEIDLER PARTNERSHIP ARCHITECTS

TORONTO . CALGARY . VICTORIA . LONDON . BERLIN . BEIJING . CHENGDU . ABU DHABI

@ZeidlerArch

www.zeidler.com

Next Generation **Healthcare**

We designed the King Saud Medical City to meet world-class standards in care delivery for a new generation of patients and medical professionals. Designing high performance hospitals that deliver transformative care is why, for 11 years, we remain the world's number one healthcare design firm. **This is where great begins.**

HDR

hdrinc.com