

RESTORATIVE SPACE

Connecting to nature at the Groot Klimmendaal Rehabilitation Centre



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Contributors

John Zeisel

A tribute to designer Eva Zeisel (1906-2011), whose long life was one of overcoming adversity, empowering others, and giving and receiving love



Ken Yeang

The next generation will design sustainably as second nature; they can then focus on what architecture can do to alleviate the human condition



Mike Nightingale

Nightingale Associates' R&D arm has uncovered innovative projects that empower local clinicians to deliver low-cost healthcare to African communities



Tobias Gilk

With a huge global demand to employ advanced imaging technology, hospital planners must make sure that their supporting facilities are as good as the equipment



Ihab Elzeyadi

Life after LEED: the first systematic analysis of how well sustainable strategies are performing at a LEED Platinum-rated healthcare building in Portland



Cover Image

Winner of the World Architecture Foundation's healthcare award, Koen van Velsen's Rehabilitation Centre Groot Klimmendaal. Photograph: Rene de Wit



Design for humanity

History is littered with examples of how human beings have found their greatest inspiration when faced with even greater adversity. It is in these times when innovation and true beauty reveals itself through the human spirit. Design has many definitions, but in essence it is an expression of our values both as individuals and communities. But great designers can also help to redefine our societal values, reminding us of our potential and of what it means to be human. The spirit of great designers also lives on through their work and the people they touch – their families, friends, professional colleagues and the many users of their designs. Through her son, Dr John Zeisel, as chair of our scientific committee, this journal and the International Academy for Design & Health, has been touched by the incredible life of Eva Zeisel, 'maker of things', who recently passed away aged 105. Expressing his admiration for Eva's work, the Academy's founder, Prof Alan Dilani, describes her as 'a symbol of hope, creativity and inspiration for the field of design, health and humanity.' On pages 8-11, we are privileged to publish John's own personal tribute to his mother who lived a life and made a contribution to the world like few others through a humanity she expressed ultimately through her designs. Her legacy lives on through her work and her family.

Marc Sansom
Editorial director



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BRIEFING

06 YEANG TO SPEAK IN KUALA LUMPUR Professor Ken Yeang will deliver the keynote speech at the 8th Design & Health World Congress & Exhibition

08 BALANCING LIFE, WORK & BEAUTY John Zeisel celebrates the long life and prolific work of his mother, ceramicist and designer Eva Zeisel

OPINION

13 CRITICAL PATH Alan Dilani calls for a more rigorous critical debate to transform US society from a profit-driven pathenogenic one to a salutogenic one

14 CLEAN CITY, HEALTHY CITY Ken Yeang, pioneer of ecological architecture, discusses his work – and in particular, how the cities of the future can be both healthy and sustainable

EVENTS & AWARDS

17 SALUTOGENIC STANDARDS Submit your entry for the Design & Health International Academy Awards

35 A HEALTHY INVESTMENT Sign up for Design & Health Australasia 2012, on this March in Sydney

PROJECTS

18 RESTORATIVE SPACE Koen van Velsen's Rehabilitation Centre in The Netherlands uses direct contact with nature to promote a sense of wellness

20 CURVE APPEAL With a plan that echoes the shape of a leafy stem, VK Group's proposed children's hospital for Ho Chi Minh City is a metaphor for healing

44 FROM ISOLATION TO INTEGRATION Elderly care focuses on the creation of desirable new communities that harmonise with their local neighbourhoods

56 IMPROVING OUR IMAGE Top-quality radiology equipment will never perform to its best without well-planned and flexible facilities to support it, says Tobias Gilk





MARKET REPORTS

24 EMERGING HOPE Sub-Saharan Africa's heavy disease burden is countered by a renewed focus on health promotion, and open dialogue about how to make things better

32 THE TOOLS TO SUCCEED Mike Nightingale explains how social enterprise, empowerment and education are driving innovation and positive change for African health

36 ACROSS THE TASMAN Australia pushes ahead with important reform, while New Zealand reconciles its position after 2010's Christchurch earthquake

SOLUTIONS

52 PROJECTS New and upcoming healthcare projects from across the globe, plus a study from Maastricht University that tests how lighting affects patients' sleep patterns



SCIENTIFIC REVIEW

59 RESEARCH PRECEDENTS Dr John Zeisel calls for a research memory bank to connect past and present studies in environmental psychology and building science

60 A PERFORMANCE ASSESSMENT OF A LEED PLATINUM BUILDING Measuring the impact of sustainable strategies on Portland's flagship green hospital

70 REDUCING VIOLENCE AND AGGRESSION BY DESIGN The UK's Design Council tackles lowering the level of violence in Accident and Emergency departments



ARTS & CULTURE

77 THE HEALING PRESENCE OF ART Colin Martin reviews art historian Richard Cook's comprehensive survey of western art's relationship to hospitals and healing



Take part in the CARE Challenge to help beat global poverty

Aid agency CARE is calling on teams across the UK's construction industry to take part in an energetic fundraising challenge. It is looking for groups of two, three or four people to complete a marathon distance on foot, bike and kayak around Dorset's Purbeck peninsula on 30 June. Teams can be made up from anyone who works in construction, from architecture to property sales, and each member will be asked to raise £600 for CARE. The charity works in 87 countries to relieve poverty, with an approach that tackles long-term development rather than the immediate causes of poverty. One such project is in Tamil Nadu in India, where CARE tackled areas affected by 2004's tsunami. Brick houses were built to replace destroyed bamboo and wooden homes, and local communities were helped to become more self-sufficient by rebuilding industry such as crab farming. "Almost seven years on, the houses were still in perfect condition," said CARE's chief executive Geoffrey Dennis, paying them a recent visit. "They're very well kept and are regularly painted by the local families who live in them."



CARE built robust housing in Tamil Nadu to replace the flimsy dwellings destroyed in 2004's tsunami

For information, visit www.carechallenge.org.uk/constructionchallenge or call 020 7091 6111.

Canada: Sleep hormone research

Researchers at Montreal's Research Institute of the McGill University Health Centre have developed a drug that could help insomniacs. The drug, UCM765, selectively activates the brain's receptor for melatonin, the hormone that regulates sleep and circadian rhythms. The researchers found that, in rats and mice, the drug increased the amount of deep sleep without interfering with the balance of REM and non-REM sleep.

USA: New HDR president

Doug Wignall, AIA, RAIC, LEED AD has been named as the new president of HDR Architecture. Previously the firm's senior vice president and international director of its healthcare division, Wignall's leadership has been instrumental in the growth of HDR's healthcare programme: the firm was named the world's top earner for the healthcare sector in Building Design's annual rankings, with an annual fee income of \$151.5m.

UK: Maggie's Aberdeen in planning

Cancer charity Maggie's continues its ambitious programme of building non-clinical cancer support units with the release of initial design concepts for a centre at Aberdeen Royal Infirmary. Norwegian architectural practice Snøhetta's design for a sinuous, single-storey pavilion (pictured

below) is currently being considered for planning permission. Two more Maggie's centres opened late last year: Maggie's Nottingham (see p52) and Swansea's Maggie's South West Wales.



USA: Naval hospital tops out

San Diego's Camp Pendleton Naval Replacement Hospital has celebrated its topping out, a month ahead of schedule. The \$394m hospital serves active and retired service members and their families, and will offer up to 60 beds, with emergency care, primary care and specialty clinics. Architects HKS are working with contractors Clark Construction Group and McCarthy Building Companies to complete the building, which will open in early 2014.

USA: Aesthetics, Inc joins Planetree

Healthcare design firm Aesthetics, Inc has become a member of Planetree, the not-for-profit network of hospitals and healthcare organisations promoting a more holistic, patient-centric approach. Aesthetics, Inc's areas of expertise include wayfinding,

interior design and healing arts programmes; Planetree designation means that the firm has reached the highest standard of patient-centric healing.

UK: Medical Architecture awarded

Roseberry Park, Middlesbrough's new health campus, has been given a RIBA North East Gold award, as well as being named the region's RIBA project of the year: Medical Architecture's flagship hospital for Tees, Esk and Wear Valleys NHS Foundation Trust, which opened last October, provides inpatient mental health, forensic mental health and learning disability services for adults and older people.

USA: Cancer centre breaks ground

A new cancer centre for Houston has broken ground. The HDR-designed, 57,000sqm Sheikh Zayed Bin Sultan Al Nahyan Building for Personalized Cancer Care is part of the University of Texas MD Anderson Cancer Center; and is scheduled for completion in 2014. A two-storey plinth, with office and laboratory towers above it, will feature collaborative areas and flexible space that can cope with evolving technology.



Yeang to speak in Kuala Lumpur

The architect, planner and pioneer of eco design, Professor Ken Yeang has agreed to deliver a keynote paper at the 8th Design & Health World Congress & Exhibition in Kuala Lumpur, from 27 June-1 July.

Regarded by many as the father of the bioclimatic skyscraper, Prof Yeang is chairman of Llewelyn Davies Yeang and renowned worldwide for designing signature green buildings and masterplans, as well as his pursuit of an authentic ecological aesthetic in his designs.

His exploration of the critical intersection between ecological design and "salutogenic" design for human health and wellbeing is set to be one of the highlights of the World Congress. See pp15-16 for a special interview with Professor Yeang to gain an early insight into some of the topics he will be addressing in his paper.

Organised by the International Academy for Design & Health, in partnership with the Ministry of Health Malaysia, more than 100 abstracts have been submitted from all over the world in anticipation of being selected for oral presentation, and are currently under review by the Academy's Scientific Committee. The Preliminary Programme is due to be published at the end of February, with over a thousand delegates expected to attend from all across the globe.

For more information, contact info@designandhealth.com



Ken Yeang, pioneer of eco-design will headline at the 8th Design & Health World Congress in June

Corporate members renew with Academy

As the Design & Health World Congress moves from a biannual to an annual schedule, reflecting its continued success in providing leadership in the creation and transfer of knowledge and the support of business networking around the world, its portfolio of corporate members continues to grow.

"Support from industry has long provided a foundation for the Academy's work, and we are grateful to all of our sponsors for continuing to recognise and engage in the important contribution the network is making to raising awareness of the role of design in improving human health and wellbeing," said Marc Sansom, corporate development and communications director.

Corporate members who have recently signed for 2012-2013 include Farrow Partnership (Canada), HDR Architecture (USA), Montgomery Sisam (Canada), Ngonyama Okpanum (South Africa), VK Studio (Belgium), Ove Arup (UK), Britplac (UK), HLM Architects (UK), MAAP Architects (UK), Nightingale Associates (UK), Olympus (Germany), RTKL Associates (USA), Capita (UK), BVN (Australia), Woods Bagot (Australia) and CPG (Singapore).

In 2012, the Academy will organise the 8th Design & Health World Congress & Exhibition in Kuala Lumpur, from 27 June-1 July; the 3rd Design & Health Australasia International Symposium in Sydney, from 28-29 March; the 2nd Design & Health Europe International Symposium in Helsinki, from 20-21 September and the 2nd Design & Health Africa International Symposium in Johannesburg, in November.

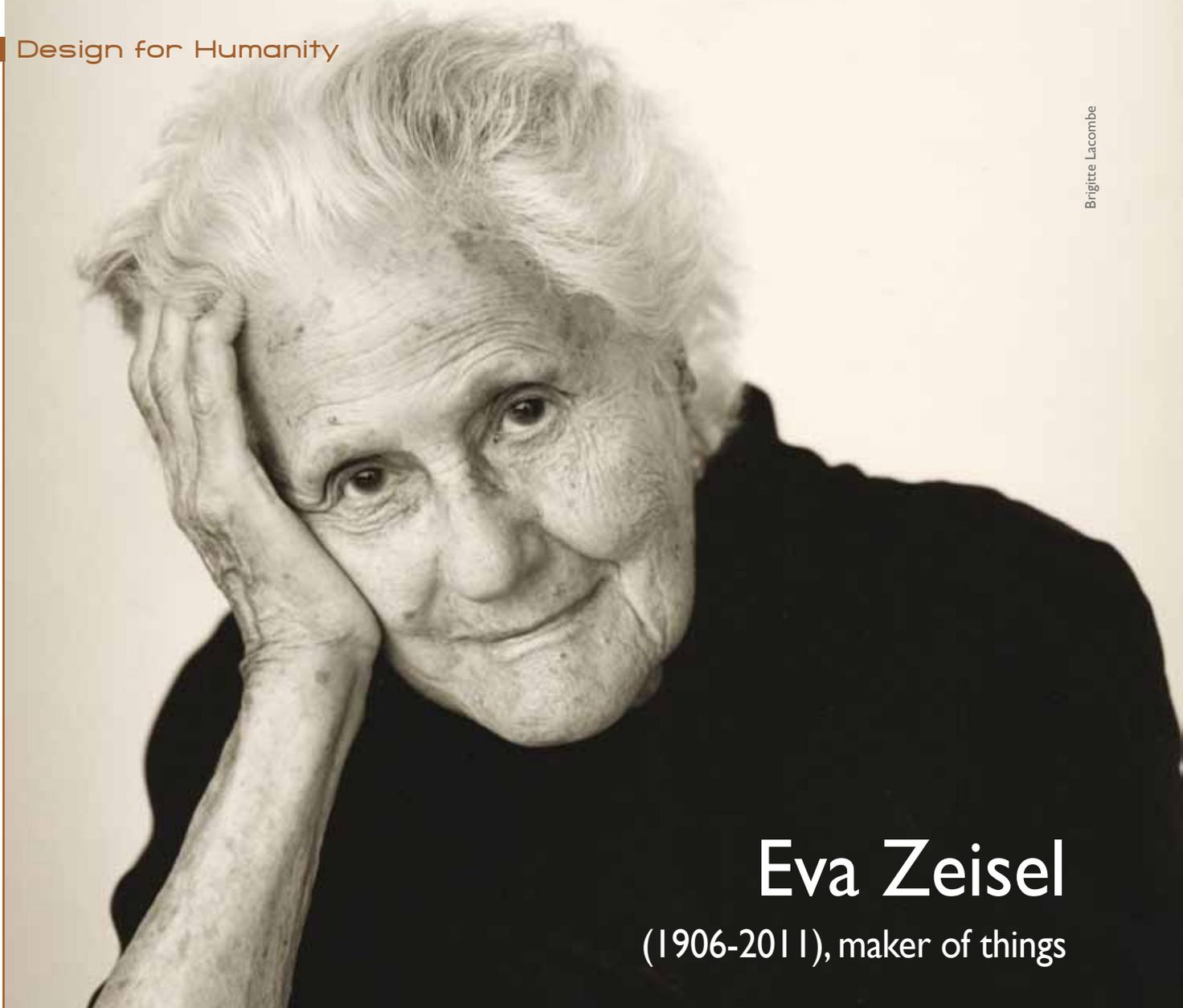
Through the Academy's event sponsorship and exhibition packages, companies are able to demonstrate their support for and network with thought leaders and opinion formers from government, research and practice all over the world.

"With its growing portfolio of events around the world, supported by World Health Design – the only global journal in the field – the Academy can offer members a wide range of opportunities to suit all budgets," adds Sansom. "We work closely with all our members to promote their expertise globally through our network and help them to form an international marketing and business development strategy that builds their global brand image and maximises their growth potential."

For more information on how to become a corporate member or for exhibition and sponsorship opportunities at Academy events in 2012, e-mail info@designandhealth.com



Mutual support: firms renew membership ahead of 2012 Congress



Eva Zeisel
(1906-2011), maker of things

Balancing life, work & beauty

Ceramicist Eva Zeisel touched thousands of lives with her playful, curvaceous tableware designs. But she also lived a remarkable life of her own – one where beauty and health could not be separated. Her son **John Zeisel** pays tribute

Eva Zeisel, my mother, died on 30 December 2011, a few weeks after her 105th birthday. Her long life was one of overcoming adversity, being creative, empowering students and family, giving and receiving love, and living to 105. If any life can be framed by a few words, her three words are curiosity, creativity and playfulness. She herself summed up her design approach as “the playful search for beauty.” People were drawn to Eva as they are to all powerfully creative artists and thinkers – because they know that she saw to the heart of things and that her approval meant so much more than the approval of others. When I ponder why this was, I realise that above all she was nonjudgmental. Her curiosity knew no bounds. She would listen to everyone with an open mind and open heart.



John and Eva discussing production of her goblets



Eva as a teenager in Hungary

Her students learned as much from her about life, and themselves, as about design

over 100,000 individual objects, many of which are in permanent collections of the British Museum, The Boston Museum of Fine Arts, the Victoria and Albert Museum and the MoMA.

A few mention the fact that she influenced the lives of countless students when she taught at the Industrial design departments at Pratt Institute in Brooklyn and the Rhode Island School of Design in Providence – both programmes that she was instrumental in founding. They don't mention that her students learned as much from her about life, and themselves, as about design – she once had them compare the way they designed to the way they looked, pointing out how their body image influenced their work.

After a wildly successful creative life, possibly after every life, it is important to celebrate the impact the person had on the rest of the world – the karma that lasts on and on – the deeds and energy the person leaves with us. Yes I am sad, but I am also aware that Eva is still here in so many ways through not only her work but also her family.

A creative contrarian

Eva was not above being a contrarian. During the right-angled, visually severe Bauhaus and later Modernism periods she designed curves. Her dishes and pitchers and teapots and cups were – no, are – curvy and sensual, they feel and

A celebration of life

She was one of the earliest "industrial designers", although she didn't like the term. In a 2001 TED talk – delivered at the age of 95 – she explained that "industrial design" to her implied "novelty" and that the things she was after instead were elegance and beauty. She called herself "a maker of things."

Most of the articles about Eva that have appeared since her death start with the adversity she faced – imprisoned on a trumped-up charge by Stalin's KGB and kept in solitary confinement for over a year (she celebrated her 30th birthday in Leningrad's Butyrka Prison) and an escape from Vienna just as Hitler marched into Austria. They don't mention that at 95 she fell and broke her hip, an accident that has killed many elders. She survived this with determination and purpose, and went on to live and design for another ten years.

Then they highlight her successes. In the Soviet Union in the early 1930s, when, still in her mid-20s, she became artistic director of the ceramics industry, she was fond of saying: "Stalin wanted every Russian peasant to have a cup and a bowl, and I designed them." In 1947, after incredibly getting out of prison and only nine years after coming to America (and having two children), the Museum of Modern Art commissioned and exhibited her Castleton dinnerware, the first one woman show at MoMA. The articles also mention her best-selling Hallcraft dinnerware, her glazed earthenware Town and Country set, including her salt and pepper shaker "shmoos," and her Classic Century dinnerware set available today at Crate and Barrel.

By her own count, Eva designed



The "Classic" goblet – one of a six-piece set



Castleton – Eva's favourite

were meant to feel like soft, mostly female, bodies. They told stories of mother and child – touching the heart of everyone who uses them both emotionally and spiritually. She used to marvel with pleasure whenever she received letters and emails from fans telling her how much they loved her work. Eva's designs inspire love.

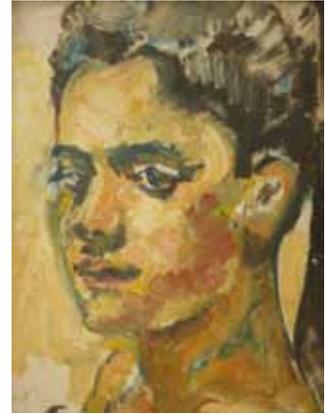
In Leningrad's Butyrka Prison she was also contrarian. When her daily interrogation and emotional battering were over, she wrote poetry using a small stick of wood wrapped in thread from her clothes. Using burnt sugar and cigarette ash as ink, she wrote on the backs of labels from cans she received infrequently in "care packages" from her mother.

Castleton, and later her best known set, Hallcraft, were the first all-white dinnerware sets introduced to the American market – a best seller for years. When the head of a major US glass factory was about to select one of six glassware designs "because the public will like them," she convinced him to produce a more beautiful and eventually highly successful version by asking him "but which do you like best?" She pointed out that just because the public were not as well to do or successful as this industrialist, they still had impeccable taste. Beauty – her vision of beauty – won out every time.

I am told by someone who worked in the Eames' studio that Charles and Ray Eames had a simple shapely white vase of Eva's on one of their desks with a flower to inspire them.

For her, design was health. I believe her passion for design kept her alive over a century; but it was more than design. It was beautiful design; it was beauty itself. Her playful search for beauty didn't stop with objects. She designed houses, store interiors, a shelving system, chairs and tables, candlesticks, tableware, glasses, Christmas decorations, rugs, a pen and pencil set, a burial urn, and even turned her hand to playwriting. Her portrait sketches are economical and expressive. One of Leó Szilárd, the co-holder (with Fermi) of the patent for the atomic bomb's chain reaction, was published in the *Atlantic Monthly*. One of me as a child along with a painting by her of me as a teenager hangs in my home. At the age of 19, one of her drawings won honorable mention in the Hungarian exposition at the 1926 Sesquicentennial Exhibition in Philadelphia.

And she never forgot the people who would experience her work. She called her work "gifts" to them. Her playful search for beauty included all the final users of her designs – those whose lives she influenced through her designs – but not only that. There were also all those she influenced through her sage advice, counsel and vision. Finally, in my work I have met many female professionals whose lives she changed by just being a role model for successful women designers.



Eva's "economical and expressive" painting of a teenage John Zeisel



Eva at work on her Lemosov coffee pot (2002)



Eva and grandsons Evan & Adam at her 94th birthday (left); Eva with granddaughter Talisman (right)





Eva's tubular steel chair at the Museum of Modern Art



Eva's racetrack coffee table

www.evazeiseloriginals.com

A creative balance of life and work

More than once, when asked if she had a highlight in her long life, she answered, as one blogger reported: "Let us separate my work and my life... the high point in my life was having my two children. The high point of my work was the Museum Ware by Castleton China. This is my favourite set. I had a show there you know, in 1946." She knew no boundaries and thus her creative urges spilled out everywhere – into objects and events and into people, among them her children and grandchildren.

Inspired by Eva's independent spirit and belief in her own creativity, Jean Richards, her daughter, is an actress and writer. Eva's grandchildren – Jean's daughter and my sons – were each inspired by Eva to rely on their own creativity and embark on the same playful search for beauty.

Each works for themselves and each follows their art: Evan Bass Zeisel is a New York filmmaker, actor and improviser. Talisman Brolin is a successful photographer in New York as well. Adam Zeisel lives in Boston and is a creative web entrepreneur of Eva's "recent" works – those since she was about 90 years old – bringing to others Eva's work through beauty – carrying on the family tradition. I take care of people living with dementia using design of the physical environment, and the arts and culture to give people with dementia a life worth living. Eva lives on in all those who learned from her and loved her... in person and through her work.



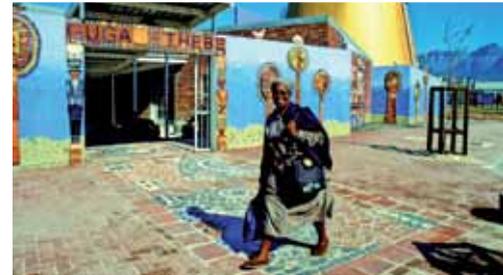
Humanity in design: Dinnerware families – shmoos and birds

Dr John Zeisel is chair of the International Academy for Design & Health's Scientific Committee

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- *Eva Zeisel: A Soviet Prison Memoir*, compiled by Jean Richards & Brent C. Brolin. An e-book available at www.evamemoir.com
- The Eva Zeisel collectors' and fan club: www.evazeisel.com
- www.evazeiseloriginals.com – Adam Zeisel's website
- Google "Eva Zeisel" to see more of her work

Product Photography: Brent C. Brolin



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

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WORLD HEALTH DESIGN
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The Academy's 7th World Congress in Boston last July offered a collaborative, supportive environment for leading international experts and faculties to discuss the science of salutogenic design, and the promotion of health through healthy buildings and infrastructure. Nurturing this global interdisciplinary network is an important part of the Academy's role, but as well as fostering a culture of knowledge exchange, it is important that we also critically review the healthcare sector; its organisational structure and its design trends.

This was especially pertinent in Boston, since, as evidence for which was shown at the Congress, US society can be considered far from healthy. Ranking last in comparison with 19 industrialised nations for preventable deaths, despite 20% of its GDP being spent on medical expenditure (the highest in the world), its healthcare industry is dominated by a profit-motivated private sector. Developing long-term disease prevention, and the promotion of health, is of no interest to these businesses. As a result, 78 percent of US healthcare expenditure is on treatment for lifestyle-related disease, and Americans now consume some 25m pills per hour.

Instead of the "commercialised sickness" of the current situation, the US could move towards a system of "commercialised health", by creating a health industry that incentivises the prevention of lifestyle diseases. The salutogenic approach is the only way to improve health in the country, by creating healthy living environments that will positively impact people's behaviour.

Designers and planners are crucial to creating these healthy environments, but this has not been critically reviewed and discussed. Firms that design "progressive" patient rooms with their own terrace, media wall and separate room for families are influenced by the pathogenic culture of the medical industry, which seeks to increase the cost of medical treatment while making no impact at all on health promotion.

With dynamism and creativity, the US could develop a more pragmatic, salutogenic approach to health



The result of a profit-driven healthcare system, the propriety of luxury rooms is rarely questioned



Critical path

The US's profit-driven healthcare system looks for the symptoms rather than the causes of disease, and such a framework can never produce a healthy society. *Alan Dilani* calls for some intellectual honesty and open debate

Such design developments are rarely criticised in the US, but accepted and presented as highly successful achievements – see pp 56-7 for a rare divergence from this, where Tobias Gilk questions the institutionally bad planning and "style over substance" approach of American radiology units.

The US has arguably the world's best scientists, the best hospitals and the best medical treatment, and I am confident that, with dynamism and creativity, it could easily develop a more pragmatic, salutogenic approach to health. Transforming US society from sick to healthy will in turn lead to a more sustainable, productive economy.

As the Academy moves into a new strategic phase that will see the development of a series of international design competitions, it welcomes more critical dialogue. This discussion will enable us to learn from past experiences, and inform the design of healthy environments around the world.

Professor Alan Dilani PhD is director general of the International Academy for Design & Health

Clean city, healthy city

Are sustainable urban design and health-promoting design one and the same? **Marc Sansom** talks to **Dr Ken Yeang**, pioneer of ecological architecture and masterplanning, about his visionary ideas

Malaysian-born Dr Ken Yeang has been at the forefront of ecological design for more than 35 years. Principal of Kuala Lumpur-based T.R. Hamzah & Yeang, and chairman of its sister company Llewelyn Davies Yeang in London, he has a global influence on the way our cities are being shaped, with a particular expertise in “deep green” masterplanning and a whole-habitat approach to sustainability. Yeang’s “bioclimactic skyscrapers”, such as Singapore’s Solaris (below), have been particularly influential – towers reimagined as vertical landscapes, with natural ventilation, rainwater harvesting and copious vegetation. His work has particular resonance with emerging economies, for whom there is the opportunity to avoid the unsustainable way in which many existing cities have developed, and create a new, more holistic model that can positively influence the health of citizens.

The 8th Design & Health World Congress & Exhibition, to be held in Kuala Lumpur on 27 June-1 July, will explore such ideas in depth, and Yeang will deliver the event’s keynote speech to open that dialogue. Ahead of the Congress, Marc Sansom spoke to him about his work.

Marc Sansom: What is the theoretical basis for your work around ecological design – and where does ecological design intersect with salutogenic design (ie, design for human health and wellbeing)?

Ken Yeang: The theory of ecological design is derived from the environmental biologist’s “ecosystem model”. This is expressed symbolically as a general systems “interactions matrix” of the consequences of human activities and the human built systems on the biosphere, over their entire life cycle. The objective is to achieve a benign and seamless biointegration with the natural environment. Salutogenic design is based on the fundamental premise that human health is ultimately dependent on having clean air, clean water, clean food, clean land and a clean built environment.

MS: As a pioneer of ecological design, how far do you think the world has come in the last 40 years in understanding the critical relationship between the built environment and the natural environment? And how far do we still have to go?

KY: Clearly, eco-design has advanced significantly in the last 40 years, largely influenced by the global recognition of the urgent need to redress man’s negative consequences on the natural environment. While significant progress has been achieved, we are still wanting when it comes to holistically resolving environmental issues in totality. Considerable changes remain – those effected on our societal systems and ways of life, our national economies, the industrial complex, transportation systems, and the rehabilitation of our existing cities and built environments into eco-cities that are “living systems”. Our current generation of designers, architects and engineers are burdened with learning how to apply eco-design principles in their work (not having acquired these skills and knowledge in their earlier tertiary education and training), whereas it is likely that the next generation will design and build sustainably as second nature. They can then return to focussing on what architecture could do to alleviate the human condition, creating effective pleasurable but sustainable spaces, places and forms that enhances quality of life for all.

MS: With the speed of urban growth set to increase, what opportunities and challenges face urban designers in emerging economies such as those in Asia and South America?

KY: The opportunity for emerging economies will be in avoiding the mistakes of the developed world – by designing and building new eco-cities from scratch using state-of-the art clean technologies, eco-technologies and IT systems, with appropriate integrated green eco-infrastructures. This will run





Dr Ken Yeang

- 1971 Graduates in Architecture from the AA (Architectural Association) School, London
- 1975 Receives Doctorate (PhD) in Architecture from Wolfson College, Cambridge
- 1976 With Tengku Dato Robert Hamzah, becomes principal of T. R. Hamzah & Yeang Sdn. Bhd
- 2000 Publishes *The Green Skyscraper: The Basis for Designing Sustainable Intensive Buildings* (Prestel, Munich, Germany)
- 2001 Member of Advisory Board of Hong Kong University, MSc Interdisciplinary Course
- 2003 Awarded Honorary D.Lit. (Hon.), University of Sheffield
- 2005 Joins British architect and planning company Llewelyn Davies as its design director; the company rebrands itself as Llewelyn Davies Yeang. Is currently also the firm's chairman
- 2007 Practice Professor, Texas A&M University, Texas
- 2009 Publishes *Eco Masterplanning* (Wiley-Academy, John Wiley & Sons, UK)
- 2011 De Grove Eminent Scholar, Florida Atlantic University, Fort Lauderdale

concurrently with the retrofitting of existing cities and built environments in the western economies of Europe and North America into eco-cities.

MS: What is your vision of the future of human settlements that might be considered to be both eco-cities and healthy cities? Can or should we distinguish one from the other?

KY: Examples of both masterplanning and buildings in our work and others involve eco-regional design (ie going beyond designing individual eco-cities) in creating new and appropriate eco-infrastructures with zero carbon and zero wastes, with the concurrent rehabilitation and repair of our earlier human devastations and fragmentation of ecosystems and making these whole again. Ecocities are clean cities, and are synonymous with healthy cities.

MS: With chronic “lifestyle” diseases such as diabetes and heart disease rising inexorably*, what design features of an eco-city can also help to support a healthy lifestyle?

KY: Clean water; clean land and a clean environment.

*In 1990, 41.9% of deaths occurred from communicable diseases, 10.7% from injuries and 47.4% from chronic disease. By 2020, only 17.7% of the global disease burden will be communicable diseases, compared to 13.7% from injury and 68.7% from chronic diseases, while ageing diseases, such as Alzheimer's and dementia increase exponentially.

MS: What are the next steps for you own work in the field of ecological design, and your vision for healthier cities by design?

KY: There remains considerable technical development, theoretical advancement, design biointegration and design interpretation to be done in eco-design. These are not so much “next steps” but simply the acceleration of continued advancements of existing eco-design endeavours and the discovery of new ways to resolve current issues and problems.

Marc Sansom is editorial director of World Health Design and director of communications at the International Academy for Design & Health

The next generation will design and build sustainably as second nature

30 June 2012

Kuala Lumpur

Design
& Health
International Academy for Design and Health

International Academy Awards

*Rewarding global excellence
in research and practice*

*Entry
Deadline
30th March
2012*

www.designandhealth.com

Images top to bottom: The Waldron Health Centre, UK, designed by Henley Halebrown Rorrison;
Khoo Teck Puat Hospital Singapore, designed by CPG Consultants;
The National Heart Centre, Singapore, designed by Broadway Malayan.

WORLD HEALTH DESIGN
ARCHITECTURE | CULTURE | TECHNOLOGY

Salutogenic standards

The 2012 Design & Health International Academy Awards, the leading international advocacy programme recognising professional excellence in the research and practice of designing healthy built environments, has opened for entries

The Design & Health International Academy Awards has a significant influence on the design and development of humanistic environments that support health, wellbeing and quality of life around the world. This year, the programme comprises 12 categories across the key areas of international health delivery.

The final awards, which will be presented at a prestigious ceremony to be held on 30 June 2012 in Kuala Lumpur during the 8th Design & Health World Congress, will reflect important aspects of the exceptional work undertaken by researchers and practitioners at the forefront of the field. Recipients of the awards will be those teams and individuals who, through outstanding efforts, have contributed to the progress of knowledge and demonstrated vision and leadership in exemplary initiatives within the field.

The 12 categories include: Health Project (over 40,000sqm); Health Project (under 40,000sqm); Future Health Project; Research Project; Mental Health Design; Elderly Care Design; Sustainable Health Project; Interior Design; Use of Art in the Patient Environment; Product Design; Lifetime Leadership Award and the Judges' Special Award.

Eligibility

Built projects or research programmes completed between 1 January 2011 and 30 March 2012 are eligible to enter. The exceptions are the Sustainable Health Project categories (see the category and criteria information at www.designandhealth.com). Projects may be entered into multiple categories, provided they are tailored to meet the specific requirements for the judging criteria of each award. Previous entrants are not eligible to enter the same category but may enter other categories. The closing date for each entry is 30 March 2012.

Judging panel and criteria

The judging panel consists of a group of independent experts from Europe, Asia, Africa, Oceania and the Americas. Experts in their field, the judges come from multidisciplinary backgrounds in research and practice. Each award has its own criteria defined by the lead judges in each category (see awards entry form).

How to submit

Complete the entry form and the 750-word submission statement and send to the address on the form together with a maximum of 10 powerpoint slides. To download the awards entry form and submission statement, visit www.designandhealth.com.

The judging panel:



John Wells-Thorpe



Susan Black



Ian Forbes



Gunther de Graeve



Marily Cintra



Alice Liang



Alan Dilani



Jacqueline Vischer



Liak Teng Lit
MBA, BSc, MSc



Chris Liddle



Yeunsook Lee



Mungo Smith

Judging process and timetable

The judging process consists of a two-phase process:

20 January Call for entries / awards open for submissions.

30 March Deadline for receipt of submissions.

1 April Phase 1: Entries are scored remotely by each judging panel against the approved criteria. The scores are forwarded to the category chairs who make a recommendation on the shortlisted entries and award winners.

10 May Awards shortlist announced. Shortlisted projects are expected to register and attend the 8th Design & Health World Congress in Kuala Lumpur, from 27 June-1 July 2012 to present their project in a poster display and receive their award, either as a category winner or as a commended project. They may be required to elaborate on the project to the judges or submit further information as required.

May/June Phase 2: Members of the judging teams will meet to make their final award decisions.

30 June Awards Ceremony & Gala Dinner at the 8th Design & Health World Congress & Exhibition in Kuala Lumpur.

Restorative space

The winner of the World Architecture Festival's healthcare award, Groot Klimmendaal is a specialist rehabilitation centre for children and adults in Arnhem, the Netherlands, and includes inpatient and outpatient care as well as therapeutic spaces such as a gym and pool. Architects Koen van Velsen took as their starting point the idea that a positive, stimulating environment with access to nature will aid patients' rehabilitation, and despite its large size – nearly 14,000sqm – the building appears to lie lightly on the land. It makes the most of a small footprint by cantilevering out over the surrounding terrain, with the added advantage that its occupants have even closer contact with the picturesque woodland that surrounds it. Groot Klimmendaal's golden-brown anodised aluminium facade is intended as a form of camouflage.

Direct connections to the landscape beyond are maximised with the use of floor-to-ceiling windows on the double-height first floor, with large v-shaped black beams that echo of the shape of the beech tree-trunks beyond. Through a clever use of glazing, natural light is able to penetrate deep into the floorplate: for example, although they are not on the perimeter of the building, the gym and pool are still afforded outdoor views via large picture windows overlooking the corridors, and then through a further window out to the trees beyond.

Bright colours offer a stimulating environment, while a shallow timber staircase that runs the whole height of the building enables a variety of alternative routes, intended by the architects as an invitation to undertake physical exercise. The fitness facilities are also available to patients' families and members of the local community such as school groups, helping to make the rehabilitation environment less isolated, and more integrated with the community.

Rehabilitation Centre Groot Klimmendaal, Arnhem, The Netherlands

Project completion date: March 2011

Architect: Architectenbureau Koen van Velsen

Client: Stichting Arnhem's revalidatiecentrum Groot Klimmendaal

Size: 14,000sqm

Environmental Engineer: Royal Haskoning RTB van Heugten

Main Contractor: BAM Utiliteitsbouw BV

Project Manager: Brinkgroep

Structural Engineer: DHV Building and Industry BV



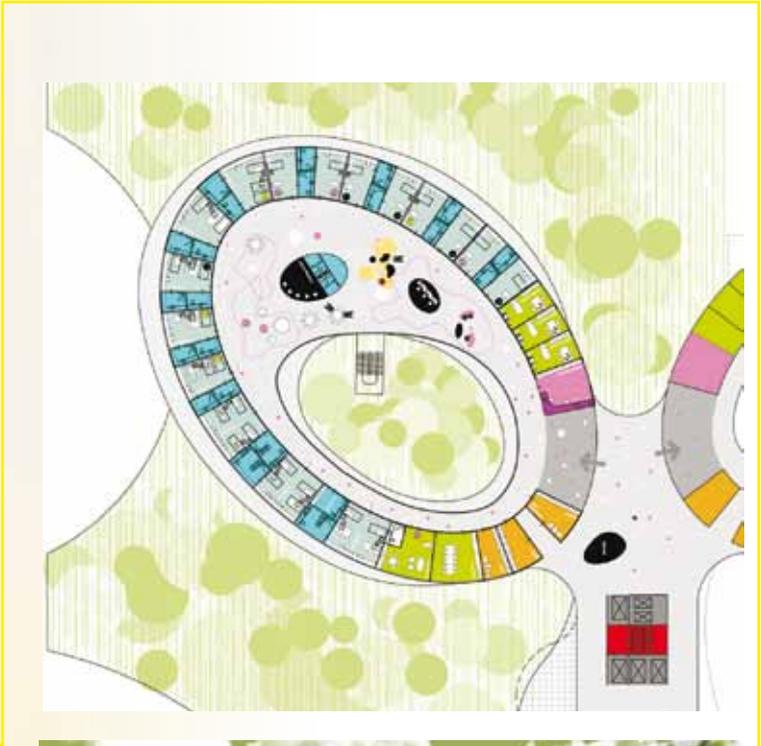
Curve appeal

Confounding stereotypes of what a hospital should look like, VK Group's winning entry to design a new 1,000-bed children's facility for Ho Chi Minh City, Vietnam, won the World Architecture Festival's Future Projects – Heath award. Its footprint – in the shape of a leafy stem – is intended as a visual metaphor for the healing environment, but these curvaceous, organic forms are also highly efficient: the oval floor plans of each “leaf”, which house the inpatient wards, are designed to reduce walking distances and make patient surveillance easier. The building's design also offers an abundance of natural light and fresh air, and a strong connection between inside and out: the wards are organised around an internal void, so all the rooms have a view of nature.

The elliptical volumes are wrapped in a curving overhang that limits solar gain but doesn't restrict views. Wards are naturally cross-ventilated, but mechanical ventilation is used in all medical rooms and where contamination is more of a risk. Roof areas will be planted, both to regulate temperature and to help with storm-water management in Vietnam's tropical climate; as much water as possible will be collected, stored and reused.

Built next to a main road, the hospital will be screened from noise via a bamboo plantation, with the main entrance placed away from the road. A central public square will provide access to outpatient and paramedical services, with a capacity of 6,000 patients per day, and this open plaza is also intended to enhance the hospital's public function. Numerous sunken gardens and patios will offer a sense of privacy and safety, with the landscaping passing right under the elliptical buildings to create a continuous extended garden.







Ngonyama Okpanum & Associates

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

Ngonyama Okpanum and Associates is dedicated to providing knowledge-based solutions to health care design.

Architecture has a strong behavioral influence on the community and society at large. Our approach to design is characterised by a focus on the interpretation of factors which impact on the built environment i.e. the social, architectural, spatial, philosophical, political and technological aspects of design; and their interpretation in the site- specific context.

Ngonyama Okpanum and Associates provides developmental, managerial and technical services in this respect, and within the context of human upliftment and the development of the built environment. Our architecture seeks to promote quality buildings with a strong recognition of the positive influence of architecture through the creation of pleasant therapeutic environments and well- designed spaces.



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CANCER RESEARCH FACILITY

PROJECT: MOTHER AND CHILD CANCER RESEARCH INSTITUTE
BAYELSA, NIGERIA



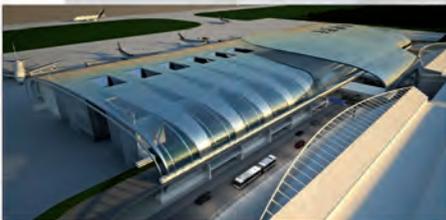
PRIVATE HEALTH CARE

PROJECT: BELLVILLE HOSPITAL
CAPE TOWN, SOUTH AFRICA



INTERNATIONAL AIRPORT

PROJECT: ABUJA INTERNATIONAL AIRPORT
ABUJA, NIGERIA



REGIONAL AIRPORT

PROJECT: ENUGU REGIONAL AIRPORT
ENUGU, NIGERIA



COMMUNITY LIBRARY AND CLINIC

PROJECT: ALBOW GARDENS
CAPE TOWN, SOUTH AFRICA
COMPLETED 2000



PRIMARY HEALTH CARE FACILITIES

PROJECT: OPOLLO HOSPITAL
BAYELSA, NIGERIA
COMPLETED 2009



TERTIARY HEALTH CARE FACILITIES

PROJECT: CHRIS HANI BARAGWANATH HOSPITAL
JOHANNESBURG, SOUTH AFRICA
COMPLETED 2009

Emerging hope

Despite its heavy disease burden, sub-Saharan Africa is taking many steps to create healthy populations – from a new focus on health promotion to the design of sustainable buildings, writes *Emily Brooks*

South Africa's second-largest township, typifies the vast healthcare inequalities that exist in the country, with a high incidence of HIV/AIDS, a high birth rate, and a high incidence of road accidents and violence. ACG drew on international thinking in healthcare design, including the NHS's design framework, *Tomorrow's Hospitals*¹. The result (see case study) is a hospital that aims to reduce stress, increase patient safety and improve overall healthcare quality, but it also responds to local culture and climate.

Khayelitsha Hospital is a flagship project for the region, and comes at a momentous time for healthcare in South Africa. In 2012 its government expects to begin rolling out a compulsory national insurance scheme that it hopes will bring about universal access to an equal standard of basic healthcare, regardless of income. Based on the NHS, the scheme demonstrates the scale of South Africa's ambitions, but it's not without controversy. Detractors say that it is too bureaucratic, with a powerful centralised procurement system that will encourage corruption; that it relies on a number of doctors that the country simply doesn't possess; and not least, that South Africa's small tax base will not be able to cover its costs. In Western Cape, under whose jurisdiction

Khayelitsha falls, "NHI implementation is still at an early stage," says Dr Laura Angeletti-du Toit, the Department of Health's chief director of infrastructure management. "The priorities for healthcare facilities are currently in the City of Cape Town, due to population migration from rural areas to urban ones. There is also the need to redress the legacy of the apartheid by providing hospitals and clinics in townships: the new Khayelitsha and Mitchell's Plain hospitals are two examples of such redress."

PPP is part of this vision of reform, and is seen as crucial for achieving better access to healthcare facilities, especially public ones. The South African government has identified five priority projects, including the redevelopment of Chris Hani Baragwanath hospital, one of the largest in the world, tendering for which is expected to open in early 2012. However, it has a poor track record for seeing PPP projects through in other sectors, particularly prisons, cancelling or stalling them after bids have been won, and this may have dented the confidence of potential international partners for healthcare.

Africa's flagship PPP project is in Lesotho, where the 425-bed Queen 'Mamohato Memorial Hospital opened in October 2011. Its management consortium is led by private healthcare group Netcare, which was charged with the design and build of the facility, as well as its management and the running of all clinical and non-clinical services including several referral clinics – a first for Africa. The IFC (The World Bank's financing arm), which contributed US\$6.25m to the project, sees the hospital as a model that can be replicated elsewhere, and is currently advising the regional government for Nigeria's Cross River State on a similar project.

There is a general argument across sub-Saharan Africa that the more serious issues of governance and accountability must be put ahead of heavy investment, because without the effective running of systems, improved health outcomes will be limited. "At the institutional level, healthcare

The more serious issues of governance and accountability must be put ahead of investment



Rwanda's Butaro hospital was built entirely by a local workforce



Iwan Baan

Butaro Hospital serves a district of 340,000 people that had previously had no district hospital – or even a doctor

management is in crisis," states South Africa's recent and long-awaited National Development Plan². In better news, the Department of Health's Infrastructure Unity System Support (IUSS) programme is updating and unifying the country's design guidelines, taking into account the climate and geography of each province. While general hospitals are making strides to achieve international standards, sectors such as mental health lag behind: Western Cape's Laura Angeletti-du Toit describes the planned revitalisation of Valkenberg Hospital, a psychiatric unit, as "challenging, as there are no national benchmarks or guidelines at the moment." She adds that the International Academy for Design and Health's Cape Town symposium last year provided a useful platform for discovering global best practice, particularly MAAP's work in Australia.

South Africa's new National Development plan puts a strong emphasis on health promotion, recognising that long-term health outcomes are shaped by factors largely outside the health system, such as education, diet and sexual behaviour. According to Jacob Motanya, associate architect/project manager at Ngonyama Okpanum & Associates (NOA), this shift to health promotion "will stem a pandemic in preventable lifestyle health conditions in a country that needs to focus its limited resources on other critical social and economic problems... the government's plan to roll out a national health insurance scheme makes it even more critical that the population remains healthy for the scheme to be feasible."

Butaro Hospital, Burera District, Rwanda

Shortlisted for the World Architecture Festival's healthcare award, Butaro Hospital serves one of the most impoverished areas in Rwanda – a district of 340,000 that formerly functioned without a district hospital or a single doctor. As well as improving the health of the population, Partners in Health and MASS sought to involve the local population in its construction, educating them in construction and stimulating the local labour economy. Nearly 4,000 people were brought in to help excavate, construct and manage the project, and the masons who were trained to build the hospital's distinctive volcanic stone walls are now sought after by contractors. MASS's design uses the stone both as a structural and decorative feature – although it is used frequently as a local building material, it is usually employed for garden walls, or covered with render. The masons were trained on the job, their work becoming more refined as they completed the building. Elsewhere, the hospital's design pays particular attention to infection control, airborne disease such as TB being a serious issue in overcrowded, poorly ventilated corridors. Louvred windows and 24-foot fans circulate the air; germicidal UV lights kill or inactivate microbes as air is drawn through the upper regions of the room; and a non-permeable, continuous floor finish provides an easy-to-clean surface devoid of joints prone to bacterial growth.

Project completion date: January 2011

Client: Rwandan Ministry of Health, Partners In Health/Inshuti Mu Buzima

Cost: US\$4.4m

Number of beds: 140

Size: 6,040sqm

Architects: MASS Design Group

Structural engineers: ICON

With Farrow Partnership Architects and Clark Nexsen, NOA won the International Academy for Design and Health's recent design competition to create a Health Promoting Lifestyle Centre, run in conjunction with the Ministry of Health. The consortium's Protea Health facility provides "a straightforward solution to a complex problem," according to Motanya. It has a strong educational remit, from cookery lessons in its outdoor kitchen to the training of health workers: "This equips people with skills that enable them better take care of themselves, and provides them with skills that lead to better jobs and pay," explains Motanya, and this leads to a virtuous cycle where "higher incomes enable better nutrition, a healthier lifestyle and better access to healthcare provision." The word "safety" is given particular emphasis in the Protea Health proposal – the building's design enables HIV/AIDS counselling to be done in private, helping to address the stigma of the disease, for example – but it is an important concept for users all over Africa, where life can be stressful, chaotic and prejudiced. Similarly, at Perkins+Will's Kenya Women and Children's Wellness Centre (see case study), the campus's gender violence recovery centre is deliberately secluded from the main hospital entrance, to create greater privacy for its users.

When making design decisions, every architect should ask: "How will this improve healthy living?"

Richard Hussey, the National Department of Health's director of facilities and planning, sees the architect's role in health promotion as an all-encompassing attention to detail that benefits everyone. This covers everything from reducing a building's energy requirements "right down to the level of detail such as the placement of hand wash basins in washrooms to eliminate transfer of organisms from one person to another when using such facilities. When making design decisions, every architect should keep in their mind the question: 'How will this improve healthy living?'"

Developing countries find themselves at an advantage when it comes to building more energy-efficient facilities: historically, scarce resources mean that Africa is sustainable by default, with



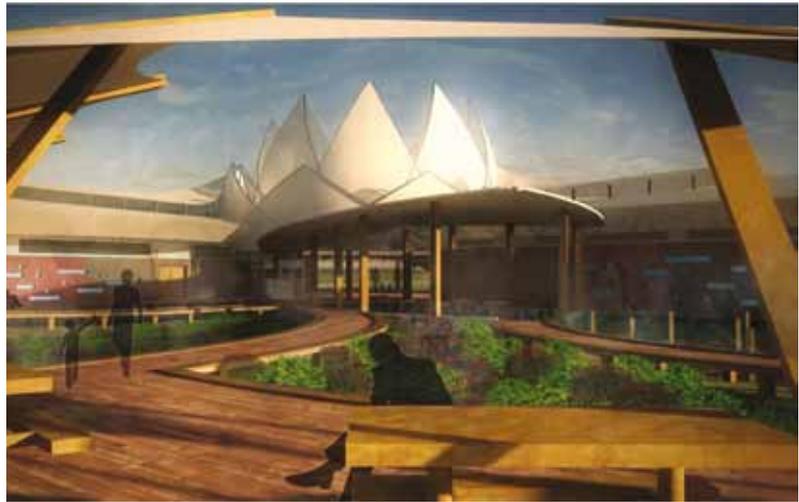
Wieland Gleich – ARCHIGRAPHY.com

Waiting areas at Khayelitsha Hospital have comfortable, flexible seating – rather than rows of rigid chairs – to encourage social interaction

a design tradition that avoids wastefulness and unnecessary energy consumption, for example by harnessing local materials (and labour) and incorporating passive solar design. Broadway Malyan's new eye centre for Accra (see case study) will be built using simple, sustainable, local materials, as will Perkins+Will's Kenya Women & Children's Wellness Centre in Nairobi. On-site energy generation is becoming the norm: Khayelitsha Hospital has both solar PV and wind generators, and the proposed Protea Health project also incorporates solar PV.

Many new schemes, such as the Kenya Women & Children's Wellness Centre, adopt a format of low-rise buildings with multiple courtyards, which are less institutional and have more in common with vernacular styles. Covered courtyards act as exterior "rooms" for patients and family; ACG's Malcolm Campbell says that "what we find in South Africa, particularly in poorer communities, is that a lot of activities such as cooking and social activities happen outside. In hospital, where people spend large amounts of time waiting, they should have a choice to wait in an internal or external space."

For all these excellent examples of hospital design, there is a strong feeling that reaching rural communities is more of a priority. "Care is often in the wrong place, so mobile installation is probably one of the first things to be tackled, and also using things like schools and shopping centres to provide services," says ACG's senior architect Gavin Graham. "Obviously hospitals



Safe place: Protea Health, NOA's winning entry in the Academy's recent competition to design a Health Promoting Lifestyle Centre

Khayelitsha Hospital, Cape Town, South Africa

Servicing the healthcare needs of half a million people, this is the Western Cape's first new district hospital in 30 years: its emergency centre opens to the public in January 2012, with the entire hospital to open April. The building's design reflects the health burden of its population, with an accident and emergency unit 30% higher than that of a standard district hospital trauma unit, to cater for a high incidence of trauma and homicide, and a 30% larger maternity ward reflecting a high birth rate in the area.

"There is a huge emphasis on natural light and natural ventilation," says ACG's senior architect Gavin Graham. "Almost all the windows are openable and we've tried as far as possible to use natural ventilation, supplemented by air conditioning in most of the patient areas."

"We have quite a severe climate when it comes to wind and rain, so offering protection from that was also a very important consideration," continues ACG's Malcolm Campbell, lead architectural consultant and design architect for the project. "The hospital entrance has a covered walkway so if patients are dropped off by taxi or bus, they can access hospital under cover." In waiting areas, artwork aims to create a pleasant and familiar atmosphere, and the seating is arranged not in uniform rows but comfortable, flexible groups, to encourage social interaction. Wayfinding is based on colour-coding, to aid illiterate patients.

Project completion date: October 2011

Client: Provincial Government of the Western Cape

Cost: Tender R459m, construction value R400m

Number of beds: 230 (expanding to 300)

Architects: ACG Architects & Development Planners/Ngonyama Okpanum & Associates

Project management: Msingi Project & Development Management

Quantity surveyors: Ngewu & Associates/Narker & Associates

Civil and structural engineers: Manong & Associates/Edifice Consulting Engineers



With much daily activity in the townships taking place outdoors, ACG incorporated many outdoor areas, including covered waiting areas, to create a sense of familiarity



Farrow Partnership Architects, Clark Nexsen and Ngonyama Okpanum & Associates

Advancing the quest to cause pandemics of health through “Centres of Influence”

The Health Promoting Lifestyle Centres for South Africa aim to dramatically reduce the burden of disease by changing how people think about their health. In contrast to long-established acute care Centres of Excellence in treating illness, the design was conceived to serve as innovative “Centres of Influence” to promote healthy living. Farrow Partnership Architects is actively influencing the future of design for health with diverse projects across North America, the Caribbean, Asia, Africa and the Middle East.

www.farrowpartnership.com

Farrow



Nairobi's new women and children's centre offers clinical as well as social care, taking the form of a series of pavilions linked by shaded courtyards

are very expensive so [the government] is targeting a lot of primary healthcare." South Africa's health insurance scheme proposes to take primary healthcare into the communities – Khayelitsha, for example, although a district hospital, will run some secondary specialties through outreach programmes: "Patients will not need to travel long distances to get health assistance, and the service will be provided in a purpose-built, patient-friendly, environmentally friendly facility," says Dr Laura Angeletti-du Toit. "The whole intention is to move the point of treatment closer to the patient," says Richard Hussey, who also foresees the increased use of mobile healthcare units that will have a preventative, diagnostic and curative remit, and "that will eliminate uneconomic multiplication of high-cost health technology."

With mobile phone reception ubiquitous even in poor and isolated communities, (mobile phone penetration in Kenya is expected reach 100 percent in 2013, for example) researchers are harnessing this technology to allow health workers to penetrate areas where they cannot be physically present – one solution to the critical lack of healthcare professionals. A pilot scheme based from St Gabriel's Hospital

Kenya Women & Children's Wellness Centre, Nairobi, Kenya

Project completion date: On site

Client: James R. Jordan Foundation International

Cost: £19m

Number of beds: 170

Architects: Perkins+Will/Triad

This not-for-profit wellness centre, instigated by the James R Jordan Foundation International, will be based adjacent to the United States International University in Nairobi. It aims to address Kenya's gender imbalance by improving the health of women, and has a preventative and a curative remit as well as being a place of sanctuary for victims of domestic violence. The centre consists of a 170-bed hospital, outpatient clinics, an institute of learning, a gender violence counselling centre and a family hostel. Creating a safe, familiar and non-institutional environment was this an important part of the brief: Perkins+Will worked with Nairobi-based Triad to create a facility that is specifically tailored to the Kenyan environment and its customs. Diagnostic facilities are sited below grade, with the remaining space organised as a village-like series of pavilions and courtyards of similar scale and texture to the surrounding communities, built with local materials.

IBI+Nightingale



Shaping the Future of Healthcare

IBI+Nightingale is a branch of the IBI group, a multi-disciplinary consulting firm that offers comprehensive local service delivery and international design excellence for sustainable environments. It is a constant pursuit involving all disciplines at every level of our organisation.

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Our work in healthcare strives to create facilities that encourage a sense of community and a social atmosphere, while considering humanistic elements such as integration of privacy, comfort, warmth and responsibility to the natural environment.

Ophthalmic Surgical Training Centre, Korle Bu Teaching Hospital, Accra, Ghana

Like many African countries, Ghana has a shortage of eye specialists, with no real opportunities for clinical staff to develop the skills needed to perform safe, sight-restoring operations for diseases such as glaucoma and trachoma. Korle Bu Teaching Hospital's proposed integrated eye centre and training facility will redress that balance. London's Moorfields Eye Hospital and Lions International are partners in the project, and are working with the West African College of Surgeons and other relevant bodies to develop a needs-based training programme for West Africa.

Broadway Malyan's facility incorporates inpatient and outpatient services, including screening suites, two operating theatres and a lecture theatre, with larger consulting/examination rooms to accommodate the extra space needed for students when staff are teaching in a clinical setting. Local building techniques and materials will be used, including aluminium profiled roofing and coloured render. A rainwater recycling system, solar thermal energy for heating water, and purpose-designed windcatchers to minimise the need for mechanical cooling, will reduce the building's energy consumption. Enhanced wayfinding graphics and minimal signage are proposed, to address the issues of the visual and language barriers that patients experience, using tactile finishes and textures with a rich colour spectrum to create a distinctive and welcoming setting.

Project completion date: enabling works on site

Client: Korle Bu Teaching Hospital/Moorfields Lions Korle Bu Trust

Built area: 2,900sqm

Cost: £1.7m

Architect/landscape architecture/interior design: Broadway Malyan

Medical Planning/equipping/project management: IHG

Engineering consultants: URS

Quantity surveyor: Thompson Cole



Accra's new ophthalmic surgical training centre, part of Moorfields Eye Hospital's commitment to eliminate avoidable blindness

in Malawi, where visits from community health workers were replaced in part by communication via text message, found that, for a £250 operational cost, the hospital saved approximately 2,048 hours of worker time, \$3,000 in fuel costs, and doubled the capacity of its tuberculosis treatment programme from 100 to 200 patients³.

Ingenuity and the will to succeed is a feature common to all those involved in creating healthy societies in tomorrow's Africa. Despite all the challenges these economies face – from rapid urbanisation to the double disease burden of the developing and the developed worlds – there is ever-present dialogue about how to change. "What is very positive about South Africa is the ongoing debate about what would be the perfect way of addressing these challenges, and that is very, very healthy," says ACG's Malcolm Campbell. "For me it is the source of a lot of wealth because people haven't given up; everyone's got their view, despite all the problems and challenges." Or, as Richard Hussey puts it: "Awareness accelerates accomplishment. Architects cannot start to fix a problem until we admit that the problem exists, accept that we are part of the cause and realise that we are able to participate in the solution."

Emily Brooks is an architectural writer

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2. *National Development Plan: Vision for 2030*. National Planning Commission, November 2011. Available from www.npconline.co.za/

3. Mahmud N, Rodriguez J, Nesbit J. A text message-based intervention to bridge the healthcare communication gap in the rural developing world. *Technology and Health Care*, Vol 18 Number 2/2010; 137-144



The tools to succeed

Mike Nightingale, founder of Nightingale Associates, explores how social enterprise, empowerment and education is helping to deliver innovative, low cost, practical healthcare to sub-Saharan Africa

Applying worldwide health planning and clinical solutions to developing countries has been shown to have many benefits – but for foreign expertise to be valuable, communities must be consulted, involved and empowered to help themselves. With much of the developing world hindered by inadequate infrastructure, poor sanitation, lack of health education and extreme poverty, understanding the local social, cultural and economic conditions are essential to enable and sustain an efficient healthcare service.

During the course of its research, Nightingale THINK in Africa (the practice's R&D group), has uncovered examples of how the skills and resources of NGOs, social enterprises and designers are empowering local clinicians to deliver practical low-cost medical care to their communities. Here are some of the most inspiring.

Improved infrastructure

In rural Africa, the combination of rough terrain and a poor transport infrastructure means that many communities are isolated from medical care. Riders for Health, a social enterprise, has successfully mobilised health workers in parts of Africa so that they can deliver a vital health service to remote communities. By addressing the often-neglected issues of transportation and logistics, their success is down to providing vehicles and instilling a culture of preventable maintenance.

Riders for Health establishes teams of local technicians and managers to run fleets in key countries, training health workers to ride and to carry out daily maintenance checks on their vehicles. The technicians also provide a monthly outreach maintenance service so that vehicles don't break down. Health workers are able to travel further distances and spend longer with communities, reducing disease and improving treatment, and this in turn restores faith in healthcare provision.



Riders for Health delivers healthcare to rural areas – and runs a maintenance programme to keep bikes on the road

Riders for Health also developed a specially adapted sidecar stretcher named the Uruhu (meaning freedom or independence). Operated by communities, it allows for patients needing emergency care to be transported quickly to hospitals – and by simply swapping purpose-built modules, the unit can be adapted from a stretcher to a water pump.

Mobile medical equipment

Remote locations and extreme economic constraints also mean that new and innovative ways have to be found to provide mobile medical equipment and facilities. Every piece of equipment has to work harder; portable ultrasound machines, for example, are used for far wider diagnostic applications than in developed countries.

Products such as the SurgiCube, designed by Netherlands firm Hippocratech, enable medical care to be delivered outside conventional operating rooms. Last year UK charity Advance Aid launched a competition to design medical support facilities using recycled shipping containers. Architects at Nightingale Associates came up with a plethora of ideas, from immediate response units to long-term solutions. Advance Aid now has over 200 ideas to choose from.

Air pollution claims the life of one person every 20 seconds, but sustainable products such as Envirofit cookstoves reduce emissions caused by traditional fires by up to 80 percent. In Zambia, one low-tech solution is a bicycle-mounted ambulance named the Zambulance: it now takes an average of 30 minutes to take a patient to a rural health centre instead of two to three hours, and its manufacturer, Zambikes, claims that 86 percent of trips have been life-saving.

Education and training

Learning from outside medical expertise can only make a difference through community participation, driven by local champions. For example, Smile Train provides training and information that enables local doctors to perform surgery to correct cleft palates. Clefts are a major problem in the developing world. Children born with the condition can't eat or speak properly and this leads to a sense of shame and isolation as many children aren't allowed to attend school or get a job. Through the work of Smile Train thousands of children are being given a chance to live full and productive lives.

Ensuring a participatory design process is also essential to design facilities that are appropriate to their physical, social and economic context. At Sunyani Hospital in Ghana the design brief was developed through local consultation and site visits. Designed by Nightingale Associates in partnership with local architects, the concept was driven by a strong emphasis on long-life, loose fit. The largely single-storey building was designed to suit the climate while minimising running and maintenance costs. An expansion zone was built into the design, to allow for future growth.

Learning from one another

By studying how healthcare is delivered in developing countries, developed nations can learn valuable lessons in the design of methodologies arising from tight economic circumstances. Budget constraints are a way of life in many developing countries and are rapidly becoming the norm in developed economies, struggling to balance the rising cost of healthcare demand against stagnant growth.

We live in one world – featuring climate change, rising urbanisation and a proliferation of non-infectious disease – that is crying out for common solutions. The smart use of technology in poorer countries is just one method that can be replicated in developed nations. Exchange programmes of doctors, nurses and managers can also give huge insights into solving shared problems. In the same way that exchanges between developed and emerging countries are hugely valuable, just as much can be learnt through peer exchanges, such as a recent one between the leaders of the slums of Mumbai and Johannesburg.

The two-way exchange of research findings between richer and poorer countries, and the promotion of design competitions, such as the Academy's recent Challenge Africa contest to design health-promoting lifestyle centres, allow designers around the world to collaborate effectively to improve the human condition.

The Mike Nightingale Fellowship will be launched during 2012. The charity's initial focus will be the improvement of health and education infrastructure in a sustainable context in sub-Saharan Africa.



Correcting cleft palate gives a child a better future



Empowerment through education: Smile Train teaches doctors how to perform surgery



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The health status of people living in Australasia is one of the highest in the world, with rising life expectancies, and falling mortality and morbidity rates. But at the same time, the region faces similar challenges to the rest of the developed world, characterised by the pressure of rising costs, an ageing population and a rise in the level of lifestyle diseases, most notably diabetes and obesity.

In addition, Australasia faces the challenge of addressing the inequities in health outcomes of its poorer socio-economic groups, in particular its indigenous population and those living in more remote and rural areas.

In recognition that a healthy population is the foundation for social development and economic growth, health reform in Australasia is undergoing a policy shift that recognises the need to embrace health promotion and embeds a preventative approach based on better education, evidence and research.

Global societies today are characterised by the importance of knowledge and information for economic growth. The human ability to process, develop, apply and formalise knowledge is a valuable asset to organisations of all types. A well-designed physical environment must therefore be built around the health of employees in order to optimise human capital and potential. Carefully designing the workplace to support employees is an investment that pays back commercially, by driving changes in organisational culture.

The concept of "supportive environments for health" was coined during 1986's World Health Conference in Ottawa. A "settings based" health promotion project focuses on the arena in which supportive health activities takes place. This theoretical approach is a shift in emphasis from individual health problems and risk factors to an examination of the nature of systems and potential wellness factors within organisations.

During the 66th meeting of the General Assembly of the United Nations last year, the global socio-economic challenge of non-communicable disease was discussed for the first time. The IADH believes strongly that the built environment has a significant impact on health and is committed to bringing this understanding to the design and health professions in an effort to reduce the prevalence of these lifestyle diseases.

We invite you to register for the 3rd International Symposium on Design & Health Australasia 2012, from 28-29 March, to explore global perspectives on the planning, procurement, design of infrastructure that supports the development of healthy environments and communities across Australasia. Register now at www.designandhealth.com



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1. Evaluate different international models of care, health theories and perspectives
2. Reflect on the socio-economic factors impacting on health and public infrastructure
3. Report on case studies of building types that are improving health outcomes
4. Recommend initiatives to improve the design quality of the health infrastructure
5. Explore how to create a sustainable health infrastructure
6. Identify what is "fit for purpose" in healthcare design
7. Discuss how to engage clinicians in the design process
8. Stress the importance of prioritising evidence in design decision making
9. Increase awareness of the available research base



Nigel Crisp



Oliver
Harrison



Richard Jackson



Chris Liddle



Across the Tasman

While economically strong Australia pushes on with reform and an ambitious building programme, concerns over earthquakes are the driver for change in New Zealand. **Kathleen Armstrong** reports

The sun continues to shine on the land down under. Riding on the back of exports of its natural resources, mining in particular, Australia's economy has bucked international trends with sustained growth. And in the healthcare sector, the development of new and refurbished facilities has progressed in both rural and urban areas, in order to improve services and meet increased demand.

Health system review

In New South Wales (NSW), the new state government, elected in March 2011, conducted a review of the governance of its health system and came up with a set of proposals to transform how healthcare is delivered in the state.

The new strategy includes a more patient-centred approach as well as increased data transparency and clinical engagement, while decentralising the management of hospital and health service delivery to local health districts (LHDs) and specialty networks. The LHDs will be responsible for the management of capital projects of less than AUD\$10m, while projects of greater value will continue to be planned and managed by Health Infrastructure, the NSW Health agency presently overseeing major capital procurement and oversight.



Currently on site, Nepean Hospital in Sydney's western suburbs will deliver extra beds and operating theatres

The state of Victoria has led the way in terms of healthcare development in Australia

"The director-general's report creates a clear process, a blueprint for many years to come," says Professor Paul Barach, who is working with the state government on improving learning and design processes while also improving consultation with clinicians and communities. "It came out of years of over-centralisation and decisions that were politically driven and not in accordance with local and patient needs." Although Barach is optimistic about the proposed changes, the recent focus on reforming governance structures has inevitably put other developments on hold. "People underestimate how long it takes to change fundamental governance processes, but we need to get the building blocks right."

Design guidelines

Something concerning Barach and many others, however, is the limbo in which the Australasian Health Facility Guidelines currently sit. Funding for the guidelines, which provided a design structure for health facilities in Australia and New Zealand, was withdrawn at the end of 2010 and as yet no one has resumed responsibility for continuing their development and updating.

The development of 16 guidelines was in progress when the project ended, eight of which had been signed off for publication: they are currently in the hands of Health Infrastructure and no decision has been made regarding how they will be managed, or who will manage them.

In the meantime, project development continues in NSW and elsewhere. Nepean Hospital, on the western outskirts of Sydney, is due for completion in mid-2012. Part of the AUD\$137.8m redevelopment



Backlit ceiling panels in the radiation bunkers – one illustrating a tree-top view, another a night sky – act as positive distractions for patients



Allen Lau/Danielle Benson

Metal banding makes up the cancer care facility's curved facade; the rainbow colours are intended to be a symbol of hope

Sunshine Hospital Radiation Therapy Centre, Melbourne, Australia

The brief for this Silver Thomas Hanley-designed facility was to create a building that was a vision of hope and life. Metal bands on the exterior of the building reflect sunlight and act as a beacon for those arriving on the site. Inside, facilities include a state-of-the-art radiation planning system and two linear accelerators. STH created two different designs for the radiation bunkers – one with a night theme, the other with a tree-top view – and feedback is being sought from patients who have used the facilities to assess the impact of the bunker design.

Project completion date: 2011

Client: Western Health

Cost: AUD\$40.5m

Architect: Silver Thomas Hanley

Project manager: Johnstaff

Construction manager: Cockram Construction

Landscape architect: John Patrick

Structural and civil engineer: Irwin Consult

Services engineer: AECOM

Plumbing engineer: CJ Arms

Interior design: CMI Design

of the Penrith Health Campus, the Hassell-designed hospital will provide six additional operating theatres and 80% single rooms through extensions to the ICU and a new ambulatory procedures centre known as the East Block. Built on a restrictive site, the design of this three-storey building will integrate with the attached theatre block in a step-down, step-up form and the bulk of the building has been broken down into linear and floating elements that oversail and layer with one another.

In Shoalhaven, on the south coast of NSW, Hassell is designing a cancer centre to serve the local population (see case study). It is part of the drive to improve the provision of cancer care across Australia, bringing radiation services to rural populations so that they do not have to travel into urban centres for treatment.

In Victoria, Silver Thomas Hanley (STH) has just finished working on the Sunshine Hospital Radiation Therapy Centre (see case study) situated in the western suburbs of Melbourne, one of the fastest growing regions in the state. The centre is part of the redevelopment of the Sunshine Hospital campus which also includes the recently opened Western Centre for Health Research and Education (WCHRE) and a new hospital inpatient building, due for completion later in 2012. Polished white concrete and zinc and vertical sunshades form common reference points across the campus, integrating the different buildings with one other.

The AUD\$51.6m WCHRE will provide a teaching, training and research centre for Sunshine Hospital. A challenge for the design team at STH was to incorporate the aspirations of the three institutions using the centre – the University of Melbourne, Victoria University and Sunshine Hospital itself – into a space for collaborative learning. This was assisted by a series of visioning

sessions with staff from the three facilities. The design includes a central atrium and breakout rooms to encourage discussion and learning and features striking polished concrete and glass forms.

STH is working on some of Australia's largest projects: the AUD\$1bn Victorian Comprehensive Cancer Centre in Melbourne (part of the Plenary Health consortium in partnership with DesignInc and McBride Charles Ryan), due to open in 2016; the AUD\$1.76bn Gold Coast University Hospital in Queensland (in partnership with PDT and Hassell) which is due for completion at the end of 2012; the AUD\$1.76bn Fiona Stanley Hospital (in partnership with Hassell and Hames Sharley) in Western Australia which will be due for completion at the end of 2013; and the AUD\$1.7bn redevelopment of the Royal Adelaide Hospital in South Australia (in partnership with DesignInc), construction of which began a couple of months ago.

The Royal Adelaide will comprise 100% single rooms and, according to STH's Ernest Girardi, will be designed around the principle of "the service going to the patient rather than the patient going to the service". The hospital will be broken into stacked "clinical villages" (for example, the cancer sector will include radio-oncology, a cancer day unit and chemotherapy) with 40 technical suites (operating and procedural rooms) of 65sqm each and 60 ICUs of 25sqm each. Imaging will be distributed across four departments – emergency, outpatients, the hot floor and inpatient areas – as part of a patient-centred approach.

The state of Victoria has led the way in many aspects of healthcare development in Australia – including the use of public-private partnership (PPP) as a funding mechanism, the decentralisation of healthcare provision and, according to Ken Dyer from Suters Architects, the incorporation of ecologically sustainable development (ESD) principles. Echuca Hospital on the banks of the Murray River is a major redevelopment of a regional hospital and includes a number of ESD projects that will be monitored for their effectiveness. Due for completion in 2016, the AUD\$65.6m project will see the delivery of contemporary acute and ambulatory services focusing on emergency services, medical imaging, inpatient accommodation, pharmacy, medical records and associated works. Its design will reflect its position at the confluence of three rivers – the Murray, Goulburn and Campaspe. A key element of the project is a Health Department study of ESD initiatives, and the final scheme will include double glazing, low-VOC finishes, recycled local timbers as linings in key public spaces, night-time purging and solar-boosted hot water. The building is also being designed with integrated spaces for expansion on both its ground and first floors.

Another Suters-designed project is the Hunter Valley Private Hospital in NSW (see case study), which opened in November 2011. The expansion of the private hospital is expected to help to take the pressure off state-run acute hospitals in the area and is another strategy for improving services – and Dyer says that private hospitals around the country are very busy.

In New Zealand, the scenario is not quite so rosy. A small country without the vast natural resources of its larger neighbour, it has felt the impact of the global recession. As a result, many projects were put on hold or approval was delayed. However, last year's devastating earthquake in Christchurch and continuing

District health boards are reassessing their building stock for how it meets seismic standards



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Silver Thomas Hanley's redeveloped Royal Adelaide Hospital breaks the facility into "clinical villages"



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A growing number of facilities in New Zealand, such as this rural one in South Island, aim to integrate primary care with family health centres

Golden Bay Integrated Family Health Centre, Golden Bay, New Zealand

The Golden Bay IFHC brings three services together in one facility – a 17-bed rest home, a 12-bed hospital and a GP practice with four GPs. To the right, on the main ‘street’ at ground level are the primary health consulting rooms. To the left, on the north side of the building, and catching the maximum amount of sun, are the rest-home rooms, which open onto semi-private courtyards. The hospital sits on the first floor; its 12 rooms have been modified to make them bigger so hoists and other equipment can easily be fitted in. Landscaping has been designed to help ameliorate the noise of trucks passing on the busy road outside. The facility will also have a birthing/post-natal room and will provide some respite care. A surgery bus will regularly visit the site – patients will have surgery in the bus before moving to the hospital building to recover.

Project completion date: mid-2012

Client: Golden Bay Community Health

Cost: NZ\$5m

Size: 4,000sqm

Architect: Peddle Thorp Architects



tremors throughout the country have led the government to review its seismic guidelines and district health boards to reassess their building stock for how it meets the necessary level 4 seismic standards for post-disaster facilities.

According to a report in the NZ Herald (15 December 2011, www.nzherald.co.nz), the country's NZ\$8.5bn building sector is about to enter a boom period – and hospitals were among the strongest performing segments in the six months to October 2011.

One of the first business cases for a new hospital to be approved by the government, the redevelopment of Christchurch Hospital is now entering the preliminary design stage, with completion expected in 2016. It will provide around 465 additional beds.

The design of hospitals in New Zealand has long been guided by the Australasian Health Facility Guidelines. Darryl Carey from Chow:Hill is concerned about the impact of the withdrawal of funding for the development of the guidelines. Carey is chair of the New Zealand Health Design Council (HDC), a network for



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Expanding private hospitals such as New South Wales's Hunter Valley is a strategy for taking the pressure off state-run acute hospitals



Inspired by the nearby native wetland landscape, a curved glass curtain wall features large-scale images of nature

Hunter Valley Private Hospital, Newcastle, Australia

The AUD\$20m expansion increased this New South Wales hospital's capacity by 70% with the addition of two fully integrated operating theatres, 35 beds, a recovery room, high-dependency unit, commercial laundry, major sterilising facility, palliation spaces, medical consulting rooms, staff breakout spaces, a cafe, stores and additional car parking. Coloured cladding in vertical stripes across three corners of the new three-storey building references the nearby native wetland bulrushes and grasses, and the colour theme continues inside. A curved glass curtain wall, featuring large-scale wetland photographs lines one of the major corridors overlooking the gardens. The artwork, courtyards and landscaping also incorporate the existing theme: "where caring comes naturally".

Project completion date: November 2011

Client: Hunter Valley Private Hospital

Cost: AUD\$20m

Architect: Suters Architects

Main contractor: PDA Building

those involved in the design, planning and management of health facility infrastructure in New Zealand. The HDC is in discussion with colleagues in Australia to look at ways of taking the guidelines forward so that the work that has already been done on them is not lost. Carey says that other key topics discussed at the HDC's seminars and conferences this year this year were seismic and disaster preparation; BIM in health; PPP procurement processes; and the country's new business case guidelines.

Carey is also part of one of the four consortia of expertise, made up of architects and other professionals, which review and advise on district health boards' (DHBs) potential privately funded healthcare project proposals. This includes the growing number of projects in both rural and urban areas aiming to integrate primary care services into family health centres. Each integrated family health centre (IFHC) will be structured according to the needs of the local community, says Margaret Garthwaite from Peddle Thorp, which designed the Golden Bay IFHC in a small rural community in the South Island (see case study). The centre is funded by the district health board and managed by the local primary health service.

"It was very politicised," Garthwaite comments on the project. "We were asked to help work through the issues and create a facility with an integrated model of care." In January Garthwaite will start work on another IFHC in Auckland. Here the focus is likely to be on the provision of diagnostic and GP services rather than the provision of aged and hospital care more necessary in a rural location like Golden Bay.

Kathleen Armstrong is a healthcare writer

Over the last decade, the creation of spaces that facilitate independence, engagement and community has been at the heart of the most successful new programmes for elderly care architecture. Schemes such as Hogewey in the Netherlands (featured in WHD's January 2011 issue), which aims to socially engineer families of like-minded individuals who can support and nurture one other in a facility that encourages self-expression and outdoor living, demonstrate an inspired response to improving the individual experience of the elderly in care.

But enduring global economic uncertainty has thrown into jeopardy the prospect of private individuals or public services funding continuing investment in similar facilities on a scale required to accommodate an ageing population. Filling the gap, however, are charities and community groups, inspired individuals and both private and social housing developers – rather than healthcare services – who are stepping in to ensure that the frail elderly do not become isolated in ageing silos.

In a time of dwindling social services provision, there are two clear options for ensuring dignity, comfort and meaningful lives for the elderly: one is

to create flexible accommodation within existing neighbourhoods to allow people to stay where their roots and friendships lie; the other is to create desirable accommodation that not only serves the frail elderly but also the able bodied, and ensures an ongoing connection with the community.

In the US, Perkins Eastman – one of the leading firms for elderly care architecture – is seeing increasing innovation in the kinds of architectural and cultural solutions their clients are demanding. One development, St John's On The Lake in Milwaukee (see case study), is a tower block of carefully tailored accommodation, with a lakeside location, integrating a vibrant arts, wellbeing and entertainment programme for residents through partnerships with local cultural groups. Meanwhile, in Japan, one inspired individual has created a series of highly distinctive dwellings in a forest setting that encourage co-operative living. The unique Gojikara Village development integrates distinctive living spaces with nursing care, a respite hotel, a community centre and a primary school. "The founder of Gojikara, Ippei Yoshida, really believes that how we care for our elders is a symptom of the values of our society," says Emi Kyota, an environmental gerontologist who has written about the project in *Design for Ageing* (Wiley, February 2012) a new book co-authored with, among others,

Pozzoni Architects' David Hughes. "In Gojikara he is trying to create an authentic community feeling, but the kind of community that might have existed 50 years ago." The buildings – as well as the plan – are quirky, individual, and mainly constructed of wood, surrounded by trees and wildlife and about as far from the manicured, clinical environment of a care home as it's possible to imagine.

"Integrating elderly care is the way forward," says Greg Penoyre, partner at Penoyre & Prasad, which has recently completed designs for a scheme for social housing providers East Thames Housing (see case study). "Elderly care is seen as an institutional issue and as a quite different set of issues for different stages of age and decline. My big interest is in blurring the boundaries between stages of peoples' lives and making it possible to feel like the place where elderly people are put is actually the place where they live rather than the place where they are

From isolation to integration

Innovative new models of elderly care see accommodation integrated into the local community, as well as the creation of desirable new communities. *Veronica Simpson* reports



Gojikara Village, Japan, one person's vision for a community that respects the elderly



Chris Barrett

Elderly care is seen as having a different set of issues for the different stages of age and decline

being treated." The East Thames Housing project, Snowden Court (see case study), offers high quality, landscaped and contemporary living accommodation for both able-bodied elderly and those needing extra care, within an existing London community.

Likewise, the UK's Pozzoni Architects has built several award-winning elderly care facilities over the last few years for enlightened elderly healthcare providers such as Belong, but it is the practice's social housing division that may well have the greatest impact on the ageing experience for the UK's elderly. According to senior partner David Hughes: "Around 99 percent of all [social housing] schemes we design now are lifetime homes. They are designed to take a ground floor toilet with shower, so it is possible to live on one floor, if needs be."

In Berlin, Eckhardt Feddersen, director of FeddersenArchitekten, has been working for the last decade to incorporate designs into all his clients' apartment

St John's On the Lake, Milwaukee, USA

This 88-unit senior living community on Lake Michigan's waterfront, an expansion of an existing campus, combines the best in urban living with forward-thinking design. The client, St John's Communities, has a progressive, whole-person wellness philosophy which was central to the design of the new 22-storey tower and the character of the spaces. A spa, with lap-pool and therapy rooms, a roof terrace and putting green, are combined with a multi-purpose event space centres around a cafe and art gallery. Partnerships forged with local art, fitness, and theatre groups ensures cultural connections with the community. The units range in size from 100sqm to 210sqm, and have been designed to maximise views onto the lake and surrounding area. Natural colours and materials, reclaimed wood and ample glazing provide a "tasteful and aspirational" backdrop.

Project completion date: summer 2011

Client: St John's Communities

Cost: \$33m

Floor area: 20,400sqm

Architect: Perkins Eastman

Architectural consultants: Continuum Architects + Planners, SC

Landscape architecture: Hitchcock Design Group



Pickmere, South Cheshire, UK

Designed as an Extra Care scheme (sheltered housing, with some additional support services) this project for Wulvern Housing Association was designed by Pozzoni Architects to be a quality environment that people would be happy to call home at any stage of their last decades. Pozzoni Architects redeveloped an existing site, refurbishing and expanding an existing accommodation block of 48 apartments, expanding to create 85 new and refurbished apartments with new communal facilities including gymnasium, spa, hair salon, community meeting rooms and bistro, all of which are open to the public, while a private landscaped garden is accessible only to residents, for security and peace and quiet. The scheme flexibly accommodates a wide variety of support needs, from minimal to critical. With a mixture of cleaned brickwork, natural timber boarding, coloured rendering, aluminium curtain walling and ample glazing, the scheme's aesthetic is contemporary and domestic, not institutional, with communal areas that have been designed to create a vibrant community hub for staff, residents and visitors alike.



Project completion date: 2011

Client: Wulvern Housing Ltd

Cost: £9m

Architect: Pozzoni Architects

**People are
happy to live
in a communal
environment if
they can maintain
their identity**

blocks that facilitate independent living for all but the most advanced dementia patients, facilitating “ageing in place” – including the placement of day care centres at the heart of developments. He says that Germany and Switzerland are probably among the leaders of enlightened accommodation provision for all life stages, but feels that more still needs to be done to encourage true community integration. “We are doing a project in a suburb of Berne where we are planning to create a social heart within the community; there’s a children’s nursery, a public library, a huge restaurant and 10 medical practitioners,” he says. “It all adds up to a little *quartier* in which people of all ages can live very easily and have lots of choices.” Feddersen also ensured that a 170-bed care home at the centre of this facility could be easily reconstructed into normal

apartments, to facilitate a mixture of able and less able-bodied residents, of all generations.

The quality of facilities is key in schemes that aim to create a social hub within residential blocks. In the UK, Belong is a pioneering elderly care provider that champions the provision of apartments for the able-bodied elderly alongside extra care facilities, within a “village centre” format that fosters community engagement. But the formula only works because the facilities can compete with anything on the local high street. Belong’s latest scheme in Atherton, Greater Manchester, has 26 “normal” apartments and 72 bedrooms spread around six, 12-person households as well as a village centre with bistro/cafe, hairdressers and beauty salon. It is already 85% occupied and most of the apartments have sold (even in a depressed housing market). What makes the difference? According to operations director Tracy Paine: “The village centre is very supportive and lively. We run the cafes ourselves, and they are very busy and popular with people from all around the neighbourhood; family can come and visit and teenagers can use the internet cafe. We’ve got a lot of married couples that move in to the apartments, knowing that if one of them falls ill, they can still be together. People never have to move on.”

The commercial imperative is driving these schemes towards a more sophisticated, domestic aesthetic. Penoyre & Prasad’s Snowden Court development is unashamedly contemporary, because, says project architect Alan Holloway, “a high proportion of the residents will have grown up in houses of the 60s, 70s and 80s. People are happy to live in a communal environment, but they must maintain their identity within it.”

Eckhardt Feddersen agrees that the more an apartment reflects the residents’ enduring tastes and lifestyle (rather than the need for carer convenience and hygiene), the more at home they will feel. Elderly apartments for lifelong city dwellers, for example, should be urban *quartiers* such as his Berne scheme, rather than fake rustic villages on the edge of town. He is dismissive of some of the more US-style schemes – vast, barn-



Belong Atherton’s site includes a “village centre” popular with all ages



A less institutional, more domestic aesthetic is becoming the norm, as at Belong Atherton

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like institutions that “look like a cheap model of a Schloss”, adding for good measure that “the intelligentsia of Hamburg would never dream of inhabiting such a place.”

One scheme with an authentic sense of place is Portuguese architects Aires Mateus' *Residências Assistidas em Alcácer do Sal*. The building was commissioned by Santa Casa da Misericórdia, originally a religious charity but now working with government to provide homes for Portugal's disenfranchised and impoverished. Designed for a largely agricultural and fishing community, each dwelling resembles the whitewashed simplicity of rural cottages, but with a contemporary style. Stacked like sugar cubes along a kinked spine, the three-storey building rises and falls with the landscape, providing a sense of journey and perspective wherever its occupants gaze or stroll.

“Beautiful architecture is a place set up for people to feel well in,” says Feddersen. “You have to have something that people accept as their original feeling of being home.” However, while this may well be true of those capable of relatively independent living, he says that for extra care or critical care residents, it is “only 15 percent of the solution”. His firm's research into care home architecture concludes that facilities that improve conditions for carers are more important

than stylistic invention – meaning convenient parking, good changing facilities, thoughtful design that facilitates passive supervision and safety. He says: “The more we think about the nurses the better the atmosphere is.”

Veronica Simpson is an architectural writer



Centre for Brain Health, Vancouver, Canada

The new Djavad Mowafaghian Centre for Brain Health, “will change the way we do business in brain health,” according to its director Dr Max Cynader. The centre is unusual – if not unique – in combining cutting-edge research with advanced clinical care, a healthy ageing programme and state-of-the-art facilities for brain imaging and genomics. A brain tissue and DNA bank will collect data from volunteer patient participants, used to identify genetic risk factors for diseases. The centre also combines neurology with psychiatry in the same clinical facility – something Stantec Anshen + Allen associate Sharon Woodworth has never encountered. Stantec's key objectives were to achieve a sense of comfort and security for the centre's users, who include patients seeking neurological treatment for Alzheimer's, dementia, MS and Huntington's. Short walking distances between entry and clinical spaces, simplified wayfinding and numerous places for rest and reflection are provided, alongside maximum daylight through large glazed areas. The building is designed to meet LEED Gold standard, through reduced energy consumption, conservation of water and use of low-VOC materials.

Project completion date: 2013

Client: University of British Columbia

Cost: CAN\$68m

Floor area: 12,500sqm

Architect: Stantec Anshen + Allen

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Snowden Court, London, UK

Penoyre & Prasad (P&P) worked closely with client East Thames Housing to try and create a facility for elderly people who need either a little or a great deal of support, all set within an existing residential neighbourhood. The scheme will support residents' needs as they age, and encourage community integration. Combining an Extra Care housing block of 60 apartments with a 38-apartment sheltered accommodation block, the geometry of the buildings is designed to create a series of places around, between and within the buildings, "breaking down the whole into bite size pieces," as P&P project architect Alan Holloway states. A large, glazed, double-height entrance foyer welcomes visitors and residents alike to the Extra Care block, which is cranked in several places to create spaces for contemplation as well as congregation. The double-height lounge and dining area looks directly onto garden and riverside space to the rear, and a single-storey bay window protrudes to afford a 180-degree view of trees, water and open playing fields beyond. Each of the apartments has either a bay window or a balcony, recessed for extra shelter in the Extra Care units. Entrances and exits ensure a sense of access and openness to the community – the previous entrance, to the empty 1960s facility that this building replaces, looked onto the adjacent tower block, but P&P's scheme ensures the main entrance is off the main road, linking the buildings to the wider community.

Project completion date: 2012

Client: East Thames Housing

Contract type: Design and Build

Cost: £11.8m

Architect: Penoyre & Prasad

Size: 9,590sqm

Mechanical, electrical, environmental, CSH and daylight consultants: Max Fordham LLP

Landscape architects: Farrer Huxley

Structural engineers and highways consultant: Colin Toms & Partners

Digital hospital for Canada

A new hospital for Toronto will be one of the first in North America to use fully integrated digital technology. The 158,000sqm Humber River Regional Hospital is the work of a consortium, Plenary Health Care Partnerships, which will design, build, finance and maintain the facility for 30 years: consortium member HDR is providing architectural and healthcare consulting services. "Although many hospitals have digital components, Humber River is the first hospital in North America to fully integrate and automate all of its processes; everything is done digitally," says Jerry Jeter, healthcare principal at HDR. Its automated features will include kiosks and mobile devices through which information can be accessed anywhere in the building; smart bed technology that monitors patients' vital signs and updates electronic medical records immediately; and Automated-Guided Vehicles (AGVs) that deliver supplies and equipment, allowing staff more time for patient care. The hospital, which has already broken ground and should be completed in late 2015, also expects to receive LEED silver certification.



Ninth Maggie's Centre opens in Nottingham

An oval-shaped elevated building in the grounds of Nottingham City Hospital has become the UK's ninth Maggie's Centre. Designed by CZWG Architects' Piers Gough, with interiors by Nottingham native Paul Smith, the building is clad in bright-green ceramic tiles, making for a bold antidote to the clinical facilities in whose shadow it sits. The building's elevation allows for a feeling of light and space, and there are several balconies from which users can look out onto the landscape. Gough, who was a friend of Maggie's founder Maggie Keswick Jencks, says that his creation "will be a sanctuary for all those who walk through the door. From the outside the playful appearance will entice people to take a look through the door; once they do the harmony of light and space will create a uniquely welcoming environment." The building serves a catchment of some 1.3m people, a region that sees 4,000 new cases of cancer every year.



Multi-disciplinary centre for Devon

A new centre of excellence for Devon, designed by Devereux Architects, has received planning permission. Set for completion in 2013, the 7,250sqm Research, Innovation, Learning and Development Centre (RILD) is a partnership between the Royal Devon & Exeter NHS Foundation Trust, the Peninsula College of Medicine and Dentistry and the University of Exeter, and will put education, research and healthcare facilities under one roof. The four-storey building will include a medical research facility, part-funded by the Wellcome Trust and Wolfson Foundation, and two floors of research labs with a focus on the treatment of conditions such as diabetes and obesity, as well as a redeveloped postgraduate education department, a clinical research and training facility, conference facilities and a cafe. A central hub between the building's two wings will link different activities; users will be encouraged to interact in formal and informal meeting spaces on each level. The project is also expected to receive a BREEAM Excellent rating.

Nightingale in Wales

The largest new hospital to be built in Wales for 30 years, the 233-bed Ysbyty Ystrad Fawr, opened in November 2011. Nightingale Associates' 31,000sqm facility features an integrated care centre, diagnostic and treatment centre, integrated therapies including palliative care, a local emergency centre and short-stay beds. A midwifery-led birthing centre, mental health services and non-clinical support are also provided. Like the practice's smaller Ysbyty Aneurin Bevan, which opened at the end of 2010, the building uses a zig-zag plan to maximise the availability of sunlight and enable the majority of rooms to have a rural view; all rooms are single bedded to provide greater privacy and minimise infection. A riverside setting means that special provision has been made to ensure the hospital can still function in the event of flooding – the concourse and clinical accommodation are located one floor above the floodplain, with the space underneath concealing a 630-space car park.



Birmingham “superhospital” open



Queen Elizabeth Hospital, Birmingham's major PFI healthcare project, is now fully open. The £559m building for Birmingham University Hospital NHS Trust was designed by BDP and provides 1,213 beds as well as an accident and emergency department, specialist burns and transplant wards, a decontamination suite and 30 operating theatres. The hospital takes the form of a row of three elliptical towers (where the beds are sited) sitting on top of a high-tech medical treatment podium; each ellipse is hollowed out, creating a courtyard garden at its centre and maximising daylight. A patient-centric approach saw BPD develop “disease groupings” to cut patients' movements throughout the hospital, reducing the number of healthcare professionals they have to meet during their stay. The project was a joint venture with Balfour Beatty and Haden Young for PFI consortium Consort Healthcare.

Sustainable cosmetic surgery clinic

German practice Schmucker & Partner has built a €35.5m private clinic in Heidelberg that specialises in cosmetic surgery. Ethianum is a state-of-the-art, 11,000sqm clinic aimed at health tourists as well as domestic patients. Built from Heidelberg's distinctive red sandstone, its facade contains a regular series of shaded balconies; an imposing atrium greets patients, where, as well as a reception, there is a cafe, conference area and three surgeries. Up on the second floor, the 29 patient rooms have been designed to hotel standards. The architects' vision for wellness embraces the building's sustainability: the clinic is heated via a heat pump, and a heat recovery system also saves energy. There is also a green roof, and rainwater harvesting to feed the plants.



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Light sleepers

Sleep is an essential component of the healing process, but patients manage about 5 percent less of it in hospitals than they would at home, due to factors such as unfamiliar surroundings, discomfort and noise. Maastricht University has been testing out one of those factors – the amount and quality of ambient light a patient receives – using a new system from Philips that mimics the natural day/night light cycle outdoors. First findings are encouraging: compared to a control group, cardiac patients using the HealWell system took 30 percent less time to fall asleep by the time they had been using it a week, and they slept an average 8 percent longer.

Built on existing research showing that high levels of light during the day can help to regulate the body clock, HealWell produces lighting levels that change gradually throughout the course of the day, much like the changes in light outdoors on a sunny day. This in turn can have a positive effect on sleep patterns as well as boost mood. Patients in the nine-month study also reported that they appreciated being able to select the ambient lighting themselves, while staff liked the evenly distributed light from above, which enabled them to see properly and work effectively.

“We can now tell from the results of the Philips HealWell research that better light during the day enables patients to sleep longer at night,” says Dr Petra Kuijpers, cardiologist at the Maastricht UMC+. “The patient’s mental state is an important factor that influences the prognosis for cardiac patients, and light could have a positive effect on this, as well as on the patient’s health in the long term. This is, however, an area in which further research is required.

“What the positive results of the research demonstrate is the valuable role that HealWell can play in improving the healing environment and promoting the recovery of our patients.”



Tested at Maastricht University, HealWell (above) mimics daylight, helping to regulate patients' body clocks and improve sleep. Top: a patient room without HealWell



The high quality of American radiology equipment often doesn't match the design of the facilities themselves – and the international market should strive not repeat US mistakes, writes *Tobias Gilk*

Improving our image

When American architects visit Europe, among its greatest attractions are the breathtaking gothic cathedrals. We have a special appreciation for these buildings – they were not only costly to erect, but dangerous too, which we know from the frequency with which they collapsed during construction. After the fall of the Roman Empire, architects had to rediscover, by trial and error; how to build arches, vaults, buttresses, and all of the other components of complex buildings. Simultaneously, cities vied with one another to have the tallest and widest cathedrals, with the most stained glass, creating something of an “arms race” of cathedral building. Builders literally pushed their designs to breaking point – and if their building collapsed and killed half a dozen stonemasons, that failure became part of the body of professional knowledge among other builders. But what do 700-year-old stone buildings have to do with today's cutting-edge radiology? Not much. And that's the problem.

Stagnant design

As modern radiology technology spreads around the world, it is the medieval builder's ability to learn from past mistakes that is missing. The US (arguably) has the most developed imaging, nuclear medicine and radiation therapy infrastructure in the world, and many look to the American model as the basis for planning their own systems. But, despite technologically innovative imaging machines, the planning and design of imaging facilities serially repeat the mistakes of prior architects, to the point where radiology architecture has institutionalised anachronistic practices.

In the last 30 years, imaging technology, clinical applications, patient demographics and financial models have all shifted dramatically, and yet designs for a CT room design today look indistinguishable from designs for a

CT room from a generation ago. With advanced medical imaging poised for substantial global growth, one of the worst things that could happen would be for others to model new facilities after the US example. Those nations advancing their medical care with technology ought to look first at how radiology design best fits their needs.

Behind the curve

One attribute worth particular attention is throughput, which has become the ultimate aspiration of contemporary imaging for a number of reasons. The first is financial: in times of ever-growing financial pressure, capital costs aren't going down significantly any time soon, and until someone perfects a patient conveyor-belt, staffing requirements are near their functional floor. In answer to these accumulating



While fast equipment can increase throughput, facility planners must look at operational bottlenecks and lifecycle capacity to fully realise potential



financial pressures, when capital costs can be cut no further, the only solution is to increase revenue. At fixed per-procedure reimbursements, this can only mean increasing throughput. For organisations that operate on fixed budgets for patient care services (such as most nationalised health services), maximising the clinical value of the investment, rather than maximising revenue, is the goal – and this means serving increasing numbers of beneficiaries. Throughput is again the solution.

Improved throughput by design

There are numerous parts of the world (Africa, the Middle East, Asia) where population growth and increasing demands for advanced healthcare are placing huge systemic demands to deploy advanced imaging and therapy technologies, such as MRI. Whether the society is comparatively wealthy, such as many Gulf states, or cash-strapped, as is much of Africa, or as populous as Asia, throughput and efficiency should be an equally important element in strategies for development and deployment of imaging technology.

Advanced imaging technology such as PET, CT and MRI seem to be following a radiology parallel to Moore's law (which states that computing power doubles every 18 months), as scanners are faster, stronger, and produce better images with each successive generation. But a Lamborghini engine in a Tata Nano doesn't make it a Formula One racecar. Fast scanners in poorly conceived supporting facilities will never realise their potential.

Beyond increasing revenue and patients served, perhaps the greatest benefit to developing systems is the strategic benefit of facilities that can respond to future need. What if the first MRI for a facility or region reveals a tremendous latent demand? If your service isn't flexible and scalable (and this includes bricks and mortar), how do you respond to this growth? Even slow-and-steady growth can be thwarted through a failure to imagine and anticipate changing needs. How can you expand capacity? How can you add clinical applications? How will you add equipment or space? It is short-sighted to pour resources into a particular scanner without looking at operational bottlenecks, and lifecycle capacity of your facility; an effective planner is at least as important to your capacity for efficiency as is any single piece of hardware.

A holistic view

So if throughput is precious, for financial, beneficiary or development concerns (or a combination of all three), we should not be fixated on the promises of a single piece of hardware, but we should look holistically at the patients, providers and the environment though which we provide care.

Fast scanners in poorly conceived supporting facilities will never realise their potential

Overall, regions that are expanding their use of technologically advanced medical imaging need to look closely at their own needs before adopting the facility designs templates that are proffered. A close analysis of the most prolific model, that of the US, will reveal that as glossy and gleaming as many of these facilities are, the designs actively undermine many of the basic needs of the healthcare systems they were built for: style over substance, and ready-made prototypes over appropriateness.

US cathedrals to medical imaging may not be falling down, but they largely aren't supporting the mission of their churches.

Tobias Gilk, M.Arch., is senior vice president of RADIOLOGY-Planning (RAD-Planning), in Kansas City, USA

Above, left to right: The Marx Brain Imaging Center at the University of Missouri – Columbia, designed by RAD-Planning. Advanced imaging equipment can often make large demands on infrastructure and utilities, but that needn't be reflected in the buildings that house them: here, a fairly modest extension to an existing building has been designed to minimise energy requirements through the use of daylighting, superior insulation and thermal massing. The translucent facade offers an even light, with no glare

Photography: RAD-Planning



Sustainable Therapeutic Environments

Grafted into a mature landscape on the fringe of Northumberland's countryside, Medical Architecture's Ferndene brings together children's mental health and learning disability services for the first time in a design that offers a rich range of settings for care and therapy. The 40 bedroom residential and day centre is for children aged 10 to 18 years old.

Photographs by Jill Tate © 2011 www.jilltate.com



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Design & Health Scientific Review

Research precedents



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

This month brings us two interesting and engaging research projects – one on Emergency Rooms and the other on the relationship between building systems and users responses in a single LEED Platinum building. I have a particular interest in these subjects having spent several years in the 1970's and '80s on related studies for two Canadian Government agencies. Similar to Chris Howroyd's study presented here to reduce violence and aggression in A&E services by design, in the 1970s I conducted a study on how design

could reduce vandalism in schools, and in the 1980s I studied emergency rooms across Canada to establish a basic post-occupancy evaluation (POE) methodology for Emergency Rooms design and use. Also in the 1980s, I worked on a team of building scientists and social scientists in the Canadian Government carrying out what was then called Total Building Performance Assessment studies. Design research and related fields like environmental psychology and building science need a 'research memory bank' to connect past and present studies. Howroyd presents a sensitive user needs model for the UK Design Council's study and design guidance. In summary: People arrive at A&E services with high expectations for attention, care and speedy service. Faced with the reality that emergency care is difficult to plan for and that a basic emergency room activity – triage – guarantees that many who arrive early will be passed over for those needing more urgent medical attention, they become anxious and frustrated, lowering their patience threshold and leading to anger and sometimes violence. Such a model is helpful to guide design decisions and interventions that reduce expectations, increase awareness of the process, thereby lowering frustration and minimising aggression and violence. Elzeyadi's LEED Platinum Building Assessment, in the long tradition of merging technical measurement data from thermal, lighting, daylight, airflow and sound studies with studies of users responses is a large bite to chew and Elzeyadi should be commended for this quest. His technical data are remarkable – both measurement of actual conditions and modeling. Because of his aspirations, he faces greater challenges. It is difficult to achieve a representative sample based on voluntary survey participation in a multi-use building. It is also difficult to resolve the conflict inherent in terms like "thermal comfort" – employed by some building scientists to refer to a specific temperature range and by others to mean user comfort expressed by users. And Elzeyadi's user seems to measure "satisfaction" as well as expressed "comfort" with building conditions, which is difficult to interpret in terms of user "productivity." Embedded in this report are sensitive observations, among these how people on the east and west facing sides of the building turn on their electric lights during the day in order to offset glare. Out of the Canadian Government Total Building Assessment program came a series of articles and books, such as the work of Jacqueline Vischer called "Buildings-in-Use Assessment" which focuses on resolving the empirical connections between building conditions, user comfort and productivity. Wouldn't the results be enlightening if such precedents were linked to the present study? We really need that research memory bank.



60-69

**Post-occupancy Evaluation:
A Design, Operations and
Performance Assessment of
a LEED Platinum Building**
Ihab M K Elzeyadi, PhD, FEIA,
LEED AP



70-75

**Accident & Emergency
Reducing violence and
aggression by design**
Chris Howroyd, The Design
Council UK

Post-occupancy evaluation:

A design, operations and performance assessment of a LEED Platinum building

The first systematic analysis of the impact of sustainable strategies employed at Oregon Health and Science University's Center for Health and Healing (OHSU-CHH)

Ihab M.K. Elzeyadi, Ph.D., FEIA, LEEDAP

The Oregon Health and Science University (OHSU) Center for Health and Healing (CHH) in Portland, Oregon, is the first LEED Platinum certified healthcare facility in the US, and is one of the largest and most complex LEED Platinum projects to date.

Although a number of publications and presentations have focused on the building's design innovations, none have systematically analysed the impacts of the different sustainable strategies employed on the building operation and energy use, as well as occupants' comfort and wellbeing.

This paper reports on three different systemic performance assessments: the HVAC and radiant heating and cooling systems' effect on occupants' thermal comfort using diagnostic physical measurements and users surveys; daylighting and views availability and their impact on occupants' visual comfort in offices and labs; and a comparison of the ecological and thermal performance of the eco roof, green roofs and cool roofs designed for the building. The study employed a multi-method approach combining physical systems performance assessments with occupants' feedback from an online questionnaire, observations and focus groups.

A bold vision

The Oregon Health Sciences University Center for Health and Healing (OHSU-CHH) goes beyond LEED Platinum to provide exceptional environments for work, research, and healing. The mixed-use building is a cutting-edge example of high-performance building design. Designed by GBD Architects, it was commissioned in January 2007 and is one of the largest LEED Platinum buildings of its kind¹. Located in Portland's South Waterfront

Urban Redevelopment District, the building provides additional space and facilities for the OHSU campus located in the west hills; a cablecar connects the existing campus with the new CHH building on the south waterfront (Figure 1).

Despite the wide coverage of the building in multiple publication and journals, there is a current lack of studies linking

the design intentions of the systems, their operation, and their impacts on both human performance and carbon emissions. This paper intends to fill this current knowledge gap by providing a comprehensive analysis of the building systems based on their isolated as well as their cumulative impacts on the "triple bottom line" – people, profit, and the planet. The paper assesses not only



Figure 1: As well as clinical components, the OHSU-CHH building offers communal facilities, including a wellness centre, gym, spa and cafe

GBD Architects

the physical performance of these systems but also their impact on occupants' comfort and wellbeing².

As the first LEED Platinum medical project in the world to be built to this standard, the 16-storey, 38,000sqm building has eight levels devoted to physician practices, surgery and imaging, and three floors that house a health and wellness centre. The wellness centre features a gymnasium, four-lane lap pool, therapy pool, weight training and a day spa. Four levels are dedicated to education and research activities, including space for a biomedical engineering programme. The ground floor houses retail space, including a pharmacy, optical shop and a cafe.

The key green features of the building that are of interest to our study include:

- Daylighting passive heating, cooling, and natural ventilation of the stairwells
- Green roofs and cool roofs to harvest rainwater and reduce run-off impact on the storm water system grid
- "Displacement ventilation" in examination and office spaces and radiant floor heating in waiting room and lobbies, which means air circulates through natural radiation and convection as opposed to being blown by fans; this reduces air contaminant levels and eliminates supply air reheat
- Chilled-beam cooling, which reduces overall building fan energy use by 20-30 percent and therefore allows for a smaller HVAC system than a conventional forced-air approach
- Circulation of reclaimed rainwater and ground water in concrete slabs, for radiant cooling of ground floor atrium and lobby
- A solar collector trombe wall occupies 15th and 16th floors: warm air collected from the surface of the wall is circulated through the building during the winter, reducing energy use
- Rejected heat from the microturbines at the central utility plant is captured and used in the building to preheat domestic hot water. It is also stored in the first-floor slab and the health-club swimming pool when thermal storage of excess heat provides load-shifting benefits
- Hallway and stairwell occupancy sensors to ensure that electric lighting is used only when needed. Occupancy sensors in lab exhaust systems are also used and avoid dumping conditioned air outside when labs are not in use

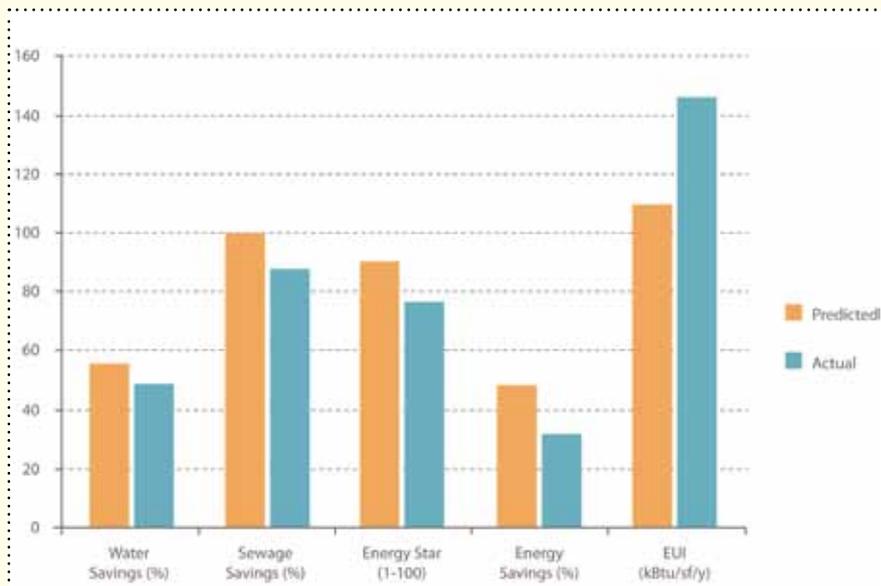


Figure 2: One-year resource consumption and physical performance of the OHSU-CHH building

- Heat recovery systems, incorporated into laboratory and general exhausts and returning gym air through the locker rooms.
- Demand controlled ventilation (DCV) using carbon dioxide sensors and occupancy sensors, so spaces are not over ventilated or over lit when not in use
- Night flush cooling, using outside air, until one hour before daily occupancy
- Building commissioning, including field verification of all energy consuming equipment.

Indoor environmental quality

Despite the importance of energy and resources savings of green buildings, proven impacts on occupants' health and performance from improved Indoor Environmental Quality (IEQ) will be a game-changer. Proven evidence on the reduction of sick building syndrome (SBS) symptoms, or the increased indoor comfort of occupants due to better lighting, thermal conditions and air quality, will drive future design teams to select strategies based on these human impacts. However, evidence to support these claims has been mixed². Existing studies of occupant satisfaction and comfort in LEED buildings by the Center for the Built Environment at the University of California, Berkeley, shows high variability, with some buildings rated very positively and others having modest comfort and satisfaction levels^{3,4}.

The results of a one typical year monitoring procedure, conducted on the building after 18 months of its operation and additional commissioning, show that it was not

meeting its design goals regarding resource consumption, with a shortage of 5-10 percent overall. Despite this, the building is still considered exemplary in its performance, exceeding most buildings in its categories and earning it an EPA Energy Star Rating of 78 points, with approximately 90 percent sewage savings, 50 percent water savings, and 36 percent energy savings over typical code building of its size and type (Figure 2)⁵.

In addition to a performance assessment analysis of the different systems, an occupant survey was administered simultaneously by OHSU and Better Bricks to measure employees' satisfaction of OHSU-CHH⁶. The web-based questionnaire was administered by OHSU for CHH staff occupants during autumn 2008. Oregon Health & Science University's Institutional Review Board approved all study activities. In September 2008, an email was sent from the facilities manager to all the tenants, describing the study. Two reminder emails were sent over the following three weeks, and one week later a final email was sent which included an extension of the deadline and an additional prize draw. The web survey was open for seven weeks in total⁶. Questions were added to address specific issues such as Sick Building Syndrome symptoms.

A total of 172 occupants completed the survey out of approximately 800 that were documented to be working in the building at the time of the survey administration. OHSU Human Resources notes that some employees who work in the CHH building are not documented. About half

the participants (52.9 percent) had been working in the CHH building for over 22 months and 75.6 percent had been working in the CHH building for over a year. Almost half (48.9 percent) of the participants had been working at OHSU for five years or more, of which 89 percent had a primary workstation in the building.

Preliminary results of the survey show strong occupant satisfaction with the environmental agenda of the building. Eighty-six percent agreed that it was important to work in a building that is environmentally conscious.

A detailed post-occupancy evaluation (POE) was conducted to investigate both the building not meeting its predicted design goals, and the occupants' interaction with the green building systems. The study used an innovative mixed-method approach combining a POE with three diagnostics quasi-experiments investigating comparative analysis of different systems performance.

Given the complexity of the building – its different occupants and space types, and its 24/7 operation schedule – its designers employed different systems of lighting, ventilation, HVAC, and storm-water harvesting and mitigation. These different systems provided the ideal set-up to compare the performance of various systems against each other in a multi-method research design approach². For each of the three quasi-experiments, the study assessed the physical conditions of occupants' work spaces related to:

- Thermal qualities: radiant and variable air volume (VAV), HVAC systems
- Visual qualities: daylighting and electric lighting quality
- Biophilic qualities: green/garden roof and cool/permeable roofs.

Thermal qualities: mixed-mode HVAC systems

Because of the mixed use of both radiant and VAV systems, as well as the high expectations for the HVAC systems, the OHSU-CHH provided an ideal setting to compare radiant systems and conventional VAV-HVAC systems.

A stated goal of the building was to achieve thermal comfort without conforming rigidly to a 23°C (73°F) +/-1°C approach common to conventional systems. Components of the radiant system include in-slab heating and cooling in the lobby, chilled

beams at ceiling level and radiant fin tube heating along wall bases. Water for the systems is cooled by way of reclaimed rainwater and ground water and heated passively from heat given off by other equipment as well as on-site waste bio-reactor turbines^{1,5}. It is important to note that the study was conducted between the months of

November and December, when the building is predominantly in a heating mode.

Radiant heating and cooling systems are an underutilised way of providing very high quality thermal comfort to occupants. This may be attributed to unfamiliarity in the design community, perceived expense and slow reaction to changing demands in

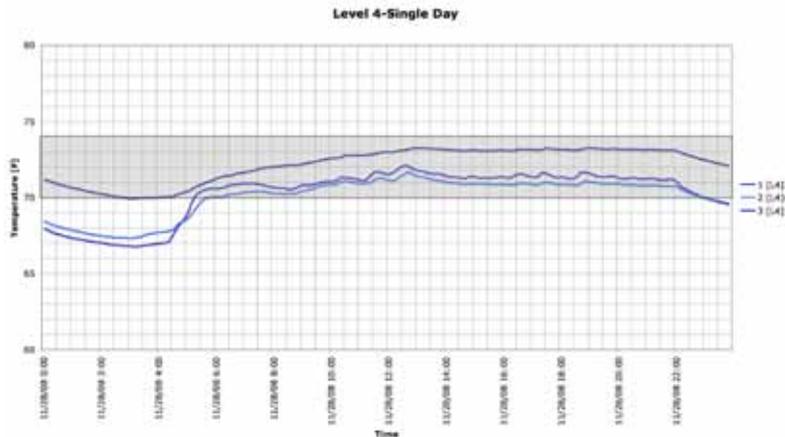


Figure 3: Level-4 HVAC-VAV system temperature performance for one typical day

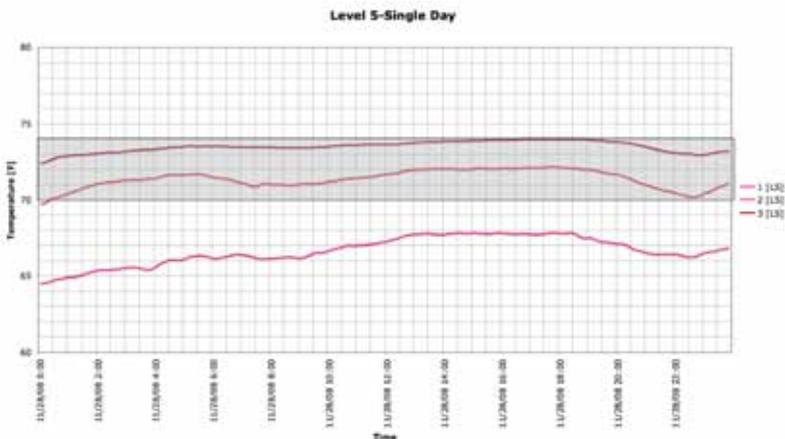


Figure 4: Level 5 radiant systems temperature performance for one typical day (waiting room with terrace door)

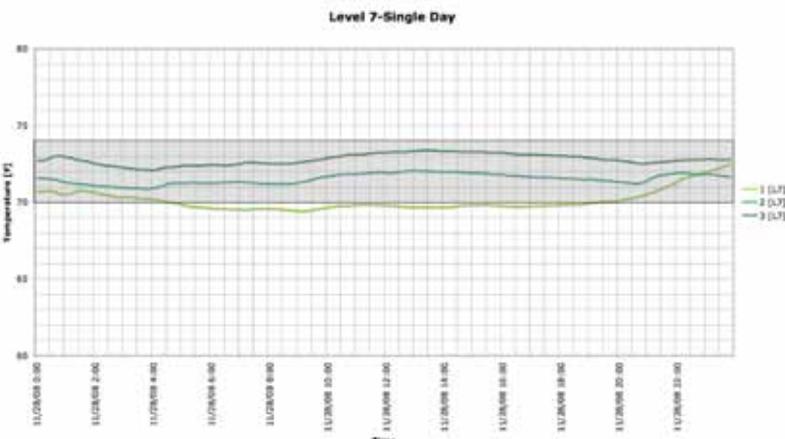


Figure 5: Level 7 radiant systems temperature performance for one typical day (waiting room without terrace door)

thermal comfort – a common condition in public spaces¹. Traditional HVAC systems maintain interior air temperatures in a range of about 21-24°C (70-75°F). This requires larger, more tightly controlled heating and cooling systems than may be necessary for all but a few peak periods in summer or winter for a commercial building in Portland. In certain spaces through which people pass relatively quickly (stairwells, lobby, corridors), designers can widen acceptable temperatures to a broader range, sometimes as much as 18-26°C (64-79°F). As a result, smaller and more affordable systems, such as those designed for the OHSU-CHH building, were at significant cost savings¹.

The relaxed temperature range in the stairwells and lobby comes not just from adjusting the thermostat, but from using radiant heating/cooling and natural ventilation instead of relying solely on traditional air conditioning and forced ventilation. Radiant space conditioning utilises the temperature of surfaces such as walls and floors, which tend to have less temperature fluctuation. Studies also show that people in naturally ventilated spaces are psychologically more accepting of a wider warm-cold spectrum throughout the day^{2,4}, so while the stairs and lobby might have a higher or lower temperature reading than the rest of the building, they would feel just as comfortable. Our hypothesis was that radiant systems at CHH would be unable to provide the same level of thermal comfort as VAV systems. Changes in exterior climate conditions, internal heat gain from occupants and equipment, and heat gain/loss through the curtain wall facade were thought to present significant obstacles for radiant systems in maintaining consistent comfort conditions, reducing horizontal and vertical stratification of temperatures, and in reacting to changes in thermal conditions.

To test the hypothesis, indoor climate parameters (temperature, relative humidity, air movement and mean surface temperatures) were monitored using detailed environmental data loggers and mote (wireless) sensors in various locations of the building over a period of three weeks. Sampled space types were matched according to their orientation, occupancy levels, space use and floor area. Indoor thermal comfort was compared for spaces with radiant (Levels 5 & 7) and VAV HVAC systems (Level 4) in two categories – low infiltration

rates for internal spaces with limited access to outside terraces (Level 7) and moderate infiltration rates due to proximity to exterior spaces and terraces (Level 5). Assessment of surface temperatures and air flow was collected at equal intervals during sampled days using measurements from hand-held instruments. Physical data collection was supplemented with behavioural observation as well as several informal and impromptu interviews with occupants and questionnaire responses. This data provided a limited, but insightful, sense of how occupants view their comfort in the space.

Analysis of trend data from the data loggers shows clearly that Level 4 (VAV system) was able to maintain consistent temperature conditions throughout the space compared with Levels 5 and 7 (radiant heating and cooling) (Figures 3-5). Levels 5 and 7 showed some temperature fluctuations between measurements taken near the exterior facade and measurements taken deeper into the floorplate. However, daytime/night-time temperature fluctuations were more pronounced on Level 4 than on Levels 5 and 7. These results indicate that spaces with VAV systems may be better equipped to maintain thermal conditions at various points during the day than spaces with radiant heating or cooling systems. This is consistent with the initial hypothesis and previously published studies^{3,4,7}.

When daily high and low temperature and relative humidity data taken from trend charts for each level were plotted

on psychrometric charts to ascertain where the measured conditions fall with respect to the winter comfort zone, the results were surprising. Despite the more consistent temperatures found on Level 4 (VAV system), conditions fall outside of the comfort zone at various points during our assessment period. Conversely, Levels 5 and 7 (radiant heating and cooling systems) fall within the comfort zone area, despite greater horizontal stratification of thermal conditions. This indicates that radiant heating and cooling systems may be capable of competing with more conventional air systems on the basis of maintaining thermal comfort conditions within a narrow range of temperatures.

The study used an innovative approach developed previously by Elzeyadi et al.⁷ to visualise thermal sensation from the occupants' perspective. Point-source measurements were taken to complement the data being logged over time, with readings taken at three different heights; floor level, four feet above the finished floor, and ceiling height. The data collected on each of the two measurement days was used to generate a thermal map for each of the three study spaces. The results (Figure 6) indicate that both spaces with VAV systems (Level 4) and spaces with radiant heating and cooling systems (Levels 5 and 7) are able to achieve thermal conditions within the a 23°C (73°F) +/-1°C stated comfort range when exterior weather conditions are mild (10-20°C, or 50-70°F).

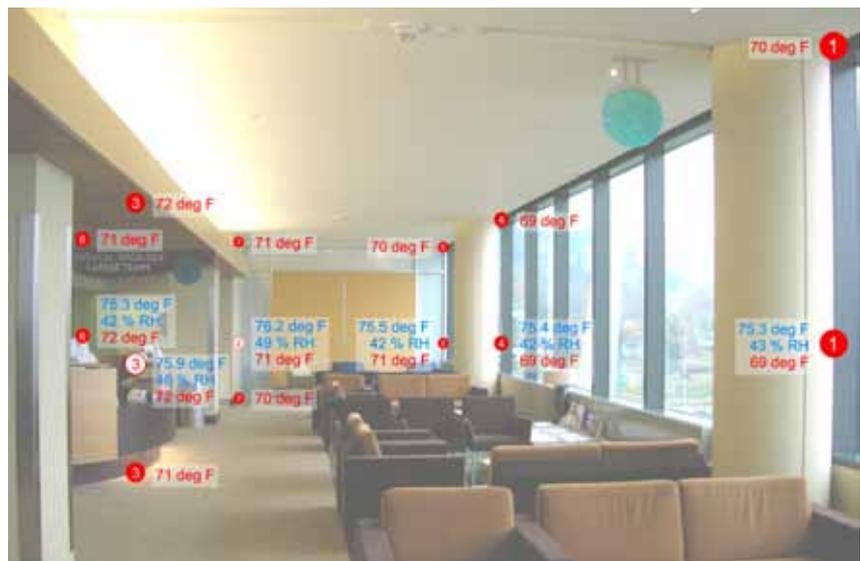


Figure 6: Level 7 (radiant system) point-source thermal map

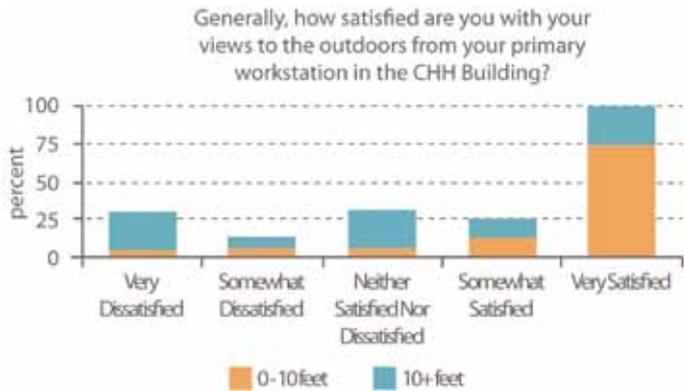


Figure 9 (above): Occupants' satisfaction with outside views⁶

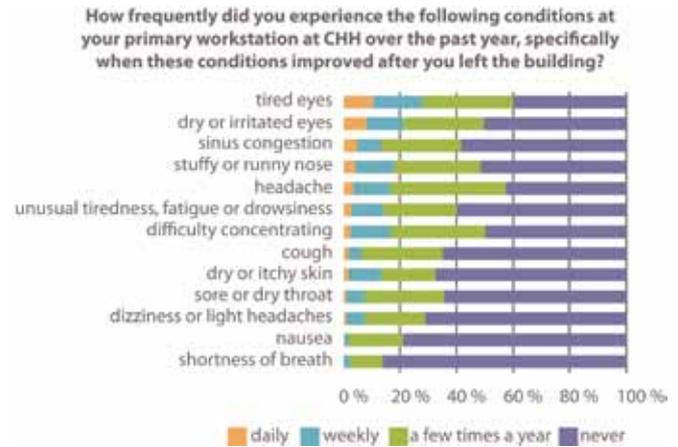


Figure 10 (right): Occupants' experience of sick building syndrome symptoms⁶

Results show that radiant temperature control has many advantages simply from a comfort standpoint. Heat is often radiated from the floor or wall surface near the occupant, providing warm surface temperatures in the tangible living environment⁷⁻⁹. The study space at OHSU CHH utilised radiant fin tubes at the curtain wall system, providing a comfortable barrier between occupants and glass, the coldest surface in the rooms. Vertical temperature stratification is also less pronounced in radiant systems, compared with forced air systems. This is partially due to placing radiant systems at the floor and/or ceiling to take advantage of simple buoyancy and air displacement. With the need only for simple air exchange, uncomfortable draughts are also no longer a threat.

Fast changes in thermal loads present challenges for any temperature regulating system. The moderate sized waiting rooms in the study did not see high occupancy loads but more frequent schedule changes of occupancy. The rooms using radiant heating systems more closely maintained a temperature within 21-23°C (70-74°F). The stability of baseline temperature in a radiant system provides the most flexibility within varied programmes and schedules of a building^{8,9}.

Radiant systems in large public spaces and those with high ceilings can provide warmth and cooling at the floor level without the need for large volumes of air to be forced down from above in posing noise issues¹⁰. If however the radiant system relies on thermal mass, such as a concrete floor, this can backfire acoustically. Furnishings and finishes can also impede the system by acting as insulators if not chosen properly. Beyond these advantages, the primary use of water

in radiant systems opens it up to many energy alternatives and energy offsets while maintaining satisfactory thermal comfort parameters for the buildings' occupants.

Visual qualities: daylight and LEED

Daylighting in healthcare settings impacts human comfort on a physical¹¹, physiological^{12,13} and psychological¹⁴ level. Findings of previous studies, however, are not always conclusive of a positive correlation between daylighting availability and human comfort. This is in part due to the association of glare, visual asymmetry, and poor lighting quality when spaces are designed to meet a certain indoor daylighting factor without proper design of a high daylighting quality^{11,15}. In addition, there are limitations in existing tools to quantify the relationship between daylighting and human comfort, which have often been simplified to abstract formulas of daylighting availability or daylighting factor levels recommendations^{15,16}. This discomfort is further described by direct glare, reflected glare, and contrast, and the relationship between visual comfort and these concepts are operationalised as the extent to which a particular source of light interferes with a person's ability to perform a task^{11,17,18}.

The dynamic nature of daylight in buildings complicates the task of providing comfortable levels of illumination to side-lit office spaces when compared to electric lighting design. While daylight is often associated with better views, it also coincides with increased events of glare due to the ever-changing direction of daylight and solar radiation associated with the sun's path.

This part of the investigation focuses on lighting evaluation of five different office spaces within the OHSU-CHH. Four are on the perimeter of the building with electric

lighting and side lighting from windows, and the fifth is an interior office space with only electric lighting.

Our hypothesis stated that the combination of natural and artificial light on the north side of OHSU-CHH will offer the best conditions for evenly distributed light and glare reduction over the course of the working day. The resulting composition of light and view will provide the best conditions for visual comfort and occupant satisfaction in workspace lighting. Our study measured illuminance and luminance within these offices at 9am, noon and 3pm. Photographs recorded the light conditions in order to use image analysis software. This enabled us to perform objective comparisons and correlate the data we collected through luminance and illuminance measurements.

All five office spaces were similar in their floor areas, size, interior finishes, furniture layout and organisational rank of the occupant. Four of the offices were in the same floor level with unobstructed views, while the fifth office was on a different floor level, but still with an unobstructed view. This was due to the limitations of finding an identical east-facing office in the same floor level as the rest of the studied settings. Illuminance levels in all office types were measured on a 5'x5' isolux grid, and we measured the luminance levels of various spots within the occupants' fields of vision in each office space.

Views and lighting as seen through the eyes of a user differ significantly based on visual perceptions, so reliance on illuminance measurements alone may provide false indicators if used as the primary evaluation tool. For this portion of our evaluation we incorporated the use of an image analysis procedure. This approach considers

interior luminance and daylighting through the use of digital photography and photo evaluation via a false-colour luminosity rendering analysis. This provides a metric for documenting the distribution patterns of associated glare and brightness for each of the five office environments.

For the five offices we evaluated, occupants were between 0-15 feet of a window and had substantial views and an average daylight factor of 3 percent in the deepest area of the office space further away from the perimeter side windows

Occupants reported high-level of satisfaction with views outside windows (Figure 9), with higher levels of satisfaction for occupants situated within 0-10 feet away from the windows. Occupants located more than 10 feet away from the perimeter windows were generally less satisfied with their views. More occupants who reported higher levels of satisfaction with their views were occupying north- and south-facing offices. This might be in part due to high levels of luminance and glare index perceived by the occupants on the east and west oriented offices rather than due to the content of the view since they were mostly of equal complexity.

Thirty five percent of the surveyed occupants were generally comfortable with the lighting conditions in their offices, with 15 percent reporting being comfortable only a few times a year. The low level of satisfaction with the lighting system was mostly due to glare from windows, which was one of the most associated complaints reported followed by the inconsistency in the amount of daylight. Occupants of the East and West offices reported glare conditions to be the worst compared to those on the North and South. Occupants reported a number of SBS symptoms related to their experience in the building; although not severe in frequency, visually-related SBS symptoms and headaches are however among the highest in frequency (Figure 10).

Each set of photos was analysed by the using an image analysis and raster mapping procedure to create both a High Dynamic Range (HDR) photo, and a false-colour luminance map. At the same time, the plan and section for each of the rooms was analysed to determine the field of vision of the occupant in the room. This brightness intensity of the scene was calibrated by recording the lowest and highest luminance

in the scene corresponding to the occupant's field of vision.

As hypothesised, a luminance ratio of 1:5 for the field of vision, or in the 1:10 ratio within the entire scene, was common for all testing times for the north-facing office. The same is true for the morning and afternoon conditions of the south-facing office. The east- and west-facing offices consistently showed huge variations outside these ratios, with glare perception on several occasions throughout the day. This indicates that although these offices meet the daylight factor recommendation and pass the LEED 8.1 credit test, they fail to provide occupants with a sufficient daylighting quality to perform their tasks¹⁹. With many occupants preferring to situate their office closer to the windows, they became subject to visual discomfort due to unwanted brightness.

The results from our measurements and image analysis found that, despite an overcast sky, the range of daylight entering the offices varied and produced more distinct lighting conditions in the east, south, and west offices, predominantly during the noon data points when the sun was strongest. Data suggests that the east- and west-facing offices have more luminance variations that exceed the 1:3/1:5 ratios within the field of vision for both facades. This result in poor lighting quality conditions, reinforced by the occupant choosing to switch on the electric light in the afternoon to balance glare from windows. The south-facing office has a smaller aperture, as well as external shading devices, which contributed to lower light level than the other perimeter offices, but these balanced the daylighting quality and brightness patterns in the space. As hypothesised the north-facing offices

provided the most balanced brightness patterns and was the brightest in terms of light levels and luminosity. Occupants turned off their electric light system in their north offices most of the day (Figure 10).

Biophilic qualities: green roofs pay dividends

City areas are warmer than suburbs or rural areas due to less vegetation and more infrastructure surface coverage that radiates heat back into the atmosphere, creating an urban heat island²⁰. To mitigate this, conventional roofing material may be replaced by a white or reflective cool roofing material with high solar reflectance and thermal emittance, or a green roof, which consists of a layer of vegetation over a growing medium on top of a synthetic, waterproof membrane.

The OHSU-CHH building utilises both green roof and cool roof technology^{1,5}. One of the building's key green design features is a 2,100sqm green roof for stormwater management, rainwater harvesting and temperature moderation (Figure 11). Given the growth of LEED-certified building design, the effectiveness of such features is under tight scrutiny^{20,21}. For this section of the study, we compared the performance of the green roof and cool-roof surface materials' heat-reduction capacity.

To investigate the effectiveness of both systems, we set-up a 2x2 quasi-experimental research design to study the performance of both roofs in a southern verses a northern orientation, as well as in an accessible verses non-accessible roof conditions so as to vary the variables studied between the two systems. The variety of roof systems employed at the CHH building

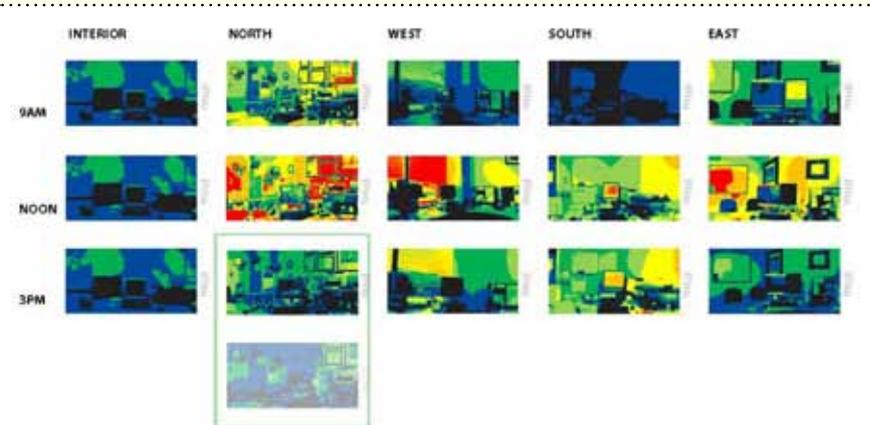


Figure 10: False-colour rendering luminous distribution images of five offices compared at different times of day

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Figure 11: OHSU-CHH north and south green roof and cool roof

offered an interesting quasi-experimental setting for our study. Due to the variation in slope compositions and layering details of both systems towards the primary drainage point, the moisture content of 20 square feet of green roof and cool roof were monitored using an established grid system. The moisture content changed over a one-month period and these findings were mapped to determine if the roof was functioning efficiently. Furthermore, these findings may also help understand which species of plants grow best with respect to moisture content as well as pinpoint whether moisture content helps stimulate invasive species on green roofs.

A key aspect of a well performing green roof is the reduction of surface temperature^{21,22}. Looking at the roof plan of the OSHU building, there are two distinct sections of green roofs: one upper roof with southern sun exposure and one lower roof with northern sun exposure. For our study, we measured the heat reduction capacity of these two areas. We collected our data from four points: southern green roof; southern cool roof; northern terrace roof garden; and northern terrace tiles. These points were chosen to give an accurate data reading of the surface while eliminating as many outside variables as possible, such as shade, sun and mechanical equipment.

In addition to finding whether or not the green roof aided in surface temperature moderation, we also wanted to determine the stratification that occurred within the layers of these roofs, to help establish an understanding of the different microclimates that occur within each type of roof. To accomplish this, a series of sensors were placed at the green roof location as well as

the green terrace location. On the green roof, a sensor was placed on the surface of the growing medium under the canopy of the sedum, and a sensor was then placed an inch within the growing medium. At the green terrace location, a sensor was placed on the surface of the growing medium underneath the vegetation canopy and a sensor was placed an inch into the growing medium. Additionally, a sensor was placed approximately 18 inches above the surface in the vegetation canopy.

In addition to mitigating the urban heat island effect, green roofs have excellent time-lag properties, which help moderate heating and cooling loads on a building^{20,22}. Focusing on the highs over the study day period, our data shows that the green-roof surface averaged 2.2°C lower during the day than the cool roof surface. When comparing the performance on the low night temperature, the green-roof surface averaged 0.6°C higher during the night than the cool roof surface (Figure 12).

Temperature fluctuations on the south roofs were much more dramatic than the north roofs. The average surface temperature fluctuation of the green terrace was 25 percent less than the south-exposed green-roof surface. Focusing on the highs over the study period, the green vegetation in the green-terrace surface averaged 0.6°C lower during the day than the cool tile surface of the terrace. When comparing the low night temperatures, the green-terrace plantings averaged 1.1°C higher during the night than the cool tile surface (Figure 13).

Unlike cool roofs, the vegetative surface area of green roofs also absorbs carbon dioxide and filters air pollutants. This can lead to an improvement in the ambient air

quality of surrounding areas²³. Depending on the composition of the vegetative roof system and its surface area, green roofs may significantly decrease storm water runoff during normal and peak events²². Based on local city codes, decreasing storm water runoff may lower fines incurred from large runoff events. In addition, green roofs increase wildlife habitats and provide much needed green space for urban dwellers²³.

Their visual and physical accessibility can offer an important aesthetic appeal, which can lead to an increase in property value and the marketability of the building as a whole^{22,23}. Our POE assessment of the building occupants corroborates this finding based on questionnaires and employee interviews. While not widely tested, green roofs may also offer acoustic insulation depending on the composition of the living substrate²⁴. In some cities, they have been successfully employed for food production²².

Conclusions: shades of green

To evaluate the effectiveness of green strategies in healthcare buildings, designers need to establish clear performance goals that acknowledge both the physical performance and the impacts on occupants' well-being and comfort. An established process to ensure fine tuning the systems, and engaging the occupants in managing them through feedback loops, is essential, helping engage occupants in the building's management and ensure it meets design goals.

The main objective of this paper is to provide detailed as well as context-specific information regarding the design, operation, and performance of a number of innovative green strategies employed in the OHSU-CHH building. By establishing a comparative approach between different strategies, the study provided an evidence-based guide to future designs for the suitability and performance of one strategy over others.

Green strategies should not be perceived as "one size fits all" and might not be suitable in all design situations. It is clear from the findings that performance of some strategies can positively impact behaviour in one condition yet have negative impacts on others. Designers will need to balance pros and cons of green systems as they manage the design process. The knowledge provided will help building designers and owners establish a clear vision of the impact of the researched strategies on the "triple bottom

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line" of people, planet, and profit. It will also provide evidence-based design guidelines for the application of these strategies in green buildings of the future.

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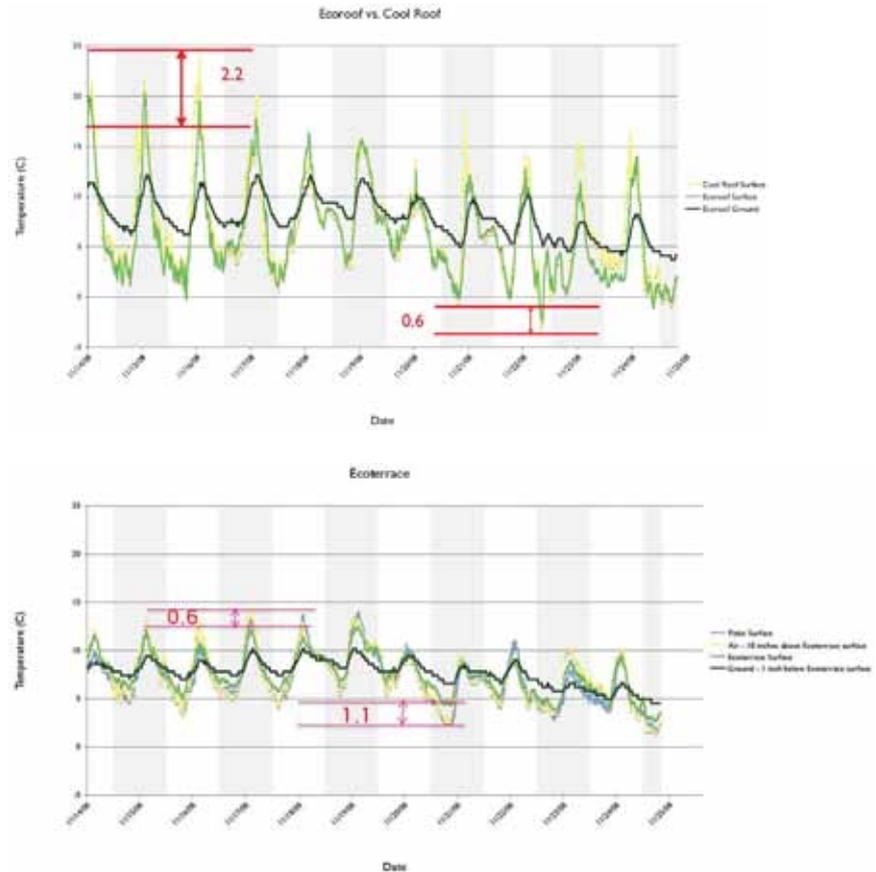


Figure 12 (top): Temperature data comparing the performance of the southern green roofs and cool roofs
 Figure 13 (above): Temperature data comparing the northern green terrace and cool tiles for the terraces

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Accident & Emergency: **Reducing violence and aggression by design**

Working with the NHS and Department of Health, the UK's Design Council has devised a strategy to help solve a costly and difficult problem – the high level of violence and aggression in A&E

Chris Howroyd, The Design Council

NHS hospital staff in the UK experience more than 150 incidents of violence and aggression every day. This problem is particularly prevalent in high-pressure areas, with a fifth of all incidents taking place in Acute Trusts, which include Accident and Emergency (A&E) departments.

The estimated cost of the problem to the NHS exceeds £69m annually, but this figure does not tell the whole story. Violent and aggressive behaviour affects staff, patients and other service users in a number of different ways. As well as impacting on job

satisfaction and the patient experience, it can also mask a number of additional costs – for example, the lost investment in training members of staff who decide to leave, and the specialist security guards now employed by some hospitals to deal with incidents.

The Design Council worked in partnership with the Department of Health and the NHS on a year-long project, Reducing Violence and Aggression in A&E.

Objectives

The programme's specific goals were to:

- Support NHS staff and organisations in reducing the incidence of violence and aggression towards staff

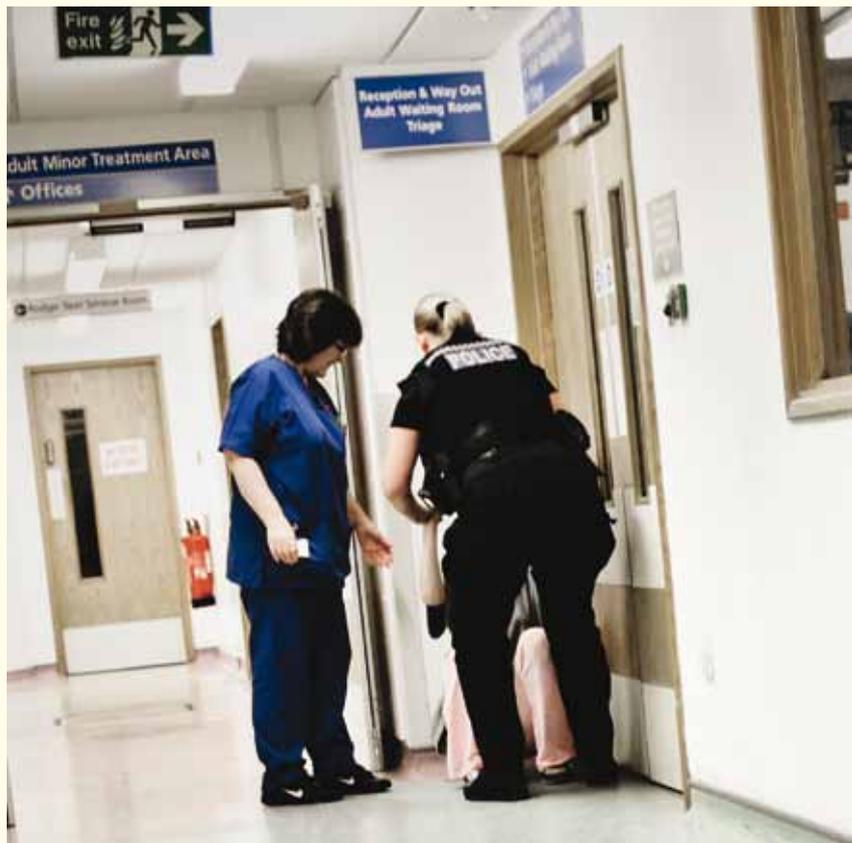
- Deliver tangible cost savings, reducing the actual and associated costs of incurred by the NHS
- Help bolster staff confidence and satisfaction by making real and perceived improvements to healthcare environments and facilities
- Help deliver improved patient care through calmer environments
- Generate awareness and support a culture change among staff and patients, focusing on mutual trust and respect
- Accelerate the identification and adoption of innovative design in NHS A&E departments.

The Design Council and Department of Health saw that it was essential for the commissioned team to develop, prototype and test solutions in operational A&E departments. Three NHS Trusts, broadly representative of A&E departments across the country, acted as partner Trusts. As well as providing valuable sites for research, the Trusts worked closely with the winning team to co-design solutions to the problem and act as test-beds for the emerging solutions.

Methodology

In order to understand the issue, the Design Council commissioned two ethnographic research companies to spend more than 300 hours in the partner NHS Trusts' A&E departments, looking at how they worked from a user's perspective. This research led to the identification of six perpetrator characteristics pertaining to individuals who commit acts of aggression or violence and a set of nine triggers.

Some individuals are more likely to behave aggressively or violently than others. People with mental health problems and people who are drunk or under the influence of drugs are the most likely perpetrators of violent or aggressive behaviour. When visitors behave violently or aggressively, staff



Violence and aggression in A&E cost the NHS £69m a year, plus costs such as specialist security staff

Andy Smith

need systems, spaces and access to security staff that can protect them.

The ethnographic and desk research showed that there is significant potential for designers to make A&E safer. Interestingly, their research suggested that nearly 50 percent of all incidents come from patients who are sober and that flare-ups were as likely to occur from visitors accompanying the patient as the patients themselves.

A&E patients are often in pain and the visitors who accompany them are worried about their condition. The pain and worry can alter their behaviour, perhaps reducing their tolerance levels and making them more likely to behave aggressively.

Findings from the ethnographic research, desk research and workshops with staff and patient user led to the identification of six design briefs. These briefs were issued to the UK design community through a national competition, allowing teams to pitch their credentials and an innovative, yet practical approach to help reduce violence and aggression in A&E departments. Their responses could include new systems, processes, interior layouts, furniture, equipment, communications and/or services.

The winning team was a UK-based multidisciplinary consortium led by design studio PearsonLloyd, comprising some of the country's most respected designers, researchers, evaluation consultants, senior clinicians and social scientists. They were awarded a modest R&D grant to develop practical, cost-effective solutions that could be easily retrofitted into existing NHS A&E departments. Over a four-month period, the team were supported by an independent advisory board, made up of senior stakeholders in health, industry and education, convened by the Design Council to offer the team strategic guidance. In addition, the team worked closely with the three partner NHS Trusts to research, develop and refine their concepts.

A journey through A&E

Pre-arrival: If people think they need medical attention or advice, they have to decide whether they go to their GP, to A&E or to another healthcare service. Their decision about which service they should go to, and when, can be influenced by a number of factors, including how urgently they need attention, the nature of their problem or how close they are to the location of a



Ethnographic research revealed six "perpetrator profiles": the different types of people likely to flare up in A&E

certain healthcare provider. However, many people's default choice is to visit A&E and this can result in overcrowding and longer waiting times that can leave visitors feeling stressed, which may make them more likely to behave aggressively. By working with designers, healthcare providers can share the information people need in order to decide which is the most appropriate healthcare service for them to access, and they can help manage expectations about a visit to A&E by providing details on waiting times and services provided.

Outside the hospital: Before they even enter A&E, patients can be hit with a series of negative and time-consuming experiences. Where do they park their car? How long will they have to buy a parking ticket for? Where will they meet their family if they've come by ambulance? Experiences like these can leave people frustrated and more likely to behave aggressively. Hospitals can deliver a service that extends beyond the A&E department's doors, by working with designers to create a service that is convenient, easy to use and understand. By designing clear parking systems and clearly signposting the route to A&E, the space outside the hospital can make the entire experience less frustrating.

Entrance Area: When people need treatment at A&E they expect to be able to find the department and check-in quickly and easily. The entrance and reception areas

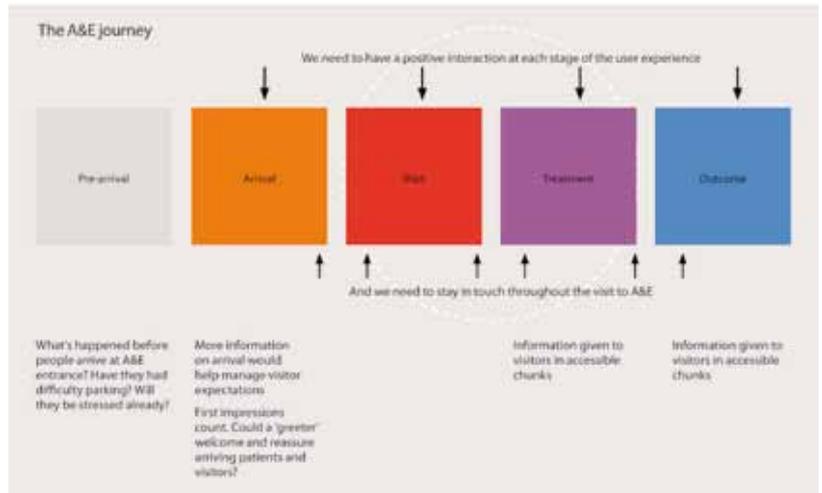
set the tone for a patient's experience of their time in A&E and any further stay in hospital. People often arrive at A&E in pain or discomfort and expect to check in and receive treatment almost immediately. This isn't always realistic. Together, these factors can result in increased levels of stress that manifests in violent or aggressive behaviour. A&E managers can create a welcoming and easy to use entrance space to deliver a positive first impression and set the tone for the rest of the A&E experience.

Reception space: A reception that establishes rapport between staff and patients and provides many types of information can help to manage patient and visitor expectations of how their time in A&E will be spent. If people aren't confused they may be less likely to become violent or aggressive. Visitors arriving at A&E for the first time may not know what to do, or understand the process for receiving treatment. This may cause frustration, particularly if visitors inadvertently miss a step in the process that causes a delay to their treatment. Through the use of effective design, the reception staff and area can provide clear and relevant information about the patient journey and manage patients' expectations so that frustrations do not occur in the first place.

Waiting: "A systematic review of violence in emergency departments demonstrated the association between increased violence



Identifying key points along the patient journey



How patients progress through A&E – and how they can be better informed along the way

against staff and longer waiting times¹¹. Time spent waiting can seem a disproportionately large part of the time spent in A&E, so the spaces where people wait and the information provided while they wait will determine a substantial part of people's reaction to their experience. Waiting spaces, whether a central space near reception or secondary areas near places like x-ray departments or paediatric treatment areas, will be used by patients and visitors at many different stages of the A&E process. If only one waiting area is used by the department, it can be difficult for the visitor to know whether they have progressed at all. Zoning the waiting area can also aid understanding and the feeling of progression. Designers can help shape the spaces and provide information to waiting people in order to make waiting areas feel less ad-hoc. The secondary waiting area should be a planned and clearly identified space in which it feels like the visitor is being looked after and has a purpose in being there.

Triage: Once people have checked-in they wait to be seen by a triage nurse, who will start their diagnosis and treatment process. But patients will not necessarily understand what triage means, and consequently what the triage nurse will do. Staff should always give a personal introduction, explain their role and what they will do and explain the next steps in the patient care pathway². They may be in a distressed and vulnerable state so can very easily feel threatened or agitated by the need to share personal information. This could lead to them responding aggressively. The triage spaces

and the service and information delivered by staff should be designed to feel non-threatening and comfortable.

Patient Bays: Patients will spend periods of time alone in patient bays and might become agitated while waiting for treatment. Care should be taken to ensure that no equipment is stored that could potentially be used as a weapon. Design can help make a more reassuring space where information is provided to help manage their expectations and make them feel safe.

The ideal patient experience

Designers can help provide staff with areas where they can have private consultation, as well as engage in communication to relieve stress and reduce tension. By breaking down the different key stages of a typical patient journey through A&E, the team were able to create an ideal patient experience, which would inform their eventual solutions. This period of discovery resulted in them taking a holistic approach to tackling the issue of violence and aggression in A&E. This led them to review the six national challenge briefs, and distil these into four themes:

- The arrival experience: creating positive first impressions and managing expectations for patients and other service users
- The waiting experience: how to intervene before frustrations accumulate
- Guidance: providing information to patients and other service users to alleviate the stress of the unknown
- People: building a good mutual relationship between the user and the system.

Once they had identified these four themes, the team investigated each one in greater detail to understand how they currently work in A&E departments. This enabled them to identify every opportunity for their design solutions to help reduce violence and aggression, and also helped them to understand that the solutions would have to work to certain constraints. Specifically, the solutions would need to be:

- Implementable
- Non-trust specific
- Retrofittable
- Flexible
- Affordable
- Effective.

The team's solutions distilled the four theme areas into three distinct outputs: Guidance, People and Toolkit.

Results: Guidance

This project looked primarily at the question of how to convey basic information in a busy A&E department, where staff are often too busy to offer guidance on an individual basis, or provide repeated updates to patients regarding their treatment process.

The team's primary design output focused on a guidance package that communicates essential information to the patients and other service users arriving at A&E. The solution had to be retrofittable and easily implemented in any hospital, as well as addressing the issue of violence and aggression. The goal of this guidance package was to give patients and other service users in A&E a better understanding

of how the department works, and a sense that their human, as well as clinical, needs are being attended to. As a result, this would make them less likely to become confused, frustrated and potentially aggressive as they progress through the system.

The team felt that this would be best achieved by environmental graphics, complemented by a live digital system and welcoming arrival process. The first step was to establish exactly what kind of information was required, where and why. A matrix was developed, which categorised information into the three levels of static, live (dynamic) and personal, and whether this information was mobile or fixed to a location.

Different delivery formats and technologies could deliver the various levels of information. For example, the more generic static information, such as the general process for treatment, can be delivered in a fixed print/graphic format. Personal information can only be delivered digitally with a password and identity number, due to confidentiality reasons.

Given the emphasis on the solutions being retrofittable and easily implemented, the decision was taken to focus on the static and live information for this project, with the potential for personal information being scoped out as a future development.

The team's primary solution for providing essential guidance was to develop a series of static, fixed-format signs. Digital formats could also display dynamic and personalised information. The recognition that static, fixed information presented the best opportunity for conveying basic information to patients and other service users in A&E led to the team developing the concept of the process map and the "slice".

A narrow vertical slice in each space would be modified to contain all the information relevant to the user at that stage in the treatment process. This meant that rather than redesigning the whole department, or refitting each and every room, a "slice" could be inserted, which would guide the patient or other service user along their journey through A&E.

The flexibility of the "slice" system means it can be inserted into any room, space, or corridor; creating an instantly recognisable point for information and communication throughout the department. The ideal case scenario would be to have a four-sided slice (walls, ceiling and floor) – the ceiling panel

would be of most use to those arriving by stretcher but when retrofitting, space constraints might mean it would have to be scaled down into one full-height panel.

A patient survey confirmed that there was a need for even the most basic of information, so the first necessity was to make sure that this information was conveyed in the panels. This meant explaining what the process for treatment was, and addressing the gap between the patient's or other service user's expectations and the actual process.

To accompany the "slices", a process map was developed that illustrated the patient journey as a series of steps moving towards the goal of treatment, with a pause (or wait) before moving onto each step. The steps were categorised into the four larger stages of check-in, assessment, treatment and outcome (or further treatment). It was important to illustrate each wait as another step in the journey towards treatment in order to redress perceptions around waiting in A&E. The process map is intended to be displayed in full size in the waiting room, but the information should also be available in a portable format as a patient leaflet.

Print information is ideal for communicating basic static information, but a digital information stream is necessary to communicate live information. The digital content builds on the visual language established in the print information. The team's patient survey was instrumental in establishing what type of live information was useful. Displaying department waiting times would enable people to relax while waiting, rather than having the anxiety of constantly wondering when their names will be called. It would also enable people to decide whether to come back to A&E at a less busy time for faster treatment.

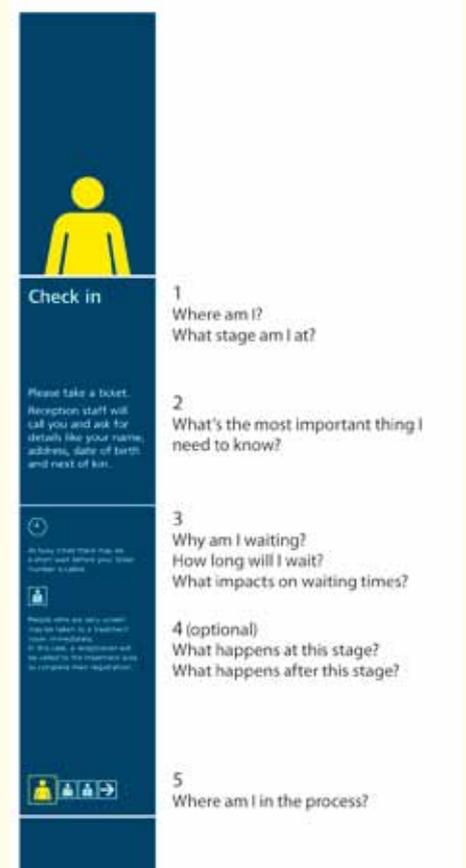
Departments working with electronic patient records now have all the data needed to output the information on waiting times and busyness. Although this is reliant on the data being inputted into the software system in real-time, many A&E departments now appear to be moving towards achieving this goal for their own self-monitoring purposes.

The question then simply becomes what information to extract, and how to display it. Different levels of technology allow different amounts of information to be presented, but these are not all able to be

implemented immediately. Live information screens are currently being used in some A&E departments. Many of those seen by the team, however, were being changed manually. Typically, they were not being updated consistently, especially when the department was busy, or they were broken and showed blank screens.

Using the existing data stored in software systems already used by A&E departments enables the updating to be done automatically and regularly. It can also provide more accurate and relevant information. For example, it can inform the waiting room when urgently ill patients arrive by ambulance. As a solution that could be immediately implemented (subject to the A&E department having the right software), this solution was developed for this project. Contact has been made with the largest provider of A&E software to form a collaboration to develop the software.

The "slices" themselves were envisaged as starting outside the building in the car park,



The "slice", an instantly recognisable information point that can be inserted into a variety of spaces

and then continuing inside throughout the department. A handful of standard-sized wall panels were designed which could be used anywhere within A&E. A ceiling panel was also incorporated for patients arriving on stretchers. These were intended for the ambulance entrance, as well as being above the bed for resuscitation and major wards.

In deciding the content of each panel, it was crucial to understand that there was no linear order to the panels. Patients and other service users can enter the A&E system from a number of routes, and so each panel must make sense in isolation. The visual language references a journey map, with each step represented as a “stop”. The stop names can be read from a distance, so the overall process can be quickly understood. If the reader moves closer, they can read the explanatory text and learn more about each step. The panels are designed to hold the key information at a height of 1–2m. They place the location at the top, followed by the key message for that space, then information about what happens in that space, and then what the patient/visitor should expect to happen next.

The realities of retrofitting these panels into existing departments with very little spare wall space meant that the width had to be quite constrained, and that crash bumpers would run through the middle of each panel. It is important to ensure that the information can be read by everyone so the graphics took into account the need to use a clear font and font size, colour contrast, readability and pictograms.

In addition to the live information screen, the team also identified the benefits of installing a touchscreen facility. In particular;

a barcode-enabled touchscreen can enable patients to access their own records and view the waiting times particular to their own personal treatment. The touchscreens could also display information in multiple languages, and provide an audio channel for those with impaired vision.

Smartphones provide the greatest scope for information personalisation and breadth of information. It is anticipated that in future, phone apps would enable users to self-triage, find their least busy local urgent care centres, and check-in before arriving. This has benefits both for users, who are able to maximise the use of healthcare provision in their local area, and also for the centres, who are able to anticipate patient numbers better. A phone app is fully anticipated to be the next stage in development for this project, but was beyond the scope of this project’s objectives and timelines.

Results: People Project

Over the past decade, the NHS has sought to become a more patient-centred healthcare provider. Implementing this cultural change is an ongoing process. First-time visitors to A&E still encounter a complex system – and human contact remains the best way to guide, help and reassure them. This human contact provides the interface between service users and the healthcare system, and can be considered to be the “customer service” that they experience.

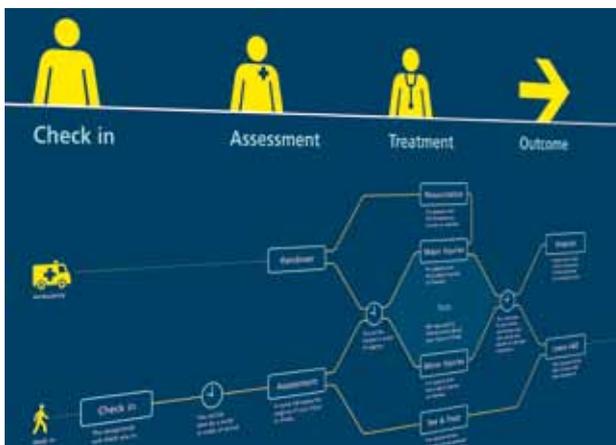
However, the frontline staff providing this service may be subject to many systemic factors which impede their ability to deliver a patient- or service user-focused service, such as understaffing or time constraints. This may also be exacerbated by continuous

negative feedback and abuse from those using the A&E service. The team recognised that staff, patients and other service users are typically well-meaning and emotionally tolerant, but that emotions commonly experienced in A&E, such as frustration, anxiety, fear, pain and loss, can reduce tolerance thresholds for staff and patients.

This design output centred on a programme to engage staff and work with them to ensure the departmental culture is one of dignity and respect. The designers focused on how to attend to the relationships and interactions among and between every person involved in A&E.

The People Project aims to promote staff engagement, boost morale and reduce staff absenteeism to enable staff to become advocates of change. The goal is to help individuals and the department as a whole to understand, learn and improve ways of handling aggression and violence while maintaining compassion and empathy.

A two-pronged solution was proposed. The first was an induction pack for staff new to A&E, and the other was a system for more established staff members to promote reflection on managing problems when they arise. The induction pack was designed to help individuals joining the department understand the culture of the hospital they are entering. This pack would need to be developed with the individual A&E department to tailor it to their needs and dovetail it into their existing induction processes. It could contain information on patient types likely to become aggressive or violent, guidance on how best to respond, and indicate “flashpoint” times when aggression is most likely to occur.



The process map breaks down the patient journey into a series of steps



The process map in situ, alongside live digital information showing waiting times

Current working patterns within A&E also support the concept of an induction pack. While all staff should receive training to develop necessary skills, there are many staff who may regularly work within the department but do not qualify for training. At university hospitals, for example, there are also many trainee nurses and junior medics in the department who may be there for only a few months at a time and therefore miss out on training. The induction pack therefore helps to resolve this problem, so that all staff have the requisite knowledge.

For long-term staff a reflective programme was proposed that encourages staff to notice incident levels, discuss and reflect on their experiences, and give recommendations for improvement:

Observation: Noticing incident levels is important in helping staff understand the potential perpetrators of violence and aggression and to reflect on the reasons for this behaviour. This enables tools and procedures to be developed to proactively respond, and help mitigate against it.

Discussion: This observation work then feeds into a weekly discussion forum, where staff can reflect upon their experiences, and deal with the day-to-day problems of working in this environment, as well as how to respond to the findings they have collected. It would need to be conducted by an external facilitator who is able to question and confront the issues at hand.

The team felt that it was essential for the findings from these observations and discussions to be reported back to senior management, with any recommendations for changes that can be implemented. This way, positive changes can occur within the

department and the group will feel that there is a purpose to the work. These insights can also be fed back into the induction pack, creating a positive feedback loop.

Results: Design Toolkit

To enable any NHS Trust to implement changes to improve safety in their A&E departments, instead of redesigning just one specific waiting room or department, the designers worked on producing guidance to enable NHS Trusts to implement these changes within their A&E departments.

The toolkit (found online at www.aetoolkit.org.uk) is a compilation of all the high-level design recommendations that can help to reduce aggression and violence in A&E. These are not solutions in themselves, but may be specifications or service changes. Intended for commissioners, providers and users, it breaks the patient journey down into its different stages of the A&E process and presents case studies of best practice that are in place at other NHS Trusts.

Conclusions and next steps

In order to quantify the impact of the proposed design solutions, the team developed an evaluation framework to monitor their implementation, using a multi-method data capture strategy. This includes structured observations; pre- and post-implementation; a patient, families and friend's survey; a staff and managers' survey and qualitative interviews with key staff and managers. The team also conducted secondary analysis of existing datasets collected within national NHS, Care Quality Commission (CQC) and Security Incident Reporting Systems (SIRS) frameworks.

A number of NHS Trusts are soon to announce that they will be implementing the solutions to enable evaluation of their efficacy. The resulting evidence base is hoped to be unveiled later this year.

Dr John Heyworth, who is the emergency department consultant at Southampton General Hospital (one of the Partner Trusts) as well as the immediate past President of the College of Emergency Medicine, said: "Violence and aggression towards staff and other patients in the emergency department is a major nationwide issue – it has been getting worse and has not shown any signs of letting up in recent years.

"But, while there will always be a small minority intent on causing trouble, there are others who can resort to aggressive behaviour because they don't feel they have been communicated with effectively, their privacy has been compromised through limited space and they don't know what to expect from their treatment pathway.

"Better processes for meeting patients and discussing what they can expect, better staff training on how to handle volatile situations, and improvements in the design of departments can help to remove tension and create a calmer environment."

Author

Chris Howroyd is the Design Council's project lead – health

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1. Cooke, M, et al. *Reducing Attendances and Waits in Emergency Departments: A systematic review of present innovations*. NCCDSO, 2005.
2. Ulrich, R, Martinez, C.A. et al, *The Role of the Physical Environment in the Hospital of the 21st Century: A Once-in-a-Lifetime Opportunity*. Center for Health Design, 2004.



The "slices" shown in patient bays, with important information legible at a glance

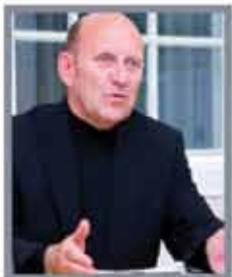


Staff record incident levels, to help understand wider patterns of behaviour

".....contributing to the development of thinking about how best to promote wellness, and deliver health services to people throughout the world"



healthcare

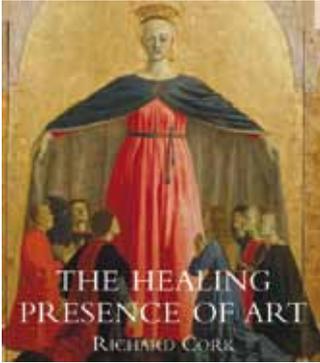


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The Healing Presence of Art: A History of Western Art in Hospitals

Richard Cork

Yale University Press 2012

£50.00/US\$90.00

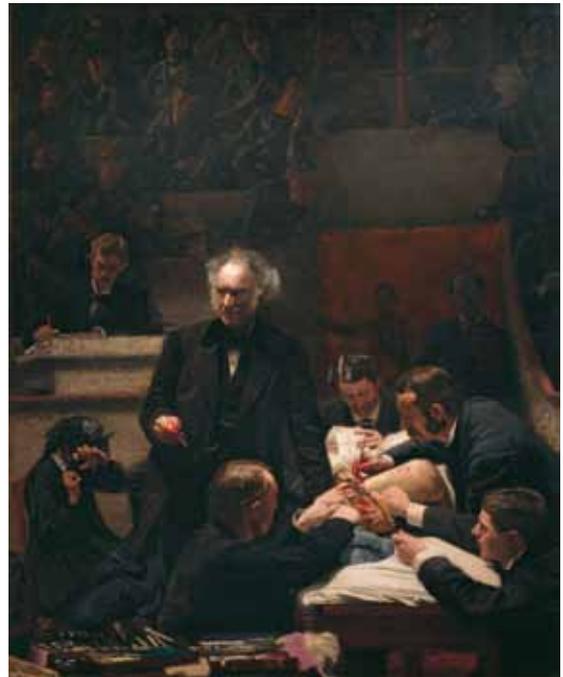
Art historian Richard Cork introduces this encyclopaedic magnum opus – the culmination of 25 years of solid research and writing – with the acknowledgement that “across the world, there is an ever-increasing awareness that art can do an immense amount to humanise our hospitals, alleviate their clinical harshness and leave a profound, lasting impression on patients, staff

and visitors.” Between birth and death, many of life’s most critical moments occur in hospital, and they deserve to occur in surroundings that match their significance. From the early Renaissance to the 21st century, artists have made immensely powerful work in hospitals across the western world, enhancing the environments in which patients and medical staff jointly strive towards better health. Historically, artists were commissioned by wealthy patrons motivated by religious piety, but now hospital art is more concerned with creating a pleasant setting for medical treatment and recovery than reiterating the Christian promise of heavenly redemption. Piero della Francesca’s *Madonna della Misericordia* (1445-61), arms outstretched to spread her cloak and provide shelter, illustrates the book’s cover and marks Cork’s starting point in providing a rigorous survey of western art associated with hospitals.

There is an extraordinarily rich archive of hospital art, which Cork dissects with gusto and catalogues carefully. He concentrates on paintings and sculpture displayed within hospitals and the architecture of the buildings. For example, architect Filippo Brunelleschi’s *Spedale degli Innocenti* (1419-27) for founding children, ornamented by Andrea della Robbia’s coloured, glazed medallions of swaddled infants (c.1487), set in the ten spandrels of its elegant entry loggia in a Florentine piazza.

Many paintings included in the book focus on the study and practice of medicine rather than improving the hospital experiences of patients, whose moods are unlikely to be buoyed by seeing depictions of anatomy lessons or operations, whether Rembrandt van Rijn’s *The Anatomy Lesson of Dr Nicolaes Tulp* (1632) or his *Anatomy Lesson of Dr Joan Deyman* (1656), Thomas Eakins’ *The Gross Clinic* (1875) or Henri de Toulouse-Lautrec’s *Dr Péan Operating (A Tracheotomy Operation)* (1891). Similarly, artists’ portraits of their own physicians, including Vincent van Gogh’s dapper *Dr Félix Rey* (1889) and Edvard Munch’s swaggering *Dr Daniel Jacobsen* (1909), were not painted to embellish hospitals for patients’ benefit.

Cork’s architectural highlights include Scottish artist Phoebe Anna Traquair’s site-specific mural *The Days of Creation* (1897-8) for the tiny mortuary at the Royal Hospital for Sick Children in Edinburgh, and



Thomas Eakins’ *The Gross Clinic* (1875). The study and practice of medicine has fascinated artists down the centuries



Phoebe Anna Traquair’s *The Days of Creation* (1897-8), a series of murals painted for the mortuary chapel at the Royal Hospital for Sick Children, Edinburgh

The Philadelphia Museum of Art/Art Resource/Scala, Florence

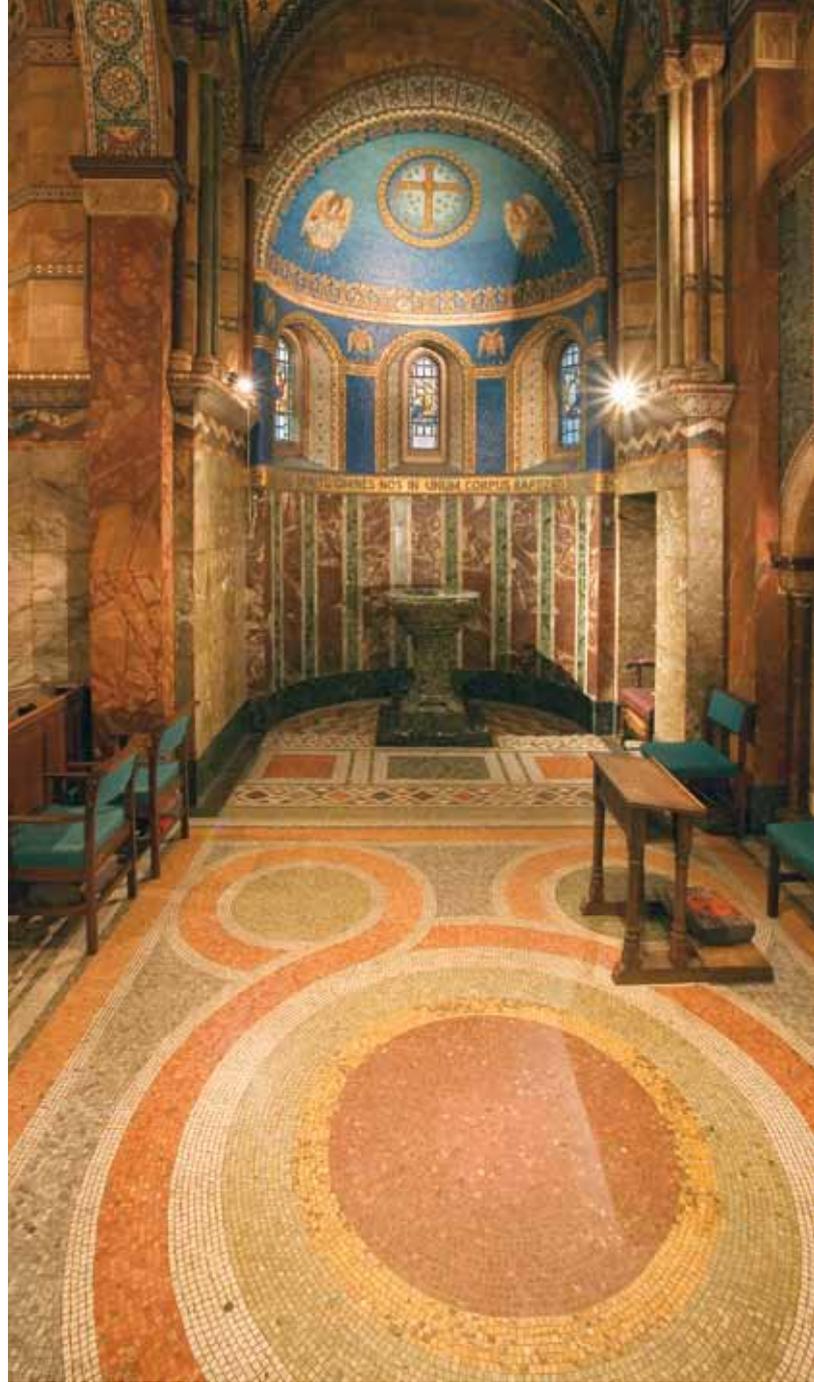


Religious paintings of the Renaissance, such as Donatello's Chellini Madonna (1456), offered patients the promise of an afterlife that was from suffering

Catalan modernista architect Lluís Domènech i Montaner's flamboyantly ornamented Hospital de La Santa Creu i Sant Pau (built from 1902) in Barcelona. The interwar link between modernist architecture and preventive primary healthcare is exemplified by Finsbury Health Centre (1938) designed by Berthold Lubetkin and Tecton. Offering free medical care, it was an early inspiration for the NHS, its two wings thrusting out from a central axis as a "megaphone for health".

The book title's claim for the "healing presence" of art in hospitals is not ambitious enough in the early 21st century. Cork's selection of masterpieces by great Renaissance masters, including Piero della Francesca, Donatello, Rogier van der Weyden and El Greco, illustrates how religious belief historically offered patients the promise of relief from earthly suffering and eventual heavenly peace, but provides less insight into 21st-century patients' experience of art in association with contemporary western medicine. Little evidence is presented or discussed about art's role in "healing" within hospitals, although data exist that views of nature, illusory or real, reduce patients' use of post-operative pain relief and the durations of their hospital stays. The role of art therapy – practical art in the hands of patients rather than on hospital corridor walls – is also hugely important. For example, Jeffrey Blonides' video installation in a windowless Intensive Care Unit at Guy's and St Thomas' Hospital and an art session organised by the National Portrait Gallery at Great Ormond Street Hospital for Sick Children, up the ante for art's healing role in hospitals. Cork's prodigiously researched book documents how art in hospitals developed and provides a solid foundation for its future role.

Colin Martin is a writer on architecture, art and design, with a particular interest in their intersection with medicine and science



John Loughborough Pearson's Middlesex Hospital Chapel (1890), now Grade II-listed



Richard Dadd in around 1856; in poor mental health, the artist spent 42 years incarcerated in Bethlem Hospital and Broadmoor Asylum



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